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Popular Master Guide

Jammu & Kashmir Services Selection Board (JKSSB)

Class-IV Posts

For District/Divisional/UT Cadre

Recruitment Exam

- Specialised Study Material Prepared by Experts
- Solved Multiple Choice Questions (MCQs)
- Solved Question Paper

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2021
EDITION

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Published by
O.P. Gupta *for* Ramesh Publishing House

Admin. Office
12-H, New Daryaganj Road, Opp. Officers' Mess,
New Delhi-110002 ✆ 23261567, 23275224, 23275124

E-mail: info@rameshpublishinghouse.com
Website: www.rameshpublishinghouse.com

Showroom
• Balaji Market, Nai Sarak, Delhi-6 ✆ 23253720, 23282525
• 4457, Nai Sarak, Delhi-6, ✆ 23918938

Book Code: R-2125

ISBN: 978-93-89480-70-2

HSN Code: 49011010

SCHEME OF EXAMINATION

- The Examination will consist of Objective Type, Multiple Choice Questions only and shall be OMR based. The questions will be set in English only.
- There will be negative marking of 0.25 marks for each wrong answer.

SYLLABUS

1. BASIC MATHEMATICS **20 Marks**

• Percentage • Average • Time, Work and Distance • Ration and Proportions • Problem of Age • Probability • LCM, HCF • Mensuration.

2. BASIC REASONING **20 Marks**

• Analogies • Relationship Concepts • Figure Odd One Out • Direct Sense • Figure Series Completion • Venn Diagram • Number Series • Coding/Decoding.

3. BASIC ENGLISH **20 Marks**

• Articles • Synonyms • Antonyms • Preposition • Verbs • Reading Comprehension • Determiners • Spellings • Sentences.

4. GENERAL AWARENESS AND SCIENCE **40 Marks**

• General Current Events (National Level) • Sports • Indian Culture • Indian History • Indian Geography • Capital/State • General Science • Health, Hygiene and Sanitation • Geography of Jammu and Kashmir • Culture of Jammu and Kashmir • History of Jammu and Kashmir.

CONTENTS

Current Affairs

J&K and Ladakh are Now Union Territories

Ending Jammu and Kashmir's special status in the Indian Union, the BJP government extended all provisions of the Constitution to the State in one go, downsized the State into two Union Territories and allowed all citizens to vote and buy property in the State. The Union Territory (UT) of Jammu and Kashmir will have a Lieutenant Governor and the maximum strength of its Assembly will be of 107 seats, which will be further enhanced to 114 after a delimitation exercise according to the act passed by Parliament on August 6, 2019. Twenty-four seats of the Assembly continue to remain vacant as they fall under Pakistan-occupied Kashmir (PoK).

The UT of Ladakh will have Kargil and Leh districts. There shall be a Council of Ministers in the successor UT of J&K consisting of not more than 10 per cent of the total number of members in the Legislative Assembly, with the Chief Minister as the head to aid and advise the Lieutenant Governor in the exercise of his functions in relation to matters with respect to which the Legislative Assembly has power to make laws. The new UT would have reservation in the Assembly seats.

As per the Act the Lieutenant Governor of the successor UT of J&K may nominate two members to the Legislative Assembly to give representation to women, if in his opinion women are not adequately represented in the Legislative Assembly. The Act said the Lok Sabha would have five seats from the UT of J&K, while Ladakh would have one seat. With this, the total number of UTs in the country will go up to eight—J&K, Ladakh, Delhi, Puducherry, Dadra & Nagar Haveli and Diu & Daman, Chandigarh, Lakshadweep and Andaman and Nicobar Islands. Currently, only two UTs—Delhi and Puducherry—have Legislative Assemblies. With addition of J&K, the number will go up to three. UTs with Legislative Assemblies have Lt Governors.

Article 370: Article 370 was incorporated in Part XXI (temporary provisions with respect to the State of Jammu and Kashmir) of the Constition. The state's constituent assembly had wanted only those aspects of the Indian Constitution that reflected what Hari Singh had signed away. Besides Article 1, it was the only other article of the Indian Constitution that automatically applied to J&K. The other provisions of the Indian statute could apply to the state only if its constituent assembly concurred. Article 370 provided Jammu & Kashmir with special status, allowing it its own

state constitution. The Union of India could legislate/act only in defence, foreign affairs and communications. Since the 1950s, there have been afforts to pull the state into a deeper embrace with the Union, but Art 370 was strengthened when Sheikh Abdullah, who had become the second Prime Minister of J&K in 1948 and was later dismissed, came to an agreement—after spells of detention—with Prime Minister Indira Gandhi in 1975.

35A Defines who is a Permanent Resident: Article 35A was made part of the Indian Constitution in 1954, through a presidential order — through its genesis goes back to early 20th century Dogra apprehensions of an influx from Punjab, which they feared would change the state's demographic and land ownership patterns. The article, which defines who is a permanent resident of J&K and lays down laws restricting property purchase and ownership to such permanent residents, also discriminated against women, depriving them of their state subject rights if they married non-permanent residents.

Jammu and Kashmir After Reorganisation Act, 2019

- People from other states will now be eligible to serve and purchase land.
- Legislative Assembly duration in Union Territory of J&K will be 5 years.
- There will be Common HC for J&K, and Ladakh UTs.
- There will be Single citizenship only.
- Tricolour flag will be the only flag to hoisted in Jammu & Kashmir (UT) and Ladakh (UT).
- Provisions of the Indians Constitution are applicable in the State.
- UT Administration will have to frame the rules of the services of State cadre and other officers as number of employees from Ladakh are posted in Jammu and Kashmir divisions and vice versa.
- Jammu and Kashmir Police will come under control of the Union Home Ministry.
- The process for fresh delimitation will be carried out be setting up a Delimitation Commission.
- J&K, Reorganization Bill comes into forces and J&K and Ladakh are declared as UTs.
- No permission will be required to set up industry and non-locals will be eligible to apply for jobs in the UTs unless the administration imposes a cap, with effect from 31st Oct. 2019.
- There will be no separate Constitution.
- West Pakistani refugees and Valmikis, who had been denied state subject right even after 72 years of settlement in the State, will be equal stakeholders now.
- Leh and Kargil districts will have Autonomous Councils, Municipalities and Panchayats. It may be mentioned here that law and order of the UTs is directly controlled by the Central.
- UT can't make laws pertaining to Law and Orders, Police.
- UT of Jammu and Kashmir to have only nine Ministers.
- UT Ladakh to have Advisors.
- PSC for J&K UT, UPSC for Ladakh.
- 4 RS members to continue with their term.
- With abrogation of Article 370, Jammu and Kashmir is as much part of India as all other States.
- Article 360 (Financial Emergency) will be applicable.
- Minorities will be eligible for reservation in services.

- Land—the rights in or over it—will be with the elected government of the Union Territory of Jammu and Kashmir, unlike in Delhi where the L-G exercises control through the Delhi Development Authority (DDA), a central government entity.
- The UT of Jammu and Kashmir will have a Lieutenant Governor and the maximum strength of its assembly will be 107, which will be enhanced to 114 after a delimitation exercise. Twenty-four seats of the Assembly will continue to remain vacant as they fall under Pakistan-occupied Kashmir (PoK).
- According to the Jammu and Kashmir Reorganisation Act, 2019, the Legislative Assembly of the UT of Jammu and Kashmir may make laws for the whole or any part of the union territory with respect to any of the matters enumerated in the state list of the Constitution except the subjects mentioned in entries one and two—'public order' and 'police' respectively— or the Concurrent List in the Seventh Schedule of the Constitution.
- Matters related to land, that is to say, rights in or over it, land tenures, transfer and alienation of agricultural land, land improvement and agricultural loans will be under the domain of the elected government of UT of Jammu and Kashmir.
- Land revenue, including the assessment and collection of revenue, maintanance of land records, survey for revenue purposes and records of rights, and alienation of revenues will also come under the purview of the elected government of UT of Jammu and Kashmir.
- Police, law and order, and land in the UT of Ladakh will be under the direct control of its L-G, through whom the Centre will administer the high-altitude region. According to the Act, Ladakh will not have a legislative assembly.
- All India Services like the Indian Administrative Service (IAS) and the Indian Police Service (IPS), and the Anti-Corruption Bureau (ACB) will be under the control of the L-G and not the elected government of the UT of J&K.
- The Act says the cadres of the IAS and IPS for the existing state of Jammu and Kashmir, on and from the appointed day, shall continue to function on the existing cadres. However, in future, the all India service officers to be posted to UTs of Jammu and Kashmir or Ladakh shall be borne on the Arunachal Pradesh, Goa Mizoram and Union Territory cadre, more popularly known as UT cadre.

Multiple Choice Questions

1. The state of Jammu and Kashmir formally split into two Union Territories (UTs) on:
   A. Oct. 31, 2019
   B. Nov. 30, 2019
   C. Aug. 31, 2019
   D. Dec. 31, 2019

2. On which date the J&K reorganization bill discussed in Rajya Sabha?
   A. Aug. 15, 2019
   B. Aug. 5, 2019
   C. Aug. 9, 2019
   D. None of these

3. Lieutenant Governor of J&K (UT) will be appointed by:
   A. Prime Minister of India
   B. President of India

C. Home Minister in India
D. None of these

4. The Union territory of Ladakh will include the districts:
A. Leh and Kargil
B. Jammu and Srinagar
C. Doda and Kishtwar
D. None of these

5. High Court of Jammu and Kashmir will function as:
A. High Court Jammu
B. High Court of Kashmir
C. UT of Jammu and Kashmir and UT of Ladakh
D. All of these

6. The council of Ministers including Chief Minister of Jammu and Kashmir union territory will be appointed by
A. Lieutenant Governor
B. Governor
C. President of India
D. None of these

7. Number of districts included in Jammu and Kashmir (UT) will be:
A. 22 B. 18
C. 20 D. 16

8. The union territory of Ladakh is similar to:
A. Delhi B. Chandigarh
C. Puducherry D. Dadar-Haveli

9. The union territory of J&K is similar to:
A. Delhi B. Chandigarh
C. Puducherry D. Dadar-Haveli

10. Sanctioned strength of Minister of Cabinet according to J&K (UT) formation is:
A. 9 B. 35
C. 10 D. 20

ANSWERS

1	2	3	4	5	6	7	8	9	10
A	B	B	A	C	C	C	B	A	A

2007

Model Paper (Solved)

Jammu & Kashmir Services Selection Board (JKSSB)

CLASS-IV POSTS

Recruitment Examination

Basic Mathematics

1. A bag contains 6 tennis balls and 8 cricket balls. Three balls are randomly drawn from the bag. What is the probability that at least one of the drawn balls is cricket ball?

A. $\frac{2}{91}$ B. $\frac{3}{91}$

C. $\frac{5}{91}$ D. $\frac{86}{91}$

2. The diameter of a wheel is 35 cms. The distance travelled by the wheel, if it makes 50 revolutions is

A. 43 metres B. 52 metres

C. 55 metres D. 58 metres

3. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is either a black card or a Jack?

A. $\frac{7}{13}$ B. $\frac{13}{15}$

C. $\frac{13}{18}$ D. $\frac{8}{13}$

4. If a square is inscribed in a circle, the ratio of the areas of the square and the circle is

A. 2 : 7 B. 2 : π

C. π : 3 D. 4 : 5

5. In a simultaneous throw of three coins, the probability of getting atmost two tails is

A. $\frac{1}{2}$ B. $\frac{7}{8}$

C. $\frac{2}{3}$ D. $\frac{3}{4}$

6. The length of a rectangle is thrice its width. If the length of its diagonal is $4\sqrt{10}$ cms, the perimeter of the rectangle is

A. 32 cms B. 36 cms

C. 42 cms D. 45 cms

7. The total surface area of a cylinder whose diameter is 30 cms and height is 13 cms is

A. 2480 sq. cms B. 2640 sq. cms

C. 2865 sq. cms D. 2768 sq. cms

8. If the ratio of the areas of two squares are in the ratio 9 : 4, then the ratio of their perimeters will be in the ratio

A. 5 : 3 B. 3 : 2

C. 2 : 3 D. 3 : 5

9. If A and B are mutually exclusive events, the probability of A $\cap$ B is:

A. 0 B. 1

C. 0.3 D. 0.4

10. The average of eleven numbers is 30. If average of first ten numbers is 22 then what is the eleventh number?

A. 8 B. 80

C. 30 D. 110

11. Deepa and Seema together do a work in 6 days. Deepa can complete the same work alone in 9 days. In how many days will Seema complete the work alone?

A. 18 days B. 3 days

C. 12 days D. 15 days

12. The population of a city was 70,000, it increased by 8%. What is the population now?

A. 76,000 B. 76,500

C. 76,600 D. 75,600

13. What will be the Highest Common Factor of 4, 8 and 12?

A. 1 B. 4

C. 8 D. 2

14. A motorcycle covers 60 km in 3 hours. Its speed is doubled. What distance will it cover in the next 1 hour?
A. 360 km B. 40 km
C. 60 km D. 120 km

15. The length of a rectangular field is increased by 20% and breadth is decreased by 20%. What is the per cent increase or decrease in its area?
A. 20% increase B. 4% decrease
C. 1% increase D. No change

16. What is the Lowest Common Multiple of 2, 3 and 7?
A. 42 B. 21
C. 14 D. 6

17. There are 1500 students in a school. 15% are Muslims, 7% Sikhs, 8% Christians and remaining are Hindus. How many Hindu students are there in the school?
A. 1470 B. 700
C. 1050 D. 1200

18. 60% is equal to:
A. $\frac{6}{9}$ B. $\frac{9}{10}$
C. $\frac{3}{5}$ D. $\frac{7}{9}$

19. A bus travels at a speed of 75 km/hr for 45 minutes and then travels at a speed of 90 km/hr for 45 minutes. What distance will it cover in one and a half hour?
A. 123.75 km B. 165 km
C. 125 km D. 82.5 km

20. A shopkeeper sold a shirt for ₹ 728 at a loss of 9%. If he had sold for ₹ 792, what would have been the gain/loss per cent?
A. 8% loss B. 9% profit
C. 1% loss D. 8% profit

Basic Reasoning

Directions (21-24): *Complete the following series each of which follows a certain pattern.*

21. 3, 12, 27, 48, 75, 108, ...?...
A. 162 B. 183
C. 192 D. 147

22. 49, 121, 169, 289, ...?...
A. 361 B. 529
C. 400 D. 441

23. a_ccabc_a_cc_bcc
A. c b c b B. b c b a
C. b a c b D. b b c c

24. _cbacb_dbad_adc_.
A. d a c b B. b c a a
C. c c a a D. c b d d

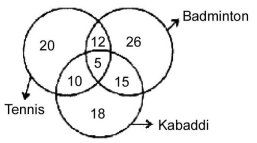
Directions (25-27): *In the following questions, find the odd one out.*

25. A. Nepal B. Germany
C. China D. India

26. A. BY B. CV
C. DW D. AZ

27. A. 18 B. 27
C. 33 D. 9

Directions (28-31): *The figure given below consists of three intersecting circles which represent set of players who play Tennis, Badminton and Kabaddi. Each region in the figure is represented by a number.*



28. How many players play Kabaddi?
A. 48 B. 28
C. 38 D. 43

29. Which number represents the set of players who play only Tennis?
A. 20 B. 15
C. 5 D. 18

30. Which number represents the set of players who play both Tennis and Badminton but not Kabaddi?
A. 10 B. 12
C. 15 D. 5

31. Which game is played by least number of players?
A. Tennis B. Badminton
C. Kabaddi D. All the three

32. If CORRECTION is coded as DPSSFDUJPO, how would EMOTION be coded?
A. FPNUJPO B. FNPUJOP
C. FNPUPOJ D. FNPUJPO

33. If BANGLE is coded as ELGNAB. How would SANDAL be coded?
A. LADNSA B. LANDAS
C. LADNAS D. LADANS

34. 'P' is the only daughter of 'R'. 'R' is a grandmother of 'Q'. The name of 'Q's sister is 'S', then what is the relation of 'S' to 'P'?
A. Daughter B. Mother
C. Sister D. Aunt

35. In certain code language, the word RESPONSE is coded as ESNOPSER. Then the word SYMBOLIC will be coded as:
A. LYMBOCIS B. BOSLYCIS
C. CILYMBOS D. CILOBMYS

36. A man moves 3 km North, then turns West and moves 2 km, again he turns North and walks 1 km, and 5 km towards East. How far is he now from his original place?
A. 11 km B. 8 km
C. 10 km D. 5 km

37. Write the next term of the following number series.
15, 29, 56, 108, 205, 400 _____ .
A. 756 B. 768
C. 758 D. 770

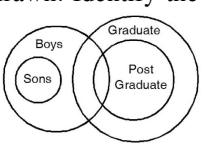
Directions (Q. 38): *In this question below four figures are given. Three are similar in a certain way and so form a group. The question is— which one of the figures* ***does not*** *belong to that group?*

38.

A. B. C. D.

39. If '+' means '×', '÷' means '+', '–' means '÷' and '×' means '–'. Find the value of $56 - 8 \times 5 \div 4 + 7$:
A. 25 B. 30
C. 27 D. 32

40. Based on the given figure, following conclusions are drawn. Identify the true conclusion.



Conclusion:
I. All boys are sons.
II. Some graduates are post Graduates.
III. Some boys are graduates.
IV. Some post graduates are boys.
A. I, II and III are true
B. III and IV are true
C. II, III and IV are true
D. I and III are true

Basic English

41. Fill in the blanks with the correct articles:
____ traveller told us ____ interesting story.
A. the, the B. the, an
C. a, the D. the, a

42. Fill in the blanks with the correct articles:
____ Amazon is ____ river in South America.
A. the, the B. the, a
C. a, an D. a, the

43. Fill in the blank with the correct preposition:
He is two years older than ____.
A. she B. me
C. they D. I

44. Identify the sentence which is correct:
A. There is no danger of the bridge's collapsing.
B. There is not danger of the bridge will collapse.
C. There is no danger of the bridge collapsing.
D. There is no danger that the bridge is to be collapsing.

45. Choose the correct verb to fill in the blanks:
It ____ very heavily last night.
A. will be raining B. rains
C. rained D. is raining

46. Identify the meaning of the underlined phrase:
She <u>looks down upon</u> her poor neighbours.
A. behaves rudely with
B. watches from an elevated position
C. shows animosity towards
D. despises

Directions (Qs. Nos. 47-48): *Read the passage and answer the question that follows:*

At about 8 O'clock in the evening I entered the little town near the airport and made my way to the inn in which I had passed the first night of my holiday. I had chosen this particular inn at random, but it had been comfortable and quiet as there were few other guests. On my walking tour, I had stopped where my fancy dictated and lingered on in one place, with no one to please but onself. I had experienced no difficulty anywhere in finding accommodation, so it had never entered my head that it would be sensible to make arrangements in advance for my last night. Imagine my surprise when I discovered that the inn was overflowing with delegates to some conference. The inn-keeper apologized profusely for having no room, and offered me a most inviting dinner. But I did not stop for this because I wanted to find some place to sleep.

47. The author is describing
A. a river cruise
B. a walking tour
C. a trekking expedition
D. a train journey

48. The author did not make arrangements in advance for his last night because he
A. had no one to please but himself.
B. expected the inn-keeper to give him a room.
C. found no difficulty anywhere in finding accommodation.
D. did not plan his trip very well.

49. Choose the correct word to complete the sentence:
The students are anxious ____ their results.
A. for B. about
C. at D. with

50. Choose the correct word to complete the sentence:
It is difficult to say, if I ____ attend the function.
A. could B. can
C. will D. might

51. Choose the correct article to complete the sentence:
Have you ever seen ..... Taj Mahal in Agra?
A. a B. an
C. the D. No article required

52. Choose the correct tense to complete the sentence:
I ..... down the lane for quite some time.
A. have walk B. had walking
C. had been walking D. have been walk

53. Choose the correct preposition to complete the sentence:
The dog sat ..... the tree.
A. besides B. through
C. beneath D. beyond

54. Rearrange the following words to make a meaningful sentence:
Published / well / is / a / poet / Gorden
A. Gorden is a well published poet
B. Poet is a well published gorden
C. Well published poet gorden is
D. Published well is a poet gorden

55. Identify the antonym of the given word: "BARREN"
A. desert B. arid
C. fertile D. empty

56. Choose the most appropriate sentence for the given sentence in Indirect or Direct speech:
They said that we can not live without oxygen.
A. They said, "That we can not live without oxygen".
B. They said, "We can not live without oxygen".
C. They said, "We could not live without oxygen".
D. They said, "They can not live without oxygen".

57. Fill in the blanks with the correct Model Verb:
Tina watched the movie in Marathi so, ... understand very much of it.
A. can't B. wouldn't
C. shouldn't D. couldn't

58. Indentify the Synonym of the word given:
ALERT
A. lethargic B. energetic
C. watchful D. inattentive

59. Fill in the blanks with the correct option:
The village head brought ..... a reconciliation between the two enemies.
A. among B. in
C. about D. through

60. Identify the Antonym of the given word:
MITIGATE
A. intensify B. compose
C. calm D. abate

General Awareness and Science

61. The first commercial train journey in India between Bombay and Thane was in the year:
A. 1757 B. 1863
C. 1853 D. 1894

62. Table sugar is the commonly used sweetner in households. The chemical name for this sugar is:
A. Sucrose B. Glucose
C. Dextrose D. Maltose

63. Tropic of Cancer does NOT pass through which of the following states in India?
A. Jharkhand B. Rajasthan
C. Chattisgarh D. Uttar Pradesh

64. "The Faravahar" is one of the best-known symbols of:
A. Hinduism B. Christianity
C. Zoroastrianism D. Islam

65. A war was fought between the East India Company and the army of Siraj-ud-daulah in the year 1757. This battle was known as:
A. Battle of Panipat
B. Battle of Tarain
C. Battle of Plassey
D. Battle of Chandawar

66. The loudness of sound is measured in units called:
A. Hertz B. Ohms
C. Decibels D. Moles

67. The first war of Indian independence also known as the Indian Sepoy Mutiny against the British broke out in the year:
A. 1947 B. 1857
C. 1877 D. 1907

68. Which of the following plants belongs to the grass family?
A. Bamboo B. Alicia
C. Aloe Vera D. Hibiscus

69. Khashaba Jadhav won an individual Olympic Bronze Medal at the 1952, Summer Olympics held in:
A. Melbourne B. Helsinki
C. Tokyo D. Munich

70. Which of the following exquisite mountain stream flows through the valleys between the beautiful Chinamarg and Nurpur Pass in the state of Jammu and Kashmir?
A. Yousmarg B. Baisaran
C. Ferozpur Nallah D. Betab valley

71. In the history of Jammu and Kashmir the ruler of Darvabhisara named Samgramaraja belonged to which of the following dynasties?
A. Kutumbi B. Lohara
C. Utpala D. Huna

72. On October 1947, who among the following was appointed as the Emergency Administrator for the state of Jammu and Kashmir by Maharaja Hari Singh?
A. Yuvaraj Karan Singh
B. Sheikh Abdullah
C. Bakshi Ghulam Mohammed
D. Ghulam Mohammed Sadiq

73. Which among the following is an oxbow type of lake of Jammu and Kashmir and has probably originated by the meandering of the alluvial deposits?
A. Dal Lake B. Ahansar Lake
C. Nilnag Lake D. Sheikhsar Lake

74. The kings named Toramana and Mihirakula belonged to which dynasty in the history of Jammu and Kashmir?
A. Gonandiya B. Utpala
C. Huna D. Kutumbi

75. Which of the following is TRUE about the historical personality 'Kalhana' with respect to Jammu and Kashmir region?
A. He was the first Home Minister of Jammu and Kashmir state
B. He was a santoor player, an ancient stringed musical instrument
C. He wrote "Rajatarangini" that records complete history of the legendary kings of Kashmir
D. He served under the king Pratap Singh of Jammu and Kashmir

76. The construction of Raghunath Temple in Jammu was started by which of the following rulers in the history of Jammu and Kashmir?
A. Pratap Singh B. Hari Singh
C. Ranjit Singh D. Gulab Singh

77. Which of the following is a renewable resource?
A. Petrol B. LPG
C. Coal D. Wind

78. Which among the following belongs to autotroph?
A. Lion B. Cow
C. Grass D. Cat

79. Which of the following disease results from the breakdown of collagen?
A. Beriberi B. Scurvy
C. Blindness D. Anaemia

80. Which among the following is a less polluting fuel with respect to global emissions?
A. Coal B. Petrol
C. Natural gas D. Kerosene

81. Which among the following is a Greenhouse gas?
A. Nitrogen B. Methane
C. Oxygen D. Sulphur dioxide

82. Which of the following devices converts electrical energy to sound?
A. Loudspeaker B. Solar cell
C. Wind turbine D. Microphone

83. Which of the following battery is a primary battery?
A. Lead acid
B. Nickel-Metal Hydride
C. Lithium
D. Nickel-Cadmium

84. Which of the following is a major kharif crop in India?
A. Barley B. Mustard
C. Wheat D. Maize

85. The Association of Southeast Asian Nations, or ASEAN, was established in Bangkok, Thailand on
A. 08 August 1969 B. 08 August 1967
C. 08 August 1971 D. 08 August 1973

86. Which of the following rivers of Jammu and Kashmir has its source in Verinag spring in Anantnag district?
A. Jhelum B. Kishan Ganga
C. Tawi D. Indus

87. Hiuen-Tsang, the eminent Chinese traveller visited Kashmir during the rule of which dynasty?
A. Karakota B. Gonanda
C. Aditya D. Utpala

88. The Bag-e-Bahu fort remains to be the oldest and the most iconic of all monumental marvels in Jammu, and was built by
A. Raja Bahulochan B. Dara Shikoh
C. Sampuran Singh D. Mian Hathu

89. Which of the following is an INCORRECT statement with respect to the Bag-e-Bahu Fort?
A. It was built by Raja Bahulochan
B. It is believed to be approximately 3000 years old
C. It was revamped by the Kings of the Dogra Dynasty
D. It is beside the Jhelum River

90. Liquids are used in car brake systems because they are
A. incompressible and can flow easily
B. compressible but cannot flow
C. incompressible and cannot diffuse into another liquid
D. compressible and can flow easily

91. Pellagra is a disease caused due to the deficiency of Vitamin
A. B2 Riboflavin B. B12 Cobalamin
C. B3 Niacin D. B1 Thiamine

92. Which gas was responsible for the Bhopal Gas Tragedy that took place on Decembe 2, 1984?
A. Methylamine B. Methyl isocyanate
C. Carbon monoxide D. Phosgene

93. The temple of Vaishno Devi is located on the mountain :
A. Nanda Devi B. Nyegyi Kansang
C. Padmanabh D. Trikuta

94. Which one of the following lakes is connected with Jhelum by a canal near Sumbal?
A. Mansbal B. Dal
C. Anchar D. Gangabal

95. Mamleshwar temple in Phalgam is devoted to the Hindu God :
A. Kali B. Shiva
C. Krishna D. Vishnu

96. Hari Parbat Fort was built by:
A. Emperor Humayun
B. Chandragupta Maurya
C. Shivaji Maharaj
D. Atta Mohammad Khan

97. Which of the following places is known as 'The Meadow of Flower'?
A. Kangra B. Gulmarg
C. Dibang D. Neora

98. Air pollution from automobiles can be controlled by fitting :
A. Cyclone separator
B. Electrostatic precipitator
C. Catalytic converter
D. Wet scrubber

99. The speedometer of a vehicle shows which one of the following?
A. Acceleration
B. Average speed
C. Instantaneous speed
D. Velocity

100. The most common material used in making solar cells is :
A. Silver B. Iron
C. Aluminium D. Silicon

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	C	A	B	B	A	B	B	A	D
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	D	B	B	B	A	C	C	A	A
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
D	A	B	A	B	B	C	A	A	B
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
A	D	C	A	D	D	B	D	B	C
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
B	B	B	C	C	A	B	C	B	C
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
C	C	C	A	C	B	D	C	C	A
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
C	A	D	C	C	C	B	A	B	C
71	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
B	B	B	C	C	D	D	C	B	C
81	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**
B	A	C	D	B	A	A	A	D	A
91	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
C	B	D	A	B	D	B	C	C	D

EXPLANATORY ANSWERS

2. Given, diameter of wheel = 35 cm

i.e., $2r = 35$ cm

$\therefore \quad r = \frac{35}{2}$ cm

Circumference of wheel = $2\pi r$

$$= 2 \times \frac{22}{\cancel{7}} \times \frac{\overset{5}{\cancel{35}}}{\cancel{2}} = 110 \text{ cm}$$

It makes 50 revolutions

$\therefore$ Distance travelled by the wheel = $50 \times 2\pi r$

$= 50 \times 110$ cm $= 5500$ cm

$$= \frac{55\cancel{00}}{1\cancel{00}} \text{ m} = 55 \text{ m}$$

5. In a simultaneous throw of three coins

$\therefore$ Sample space, S = {HHH, HHT, THH, HTH, TTT, TTH, HTT, THT}

$\therefore \quad n(S) = 8$

E = getting almost of two tails

$\therefore \quad n(E) = 7$

$\therefore$ Probability $= \frac{n(E)}{n(S)} = \frac{7}{8}$

7. Given, a cylinder

diameter $= 2r = 30$ cm

$\therefore \quad r = 15$ cm and $h = 13$ cm

$\therefore$ The total surface area $= 2\pi rh + 2\pi r^2$

$= 2\pi r(h + r)$

$$= 2 \times \frac{22}{7} \times 15(13+15)$$

$$= 2 \times \frac{22}{\cancel{7}} \times 15 \times \overset{4}{\cancel{28}}$$

$= 44 \times 60 = 2640$ sq. cm

8. The ratio of the areas of two squares = 9 : 4

$$\frac{A_1}{A_2} = \frac{9}{4} = \frac{3^2}{2^2} \qquad [\text{Area} = (\text{side})^2]$$

$\therefore$ Side of square is 3 and 2 [P = 4 × side]

$\therefore$ Perimeter = 4 × 3 and 4 × 2

$\therefore \quad$ Ratio $= \frac{\cancel{4} \times 3}{\cancel{4} \times 2} = \frac{3}{2} = 3 : 2$

9. If A and B are mutually exclusive events, Then, $(A \cap B) = 0$

10. Eleventh Number = $30 \times 11 - 10 \times 22$

$= 330 - 220 = 110.$

11. Time taken by Seema = x days (let)

According to the question,

$$\frac{1}{x} + \frac{1}{9} = \frac{1}{6}$$

$$\Rightarrow \quad \frac{1}{x} = \frac{1}{6} - \frac{1}{9} = \frac{3-2}{18} = \frac{1}{18}$$

$\Rightarrow \quad x = 18$ days.

12. Present population of city

$$= P_0\left(1 + \frac{R}{100}\right)^T = 70000\left(1 + \frac{8}{100}\right)$$

$$= 70000 \times \frac{108}{100} = 75,600.$$

13. $4 = 2 \times 2$

$8 = 2 \times 2 \times 2$

$12 = 2 \times 2 \times 3$

$\therefore$ HCF $= 2 \times 2 = 4.$

14. Speed $= \frac{\text{Distance}}{\text{Time}} = \frac{60}{3} = 20$ kmph

New speed $= 2 \times 20 = 40$ kmph

$\therefore$ Required distance = 40 km.

15. Required answer

$$= \left(x + y + \frac{xy}{100}\right)\% = \left(20 - 20 - \frac{20 \times 20}{100}\right)\%$$

$= -4\%$

Negative sign shows decrease.

16. Required LCM $= 2 \times 3 \times 7 = 42.$

17. Percentage of Hindu students

$= 100 - (15 + 7 + 8) = 100 - 30 = 70\%$

$\therefore$ Number of Hindu students

$$= \frac{1500 \times 70}{100} = 1050.$$

18. $60\% = \frac{60}{100} = \frac{3}{5}.$

Basic Mathematics

1 Percentage

The word 'per cent' or 'percentage' means 'for every one hundred'. In other words, it gives an indication of rate per hundred. It is denoted by the symbol %.

For example, 5% means 5 out of one hundred or $\frac{5}{100}$.

Remember

(*i*) For converting a per cent into a fraction, divide it by 100.

(*ii*) For converting a fraction into a per cent, multiply it by 100.

(*iii*) For converting a per cent into a decimal, shift the decimal point two places to the left.

(*iv*) For converting one given quantity (x) as a percentage of another given quantity (y), find $\frac{x}{y} \times 100$.

(*v*) There is no unit of percentage.

Important Facts:

For quickly solving the problems related to percentage, remember following rules:

Rule 1

(*a*) Of the given two numbers if the first is $x\%$ more than the second, then the second will be $\left(\frac{100 \times x}{100 + x}\right)\%$ less than the first.

(*b*) Of the given two numbers if the first is $x\%$ less than the second, then the second will be $\left(\frac{100 \times x}{100 - x}\right)\%$ more than the first.

(*c*) If two numbers are respectively $x\%$ and $y\%$ more than a third number, then the first number will be $\left(\frac{100 + x}{100 + y} \times 100\right)\%$ of the second.

(*d*) If two numbers are respectively $x\%$ and $y\%$ less than a third number, then the first number will be $\left(\frac{100 - x}{100 - y} \times 100\right)\%$ of the second.

Rule 2

(*a*) If a number or quantity is increased by $x\%$ then in order to restore its original value it must be decreased by $\left[\frac{100 \times x}{100 + x}\right]\%$.

(*b*) If a number or quantity is decreased by $x\%$ then in order to restore its original value it must be increased by $\left[\frac{100 \times x}{100 - x}\right]\%$.

Rule 3

(*a*) If a number is successively increased by $x\%$ and $y\%$ then a single equivalent increase in that number will be $\left(x + y + \frac{xy}{100}\right)\%$

(*b*) If two successive discounts of $x\%$ and $y\%$ are allowed on a particular amount, then a single discount that is equivalent to the two successive discounts will be $\left(x + y - \frac{xy}{100}\right)\%$

(*c*) If a number is successively increased by *x*%, *y*% and *z*%, then a single equivalent increase in that number will be

$$\left[(x+y+z)+\left(\frac{xy+yz+zx}{100}\right)+\frac{(xyz)}{10000}\right]\%$$

(*d*) If three successive discounts of *x*%, *y*% and *z*% are allowed on an amount, then a single discount that is equivalent to the three successive discounts will be

$$\left[x+y+z-\frac{(xy+yz+zx)}{100}+\frac{xyz}{10000}\right]\%$$

Rule 4

(*a*) If a number is increased by *x*% and thereafter reduced by *x*%, then the number will be reduced by $\left(\frac{x^2}{100}\right)$ per cent.

(*b*) If a number is reduced by *x*% and thereafter increased by *x*% then the number will be reduced by $\left(\frac{x^2}{100}\right)$ per cent.

(*c*) If due to an increase of *x*% in the selling price of certain commodity the sell/ consumption of the commodity decreases by *y*%, then gross receipts on account of sale of that commodity will be increased or decreased by $\left(x-y-\frac{xy}{100}\right)\%$, where $x > y$ and will be decreased by $\left(y-x+\frac{xy}{100}\right)\%$, where $y > x$.

Multiple Choice Questions

1. If *x* is 90% of *y*, then what per cent of *x* is *y*?
A. 90 B. 190
C. 101.1 D. 111.1

2. A number exceeds 20% of itself by 40. The number is:
A. 50 B. 60
C. 80 D. 320

3. The price of an article is cut by 10%. To restore it to the former value, the new price must be increased by:
A. 10% B. $9\frac{1}{11}\%$
C. $11\frac{1}{9}\%$ D. 11%

4. The income of a broker remains unchanged though the rate of commission is increased from 4% to 5%. The percentage of slump business is:
A. 8% B. 1%
C. 20% D. 80%

5. 5% income of A is equal to 15% income of B and 10% income of B is equal to 20% income of C. If income of C is ₹ 2000, then total income of A, B and C is:
A. ₹ 6000 B. ₹ 18000
C. ₹ 20000 D. ₹ 14000

6. A student who secures 20% marks in an examination fails by 30 marks. Another student who secures 32% gets 42 marks more than those required to pass. The percentage of marks required to pass is:
A. 20 B. 25
C. 28 D. 30

7. In a college election, a candidate secured 62% of the votes and is elected by a majority of 144 votes. The total number of votes polled is:
A. 600 B. 800
C. 925 D. 1200

8. What will be 80% of a number whose 200% is 90?
A. 144 B. 72
C. 36 D. None of these

9. *p* is six times as large as *q*. The per cent that *q* is less than *p*, is:
A. $83\frac{1}{3}$ B. $16\frac{2}{3}$
C. 90 D. 60

10. The price of an article has been reduced by 25%. In order to restore the original price, the new price must be increased by:

A. $33\frac{1}{3}\%$ B. $11\frac{1}{9}\%$

C. $9\frac{1}{11}\%$ D. $66\frac{2}{3}\%$

11. The price of cooking oil has increased by 25%. The percentage of reduction that a family should effect in the use of cooking oil so as not to increase the expenditure on this account is:

A. 25% B. 30%

C. 20% D. 15%

12. In an organisation, 40% of the employees are matriculates, 50% of the remaining are graduates and the remaining 180 are postgraduates. How many employees are graduates?

A. 360 B. 240

C. 300 D. 180

13. In 40% of the people read newspaper X, 50% read newspaper Y, and 10% read both the papers. What percentage of the people read neither newspaper?

A. 10% B. 15%

C. 20% D. 25%

14. The population of a town increases by 5% annually. If its population in 2008 was 138915, what it was in 2005?

A. 110000 B. 100000

C. 120000 D. 90000

15. The population of a village is 4500. $\frac{5}{9}$th of them are males and rest females. If 40% of the males are married, then the percentage of married female is:

A. 35 B. 40

C. 50 D. 60

16. A's income is 10% more than B's. How much per cent is B's income is less than A's?

A. 10% B. 7%

C. $9\frac{1}{11}\%$ D. $6\frac{1}{2}\%$

17. A mixture of 40 litres of milk and water contains 10% water. How much water must be added to make water 20% in the new mixture?

A. 10 litres B. 7 litres

C. 5 litres D. 3 litres

18. If $z = \frac{x^2}{y}$ and x, y both are increased in value by 10%, then the value of z is:

A. unchanged B. increased by 10%

C. increased by 11% D. increased by 20%

19. In an examination, 35% of the examinees failed in G.K. and 25% in English. If 10% of the examinees failed in both, then the percentage of examinees passed will be:

A. 40% B. 45%

C. 48% D. 50%

20. If the price of a television set is increased by 25%, then by what percentage should the new price be reduced to bring the price back to original level?

A. 15% B. 20%

C. 25% D. 30%

21. The number of grams of water needed to reduce 9 grams of shaving lotion containing 50% alcohol to a lotion containing 30% alcohol, is:

A. 4 B. 5

C. 6 D. 7

22. A candidate needs 35% marks to pass. If he gets 96 marks and fails by 16 marks, then the maximum marks are:

A. 250 B. 320

C. 300 D. 425

23. In an election one of the two candidates gets 40% votes and loses by 100 votes. Total number of votes is:

A. 500 B. 400

C. 600 D. 1000

24. If the income tax is decreased by 26%, a man's net income increases by $\frac{2}{3}\%$. The rate of income tax is:

A. $3\frac{1}{2}\%$ B. $2\frac{1}{2}\%$

C. $1\frac{1}{2}\%$ D. 3%

25. The gross income of a person is ₹ 20000. 10% of his income is exempted from income tax and his net income is ₹ 19100. The rate of income tax is:
A. 3% B. 2%
C. 4% D. 5%

26. If the rate of income tax is 5%, the net income of a person is ₹ 17100. If the rate of income tax is 6%, how much will be the net income?
A. 15820 B. 16920
C. 17820 D. 18920

27. The gross income of a person is ₹ 15000, 20% of his income is exempted from income tax and the rate of income tax is ₹ 4%. The net income is :
A. 14520 B. 14620
C. 15520 D. 15620

28. The gross income of a person is ₹ 16000. A part of his income is exempted from income tax and his net income is ₹ 14480. If the rate of income tax is 8%, the income exempted from income tax is :
A. 1600
B. 1700
C. 1800
D. 1500

29. One-eight of a number is 17.25. What will 73% of number be?
A. 82.66 B. 96.42
C. 100.74 D. 138.00

30. If 58% of 960 – x% of 635 = 277.4, find the value of x.
A. 24 B. 36
C. 44 D. 58

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	A	C	C	B	B	A	C	A	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	D	C	C	C	C	C	B	D	B
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	B	A	B	D	B	A	D	C	C

EXPLANATORY ANSWERS

1. $x = 90\%$ of y

$\Rightarrow \quad x = \frac{90}{100}y$

Required percentage

$$= \frac{y}{9y/10} = \frac{10}{9}\times 100 = 111.1\%.$$

2. $x - 20\%$ of $x = 40$

$\Rightarrow \quad x - \frac{x}{5} = 40$

$\Rightarrow \quad \frac{4x}{5} = 40 \Rightarrow x = \frac{40\times 5}{4} = 50.$

3. Required percentage

$$= \frac{10}{100-10}\times 100 = \frac{10}{90}\times 100 = 11\frac{1}{9}\%.$$

4. Let the business value changes from x to y
Then 4% of $x = 5\%$ of y

$\Rightarrow \quad \frac{4}{100}\times x = \frac{5}{100}\times y \Rightarrow y = \frac{4}{5}x$

$\therefore$ Changes in business $= \left(x - \frac{4}{5}x\right) = \frac{1}{5}x$

$\therefore$ Percentage slump in business

$$= \left(\frac{1}{5}x\times\frac{1}{x}\times 100\right)\% = 20\%.$$

5. 5% A = 15% B, and 10% B = 20% C
Then, A = 3B and B = 2C
$\therefore$ B = 2C = 2 × 2000 = ₹ 4000
And A = 3B = 3 × 4000 = ₹ 12000
$\therefore$ A + B + C = 12000 + 4000 + 2000
= ₹ 18000.

6. 20% of x + 30 = 32% of x − 42

$\Rightarrow$ 12% of x = 72

$\Rightarrow$ $x = \dfrac{72 \times 100}{12} = 600$

Pass Mark = 20% of 600 + 30 = 150

Pass percentage = $\left(\dfrac{150}{600} \times 100\right)\% = 25\%$.

7. (62% of x − 38% of x) = 144

$\Rightarrow$ 24% of x = 144

$\Rightarrow$ $x = \dfrac{144 \times 100}{24} = 600$.

8. 200% of x = 90

$\Rightarrow$ $x = \dfrac{90 \times 100}{200} = 45$

$\therefore$ 80% of $x = \left(\dfrac{80}{100} \times 45\right) = 36$

9. $p = 6q$

Required percentage

$= \dfrac{6q - q}{6q} \times 100 = \dfrac{5}{6} \times 100 = 83\dfrac{1}{3}\%$.

10. Required percentage

$= \dfrac{25}{100 - 25} \times 100 = \dfrac{25}{75} \times 100 = 33\dfrac{1}{3}\%$.

11. Required reduction

$= \left[\dfrac{r}{(100 + r)} \times 100\right] = \left(\dfrac{25}{125} \times 100\right)\% = 20\%$.

12. Matriculates = $\dfrac{40}{100}x = \dfrac{2x}{5}$

Remaining = $\left(x - \dfrac{2x}{5}\right) = \dfrac{3x}{5}$

Graduates = $\dfrac{50}{100} \times \dfrac{3x}{5} = \dfrac{3x}{10}$

Remaining = $\dfrac{3x}{5} - \dfrac{3x}{10} = \dfrac{3x}{10}$

Now, $\dfrac{3x}{10} = 180$

$\therefore$ $x = \dfrac{10 \times 180}{3} = 600$

$\therefore$ Graduates = $\dfrac{3 \times 600}{10} = 180$.

13. Number of people read either one or both

= 40 + 50 − 10 = 80%

Hence, number of people read neither newspaper = 100 − 80 = 20%

14. $x \times \left(1 + \dfrac{5}{100}\right)^3 = 138915$

$\Rightarrow x \times \dfrac{21}{20} \times \dfrac{21}{20} \times \dfrac{21}{20} = 138915$

$\Rightarrow$ $x = \dfrac{138915 \times 20 \times 20 \times 20}{21 \times 21 \times 21}$

= 120000.

15. Males = $\left(\dfrac{5}{9} \times 4500\right) = 2500$

Females = 2000

$\therefore$ Married males = $\dfrac{40}{100} \times 2500 = 1000$

and married females = 1000

$\therefore$ Percentage of married females

$= \left(\dfrac{1000}{2000} \times 100\right)\% = 50\%$.

16. Required percentage

$= \left[\dfrac{10}{(100 + 10)} \times 100\right]\% = 9\dfrac{1}{11}\%$.

17. Water = 10/100 × 40 = 4 litres

Let x litres of water be added,

Then, $x + 4 = \dfrac{20}{100}(40 + x)$

$\Rightarrow$ $5x + 20 = 40 + x$

$\Rightarrow$ $4x = 20$

$\therefore$ $x = 5$ litres.

18. $z = \dfrac{x^2}{y}$

$\therefore$ New value of z

$= \dfrac{\left(\dfrac{110}{100}x\right)^2}{\left(\dfrac{110}{100}y\right)} = \dfrac{11}{100}\dfrac{x^2}{y} = \dfrac{11}{10}z$

$\therefore$ Increase percentage

$= \dfrac{\left(\dfrac{11}{10}z - z\right)}{z} \times 100 = 10\%$

19. Failed in either one or both subjects
$= 35 + 25 - 10 = 50\%$
$\therefore$ Number of examinees passed
$= (100 - 50) = 50\%.$

20. Required reduction $= \frac{25}{100+25} \times 100 = 20\%$

21. Alcohol in 9 gms $= \left(\frac{50}{100} \times 9\right) = 4.5$ gms.
Let x gm of water be added.
Then, $\frac{4.5}{9+x} \times 100 = 30$
$\Rightarrow 270 + 30x = 450$
$\Rightarrow 30x = 180$
$\Rightarrow x = 6$ gms.

22. 35% of $x = 96 + 16 = 112$
$\Rightarrow \frac{35}{100} \times x = 112$
$\Rightarrow x = \frac{112 \times 100}{35} = 320.$

23. Out of 100, difference in votes
$= (60 - 40) = 20$
20% of $x = 100$
$\therefore x = \frac{100 \times 100}{20} = 500$

24. 26% of income tax $= \frac{2}{3}\%$ of the net income
$\therefore$ Income tax $= \left[\frac{2}{3} \times \frac{100}{26}\right]\%$ of the net income $= \frac{100}{39}\%$ of the net income
Let net income = ₹ 3900
$\therefore$ Income tax $= 3900 \times \frac{100}{39 \times 100} =$ ₹ 100
$\Rightarrow$ Gross income = ₹ 3900 + ₹ 100
= ₹ 4000
$\therefore$ Rate % of income tax
$= \left(\frac{100}{4000} \times 100\right)\% = 2\frac{1}{2}\%.$

25. Gross income = ₹ 20000
Income exempted from income tax
$= 10\%$ of gross income
$\therefore$ Income on which income tax is chargeable
$= (100 - 10\%) = 90\%$ of gross income
$= 20000 \times \frac{90}{100} =$ ₹ 18000
$\therefore$ Total income tax paid on
= ₹ 20000 − ₹ 19100 = ₹ 900
$\therefore$ Rate per cent of income tax
$= \frac{900}{18000} \times 100 = 5\%$

26. Gross income $= \frac{100}{95} \times 17100 =$ ₹ 18000
New net income $= \frac{94}{100} \times 18000 =$ ₹ 16920

27. Gross income = ₹ 15000
Income on which income tax is chargeable
$= (100 - 20)\% = 80\%$ of gross income
$= 15000 \times \frac{80}{100} =$ ₹ 12000
$\therefore$ Income tax paid @ 4%
$= 12000 \times \frac{4}{100} =$ ₹ 480
$\therefore$ Net income = 15000 − 480 = ₹ 14520

28. Gross income = ₹ 16000
Net income = ₹ 14840
$\therefore$ Income tax paid
= ₹ 16000 − ₹ 14840 = ₹ 1160
$\therefore$ Chargeable income is
$= 1160 \times \frac{100}{8} =$ ₹ 14500
Hence, income exempted from income tax
= 16000 − 14500 = ₹ 1500

29. The number = 8 × 17.25 = 138.00
73% of the number
$= \frac{73}{100} \times 138 = \frac{10074}{100} = 100.74$

30. 58% of $960 - x\%$ of $635 = 277.4$
$\Rightarrow \frac{58}{100} \times 960 - \frac{x}{100} \times 635 = 277.4$
$\Rightarrow \frac{127x}{20} = 556.8 - 277.4$
$\therefore x = \frac{20 \times 279.4}{127} = 44$

●●●

2 Average

The average of any number of quantities of the same kind can be found by dividing their sum by their number. Thus,

$$\text{Average} = \frac{\text{Sum of quantities}}{\text{No. of quantities}}$$

Sum of quantities = Their average × Their number

$$\text{Number of quantities} = \frac{\text{Sum of quantities}}{\text{Their average}}$$

When a body coveres the same distance at two different speeds p km/hr and q km/hr, then its average speed for the whole journey is $\frac{2pq}{p+q}$ km/hr.

Multiple Choice Questions

1. The average of the fractions

$1\frac{1}{2}$, $2\frac{1}{3}$, $3\frac{1}{3}$ and $4\frac{5}{6}$ is

A. 2 B. $2\frac{1}{2}$

C. 3 D. 4

2. The average of first nine multiples of 3 is

A. 12.0 B. 12.5

C. 15.0 D. 18.5

3. The average of 13 numbers is 68, the average of first 7 numbers is 63 and the average of last 7 numbers is 70. What is the 7th number?

A. 43 B. 45

C. 47 D. 49

4. One-third of a certain journey was covered at the rate of 25 km per hour, one-fourth at the rate of 30 km per hour and the rest at the 50 km per hour. What is the average speed per hour for whole journey?

A. $33\frac{1}{3}$ kmph B. $44\frac{1}{4}$ kmph

C. $22\frac{1}{2}$ kmph D. 33 kmph

5. Nine men went to a hotel. Eight of them spent ₹ 3 for each over their meals and the ninth spent ₹ 2 more than the average expenditure of all the nine. What is the total money spent by them?

A. ₹ 29.25 B. ₹ 29.50

C. ₹ 29 D. ₹ 30

6. An establishment is permitted an average monthly contingency expenditure of ₹ 500 per month during the financial year. When a trial check was made at the end of the first nine months of the year it was found that the average monthly contingency expenditure worked out to be ₹ 511. What average monthly expenditure for the next three months should be aimed at in order to attain the permissible average of ₹ 500 per month for the whole year?

A. ₹ 567 B. ₹ 467

C. ₹ 367 D. ₹ 667

7. Average age of 8 persons increased by 2 years, when two men whose ages are 20 and 24 years are replaced by two women. What is the average age of women?

A. 30 years B. 31 years

C. 28 years D. 33 years

8. A man had seven children. When their average age was 12 years, the child who was 6 years of age died. What was the average of the surviving children 5 years after the death of the child?
A. 15 years B. 16 years
C. 17 years D. 18 years

9. The weight of a body, calculated as the average of seven different experiments is 53.735 grams. The average of the first three is 54.005 grams, the fourth was greater than the fifth by 0.004 gram, while the average of the sixth and seventh was 0.010 gram less than the average of the first three. What is the weight of the body as obtained by the fourth experiment?
A. 53.068 gm B. 53.078 gm
C. 53.086 gm D. 53.072 gm

10. A batsman has a certain average of runs for 16 innings. In the 17th innings, he makes a score of 85 runs thereby increasing his average by 3. What is the average after the 17th inning?
A. 33 runs B. 34 runs
C. 37 runs D. 36 runs

11. The average of 50 numbers is 38. If two numbers namely 45 and 55 are discarded, the average of the remaining numbers is
A. 36.5 B. 37
C. 37.5 D. 37.52

12. The average of 6 observations is 12. A new seventh observation is included and the new average is decreased by 1. The seventh observation is
A. 1 B. 3
C. 5 D. 6

13. A man whose bowling average is 12.4 takes 5 wickets for 26 runs and thereby decreases his average by 0.4. The number of wickets, taken by him, before his last match, is
A. 85 B. 78
C. 72 D. 64

14. The average of marks obtained by 120 candidates was 35. If the average of marks of passed candidates was 39 and that of failed candidates was 15, the number of candidates who passed the examination is
A. 100 B. 110
C. 120 D. 150

15. The average of three numbers is 42. The first is twice the second and the second is twice the third. The difference between the largest and the smallest number is
A. 18 B. 36
C. 54 D. 72

16. Out of three numbers, the first is twice the second and is half of the third. If the average of the three numbers is 56, the three numbers in order are
A. 48, 96, 24 B. 48, 24, 96
C. 96, 24, 48 D. 96, 48, 24

17. The average age of 30 students in a class is 12 years. The average age of a group of 5 of the students is 10 years and that of another group of 5 of them is 14 years. The average age of the remaining students is
A. 8 years B. 10 years
C. 12 years D. 14 years

18. Out of four numbers, the average of first three is 15 and that of the last three is 16. If the last number is 19, the first is
A. 15 B. 16
C. 18 D. 19

19. The average age of an adult class is 40 years. 12 new students with an average age of 32 years join the class, thereby decreasing the average by 4 years. The original strength of the class was
A. 10 B. 11
C. 12 D. 15

20. The average age of 24 students in a class is 10. If the teacher's age is included, the average increases by one. The age of the teacher is
A. 25 B. 30
C. 35 D. 40

21. The average age of A, B, C and D five years ago was 45 years. By including X, the present age of all the five is 49 years. The present age of X is
A. 64 years B. 48 years
C. 45 years D. 40 years

22. The average expenditure of a man for the first five months is ₹ 120 and for the next seven months it is ₹ 130. If he saves ₹ 290 in that year, his monthly average income is
A. ₹ 1000 B. ₹ 1800
C. ₹ 2000 D. ₹ 2500

23. The average weight of a class of 40 students is 40 kg. If the weight of the teacher be included, the average weight increases by 500 gms. The weight of the teacher is
A. 40.5 kg B. 60 kg
C. 60.5 kg D. 62 kg

24. The average weight of 8 persons is increased by 2.5 kg when one of them whose weight is 56 kg is replaced by a new man. The weight of the new man is
A. 66 kg
B. 75 kg
C. 76 kg
D. 86 kg

25. If a, b, c, d, e are five consecutive odd numbers, their average is
A. $(a + 4)$
B. $\frac{abcde}{5}$
C. $5(a + b + c + d + e)$
D. None of these

26. The average of four positive integers is 72.5. The highest integer is 117 and the lowest integer is 15. The difference between the remaining two integers is 12. Which integer is higher of these two remaining integers?
A. 85 B. 84
C. 73 D. 70

27. Out of the three given numbers, the first number is twice the second and thrice the third. If the average of three numbers is 121, what is the difference between the first and third number?
A. 144 B. 77
C. 99 D. 132

28. The average of 5 consecutive odd numbers A, B, C, D and E is 41. What is the product of A and E?
A. 1591 B. 1665
C. 1517 D. 1677

29. The average of 5 consecutive even numbers A, B, C, D and E is 34. What is the product of B and D?
A. 1152 B. 1368
C. 1224 D. 1088

30. The average of four consecutive odd numbers is 12. What is the lowest odd number?
A. 3 B. 5
C. 7 D. 9

ANSWERS

1	2	3	4	5	6	7	8	9	10
C	C	C	A	A	B	A	D	D	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	C	A	A	C	B	C	B	C	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	B	C	C	A	A	D	B	A	D

EXPLANATORY ANSWERS

1. Average $= \frac{1}{4}\left(\frac{3}{2} + \frac{7}{3} + \frac{10}{3} + \frac{29}{6}\right)$

$= \left(\frac{9 + 14 + 20 + 29}{24}\right) = \frac{72}{24} = 3$

2. Average $= \frac{3(1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9)}{9}$

$= \frac{135}{9} = 15$

3. Average of 13 numbers = 68

$\therefore$ Total of 13 numbers = $13 \times 68 = 884$

Average of last 7 numbers = 70

$\therefore$ Total of last 7 numbers = $7 \times 70 = 490$

$\therefore$ Average of first 6 numbers

$= 884 - 490 = 394$

$\therefore$ Average of first 7 numbers = 63

$\therefore$ Total of first 7 numbers = $63 \times 7 = 441$

$\therefore$ 7th number = $441 - 394 = 47$

4. Let the total distance covered during journey = 60 km

$\frac{1}{3}$ of the distance covered during journey

$$= 60 \times \frac{1}{3} = 20 \text{ km}$$

$\frac{1}{4}$ of the distance covered during journey

$$= \frac{1}{4} \times 60 = 15 \text{ km}$$

$\therefore$ The distance covered during the rest of journey = $60 - (20 + 15) = 25$ km

Time taken to cover 20 km at 25 km/h

$$= \frac{20}{25}\text{hours} = \frac{4}{5}\text{hour}$$

Time taken to cover 15 km at 30 km/h

$$= \frac{15}{30}\text{hours} = \frac{1}{2}\text{hour}$$

Time taken to cover 25 km at 50 km/h

$$= \frac{25}{50}\text{hours} = \frac{1}{2}\text{hour}$$

Total time taken $= \frac{4}{5} + \frac{1}{2} + \frac{1}{2} = \frac{9}{5}\text{hours}$

Hence average speed per hour

$$= 60 \div \frac{9}{5} = \frac{60 \times 5}{9}$$

$$= \frac{100}{3}\text{km/h} = 33\frac{1}{3}\text{km/h}$$

5. Let the average expenditure of all the nine = ₹ x

Now amount spent by eight = ₹ 3×8 = ₹ 24

and total spent by the ninth = ₹ $x + 2$

$$\Rightarrow \quad \frac{26 + x}{9} = x$$

$\therefore$ Average amount spent by nine = $\frac{26 + x}{9}$

Total amount spent by nine

$= 24 + x + 2 = 26 + x$

$$\Rightarrow \quad 9x = 26 + x$$

or, $\quad 8x = 26$

$$\Rightarrow \quad x = \frac{26}{8} = ₹\ 3.25$$

Hence total money spent

= ₹ (3.25×9) = ₹ 29.25.

6. Average monthly expenditure permitted

= ₹ 500

Total expenditure permitted for 12 months

= ₹ 500×12 = ₹ 6000

Expenditure incurred during the first nine months

= ₹ 511×9 = ₹ 4,599

Expenditure for the last three month

= ₹ $(6000 - 4599)$ = ₹ 1,401

$\therefore$ Average monthly expenditure for the three months

$$= \text{Rs.}\frac{1401}{3} = ₹\ 467.$$

7. Total increase in the age of 8 persons

$= 2 \times 8 = 16$ years

Total age of two men being replaced

$= 20 + 24 = 44$ years

Total of the age of two women

$= 44 + 16 = 60$ years

$\Rightarrow$ The average age of women

$$= \frac{60}{2} = 30 \text{ years.}$$

8. Average age of 7 children = 12 years

Total ages of 7 children = $12 \times 7 = 84$ years

Age of 1 child who died = 6 years

Total ages of remaining 6 children

$= 84 - 6 = 78$ years

$\therefore$ Average age of 6 children

$$= \frac{78}{6} = 13 \text{ years}$$

$\therefore$ Average age of 6 children after 5 years

$= 13 + 5 = 18$ years.

9. Total weight of 7 experiments

$= 53.735 \times 7 = 376.145$ gm

Total weight of first three

$= 54.005 \times 3 = 162.015$ gm

The average of the 6th and 7th was 0.010 gm less than that of the first three.

$\therefore$ Average of the 6th and 7th

$= 54.005 - 0.010 = 53.995$ gm

$\therefore$ Total of the 6th and 7th

$= 53.995 \times 2 = 107.990$ gm

Thus, total of 4th and 5th

$= 376.145 - (162.015 + 107.990)$

$= 106.140$ gm

The fourth was greater than the fifth by 0.004 gm

$$\therefore \quad \text{The fifth} = (106.140 - 0.004) \times \frac{1}{2}$$

$$= \frac{106.136}{2} = 53.068 \text{ gm}$$

Hence, the fourth

$= 53.068 + 0.004 = 53.072$ gm.

10. Average increase in the score of 17 innings

$= 3$ runs

Total increase in the score of 17 innings

$= 3 \times 17 = 51$ runs

$\therefore$ His average of 16 innings

$= 85 - 51 = 34$ runs

Hence, average after the 17th innings

$= 34 + 3 = 37$ runs.

11. Total of 50 numbers $= 50 \times 38 = 1900$

Total of 48 numbers

$= 1900 - (45 + 55) = 1800$

$$\therefore \quad \text{Average} = \frac{1800}{48} = 37.5$$

12. Seventh observation $= (7 \times 11 - 6 \times 12) = 5.$

13. Suppose the number of wickets taken before the last match $= x$

$$\Rightarrow \frac{12.4x + 26}{x + 5} = 12$$

$$\Rightarrow 12.4x + 26 = 12x + 60$$

$$\Rightarrow x = 85.$$

14. Let the number of candidates who passed $= x$

$$\Rightarrow 39 \times x + 15 \times (120 - x) = 120 \times 35$$

$$\Rightarrow 24x = 4200 - 1800$$

$$\therefore \quad x = \frac{2400}{24} = 100.$$

15. Let the third number $= x$

Then, second number $= 2x$

and first number $= 4x$

$$\therefore \frac{x + 2x + 4x}{3} = 42$$

$$\Rightarrow \frac{7x}{3} = 42$$

$$\Rightarrow x = \frac{42 \times 3}{7}$$

$$\Rightarrow x = 18$$

So, (largest) – (smallest) $= (4x - x) = 3x = 54$

16. Letsecond number $= x$

Then, first number $= 2x$

and third number $= 4x$

$$\therefore \frac{x + 2x + 4x}{3} = 56$$

$$\Rightarrow \frac{7x}{3} = 56$$

$$\Rightarrow 7x = 56 \times 3$$

$$\Rightarrow x = 24$$

So, the numbers are 48, 24, 96

17. Let, the required average age be x

Then, $5 \times 10 + 5 \times 14 + 20 \times x = 30 \times 12$

$$\Rightarrow 20x = 360 - 120$$

$$\Rightarrow 20x = 240$$

$$\Rightarrow x = 12 \text{ years}$$

18. Sum of four numbers $= (15 \times 3 + 19) = 64$

Sum of last three numbers $= (16 \times 3) = 48$

$\therefore$ First number $= (64 - 48) = 16$

19. Let the original strength = x

Then, $40x + 12 \times 32 = (x + 12) \times 36$

$\Rightarrow \quad 40x + 384 = 36x + 432$

$\Rightarrow \quad 4x = 48$

$\Rightarrow \quad x = 12$

20. Age of the teacher

= (25 × 11 − 24 × 10) years = 35 years

21. Present age of x

= [(49 × 5) − (4 × 45 + 4 × 5)] years

= 45 years

22. Total income

= (120 × 5 + 130 × 7 + 290) = ₹ 1800

23. Weight of the teacher

= (41 × 40.5 − 40 × 40) kg = 60.5 kg

24. Total increase = (8 × 2.5) kg = 20 kg

Weight of new man = (56 + 20)kg = 76 kg.

25. $\text{Average} = \dfrac{a + (a+2) + (a+4) + (a+6) + (a+8)}{5}$

$= (a + 4)$

26. Let the remaining two positve integers be x and $x + 12$

Now, $117 + x + 12 + x + 15 = 4 \times 72.5$

$\Rightarrow \quad 2x + 144 = 290$

$\Rightarrow \quad 2x = 146$

$\therefore \quad x = 73$

Hence, required number

$= x + 12 = 73 + 12 = 85$

27. Let the three numbers be x, $\dfrac{x}{2}$ and $\dfrac{x}{3}$ respectively,

Now, $\dfrac{1}{3}\left(x + \dfrac{x}{2} + \dfrac{x}{3}\right) = 121$

$\Rightarrow \quad \dfrac{11x}{6} = 121 \times 3$

$\therefore \quad x = \dfrac{121 \times 3 \times 6}{11} = 198$

Hence, required difference

$= x - \dfrac{x}{3} = \dfrac{2x}{3} = \dfrac{2}{3} \times 198 = 132$

28. Let 5 consecutive odd numbers be $(x + 1)$, $(x + 3)$, $(x + 5)$, $(x + 7)$ and $(x + 9)$ respectively.

Now, $\dfrac{x+1+x+3+x+5+x+7+x+9}{5} = 41$

$\Rightarrow \quad 5x + 25 = 205$

$\Rightarrow \quad 5x = 180$

$\therefore \quad x = 36$

Then, $A = x + 1 = 36 + 1 = 37;$

$E = x + 9 = 36 + 9 = 45$

Hence, their product = 37 × 45 = 1665

29. Let 5 consecutive even numbers A, B, C, D and E be x, $x + 2$, $x + 4$, $x + 6$ and $x + 8$ respectively.

Now, $\dfrac{x + x + 2 + x + 4 + x + 6 + x + 8}{5} = 34$

$\Rightarrow \quad 5x + 20 = 170$

$\Rightarrow \quad 5x = 150$

$\therefore \quad x = 30$

Then, $B = x + 2 = 30 + 2 = 32;$

$D = x + 6 = 30 + 6 = 36$

Hence, their product = 32 × 36 = 1152

30. Let 4 consecutive odd numbers be $(x + 1)$, $(x + 3)$, $(x + 5)$ and $(x + 7)$.

Now, $\dfrac{x+1+x+3+x+5+x+7}{4} = 12$

$\Rightarrow \quad 4x + 16 = 48$

$\Rightarrow \quad 4x = 32$

$\therefore \quad x = 8$

Hence, lowest odd number

$= x + 1 = 8 + 1 = 9.$

●●●

3 Time, Work and Distance

TIME AND WORK

1. If A can do a piece of work in n days, then work done by A in 1 day = $\frac{1}{n}$.
2. If work done by A in 1 day = $\frac{1}{n}$; then A can finish the whole work in n days.
3. If A is twice as good a workman as B then; Ratio of work done by A and B = 2 : 1
   Ratio of times taken by A and B to finish a work = 1 : 2.

TIME AND DISTANCE

1. Speed = Distance ÷ Time
2. Distance = Time × Speed
3. Time = Distance ÷ Speed
4. x km/hr = $\left(x \times \frac{5}{18}\right)$ m/sec
5. x metres/sec = $\left(x \times \frac{18}{5}\right)$ km/hr.
6. If the speed of a body is changed in the ratio $m : n$, then the ratio of the time taken changes in the ratio $n : m$.
7. When a man covers a certain distance with a speed of x km/h and another equal distance at the rate of y km/h, then for the whole journey, the average speed is given by

   Average speed = $\frac{2xy}{x+y}$ km/h.

Multiple Choice Questions

1. 12 boys can do a piece of work in 16 days. In how many days can 6 boys do the same work?
A. 16 days B. 32 days
C. 23 days D. 24 days

2. A can do a piece of work in 8 days while B can do the same work in 16 days. If they start working together, how long would they take to complete half portion of this work?
A. $2\frac{2}{3}$ days B. $3\frac{5}{7}$ days
C. $4\frac{1}{2}$ days D. $3\frac{1}{2}$ days

3. A can do a piece of work in 4 days. B is 50% more efficient than A. How long would B alone take to finish this work?
A. $3\frac{1}{3}$ days B. $5\frac{1}{4}$ days
C. $2\frac{2}{3}$ days D. $1\frac{2}{3}$ days

4. A and B working together complete a work in 35 days. If A takes 60 days to complete it, how long would B alone take to complete it?
A. 64 days B. 72 days
C. 81 days D. 84 days

5. A few children working together can do a piece of work in 18 days. If the number of children employed on the work is made double, how long would they take to complete half of the work?

A. $4\frac{1}{2}$ days B. $2\frac{1}{3}$ days

C. $8\frac{3}{4}$ days D. $6\frac{1}{2}$ days

6. 10 men or 18 boys can do a piece of work in 15 days. In how many days would 25 men and 15 boys complete the same work working together?

A. $5\frac{1}{2}$ days B. $4\frac{1}{2}$ days

C. $6\frac{2}{3}$ days D. $2\frac{1}{3}$ days

7. A can do a piece of work in 40 days. He starts working, but having some other engagements he drops out after 5 days. Thereafter B completes this work in 21 days. How many days would A and B take to complete this work working together?

A. 15 days B. 16 days

C. 17 days D. 11 days

8. Two persons A and B can complete a piece of work in 8 hours and 16 hours respectively. If they work at it alternately for an hour, A starting first, in how many hours will the work be finished?

A. $9\frac{1}{3}$ hours B. $10\frac{1}{2}$ hours

C. $11\frac{1}{2}$ hours D. $8\frac{1}{2}$ hours

9. 15 men can complete a work in 210 days. They started the work but at the end of 10 days 15 additional men, with double efficiency, were inducted. How many days, in whole, did they take to finish the work?

A. $76\frac{2}{3}$ days B. $84\frac{3}{4}$ days

C. $72\frac{1}{2}$ days D. 70 days

10. A and B working together can complete a piece of work in 12 days and B and C working together can complete the same work in 16 days. A worked at it for 5 days and B worked at it for 7 days. C finished the remaining work in 13 days. How many days would C alone take to complete it?

A. 10 days B. 24 days

C. 32 days D. 40 days

11. A cistern is filled by a tap in $3\frac{1}{2}$ hours. Due to a leak in the bottom of the cistern, it takes half an hour longer to fill the cistern. If the cistern is full, how long will it take the leak to empty it?

A. 28 hours B. 29 hours

C. $31\frac{1}{3}$ hours D. 38 hours

12. A is twice as good a workman as B and thrice as good a workman as C. If C alone can do a piece of work in 24 days, how long would the three persons take to finish the work working together?

A. $3\frac{3}{11}$ days B. $4\frac{4}{7}$ days

C. $4\frac{4}{11}$ days D. $3\frac{4}{11}$ days

13. Two pipes can fill a tank in 8 hours and 12 hours respectively whereas an escape pipe can empty it in 6 hours. If the three pipes are opened at 1 p.m., 2 p.m. and 3 p.m. respectively, at what time will the tank be filled?

A. 7.00 a.m. B. 8.00 a.m.

C. 5.00 a.m. D. 7.30 a.m.

14. Working 7 hours daily 24 men can complete a piece of work in 27 days. In how many days would 14 men complete the same piece of work working 9 hours daily?

A. 32 days B. 31 days

C. 36 days D. 39 days

15. A, B and C undertake to do a piece of work for ₹ 529. If A and B working together do $\frac{19}{23}$ work and B and C working together do $\frac{8}{23}$

work, how should the money be divided among them?
A. ₹ 345, ₹ 102, ₹ 82
B. ₹ 345, ₹ 92, ₹ 92
C. ₹ 330, ₹ 107, ₹ 92
D. ₹ 330, ₹ 92, ₹ 107

16. A car moving at 48 km/hr completes a journey in 10 hours. By how much the speed of this car should be increased so as to do this journey in 8 hours?
A. 8 km/hr B. 12 km/hr
C. 10 km/hr D. 15 km/hr

17. Starting from a point at a speed of 4 km/hr a man reaches at a cerain place and returns back to the point from where he had started journey on bicycle at the speed of 16 km/hr. His average speed during the entire journey will be:
A. 6.4 km/h B. 8.4 km/h
C. 5.4 km/h D. 10 km/h

18. A motorist covers a certain distance at a average speed of 48 km/h in 45 minutes. What speed in km/h he must maintain to cover the same distance in 30 minutes?
A. 66 km/h B. 79 km/h
C. 80 km/h D. 72 km/h

19. Two points A and B are 150 km apart. A man completes his onward journey from A to B in 3 hours 20 minutes and return journey from B to A in 4 hours 10 minutes. His average speed during the entire journey will be less than his average speed during the journey from A to B by:
A. 5 km/h B. 7.5 km/h
C. 9 km/h D. 3 km/h

20. A policeman saw a thief at a distance of 200 m. The policeman and the thief started running at the same time. If the policeman runs at a speed of $4\frac{1}{6}$ m per second and the thief at a speed of $3\frac{1}{3}$ m per second, after what time the policeman will catch the thief?
A. 12 min B. 10 min
C. 9 min D. 4 min

21. Kanchan walks from her home at 4 kms per hour and reaches her school 5 minutes late. If she walks at 5 kms per hour, she reaches the school 2½ minutes earlier. How far is the school from her home?
A. 3.5 kms B. 2.5 kms
C. 2.75 kms D. 3.2 kms

22. A monkey wants to climb up a glazed pole. He climbs 12 metres in 1 minute and then he slips back 3 metres in the next minute. If the pole is 63 metre high, how long does he take to climb at the top of the pole?
A. $11\frac{1}{4}$ min B. $12\frac{1}{2}$ min
C. $12\frac{3}{4}$ min D. $14\frac{3}{4}$ min

23. A and B start walking at the same time on a circular path with circumference 35 metre. If they walk in the same direction at 4 km/hr and 5 km/hr respectively, after what time will they meet together?
A. 35 hours B. 27 hours
C. 24 hours D. 40 hours

24. While walking at $\frac{3}{5}$ of his usual speed Kamalkant reaches at his destination late by 30 minutes. His usual time consumed in reaching to his destination is:
A. 32 min B. 40 min
C. 45 min D. 42 min

25. The distance between two stations A and B is 300 km. A train leaves the station A with a speed of 40 km/hr. At the same time another train departs from the station B with a speed of 50 km/hr. How much time will these two trains take to cross each other?
A. 3 hrs 40 min B. 3 hrs 20 min
C. 2 hrs 20 min D. 3 hrs 45 min

26. Gulshan starts from a place P at 2 p.m. and walks to Q at 5 km per hour. Tarun starts from P at 3 p.m. and follows Gulshan on bicycle at 10 km per hour. By when Tarun will catch Gulshan?
A. At 5.30 p.m. B. At 4.00 p.m.
C. At 4.30 p.m. D. At 6.00 p.m.

27. Nilesh goes to school from his village at the speed of 4 km/hr and returns from school to village at the speed of 2 km/hr. If he takes 6 hours in all, then what is the distance between the village and the school?
A. 8 km B. 6 km
C. 5 km D. 4 km

28. A school bus covers a distance from a village to school at the speed of 12 km/hr and reaches the school 8 minute late. The next day the bus covers the same distance at the speed of 20 km/hr and reaches the school 10 minutes early. What is the distance between village and the school?
A. 6 km B. 9 km
C. 12 km D. 15 km

29. By increasing the speed of the bus by 10 km/hr the time of journey for 72 km is reduced by 36 minutes. What was the original speed of the bus?
A. 30 km/hr B. 35 km/hr
C. 40 km/hr D. 45 km/hr

30. A car completes a fixed journey in 8 hours. It covers half distance at the speed of 40 km/hr and rest at the 60 km/hr, the distance of the journey is:
A. 400 km B. 420 km
C. 384 km D. 350 km

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	A	C	D	A	B	A	B	A	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	C	A	C	B	B	A	D	A	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	C	A	C	B	B	A	B	A	C

EXPLANATORY ANSWERS

1. ∵ 12 boys can do a piece of work in 16 days.
∴ 1 boy will do the same piece of work in 16 × 12 days.
∴ 6 boys will do the same piece of work in $\frac{16\times12}{6}$ days = 32 days.

2. (A + B)'s 1 day's work = $\frac{1}{8}+\frac{1}{16}=\frac{3}{16}$
Hence, (A + B) will do the whole work in $\frac{16}{3}$ days
So, they will do the half portion of the work in $\frac{16}{3\times2}$ days = $\frac{8}{3}=2\frac{2}{3}$ days.

3. A's 1 day's work = $\frac{1}{4}$;
Hence, B's 1 day's work = $\frac{150}{100}\times\frac{1}{4}=\frac{3}{8}$
So, B will do the whole work in $\frac{8}{3}=2\frac{2}{3}$ days.

4. (A + B)'s 1 day's work = $\frac{1}{35}$
and also, A's 1 day's work = $\frac{1}{60}$
Hence, B's 1 day's work
= $\frac{1}{35}-\frac{1}{60}=\frac{5}{420}=\frac{1}{84}$
So, B will do the whole work in 84 days.

5. Let number of children be x;
Now x children can do the work in 18 days.
Hence, $2x$ children will do $\frac{1}{2}$ of the work in $\frac{18\times x}{2x\times2}=\frac{9}{2}$ days = $4\frac{1}{2}$ days.

6. 10 men $\equiv$ 18 boys

25 men $\equiv \frac{18}{10} \times 25 = 45$ boys

Hence, 25 men + 15 boys = 45 + 15 = 60 boys

Now, 18 boys can do a piece of work in 15 days.

Hence, 60 boys will do a piece of work in $\frac{15 \times 18}{60} = \frac{9}{2}$ days = $4\frac{1}{2}$ days.

7. A's 5 days' work = $5 \times \frac{1}{40} = \frac{1}{8}$

Remaining work = $1 - \frac{1}{8} = \frac{7}{8}$, which is done by B in 21 days.

Hence, B's 1 day's work = $\frac{7}{8 \times 21} = \frac{1}{24}$

Now, (A + B)'s 1 day's work

= $\frac{1}{40} + \frac{1}{24} = \frac{8}{120} = \frac{1}{15}$

Hence, (A + B) will complete the work in 15 days.

8. In 2 hours the part of work = $\frac{1}{8} + \frac{1}{16} = \frac{3}{16}$ will be completed.

Hence, in 5 pairs of hours the part of work

= 5 × $\frac{3}{16} = \frac{15}{16}$ will be completed

Remaining work = 1 – $\frac{15}{16} = \frac{1}{16}$ which will be done by A.

Time taken by A to complete the $\frac{1}{16}$ work

= $\frac{1/16}{1/8} = \frac{1}{2}$ hour.

Hence, required number of hours

= 10 + $\frac{1}{2} = 10\frac{1}{2}$ hours.

9. 15 men's 10 days' work = $10 \times \frac{1}{210} = \frac{1}{21}$

Remaining work = $1 - \frac{1}{21} = \frac{20}{21}$

Now, (15 men + 15 men having double efficiency)'s 1 day's work

= $\frac{1}{210} + \frac{2}{210} = \frac{3}{210} = \frac{1}{70}$

Hence, number of days

= $\frac{20/21}{1/70} = \frac{20}{21} \times 70 = \frac{200}{3} = 66\frac{2}{3}$ days

So, required number of total days

= 10 + $66\frac{2}{3} = 76\frac{2}{3}$ days.

10. Here, A worked for 5 days, B for 7 days and C for 13 days $\equiv$ (A + B) worked for 5 days, (B + C) for 2 days and C for 11 days.

Let C will complete the work in x days,

Now, (A + B)'s 5 days' work + (B + C)'s 2 days' work + C's 11 days' work

= $\frac{5}{12} + \frac{2}{16} + \frac{11}{x} = \frac{13}{24} + \frac{11}{x}$

Again, $\frac{13}{24} + \frac{11}{x} = 1$

$\Rightarrow \frac{11}{x} = \frac{11}{24} \therefore x = 24$

Hence, C would alone complete the work in 24 days.

11. In 1 hour $\frac{2}{7}$ cistern is filled by the tap.

Hence, in $\frac{1}{2}$ hour $\frac{2}{14} = \frac{1}{7}$ cistern is filled by the tap.

So, $\frac{1}{7}$ cistern is emptied by the leakage in 4 hours.

So, 1 cistern will be emptied by the leakage in 28 hours.

12. Here, ratio of efficiency of A, B and C

= 1 : $\frac{1}{2} : \frac{1}{3}$

So, ratio of their time taken to complete the work = 1 : 2 : 3

Now C completes the work in 24 days, so A and B will complete the work in 8 and 16 days respectively.

Hence, (A + B + C)'s 1 day's work

$= \frac{1}{8}+\frac{1}{16}+\frac{1}{24}=\frac{11}{48}$

Therefore, (A + B + C) will complete the work in $\frac{48}{11}=4\frac{4}{11}$ days.

13. Let tank will be filled up after t hours of starting of pipe A;

Then, $t \times \frac{1}{8}+(t-1)\times\frac{1}{12}-(t-2)\times\frac{1}{6}=1$

$\Rightarrow t\left(\frac{1}{8}+\frac{1}{12}-\frac{1}{6}\right)-\frac{1}{12}+\frac{1}{3}=1$

$\Rightarrow t\times\frac{1}{24}=1-\frac{1}{4}$

$\therefore t = \frac{3}{4}\times 24 = 18$ hours

Hence, required time

= 1 p.m. + 18 hours = 7 a.m.

14. Working 7 hours a day 24 men can do the work is 27 days.

Hence, working 9 hours a day 14 men will do the work in $\frac{27\times 24\times 7}{9\times 14}$ = 36 days.

15. The part of work is done by B

$= \frac{19}{23}+\frac{8}{23}-1=\frac{4}{23}$

The part of work is done by A = $\frac{19}{23}-\frac{4}{23}=\frac{15}{23}$

The part of work is done by C = $\frac{8}{23}-\frac{4}{23}=\frac{4}{23}$

Hence,share of A = $\frac{15}{23}\times$ ₹ 529 = ₹ 345

share of B = $\frac{4}{23}\times$ ₹ 529 = ₹ 92

share of C = $\frac{4}{23}\times$ ₹ 529 = ₹ 92

So, Their shares are ₹ 345, ₹ 92 and ₹ 92.

16. Let he has to increase his speed by x km/hr for given condition; then,

$(48 + x) \times 8 = 48 \times 10$

$\Rightarrow \quad 48 + x = 60$

$\therefore \quad x = 12$ km/hr

17. Average speed during the entire journey

$= \frac{2xy}{x+y}=\frac{2\times 4\times 16}{4+16}=\frac{8\times 16}{20}$ = 6.4 km/hr.

18. Let required speed be x km/hr; then

$x \times \frac{1}{2} = 48 \times \frac{3}{4}$

$\therefore \quad x = 48 \times \frac{3}{4}\times 2 = 72$ km/hr

19. During onward journey from A to B:

Average speed = $\frac{150}{10/3}=\frac{150\times 3}{10}$ = 45 km/hr.

During entire jouney :

Average speed = $\frac{300}{\frac{10}{3}+\frac{25}{6}}=\frac{300\times 6}{45}$

= 40 km/hr.

Hence, difference of average speed

= 45 – 40 = 5 km/hr

20. Suppose the policeman will catch the thief after t seconds

then, $\left(\frac{25}{6}-\frac{10}{3}\right)t = 200 \Rightarrow \frac{5}{6}t = 200$

$\therefore \quad t = \frac{200\times 6}{5}$ = 240 sec = 4 min.

21. Suppose the distance between her house to the school = x km

Difference of time

$= \frac{5}{2}-(-5) = \frac{15}{2}$ min $= \frac{1}{8}$ hr.

$\frac{x}{4}-\frac{x}{5}=\frac{1}{8} \Rightarrow \frac{x}{20}=\frac{1}{8} \quad \therefore x = \frac{20}{8}$ = 2.5 km

22. The monkey climbs 12 metres in 1 minute and then he slips back 3 metres in the next minute

$\therefore$ The monkey climbs in the first 2 minutes

= 12 – 3 = 9 metres

$\therefore$ In the first 12 minutes the monkey climbs

$= 9 \times 6 = 54$ metres

Remaining height of the pole to be covered by the monkey

$= 63 - 54 = 9$ metre

$\therefore$ The monkey will climb the height of 9 metres in the 13th minute

$\because$ The monkey climbs 12 metres in 1 minute

$\therefore$ The monkey will climb 9 metres in $\frac{1}{12} \times 9$

$= \frac{3}{4}$ minute

$\therefore$ Time spent in climbing at the top of the pole

$= \left(12 + \frac{3}{4}\right)$ minutes $= 12\frac{3}{4}$ minutes

23. The two persons walk in the same direction

$\therefore$ Their relative speed $= 5 - 4 = 1$ km/hr

Distance covered in 1 round on the circular path = 35 km

$\therefore$ They will meet after $\frac{35}{1} = 35$ hours.

24. Suppose usual speed of Kamalkant is v km/hr and his destination is at a distance of x kms;

then usual time taken $= \frac{x}{v}$ hours.

$$\frac{x}{3v/5} - \frac{x}{v} = \frac{1}{2} \Rightarrow \frac{2x}{3v} = \frac{1}{2}$$

$$\therefore \frac{x}{v} = \frac{3}{4} \text{ hour} = 45 \text{ min.}$$

25. The two trains are moving in the opposite directions

$\therefore$ Relative speed $= 40 + 50 = 90$ km/hr.

$\therefore$ Time taken to cross each other $= \frac{300}{90} = 3\frac{1}{3}$

hours or, 3 hours 20 minutes.

26. Let Tarun will catch Gulshan after t hours the starting of Tarun; then, $10t = 5(t + 1)$

$\Rightarrow \quad 5t = 5$

$\therefore \quad t = 1$ hr

Hence, required time = 3 p.m. + 1 hr. = 4 p.m.

27. Let x km be the distance between village and the school; then

$$\frac{x}{4} + \frac{x}{2} = 6$$

$$\Rightarrow \quad \frac{3x}{4} = 6$$

$$\therefore \quad x = \frac{6 \times 4}{3} = 8 \text{ km}$$

28. Let x km be the distance from village to school, then

$$\frac{x}{12} - \frac{x}{20} = [8 - (-10)] \times \frac{1}{60}$$

$$\Rightarrow \frac{x}{30} = \frac{18}{60} \therefore x = \frac{18}{60} \times 30 = 9 \text{ km}$$

29. Let original speed of the bus be x km/hr; then

$$\frac{72}{x} - \frac{72}{x+10} = \frac{36}{60}$$

$$\Rightarrow \quad \frac{72(x+10-x)}{x^2+10x} = \frac{3}{5}$$

$$\Rightarrow \quad 1200 = x^2 + 10x$$

$$\Rightarrow \quad x^2 + 10x - 1200 = 0$$

$$\Rightarrow \quad (x + 40)\ (x - 30) = 0$$

$$\therefore \quad x = 30 \quad \text{or} \quad x = -40$$

Taking positive value only, so speed of the bus = 30 km/hr.

30. Let the distance of the journey be x km, then,

$$\frac{x}{2 \times 40} + \frac{x}{2 \times 60} = 8 \Rightarrow \frac{5x}{240} = 8$$

$\therefore \ x = 8 \times 48 = 384$ km

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4 Ratio and Proportion

RATIO

In ratio we compare two quantities of the same kind and consider what multiple, part or parts one is of the other. In comparing 8 with 4, observe that it is 2 times 4. This comparison can be represented as $8 \div 4$ or $\frac{8}{4}$.

Hence, *ratio is that relation between two numbers which is expressed by the fraction, the numerator is which is the measure of the first quantity and denominator is the measure of the second quantity.*

If the terms of a ratio be multiplied or divided by the same quantity the value of the ratio remains unaltered.

Thus, 3 : 4 is the same as 9 : 12 and 9 : 12 is the same as 3 : 4.

PROPORTION

The equality of two ratio is called proportion.

Consider the two ratios:

Ist ratio	2nd ratio
5 : 15	7 : 21

Since, 5 is one-third of 15 and 7 is one-third of 21, the two ratios are equal. The equality of two ratios is called proportion and the numbers 5, 15, and 7, 21 are said to be in **proportion.**

The proportion may be written as 5 : 15 : : 7 : 21 (5 is to 15 as 7 is to 21)

$\Rightarrow \quad 5 : 15 = 7 : 21$

$\Rightarrow \quad \frac{5}{15} = \frac{7}{21}$

The numbers 5, 15, 7 and 21 are called the terms. 5 is the first term, 15 the second, 7 the third, and 21 the fourth.

The first and fourth terms, *i.e.*, 5 and 21 are called extremes (end terms), and the second and the third terms, *i.e.*, 15 and 7 are called the **means** (middle terms), 21 is called the fourth proportional.

Some Important Facts

1. If a and b are two quantities, then

(a) Duplicate ratio of $a : b = a^2 : b^2$

(b) Sub-duplicate ratio of $a : b = \sqrt{a} : \sqrt{b}$

(c) Triplicate ratio of $a : b = a^3 : b^3$

(d) Sub-triplicate ratio $a : b = \sqrt[3]{a} : \sqrt[3]{b}$

(e) Inverse or reciprocal ratio of $a : b = \frac{1}{a} : \frac{1}{b}$

(f) Third proportional to *'a'* and *'b'* $= \frac{b^2}{a}$

2. If A : B = x : y and B : C = p : q, then

(a) A : C $= \frac{x \times p}{y \times q}$

(b) A : B : C = px : py : qy

3. In what *ratio* the two kinds of tea must be mixed together one at ₹ x per kg and another at ₹ y per kg, so that the mixture may cost ₹ z per kg?

Ratio $= \frac{z - y}{x - z}$

4. A grey hound persues a hare as takes J_1 leaps for every J_2 leaps of the hare. If K_1 leaps of the hound are equal to K_2 leaps of the hare, then the Ratio of speeds of the hound and hare is

$$\frac{J_2 \times K_1}{J_1 \times K_2}$$

5. The incomes of two persons are in the ratio of $a : b$ and their expenditure are in the ratio of $x : y$. If the saving of each person is ₹ s, then income of each is ₹ $\frac{as(y-x)}{ay-bx}$ and ₹ $\frac{bs(y-x)}{ay-bx}$ respectively.

6. In a mixture of z litre, the ratio of milk and water is $x : y$. If another p litres of water is added to the mixture, the ratio of milk and water in the resulting mixture

$$= \frac{xz}{yz + p(x+y)}$$

7. There are four members a, b, c and d, then formula for

(a) What should be added to each of these numbers so that the remaining numbers may be proportional $= \frac{ad-bc}{(b+c)-(a+d)}$

(b) What should be subtracted from each of these numbers so that the remaining numbers may be proportional

$$= \frac{ad-bc}{(a+d)-(b+c)}$$

8. In a mixture the ratio of milk and water is $a : b$. If in this mixture another K litre of water is added, then the ratio of milk and water in the resulting mixture becomes $a : m$. Then the quantity of milk in the original mixture

$$= \frac{ak}{m-b} \text{ and quantity of water } = \frac{bk}{m-b}$$

Multiple Choice Questions

1. If A : B = 6 : 7 and B : C = 8 : 9, then A : B : C is:
A. 24 : 28 : 63 B. 48 : 28 : 63
C. 48 : 56 : 63 D. None of these

2. The sum of two numbers is 20 and their difference is $2\frac{1}{2}$. What is the ratio of the numbers?
A. 11 : 7 B. 9 : 11
C. 9 : 7 D. None of these

3. If 0.7 of one number is equal to 0.075 of another, what is the ratio of the two numbers?
A. 6 : 14 B. 3 : 28
C. 5 : 7 D. None of these

4. If 10% of x is the same as 20% of y, then $x : y$ is equal to :
A. 1 : 2 B. 2 : 1
C. 5 : 1 D. 10 : 1

5. Two numbers are in the ratio 3 : 5. If each number is increased by 10, the ratio becomes 5 : 7. The numbers are:
A. 3, 5 B. 7, 9
C. 13, 22 D. 15, 25

6. The mean proportional between 0.32 and 0.02 is:
A. 0.34 B. 0.3
C. 0.16 D. 0.08

7. The sum of three numbers is 98. If the ratio between the first and second be 2 : 3 and that between the second and third be 5 : 8, then what is the second number?
A. 20 B. 30
C. 10 D. 40

8. One man adds 3 litres of water to 12 litres of milk and another 4 litres of water to 10 litres of milk. What is the ratio of the strenghts of the milk in the two mixtures?

A. 15 : 25 B. 25 : 28
C. 28 : 25 D. None of these

9. ₹ 425 is divided among 4 men, 5 women and 6 boys such that the share of a man, a woman and a boy may be in the ratio of 9 : 8 : 4. What is the share of a woman?
A. ₹ 34 B. ₹ 24
C. ₹ 44 D. None of these

10. A vessel contains liquids P and Q in the ratio 5 : 3. If 6 litres of the mixture are removed and the same quantity of liquid *q* is added, the ratio becomes 3 : 5. What quantity does the vessel hold?
A. 40 litres B. 50 litres
C. 30 litres D. None of these

11. A bucket contains a mixture of two liquids P and Q in the proportion 7 : 5. If 9 litres of the mixture is replaced by 9 litres of liquid Q, then the ratio of the two liquid becomes 7 : 9. How much of the liquid P was there in the bucket?
A. 11 litres B. 21 litres
C. 31 litres D. None of these

12. Three glasses P, Q and R with their capacities in the ratio 2 : 3 : 4 are filled with a mixture of spirit and water. The ratio of spirit to water in P, Q and R is 1 : 5, 3 : 5 and 5 : 7 respectively. If the contents of these glasses are mixed together, what is the ratio of spirit to water in the mixture?
A. 14 : 27 B. 23 : 47
C. 25 : 47 D. None of these

13. A and B are two alloys of gold and copper prepared by mixing metals in proportions 7 : 2 and 7 : 11 respectively. If equal quantities of the alloys are melted to form a third alloy C, the proportion of gold and copper in C will be
A. 5 : 9 B. 5 : 7
C. 7 : 5 D. 9 : 5

14. Gold is 19 times as heavy as water and copper 9 times as heavy as water. The ratio in which these two metals be mixed so that the mixtures is 15 times as heavy as water is:
A. 1 : 2 B. 2 : 3
C. 3 : 2 D. 19 : 135

15. The contents of two vessels containing water and milk are in the ratio 1 : 2 and 2 : 5 are mixed in the ratio 1 : 4. The resulting mixture will have water and milk in the ratio:
A. 21 : 54 B. 31 : 74
C. 27 : 74 D. None of these

16. One year ago, the ratio between Mahesh and Suresh's salaries was 3 : 5. The ratio of their individual salaries of last year and present year are 2 : 3 and 4 : 5 respectively. If their total salaries for the present year are ₹ 4300, what is the present salary of Mahesh?
A. ₹ 1800 B. ₹ 1900
C. ₹ 1600 D. None of these

17. The ratio of P's and Q's income last year was 3 : 4. The ratio of their own incomes of last year and this year is 4 : 5 and 2 : 3 respectively. If the total sum of their present income is ₹ 4160. What is the present income of P?
A. ₹ 1500 B. ₹ 1400
C. ₹ 1600 D. None of these

18. The monthly salary of A, B, C is in the proportion of 2 : 3 : 5. If C's monthly salary is ₹ 1200 more than that of A, then B's annual salary is:
A. ₹ 14400 B. ₹ 24000
C. ₹ 1200 D. ₹ 2000

19. ₹ 1050 is divided among P, Q and R. The share of P is $\frac{2}{5}$ of the combined share of Q and R. Thus P gets:
A. ₹ 200 B. ₹ 300
C. ₹ 400 D. ₹ 420

20. The ratio between Sumit's and Prakash's age at present is 2 : 3. Sumit is 6 years younger than Prakash. The ratio of Sumit's age to Prakash's age after 6 years will be:
A. 1 : 2 B. 2 : 3
C. 3 : 4 D. 3 : 8

21. The ratio between the ages of Kamla and Savitri is 6 : 5 and the sum of their ages is 44 years. The ratio of their ages after 8 years will be:
A. 5 : 6 B. 7 : 8
C. 8 : 7 D. 14 : 13

22. Vinay got thrice as many marks in Maths as in English. The proportion of his marks in Maths and History is 4 : 3. If his total marks in Maths, English and History is 250 then, what is his marks in English?
A. 120 B. 90
C. 40 D. 80

23. The areas of two spheres are in the ratio 1 : 4, the ratio of their volumes is:
A. 1 : 2 B. 1 : 4
C. 1 : 8 D. 1 : 6

24. A certain amount was divided between Kavita and Reena in the ratio 4 : 3. If Reena's share was ₹ 2400, the amount is:
A. ₹ 5600 B. ₹ 3200
C. ₹ 9600 D. None of these

25. The prices of scooter and television set are in the ratio 3 : 2. If a scooter costs ₹ 6000 more than the television set, the price of the television set is:
A. ₹ 6000 B. ₹ 10000
C. ₹ 12000 D. ₹ 18000

26. In a class, the number of boys is more than the number of girls by 12% of the total strength. The ratio of the boys to girls is:
A. 11 : 14 B. 14 : 11
C. 25 : 28 D. 28 : 25

27. A right circular cylinder and a right circular cone have the same radius and the same volume. The ratio of the height of the cylinder to that of the cone is:
A. 3 : 5 B. 2 : 5
C. 3 : 1 D. 1 : 3

28. A circle and a square have same area. Therefore, the ratio of the side of the square and the radius of the circle is :
A. $\sqrt{\pi}:1$ B. $1:\sqrt{\pi}$
C. 1 : π D. π : 1

29. A, B and C can do a work in 20, 25 and 30 days respectively. They undertook to finish the work together for ₹ 2220, then the share of A exceeds that of B by:
A. ₹ 120 B. ₹ 180
C. ₹ 300 D. ₹ 600

30. A bag contains 25 paise, 10 paise and 5 paise coins in the ratio 1 : 2 : 3. If their total value is ₹ 30, the number of 5 paise coin is:
A. 50 B. 100
C. 150 D. 200

ANSWERS

1	2	3	4	5	6	7	8	9	10
C	C	B	B	D	D	B	C	A	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	C	C	C	B	A	C	C	B	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	C	C	A	C	B	D	A	B	C

EXPLANATORY ANSWERS

1. A : B = 6 : 7
B : C = 8 : 9
$\therefore$ A : B : C = 6 × 8 : 7 × 8 : 7 × 9
= 48 : 56 : 63

2. $$\text{Ratio} = \frac{20+\frac{5}{2}}{20-\frac{5}{2}} = \frac{22.5}{17.5}$$
$$= \frac{225}{175} = \frac{9}{7} = 9:7$$

3. We have, $0.7x = 0.075\ y$
$$\frac{x}{y} = \frac{0.075}{0.7} = \frac{75}{700}$$
$$= \frac{3}{28} = 3:28$$

4. 10% of $x = 20\%$ of y

$\Rightarrow \quad \frac{10}{100}x = \frac{20}{100}y$

$\therefore \quad \frac{x}{10} = \frac{y}{5}$

$\Rightarrow \quad \frac{x}{y} = \frac{10}{5} = \frac{2}{1} \Rightarrow x : y = 2 : 1$

5. Let the number be $3x$ and $5x$.

Then, $\frac{3x+10}{5x+10} = \frac{5}{7}$

$\Rightarrow \quad 7(3x + 10) = 5(5x + 10)$

$\Rightarrow \quad 21x + 70 = 25x + 50$

$\Rightarrow \quad 4x = 20 \Rightarrow x = 5$

So, the numbers are 15, 25.

6. Mean proportional

$= \sqrt{0.32 \times 0.02} = \sqrt{0.0064} = 0.08$

7. The ratio among the three numbers is

$2 : 3$

$5 : 8$

and $10 : 15 : 24$

$\therefore$ The second number

$= \frac{98}{10+15+24} \times 15 = 30$

8. Strength of milk in the first mixture

$= \frac{12}{12+3} = \frac{12}{15}$

Strength of milk in the second mixture

$= \frac{10}{10+4} = \frac{10}{14}$

$\therefore$ The ratio of their strengths

$= \frac{12}{15} : \frac{10}{14}$

$= 12 \times 14 : 15 \times 10 = 28 : 25$

9. The ratio of shares of group of men, women and boys

$= 9 \times 4 : 8 \times 5 : 4 \times 6$

$= 9 : 10 : 6$

$\therefore$ Share of 5 women

$= \frac{425}{9+10+6} \times 10 = ₹\ 170$

$\therefore$ Share of 1 woman

$= \frac{170}{5} = ₹\ 34.$

10. Let the vessel contains $5x$ litres and $3x$ litres of liquid P and Q respectively. The removed quantity contains

$\frac{16}{5+3} \times 5 = 10$ litres of P

and $16 - 10 = 6$ litres of Q.

Now, $(5x - 10) : (3x - 6 + 16) = 3 : 5$

$\Rightarrow \quad \frac{5x-10}{3x+10} = \frac{3}{5}$

$\Rightarrow \quad 25x - 50 = 9x + 30$

$\Rightarrow \quad 16x = 80 \Rightarrow x = 5$

$\therefore$ Vessel contains $8x = 8 \times 5 = 40$ litres.

11. Let the two liquids P and Q are $7x$ litres and $5x$ litres repectively.

Now, when 9 litres of mixture are taken out,

P remains $7x - 9\left(\frac{7}{7+5}\right)$

$= 7x - \frac{9 \times 7}{12} = \left(7x - \frac{21}{4}\right)$ litres

and Q remains $5x - 9\left(\frac{5}{7+5}\right)$

$= 5x - \frac{9 \times 5}{12} = \left(5x - \frac{15}{4}\right)$ litres

Now, when 9 litres of liquid Q are added,

$\left(7x - \frac{21}{4}\right) : \left(5x - \frac{15}{4} + 9\right) = 7 : 9$

$\Rightarrow \quad \frac{7x - \frac{21}{4}}{5x - \frac{15}{4} + 9} = \frac{7}{9}$

$\Rightarrow \quad 63x - \frac{189}{4} = 35x + \frac{147}{4}$

$\Rightarrow \quad 28x = \frac{189}{4} + \frac{147}{4} = \frac{336}{4} = 84$

$\Rightarrow \quad x = \frac{84}{28} = 3$

$\Rightarrow \quad 7x = 7 \times 3 = 21$ litres.

12. P : Q : R
2 : 3 : 4
Spirit : Water = 1 : 5, 3 : 5 and 5 : 7
When they are mixed, the ratio of spirit to water

$$= \left(2\times\frac{1}{1+5}+3\times\frac{3}{3+5}+4\times\frac{5}{5+7}\right) : \left(2\times\frac{5}{1+5}+3\times\frac{5}{3+5}+4\times\frac{7}{5+7}\right)$$

$$= \left(\frac{1}{3}+\frac{9}{8}+\frac{5}{3}\right):\left(\frac{5}{3}+\frac{15}{8}+\frac{7}{3}\right)$$

$$= \frac{25}{8}:\frac{47}{8} = 25 : 47$$

13. Gold in C $= \left(\frac{7}{9}+\frac{7}{18}\right) = \frac{21}{18} = \frac{7}{6}$

Copper in C $= \left(\frac{2}{9}+\frac{11}{18}\right) = \frac{15}{18} = \frac{5}{6}$

$\therefore$ Gold : Copper $= \frac{7}{6}:\frac{5}{6} = 7 : 5$

14. Let 1 gm of gold be mixed with x gm of copper to give $(1 + x)$ gm of mixture.
Now, $1G = 19w$
and $1C = 9w$
and mixture $= 15w$
Now, 1 gm gold + x gm copper
$= (1 + x)$ gm mixture
$\therefore 19w + 9w \times x = (1 + x) \times 15w$
Thus, $4w = 6wx$

$$\Rightarrow \quad x = \frac{4w}{6w} = \frac{4}{6} = \frac{2}{3}$$

So, the required ratio is $1:\frac{2}{3}$, *i.e.*, 3 : 2.

15.

	Water	***Milk***
Vessel I	$\frac{1}{3}$	$\frac{2}{3}$
Vessel II	$\frac{2}{7}$	$\frac{5}{7}$

From vessel I, $\frac{1}{5}$ is taken and from vessel II, $\frac{4}{5}$ is taken. Therefore, the ratio of water to milk in the new vessel

$$= \left(\frac{1}{3}\times\frac{1}{5}+\frac{2}{7}\times\frac{4}{5}\right):\left(\frac{2}{3}\times\frac{1}{5}+\frac{5}{7}\times\frac{4}{5}\right)$$

$$= \left(\frac{1}{15}+\frac{8}{35}\right):\left(\frac{2}{15}+\frac{20}{35}\right) = \frac{31}{105}:\frac{74}{105}$$

$= 31 : 74$

16. The ratio of Mahesh's salary for the two years $= 2 : 3$
The ratio of Suresh's salary for the two years $= 4 : 5$
We have also given that the ratio of their salary during the last year $= 3 : 5$
Now, we change the antecedents (2 and 4) of the first two ratios so that the antecedents in the first becomes 3 (antecedent of the third ratio) and the antecedent in the second becomes 5 (consequent of the third ratio).

Thus, $2 : 3 = 3:\frac{9}{2}$

and $4 : 5 = 4\left(\frac{5}{4}\right):5\left(\frac{5}{4}\right) = 5:\frac{25}{4}$

Now, it is clear that the ratio of their salaries for the present year is $\frac{9}{2}:\frac{25}{4} = 18 : 25$

$\therefore$ The present salary of Mahesh

$$= \frac{4300}{18+25}\times 18 = ₹\ 1800$$

17. The ratio of present incomes

$$= 3\times\frac{5}{4}:4\times\frac{3}{2} = \frac{15}{4}:\frac{12}{2} = 30 : 48 = 5 : 8$$

$\therefore$ P's present income $= \frac{4160}{5+8}\times 5 = ₹\ 1600$

18. Let the monthly salary of A, B, C be $2x$, $3x$ and $5x$
Then, $5x - 2x = 1200$
or, $3x = 1200 \quad \therefore\ x = 400$
B's monthly salary $= 3x = 3 \times 400 = ₹\ 1200$

19. P : (Q + R) = 2 : 5

$\therefore$ P's share $= \text{Rs.}\left(1050\times\frac{2}{7}\right) = ₹\ 300$

20. Let their ages be $2x$ and $3x$ years.

$\Rightarrow \quad 3x - 2x = 6 \Rightarrow x = 6$

Sumit's age = 12 years

Prakash's age = 18 years

After 6 years, Sumit's age = 18 years and Prakash's age = 24 years

$\therefore$ Ratio of their ages = 18 : 24 = 3 : 4

21. Let their ages be $6x$ and $5x$ years.

$\therefore \quad 6x + 5x = 44$

$\Rightarrow \quad 11x = 44 \Rightarrow x = 4$

So, their present ages are 24 years and 20 years

$\therefore$ Ratio of their ages after 8 years

= 32 : 28 = 8 : 7

22. M = 3E and $\frac{M}{H} = \frac{4}{3}$

$\therefore \quad H = \frac{3}{4}M = \frac{3}{4} \times 3E = \frac{9}{4}E$

Now, M + E + H = 250

$\Rightarrow 3E + E + \frac{9}{4}E = 250$

$\therefore \quad 25E = 1000$ or, E = 40

23. $\frac{4\pi r^2}{4\pi R^2} = \frac{1}{4}$

$\therefore \quad \frac{r^2}{R^2} = \frac{1}{4}$ and so $\frac{r}{R} = \frac{1}{2}$

$\therefore \quad \frac{r^3}{R^3} = \frac{1}{8}$

Hence, $\frac{\frac{4}{3}\pi r^3}{\frac{4}{3}\pi R^2} = \frac{1}{8}$

Thus, their volumes are in the ratio 1 : 8.

24. Let their shares be ₹ $4x$ and ₹ $3x$

Then, $\quad 3x = 2400 \Rightarrow x =$ ₹ 800

$\therefore$ Total amount = $7x = 7 \times 800 =$ ₹ 5600

25. Let the price of a scooter be ₹ $3x$ and that of a television set be ₹ $2x$

Then, $\quad 3x - 2x = 6000$

$\Rightarrow \quad x = 6000$

$\therefore$ Cost of a television set

$= 2x = 2 \times 6000 =$ ₹ 12000.

26. Let the number of boys and girls be x and y respectively.

Then, $\quad (x - y) = 12\%$ of $(x + y)$.

$\Rightarrow \quad x - y = \frac{3}{25}(x + y)$

$\Rightarrow \quad 25x - 25y = 3x + 3y$

$\Rightarrow \quad 22x = 28y$

$\Rightarrow \quad \frac{x}{y} = \frac{28}{22} = \frac{14}{11}$

$\Rightarrow \quad$ Ratio = 14 : 11

27. Let the heights of the cylinder and cone be h and H respectively.

Then, $\quad \pi r^2 h = \frac{1}{3}\pi r^2 H \quad \Rightarrow \frac{h}{H} = \frac{1}{3}$

So, their heights in the ratio = 1 : 3

28. Let the side of the square be x and the radius of the circle be y. Then,

$x^2 = \pi y^2$

$\Rightarrow \quad \frac{x^2}{y^2} = \pi \quad \Rightarrow \frac{x}{y} = \sqrt{\pi}$

$\therefore \quad x : y = \sqrt{\pi} : 1$

29. Ratio of shares of A, B, and C

$= \frac{1}{20} : \frac{1}{25} : \frac{1}{30} = 15 : 12 : 10$

$\therefore \quad$ A's share = Rs. $\left(2220 \times \frac{15}{37}\right) =$ ₹ 900

B's share = $\left(2220 \times \frac{12}{37}\right) =$ ₹ 720

Thus, the share of A exceeds that of B by ₹ (900 – 720) = ₹ 180.

30. Ratio of their values = $\frac{1}{4} : \frac{2}{10} : \frac{3}{20} = 5 : 4 : 3$

$\therefore$ Value of 5 paise coins = Rs. $\left(30 \times \frac{3}{12}\right)$

= ₹ 7.50

$\therefore$ Number of 5 paise coins = $\frac{750}{5} = 150.$

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5 Problem of Age

Important Facts

1. The present age of the father is x times the age of his son. T years hence, the father's age become y times the age of his son. Then the present ages of the father and his son are:

Present age of the son = $\frac{(y-1)\mathrm{T}}{x-y}$ years and age of the father = $\frac{(y-1)\,\mathrm{T}\times y}{x-y}$ years

2. T years ago, the father's age was x times that of his son and at present the father's age is y times the age of his son. Then their present ages are:

Son's age = $\frac{\mathrm{T}(x-1)}{x-y}$ years; Father's age = $\frac{\mathrm{T}(x-1)}{x-y}\times y$ years.

Multiple Choice Questions

1. The present ages of Sunil and Anil are 40 and 60 years respectively. How many years ago was the ratio of their ages 3 : 5?
A. 5 years B. 10 years
C. 12 years D. 15 years

2. The ratio of present ages of two brothers is 1 : 2 and 5 years ago the ratio was 1 : 3. What will be the ratio of their ages after 5 years?
A. 1 : 4 B. 2 : 3
C. 3 : 5 D. 5 : 6

3. The ratio of ages of Mohan and Sohan is 3 : 4. Four years ago the ratio was 5 : 7. Find the present ages of Mohan and Sohan.
A. 24 years, 32 years B. 20 years, 30 years
C. 25 years, 30 years D. None of these

4. The ratio of ages of A and B is 3 : 11. After 3 years the ratio becomes 1 : 3. What are the ages of A and B?
A. 9 years, 33 years B. 10 years, 40 years
C. 9 years, 27 years D. None of these

5. In 10 years A will be twice as old as B was 10 years ago. If A is now 9 years older than B, what is the present age of B?
A. 38 years B. 39 years
C. 40 years D. 41 years

6. Radha get married 6 years ago. Today her age is $1\frac{1}{4}$ times her age at the time of marriage. Her son's age is $\frac{1}{10}$ times her age. Her son's age is:
A. 1 year B. 2 years
C. 3 years D. 4 years

7. Two years ago, the ratio of Ram's and Mohan's age was 3 : 2 and at present 7 : 5. What are their present ages?
A. 14 years, 10 years
B. 15 years, 10 years
C. 13 years, 9 years
D. None of these

8. Keshava is as much younger to Gopal as he is older to Madhava. If the sum of the ages of Gopal and Madhava is 48 years, what is the age of Keshava?
A. 21 years B. 22 years
C. 23 years D. 24 years

9. One year ago, the ratio of Yamini and Gamini's was 6 : 7 respectively. Four year hence, the ratio would become 7 : 8. Find the age of Gamini?
A. 30 years B. 32 years
C. 36 years D. 40 years

10. The ages of Samir and Saurabh are in the ratio of 8 : 15 respectively. After 9 years the ratio of their ages will be 11 : 18. What is the difference between their ages in years?
A. 20 years B. 21 years
C. 22 years D. 24 years

11. The ratio of the present ages of Suresh and his daughter is 2 : 1. Six years hence, the ratio of their ages would be 23 : 13. Find the present age of Suresh?
A. 35 years B. 40 years
C. 45 years D. 50 years

12. The ages of Surabhi and Neerja are in the ratio of 6 : 7 respectively. After 6 years the ratio of their ages will be 15 : 17. Find the age of Neerja.
A. 24 years B. 26 years
C. 28 years D. 32 years

13. The average age of a woman and her daughter is 42 years. The ratio of their ages is 2 : 1 respectively. Find the daughter's age.
A. 24 years B. 28 years
C. 30 years D. 32 years

14. The ages of A and B are in the ratio of 11 : 13 respectively. After 7 years the ratio of their ages will be 20 : 23. What is the difference in years between their ages?
A. 4 years B. 5 years
C. 6 years D. 7 years

15. The present age of father is 34 years more than that of his son. 12 years ago, father's age was 18 times the age of his son. The present age of son in years is:
A. 12 B. 14
C. 16 D. 18

16. The ratio of the ages of two persons is 4 : 7 and age of one of them is more than other by 30 years. The sum of their ages in years is:
A. 100 B. 110
C. 120 D. 130

17. A father is older than his first son by 30 years, the first son is older than the second son by 10 years. If the sum of their ages be 95 years, find the age of father.
A. 45 years B. 50 years
C. 55 years D. 65 years

18. The present age of Deepak is 3 times the present age of his son. Five years hence, the ratio of their ages will be 34 : 13 respectively. The present age of Deepak is:
A. 58 years B. 60 years
C. 63 years D. 68 years

19. A mother is 25 years older than her daughter. Five years ago, the age of the mother was 6 times the age of the daughter. What is the present age of mother?
A. 25 years B. 29 years
C. 32 years D. 35 years

20. Five years ago, Mayank's mother was three times as old as Mayank. After five years she will be twice as old as Mayank. The present age of Mayank is:
A. 13 years B. 15 years
C. 20 years D. 30 years

21. The average age of A, B and C is 25 years. The ratio of their age is 3 : 5 : 7. What is the age of A?
A. 12 years B. 15 years
C. 18 years D. 21 years

22. The difference between the present ages of P and Q is 4 years. The ratio of their ages after 5 years will be 9 : 8. The present age of P is:
A. 24 years B. 30 years
C. 32 years D. 31 years

23. The present age of a father is three times the age of his son. Five years ago, father's age was four times the age of the son. What is the present age of son?
A. 20 years B. 18 years
C. 15 years D. 12 years

24. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages was four times the father's age at that time. What are their present ages?
A. 35 years, 10 years B. 36 years, 9 years
C. 37 years, 8 years D. 39 years, 6 years

25. The mother is five times older than her son. After 4 years, the sum of their ages will be 44 years. What is the present age of the son?
A. 5 years B. 6 years
C. 7 years D. 8 years

26. The difference between the present ages of Arun and Barun is 14 years. Seven years ago the ratio of their ages was 5 : 7 respetively. The present age of Barun is :
A. 35 years B. 42 years
C. 49 years D. 56 years

27. The respective ratio of the ages of Shami, Nammi and Pammi is 3 : 4 : 5. The sum of their ages is 48 years. What will be the respective ratio of their ages 8 years hence?
A. 4 : 5 : 6 B. 5 : 6 : 7
C. 5 : 7 : 8 D. 6 : 7 : 8

28. The ratio between the ages of Ram and Mohan is 4 : 5 and that between Mohan and Anil is 5 : 6. If sum of the ages of three be 90 years, what is the age of Mohan?
A. 20 years B. 24 years
C. 25 years D. 30 years

29. Three years ago, the average age of a family of five members was 17 years. A baby having been born, the average age of the family is the same as what was three years ago. The present age of the baby is:
A. 6 months B. 9 months
C. 1 year D. 2 years

30. 5 years ago, the average age of Ram and Shyam was 20 years. Now, the average age of Ram, Shyam and Mohan is 30 years. What will be Mohan's age 10 years hence?
A. 50 years B. 45 years
C. 40 years D. 35 years

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	C	A	A	B	C	A	D	C	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	C	B	C	B	B	C	C	D	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	D	C	B	B	D	B	D	D	A

EXPLANATORY ANSWERS

1. Let x years ago, the ratio of their ages was 3 : 5, then

$$\frac{40-x}{60-x} = \frac{3}{5}$$

$\Rightarrow$ $200 - 5x = 180 - 3x$

$\Rightarrow$ $2x = 20$

$\therefore$ $x = 10$ years

2. Let their present ages be x and $2x$ years; then

$$\frac{x-5}{2x-5} = \frac{1}{3} \Rightarrow 3x - 15 = 2x - 5$$

$\therefore$ $x = 10$

Hence, their present ages 10 years and 20 years

Required ratio = $\frac{10+5}{20+5} = \frac{3}{5} = 3 : 5$

3. Let the ages of Mohan and Sohan be $3x$ years and $4x$ years;

then, $\frac{3x-4}{4x-4} = \frac{5}{7}$

$\Rightarrow$ $21x - 28 = 20x - 20$ $\therefore$ $x = 8$

Hence, their present ages,

$3x = 3 \times 8 = 24$ years;

$4x = 4 \times 8 = 32$ years.

So, their ages 24 and 32 years.

4. Let the ages of A and B be $3x$ and $11x$ years; then

$$\frac{3x+3}{11x+3}=\frac{1}{3}$$

$\Rightarrow \quad 9x + 9 = 11x + 3 \Rightarrow 2x = 6$

$\therefore \quad x = 3$

Hence, their present age,

$3x = 3 \times 3 = 9$ years;

$11x = 11 \times 3 = 33$ years

5. Let the present age of B and A be x and $(x + 9)$ years; then,

$2(x - 10) = x + 19$

$\Rightarrow \quad 2x - x = 19 + 20$

$\therefore \quad x = 39$ years

6. Let the present age of Radha be x years; then

$$\frac{5}{4}(x-6)=x \Rightarrow 5x-30=4x$$

$\therefore \quad x = 30$ years

Hence, her son's age $= \frac{1}{10} \times 30 = 3$ years

7. Let the present ages of Ram and Mohan are $7x$ and $5x$ years; then

$$\frac{7x-2}{5x-2}=\frac{3}{2}$$

$\Rightarrow \quad 14x - 4 = 15x - 6$

$\therefore \quad x = 2$

Hence, their present ages : $7 \times 2 = 14$ years and $5 \times 2 = 10$ years

8. Let the present ages of Madhava, Keshava and Gopal are a, b and c years respectively, then

$b - a = c - b$

$\Rightarrow \quad 2b = a + c \ \therefore \ b=\frac{a+c}{2}$

Hence, the age of Keshava $= \frac{48}{2} = 24$ years

9. Let one year ago the ages of Yamini and Gamini were $6x$ and $7x$ years respectively; then

$$\frac{6x+5}{7x+5}=\frac{7}{8}$$

$\Rightarrow \quad 48x + 40 = 49x + 35$

$\therefore \quad x = 5$

Hence, present ago of Gamini

$= 7x + 1 = 7 \times 5 + 1 = 36$ years

10. Let the present ages of Samir and Saurabh are $8x$ and $15x$ years respectively; then

$$\frac{8x+9}{15x+9}=\frac{11}{18}$$

$\Rightarrow \quad 144x + 162 = 165x + 99$

$\Rightarrow \quad 21x = 63 \ \therefore \ x = 3$

Hence, difference of their ages

$= 15x - 8x = 7x = 7 \times 3 = 21$ years

11. Let the present ages of Suresh and his daughter be $2x$ and x years respectively; then

$$\frac{2x+6}{x+6}=\frac{23}{13}$$

$\Rightarrow \quad 26x + 78 = 23x + 138$

$\Rightarrow \quad 3x = 60 \ \therefore \ x = 20$

Hence, present age of Suresh

$= 2 \times 10 = 40$ years

12. Let the present ages of Surabhi and Neerja are $6x$ and $7x$ years respectively; then,

$$\frac{6x+6}{7x+6}=\frac{15}{17}$$

$\Rightarrow \quad 102x + 102 = 105x + 90$

$\Rightarrow \quad 3x = 12 \ \therefore \ x = 4$

Hence, present ages of Neerja

$= 7 \times 4 = 28$ years

13. Let the present ages of woman and her daugher be $2x$ and x years respectively; then

$2x + x = 2 \times 42$

$\Rightarrow \quad 3x = 84 \ \therefore \ x = 28$

Hence, present age of her daughter = 28 years

14. Let the present ages of A and B are $11x$ and $13x$ years respectively; then

$$\frac{11x+7}{13x+7}=\frac{20}{23}$$

$\Rightarrow \quad 253x + 161 = 260x + 140$

$\Rightarrow \quad 7x = 21 \ \therefore \ x = 3$

Hence, difference of their ages

$= 13x - 11x = 2x = 2 \times 3 = 6$ years

15. Let the present ages of father and his son be $x + 34$ and x years respectively; then

$18(x - 12) = x + 34 - 12$

$\Rightarrow \quad 18x - 216 = x + 22$

$\Rightarrow \quad 17x = 238 \ \therefore \ x = 14$

Hence, present age of his son = 14 years

16. Let the present ages of two persons be $4x$ and $7x$ years respectively; then

$7x - 4x = 30$

$\Rightarrow \quad 3x = 30 \quad \therefore \ x = 10$

Hence, sum of their ages

$= 4x + 7x = 11x$

$= 11 \times 10 = 110$ years.

17. Let ages of father and his two sons are x, $(x - 30)$ and $(x - 40)$ years respectively; then

$(x + x - 30) + x - 40 = 95$

$\Rightarrow \quad 3x = 165 \quad \therefore \ x = 55$

Hence, age of the father = 55 years.

18. The present age of Deepak and his son be $3x$ and x years respectively; then

$$\frac{3x+5}{x+5} = \frac{34}{13}$$

$\Rightarrow \quad 39x + 65 = 34x + 170$

$\Rightarrow \quad 5x = 105 \therefore \ x = 21$

Hence, present age of Deepak

$= 3x = 3 \times 21 = 63.$

19. Let the present ages of mother and her daughter are $(x + 25)$ and x years respectively; then

$6(x - 5) = x + 25 - 5$

$\Rightarrow \quad 6x - 30 = x + 20$

$\Rightarrow \quad 5x = 50 \ \therefore \ x = 10$

Hence, the age of the mother

$= 10 + 25 = 35$ years.

20. Let the present ages of Mayank and his mother are x and $3(x - 5)$ years respectively; then

$\Rightarrow \quad 2(x + 5) = 3(x - 5) + 5$

$\Rightarrow \quad 2x + 10 = 3x - 15 + 5 \ \therefore \ x = 20$

Hence, present age of Mayank = 20 years.

21. Let the present ages of A, B and C are $3x$, $5x$ and $7x$ years respectively; then

$3x + 5x + 7x = 3 \times 25$

$\Rightarrow \quad 15x = 75 \ \therefore \ x = 5$

Hence, age of A $= 3x = 3 \times 5 = 15$ years

22. Let the present ages of P and Q be $(x + 4)$ and x years; then, $\dfrac{x+4+5}{x+5} = \dfrac{9}{8}$

$\Rightarrow \quad 8x + 72 = 9x + 45 \quad \therefore \ x = 27$

Hence, present age of P $= 27 + 4 = 31$ years

23. Let the present age of father and his son are $3x$ and x years respectively; then

$4(x - 5) = 3x - 5 \Rightarrow 4x - 20 = 3x - 5$

$\therefore \ x = 15$ years

24. Let the present ages of father and his son be x and $(45 - x)$ years respectively; then

$(x - 5)(45 - x - 5) = 4(45 - x - 5)$

$\Rightarrow x - 5 = 4 \therefore \ x = 9$

Now, son's age $= 45 - x = 45 - 9 = 36$ years

25. Let the present ages of mother and her son be $5x$ and x years respectively; then

$5x + 4 + x + 4 = 44 \Rightarrow 6x = 36 \ \therefore \ x = 6$ years

26. Let the present ages of Arun and Barun are x and $x + 14$ years respectively; then

$$\frac{x-7}{x+14-7} = \frac{5}{7}$$

$\Rightarrow \quad 7x - 49 = 5x + 35$

$\Rightarrow \quad 2x = 84$

$\therefore \quad x = 42$

Hence, age of Barun $= 42 + 14 = 56$ years

27. Let the present ages of Shami, Nammi and Pammi are $3x$, $4x$ and $5x$ years respectively; then, $3x + 4x + 5x = 48$

$\Rightarrow \quad 12x = 48 \ \therefore \ x = 4$

Hence, their present ages are 12, 16 and 20 years respectively.

So, required ratio

$= (12 + 8) : (16 + 8) : (20 + 8)$

$= 20 : 24 : 28 = 5 : 6 : 7$

28. Here, ratio of ages of Ram, Mohan and Anil $= 4 : 5 : 6$

Let their present ags be $4x$, $5x$ and $6x$ years respectively;

then $4x + 5x + 6x = 90$

$\Rightarrow 15x = 90 \quad \therefore \ x = 6$

Hence, age of Mohan $= 5 \times 6 = 30$ years

29. The present age of baby

$= 17 \times 6 - 20 \times 5 = 2$ years

30. The present age of Mohan

$= 3 \times 30 - 2 \times 25 = 90 - 50 = 40$ years

10 years hence, the age of Mohan

$= 40 + 10 = 50$ years

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6 Probability

- **Random Experiment:** If the result of an experiment is not certain and is any one of the several possible outcomes, the experiment is called a trial or a random experiment.
- **Sample Space:** The set of all possible outcome of an experiment is called the sample space provided no two or more of these outcomes can occur simultaneously and exactly one of these outcomes must occur whenever the experiment is conducted.
- **Events:** The outcomes of an experiment, *i.e.*, sample points of the sample space are usually known as simple events and any subset of the sample space 'S' is called an event.

  Thus throwing of a dice is an experiment, S = {1, 2, 3, 4, 5, 6} is the sample space, {1}, ... {6} are simple events and {1, 2}, etc., are events. The empty set ϕ is also an event as $\phi \subset S$ and it is called an impossible event. The sample space S is also a subset of S and so it is also an event. S represents the sure event, *i.e.*, certainty.
- **Equally Likely Events:** A set of events is said to be equally likely if taking into consideration all the relevant factors there is no reason to expect one of them in preference to others.

  For example, when a fair coin is tossed, the occurrence of a tail or a head are equally likely.
- **Exhaustive Events:** A set of events is said to be exhaustive if the performance of the experiment always results in the occurrence of atleast one of them.

  For example, if we throw a dice, then the events $A_1 = \{1, 2\}$, $A_2 = \{2, 3, 3\}$ are not exhaustive as we can get 5 as outcome of the experiment which is not the member of any of the events A_1 and A_2. If we consider the events $E_1 = \{1, 2, 3\}$ and $E_2 = \{2, 4, 5, 6\}$, then the set E_1, E_2, is exhaustive.
- **Mutually Exclusive Events:** A set of events is said to be mutually exclusive if they have no point in common, *i.e.*, happening of one of them eliminates the happening of any of the remaining events. Thus E_1, E_2, E_3, ... are mutually exclusive iff $E_i \cap E_j = \phi$ for $i \neq E_1$ and E_2 are mutually exclusive.
- **Complement of An Events:** The complement of an event A, denoted by $\overline{A}$, A' or A^c, is the set of all sample points of the space other than the sample points in A.

  e.g., In the experiment of throwing a fair dice, S = {1, 2, 3, 4, 5, 6}. If A = {1, 3, 5, 6}, then $\overline{A}$ = {2, 4}

  Note that $A \cap \overline{A} = S$.
- **Classical Definition of Probability:** If there are *n* exhaustive mutually exclusive and equally likely outcomes of an experiment and *m* of them are favourable to an event A, the probability of the happening of A is defined as the ratio *m*/*n*.

  Thus, denoting the probability of the happening of an event A by *p*, we have $p = m/n$.

  Clearly *p* is a positive number not greater than unity, so that $0 \leq p \leq 1$.

  Since the number of cases in which the event A will not happen is $n - m$, the probability *q* that the event will not happen is given by

  $$q = \frac{(n-m)}{n} = 1 - \frac{m}{n} = 1 - p. \therefore p + q = 1$$

  If probability of happening of an event A is 1, then A is certain event and if probability of

happening of an event A is 0, then A is impossible event.

- **Odds in Favour and Odds against an Event:** As a result of an experiment if a of the outcomes are favourable to an event E and b of the outcomes are against it, then we say that odds are a to b in favour of E or odds are b to a against E.

  Thus, odds in favour of an event E

  $$= \frac{\text{number of favourable cases}}{\text{number of unfavourable cases}}.$$

  Similarly, odds against an event E

  $$= \frac{\text{number of unfavourable cases}}{\text{number of favourable cases}}.$$

  If odds in favour of an event are $a : b$ then the probability of the occurrence of that event is $\frac{a}{a+b}$ and the probability of the non-occurrence of that event is $\frac{b}{(a+b)}$.

- **Addition Theorem:**
  - (a) If 'A' and 'B' are any two events in a sample space S, then $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.
  - (b) If 'A' and 'B' are mutually exclusive then $P(A \cap B) = 0$ so that $P(A \cup B) = P(A) + P(B)$.
  - (c) If A is any event in S, then $P(A') = 1 - P(A)$.
- **Total Probability Theorem:** The probability that one of several mutually exclusive events $A_1, A_2, ..., A_n$ will happen, is the sum of the probabilities of the separate events. In symbol, $P(A_1 + A_2 + ... + A_n) = P(A_1) + P(A_2) + ... + P(A_n)$.
- **Conditional Probability:** The probability of B under the assumption that A has occurred is called the conditional probability of B under the condition that the event A has taken place and is denoted by P(B/A). P(B/A) is read as "probability at the event B given A^B."
- **Conditional Probability Theorem:** If A and B are any two events in the sample space S, the conditional probability of B relative to A is given by $P(B/A) = \frac{P(B \cap A)}{P(A)} = \frac{n(B \cap A)}{n(A)}$, $A \neq \phi$.
- **Some Important Remarks about Coins, Dice and Playing Cards:**
  - (a) **Coins:** A coin has a head side and a tail side. If an experiment consist of more than a coin, coins are considered to be distinct if not otherwise stated.
  - (b) **Dice:** A die (cubical) has six faces marked 1, 2, 3, 4, 5, 6. We may have tetrahedral (having four faces 1, 2, 3, 4) or pentagonal (having five faces 1, 2, 3, 4, 5) die. As in the case of dice, if we have more than one die, all dice are considered to be distinct if not otherwise stated.
  - (c) **Playing Cards:** A pack of playing cards usually contain 52 cards.

    There are 4 suits (spade, heart, diamond and club) each having 13 cards. There are two colours — red (heart and diamond) and black (spade and club) each having 26 cards.

    In thirteen cards of each suit, there are 3 face cards namely king, queen and jack, so there are in all 12 face cards (4 kings, 4 queens and 4 jacks).

    Also there are 16 honours cards, 4 of each suit namely ace, king, queen and jack.

Multiple Choice Questions

1. Two dice are thrown simultaneously. The probability of obtaining a total score of 5 is

A. 1/18 B. 1/12
C. 1/9 D. None of these

2. Two dice are thrown simultaneously. The probability of obtaining total score of seven is

A. 5/6 B. 1/6
C. 1/7 D. 7/6

3. A card is drawn at random from a pack of 100 cards numbered 1 to 100. The probability of drawing a number, which is a square, is
A. 1/5 B. 2/5
C. 1/10 D. None of these

4. The probability of an event happening in one trial of an experiment is 0.6. Three independent trials are made. The probability that the event happens at least once is
A. 0.432 B. 0.064
C. 0.936 D. 0.568

5. One of the two exclusive events must occur the chance of one is 2/3 of the other, then odds in favour of the other are
A. 1 : 3 B. 3 : 1
C. 2 : 3 D. 3 : 2

6. Twelve coupons are numbered from 1 to 12. Six coupons are selected at random one at a time with replacement. The probability that the largest number appearing on a selected coupon is less than or equal to 8, is
A. $(2/3)^6$ B. $(7/12)^6$
C. 1/33 D. None of these

7. Seven chits are numbered 1 to 7. Four are drawn one by one with replacements. The probability that the least number on any selected chits is 5 is
A. $1 - (2/7)^4$ B. $4.(2/7)^4$
C. $(3/7)^4$ D. None of these

8. A bag contains 3 red, 4 white and 5 blue balls. All balls are different. Two balls are drawn at random. The probability that they are of different colours is
A. 47/66 B. 10/33
C. 5/22 D. None of these

9. The probabilities of three mutually exclusive events A, B and C are given by 2/3, 1/4 and 1/6 respectively. The statement
A. is true
B. is false
C. Nothing can be said
D. Could be either

10. A five digit number is formed by the digits 1, 2, 3, 4, 5, 6 and 8. The probability that the number has even digit at both ends is
A. 2/7 B. 3/7
C. 4/7 D. None of these

11. Three identical dice are rolled. The probability that the same number will appear on each of them is
A. 1/6 B. 1/18
C. 1/36 D. None of these

12. Three cards are drawn successively with replacement. The probability of selecting 2 aces and one king is
A. $1/\{(13)^2 \times 17\}$ B. $1/(13)^3$
C. $3/(13)^3$ D. None of these

13. If an integer p is chosen at random in the interval $0 \le p \le 5$, the probability that the roots of the equation $x^2 + px + p/4 + 1/2 = 0$ are real is
A. 4/5 B. 2/3
C. 3/5 D. None of these

14. There are 4 white and 4 black balls in a bag and 3 balls are drawn at random. If balls of same colour are identical, the probability that none of them is black, is
A. 1/4 B. 1/14
C. 1/2 D. None of these

15. Two events A and B have probabilities 0.25 and 0.50 respectively. The probability that both A and B occur simultaneously is 0.12. Then the probability that neither A nor B occurs is
A. 0.13 B. 0.38
C. 0.63 D. 0.37

16. The odds in favour of A solving a problem are 3 to 4 and the odds against B solving the same problem are 5 to 7. If they both try the problem, the probability that the problem is solved is
A. 41/84 B. 16/21
C. 5/21 D. 1/4

17. Cards are drawn from a pack of 52 cards one by one. The probability that exactly 10 cards will be drawn before the first ace is
A. 241/1456
B. 164/4165
C. 451/884
D. None of these

18. From eighty cards numbered 1 to 80, two cards are selected randomly. The probability that both the cards have the numbers divisible by 4 is given by
A. 21/316 B. 19/316
C. 1/4 D. None of these

19. A cubical dice is thrown 6 times. The probability that 2 and 4 will turn up exactly 3 times each is given by
A. 5/11664 B. 1/46656
C. 1/5184 D. None of these

20. The probability that an event A happens in one trial of an experiment is 0.7. Three independent trials of the experiment are performed. The probability that the event A happens atleast once is
A. 0.657 B. 0.973
C. 0.189 D. None of these

21. The probability of a problem being solved by two students are 1/2, 1/3. The probability of the problem being solved is
A. 2/3 B. 4/3
C. 1/3 D. 1

22. Let A and B be two events such that P(A) = 0.4, P(B) = 0.3 and P(A $\cup$ B) = 0.7. Then
A. A and B are independent
B. A and B are exhaustive
C. A and B are mutually exclusive
D. None of these

23. Probability of happening of at least one of the events is 0.6 and their simultaneous happening is 0.2. Then the value of P(A) + P(B) is
A. 0.8 B. 0.6
C. 0.2 D. 0.4

24. If the probabilities that A and B will die within a year are p and q respectively, then the probability that only one of them will be alive at the end of the year is
A. $p + q$ B. $p + q - 2pq$
C. $p + q - pq$ D. $p + q + pq$

25. A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six, the probability that it is actually a six is
A. 3/8 B. 1/5
C. 3/5 D. None of these

26. An urn contains 8 blue and 4 green balls. Two balls are drawn at random. The probability that both balls are of the same colour (all balls are considered to be different) is
A. 17/33 B. 1/33
C. 14/33 D. 1/11

27. In order to get at least once a head with probability ≥ 0.9, the number of times a coin needs to be tossed is
A. 3 B. 4
C. 5 D. None of these

28. From a pack of cards, 2 are drawn at random one by one with replacement. The probability that first is heart and 2nd is king is
A. 1/26 B. 1/52
C. 1/13 D. None of these

29. A dice is thrown. Consider two events A = {1, 2, 3, 4}, B = {4, 5, 6}. Then the events A and B are
A. independent B. dependent
C. mutually exclusive D. exhaustive

30. Host, his wife and 8 guests are to be seated on a round dining table at random. The probability that the host and his wife sit together is
A. 1/9 B. 2/9
C. 1/5 D. 1/10

ANSWERS

1	2	3	4	5	6	7	8	9	10
C	B	C	C	D	A	C	A	B	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	C	B	A	D	B	B	B	A	B
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
A	C	A	B	A	A	B	B	D	B

EXPLANATORY ANSWERS

1. Total ways = 6 × 6 = 36
Total 5 can be obtained in the following 4 ways : 1 + 4, 2 + 3, 3 + 2, 4 + 1
∴ Required probability = 4/36 = 1/9.

2. Total ways = 6 × 6 = 36
Total 7 can be obtained in the following 6 ways : 1 + 6, 2 + 5, 3 + 4, 4 + 3, 5 + 2, 6 + 1
∴ Required probability = 6/36 = 1/6.

3. Total number of ways = $^{100}C_1 = 100$
Favourable numbers are $1^2, 2^2, ..., 10^2$.
Therefore favourable ways = 10
∴ Probability = 10/100 = 1/10.

4. $P = 1 - (0.4)^3 = 0.936$.

5. Let P(B) = x, P(A) = $2x/3$
P(A) + P(B) = $x + 2x/3 = 1$
$\Rightarrow$ $5x/3 = 1 \Rightarrow x = 3/5$
P(A) = 2/5, P(B) = 3/5
Odds in favours of B = $\frac{3/5}{1-3/5} = \frac{3}{2}$.

6. Probability of a coupon selected with any number from 1 to 8 = 8/12.
In six trails: P (number from 1 to 8) = $(8/12)^6$
$P = (2/3)^6$.

7. P (5 or 6 or 7) in one draw = 3/7
∴ Probabilty that in each of 4 draws, the chits bear 5 or 6 or 7 = $(3/7)^4$.

8. We have the following pattern:
I red, white $P_I = 3 \times 4/^{12}C_2$
II red, blue $P_{II} = 3 \times 5/^{12}C_2$
III blue, white $P_{III} = 4 \times 5/^{12}C_2$
Since all these cases are exclusive, so the required probability = $(12 + 15 + 20)/^{12}C_2$
$= (47 \times 2)/(12 \times 11) = 47/66$.

9. Since the events A, B and C are mutually exclusive, we have
$P(A \cup B \cup C) = \frac{2}{3} + \frac{1}{4} + \frac{1}{6} = \frac{13}{12} > 1$,
which is not possible.
Hence, the statement is false.

10. Total number of 5 digit numbers obtained by the digits 1, 2, 3, 4, 5, 6 and 8.
$= {}^7P_5 = 7.6.5.4.3 = 2520$
There are 4 even digits (2, 4, 6 and 8).
∴ 2 even digits can be selected in $^4C_2 = 6$ ways
∴ The two ends can be filled in 2 × 6
= 12 ways
Remaining 3 places from remaining 5 digits can be filled in $^5P_3 = 60$ ways.
Hence, the required probability
$= \frac{12 \times 60}{2520} = \frac{2}{7}$.

11. Favourable cases = 6
Total cases = $6^3 = 216$
P(same number on three dice) = $\frac{6}{216} = \frac{1}{36}$.

12. $P(\text{ace}) = \frac{4}{52} = \frac{1}{13}$
$P(\text{king}) = \frac{4}{52} = \frac{1}{13}$
P (2 aces and one king)
$= {}^3C_2 \cdot \left(\frac{1}{13}\right)^2 \left(\frac{1}{13}\right) = \frac{3}{(13)^3}$.

13. Roots of the equation
$x^2 + px + p/4 + 1/2 = 0$ are real if
$\Delta = p^2 - 4\,(p/4 + 1/2) \geq 0$
i.e., $(p - 2)\,(p + 1) \geq 0$
i.e., $p \leq -1$ or $p \geq 2$
In $0 \leq p \leq 5$, possible values of p are 2, 3, 4, 5
Thus, probability = 4/6 = 2/3.

14. There are 4 identical white and 4 identical black balls and we have to select 3, which can be selected in the following pattern:
white 3 2 1 –
black – 1 2 3
i.e., in all 4 ways.
It should be noted that the ways of selecting 3 white balls from 4 white balls is not equal to $^4C_3$ since the white balls are identical, it is equal to 1. Similar is the cases for 2, 1, etc.

Now the number of ways of selecting 3 white balls = 1.

Hence, required probability = 1/4.

15. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \cup B) = 0.25 + 0.50 - 0.12 = 0.63$

$P(\overline{A \cup B}) = 1 - P(A \cup B) = 1 - 0.63 = 0.37.$

16. $P(A) = \frac{3}{7}$, $P(B) = \frac{7}{12}$

$P(\overline{A}) = \frac{4}{7}$, $P(\overline{B}) = \frac{5}{12}$

$\therefore P(A \cup B) = 1 - \frac{4}{7} \times \frac{5}{12} = \frac{16}{21}.$

17. P{(first 10 draws non-ace cards) (11th ace)}

$$= \frac{^{48}C_{10}}{^{52}C_{10}} \times \frac{4}{42} = \frac{164}{4165}.$$

18. Total ways = $^{80}C_2$

favourable ways = $^{20}C_2$

$$P = \frac{^{20}C_2}{^{80}C_2} = \frac{19}{316}.$$

19. $P(2) = \frac{1}{6}$, $P(4) = \frac{1}{6}$

Required probability,

$$P = {}^6C_3 \cdot \left(\frac{1}{6}\right)^3 \cdot \left(\frac{1}{6}\right)^3 = \frac{1}{6^6} \cdot \frac{6!}{3!3!} = \frac{5}{11664}.$$

20. $P(A) = 0.7 \ \therefore P(\overline{A}) = 0.3$

P(at least once) = 1 – P (no occurrence)

$= 1 - (0.3)^3 = 0.973.$

21. The probability that the problem is not being solved by any of the two students

$= (1 - 1/2)(1 - 1/3) = 1/3$

$\therefore$ Probability that the problem is solved

$= 1 - 1/3 = 2/3.$

22. $P(A \cap B) = P(A) + P(B) - P(A \cup B)$

$= 0.4 + 0.3 - 0.7 = 0$

$\therefore P(A \cap B) \neq P(A)\,P(B)$ so A and B are not independent. {Since $P(A \cap B) \neq 1$, A and B are not exhaustive.}

$P(A \cap B) = 0$ gives A and B are mutually exclusive.

23. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow 0.6 = P(A) + P(B) - 0.2$

$\Rightarrow P(A) + P(B) = 0.8.$

24. P (only one of A and B will die in a year)

$= P(\overline{A}B) + P(A\overline{B})$

$= P(\overline{A})\,P(B) + P(A)\,P(\overline{B})$

[Since A and B are independent]

$= (1 - p)q + p\,(1 - q)$

$= p + q - 2pq.$

26. Required probability $= \frac{^8C_2 + {}^4C_2}{^{12}C_2} = \frac{17}{33}.$

27. Probability of getting at least one head in n tosses $= 1 - (½)^n \geq 0.9$

$\Rightarrow \quad (½)^n \leq 0.1 \Rightarrow 2^n \geq 10$

$\Rightarrow \quad n \geq 3$

Hence, least value of $n = 4$.

28. Probability of getting heart = (13/52) = $\frac{1}{4}$

Probability of getting king = 4/52 = $\frac{1}{13}$

$\therefore$ Probability that first is heart and 2nd is king is $1/4 \times 1/13 = 1/52$.

29. $P(A) = 4/6 = 2/3,$

$P(B) = 3/6 = 1/2$

$P(AB) = 1/6$

$P(A).P(B) = 1/3$

As $P(AB) \neq P(A).P(B)$

$\therefore$ A and B are not independent. Occurrence of one do not effect the occurrence of other, $P(A \cap B) \neq$ null set

$\therefore$ Events are not mutually exclusive.

All the possible outcomes are existing, *i.e.,* $A \cup B$ is equal to sample space {1, 2, 3, 4, 5, 6}, therefore events A and B are exhaustive.

30. Favourable ways = 2!.8!.

Total ways of arrangement of 10 persons = (10 – 1)! = 9!

$\therefore \quad P = \frac{2!8!}{9!} = \frac{2}{9}.$

●●●

7 LCM and HCF

L.C.M.

Multiple : A number is said to be multiple of other when it is exactly divisible by the other.

Common multiple : A common multiple of two or more numbers is a number which is exactly divisible by each of them. For example, for 2 and 3, common multiples are 6, 12, 18, 24 and so on.

Explanation:

Consider the two numbers 2 and 3

Multiple of 2 are 2, 4, 6, 8, 10, 12, ...

Multiple of 3 are 3, 6, 9, 12, 15, ...

$\therefore$ Common multiples are 6, 12, 18, ...

Least Common Multiple (L.C.M.) : L.C.M. of two or more given numbers is the least number which is exactly divisible by each of them. For example,

6 is a common multiple of 2 and 3

12 is also common multiple of 2 and 3

18 is also common multiple of 2 and 3

But 6 is the least common multiple (L.C.M.) of 2 and 3.

Methods to find out L.C.M.

L.C.M. of two or more given numbers is determined by following two methods:

1. **By prime factorization method :** Resolve the given numbers into their prime factors and then find the product of the highest power of all the factors that occur in the given numbers. This product will be the L.C.M.

   Example 1 : Find the L.C.M. of 40, 50, 60 and 80.

   Sol: $40 = 2 \times 2 \times 2 \times 5 = 2^3 \times 5$

   $50 = 2 \times 5 \times 5 = 2 \times 5^2$

   $60 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3 \times 5$

   $80 = 2 \times 2 \times 2 \times 2 \times 5 = 2^4 \times 5$

   Here, the prime factors that occur in the given numbers are 2, 3 and 5 and their highest powers are respectively 2^4, 5^2 and 3.

   Hence, the required L.C.M. $= 2^4 \times 3 \times 5^2$

   $= 1200$.

2. **By division method :** This is the quicker method to find the prime factors and hence L.C.M.

   For determining L.C.M. of the numbers 40, 50, 60 and 80, following process of division is adopted:

2	40, 50, 60, 80
2	20, 25, 30, 40
2	10, 25, 15, 20
5	5, 25, 15, 10
	1, 5, 3, 2

   Now required L.C.M.

   $= 2 \times 2 \times 2 \times 5 \times 5 \times 3 \times 2 = 1200$

L.C.M. of decimal

First of all, we find out the L.C.M. of numbers without decimal and then, we see the number in which decimal is given in the minimum digit from right to left. We put the decimal in our result which is equal to that number of digits.

Example : Find the L.C.M. of 0.6, 9.6 and 0.36.

Sol : The given numbers are equivalent to 0.60, 9.60 and 0.36.

Now, we find out the L.C.M. of 60, 960 and 36, which is equal to 2880.

Hence, the required L.C.M. = 28.80.

L.C.M. of fraction

The L.C.M. of two or more fractions is the least fraction or integer which is exactly divisible by each of them.

If $\frac{a}{b}, \frac{c}{d}, \frac{e}{f}$ be the proper fractions, then their L.C.M. is given by

$$\frac{\text{L.C.M. of numerators } a, c, e}{\text{H.C.F. of denominators } b, d, f}$$

An example :

Find the L.C.M. of $\frac{1}{2}, \frac{3}{5}, \frac{4}{7}$ and $\frac{5}{12}$

Sol : $$\text{L.C.M.} = \frac{\text{L.C.M. of } 1, 3, 4, 5}{\text{H.C.F. of } 2, 5, 7, 12}$$

$$= \frac{60}{1} = 60$$

H.C.F.

Factor : One number is said to be a factor of other when it divides the other exactly. Hence, 5 and 7 are factors of 35.

Common factor : A common factor of two or more numbers is a number that divides each of them exactly. Hence, 5 is a common factor of 15, 25, 35 and 55.

Highest Common Factor (H.C.F.) : H.C.F. of two or more numbers is the largest number by which each given number is divisible without leaving any remainder.

An example : It is required to find the H.C.F. of 6 and 8.

Factors of 6 are 1, 2, 3, 6 and

Factors of 8 are 1, 2, 4, 8.

The common factors are 1, 2, but highest of these is 2. Hence, 2 is the H.C.F.

Note : *The terms Highest Common Divisor (H.C.D.) and Greatest Common Measure (G.C.M.) are often used in the sense of Highest Common Factor (H.C.F.)*

We can find H.C.F. by two methods:

1. **By prime factorization method :**

   An example : Find the H.C.F. of 144, 336 and 2016.

   Sol : $144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$
   $= 2^4 \times 3^2$
   $336 = 2 \times 2 \times 2 \times 2 \times 3 \times 7$
   $= 2^4 \times 3 \times 7$
   $2016 = 2 \times 2 \times 2 \times 2 \times 2 \times 7 \times 3 \times 3$
   $= 2^5 \times 7 \times 3^2$

   $\therefore$ H.C.F. of given numbers $= 2^4 \times 3 = 48$.

2. **By division method :** Divide the greater number by the smaller number, divide the divisor by the remainder, divide the remainder by the next remainder, and so on until no remainder is left. The last divisor is the required H.C.F.

   An example : Find the H.C.F. of 48, 168 and 324.

   Sol :
   ```
   48 ) 168 ( 3
        144
   ------------
   24 ) 48 ( 2
        48
   ------------
        × ×
   ```

   Thus, the H.C.F. of 48 and 168 is 24.

   Now, we find out the H.C.F. of 24 and 324

   ```
   24 ) 324 (13
        24
   ------------
        84
        72
   ------------
   12 ) 24 ( 2
        24
   ------------
        × ×
   ```

   $\therefore$ Required H.C.F. = 12.

H.C.F. of Decimals

First of all find the H.C.F. of the given numbers ignoring decimals and then put decimal at maximum digits from right to left.

An example : Find the H.C.F. of 0.0012, 1.6 and 2.8.

Sol : First we find the H.C.F. of 12, 16 and 28, which comes to 4.

So, H.C.F. of 0.0012, 1.6 and 2.8 will be 0.0004.

H.C.F. of Fractions

If $\frac{a}{b}, \frac{c}{d}, \frac{e}{f}$, ... be the proper fraction, their H.C.F. is equal to $\frac{\text{H.C.F. of numerators}}{\text{L.C.M. of denominators}}$

An example:

Find the H.C.F. of $\frac{54}{9}, 3\frac{9}{17}$ and $\frac{36}{51}$

Sol : Here,

$\frac{54}{9} = \frac{6}{1}$; $3\frac{9}{17} = \frac{60}{17}$ and $\frac{36}{51} = \frac{12}{17}$

Hence, the fractions are $\frac{6}{1}, \frac{60}{17}$ and $\frac{12}{17}$

$\therefore$ H.C.F. $= \frac{\text{H.C.F. of } 6, 60, 12}{\text{L.C.M. of } 1, 17, 17} = \frac{6}{17}$.

Relationship Between Two Numbers and Their L.C.M. and H.C.F.

Product of the H.C.F. and the L.C.M. of two numbers is equal to the product of the given numbers.

i.e., 1st number × 2nd number = H.C.F. × L.C.M.

Multiple Choice Questions

1. The H.C.F. of 72 and 18 is
A. 9 B. 72
C. 18 D. 36

2. The L.C.M. of 6, 8, 10 and 12 is
A. 120 B. 60
C. 240 D. 130

3. The H.C.F. of $\frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}$ and $\frac{9}{10}$ is
A. $\frac{1}{2420}$ B. $\frac{1}{2520}$
C. $\frac{1}{2660}$ D. $\frac{1}{2540}$

4. The L.C.M. of two numbers is 85 and their product is 1020. Their H.C.F. will be
A. 16 B. 27
C. 12 D. 22

5. The L.C.M. and H.C.F. of two numbers are 4284 and 32 respectively. If one of the numbers is 204, the other is
A. 672 B. 576
C. 676 D. 572

6. The largest four-digit number divisible by 48, 60 and 64 will be
A. 7200 B. 9600
C. 8400 D. 10,000

7. L.C.M. of 24, 28, 36 and 44 is a multiple of 24 and which of the following numbers?
A. 441 B. 231
C. 337 D. 197

8. H.C.F. of 420, 315 and 462 is
A. 24 B. 28
C. 27 D. 21

9. The smallest number exactly divisible by 3, 4, 6 and 8 is
A. 26 B. 24
C. 25 D. 28

10. The smallest three-digit number completely divisible by 12, 18 and 24 will be
A. 72 B. 144
C. 180 D. 224

11. The largest three-digit number, when divided by 6, 9 and 12 leaves 1 as remainder in each case, will be
A. 887 B. 987
C. 973 D. 730

12. Two numbers are in the ratio of 8 : 15. If their H.C.F. is 4, the numbers are
A. 32 and 60 B. 16 and 30
C. 80 and 150 D. 64 and 120

13. The largest number that will divide 226 and 272 leaving 1 and 2 as remainders respectively, is
A. 36 B. 45
C. 55 D. 59

14. Which of the following is the greatest common divisor of 1170 and 102?
A. 8 B. 4
C. 6 D. 3

15. A number, when 3 is added to it, becomes divisible by 36, 45 and 50. The smallest such number is
A. 987 B. 798
C. 986 D. 897

16. The least perfect square number which is completely divisible by 10, 20, 30 and 40 is
A. 4800 B. 3600
C. 4400 D. 2500

17. The product of two numbers is 2160 and their H.C.F. is 12. How many such pairs of numbers can be possibly formed?
A. 3 B. 1
C. 2 D. None of these

18. The greatest number that will divide 366, 513 and 324 leaving the same remainder in each case is
A. 21 B. 18
C. 27 D. 42

19. The sum of two numbers is 216 and their H.C.F. is 27. These numbers are
A. 60 and 90 B. 81 and 135
C. 64 and 128 D. 30 and 84

20. The L.C.M. of two numbers is 45 times their H.C.F. If the sum of the L.C.M. and the H.C.F. of these two numbers is 1150 and one of the numbers is 125, then the other number is
A. 256 B. 225
C. 250 D. 255

21. The H.C.F. and the L.C.M. of two numbers are 50 and 250 respectively. On dividing one of these numbers by 2, 50 is obtained as quotient. The numbers are
A. 100, 125 B. 80, 100
C. 125, 100 D. 200, 250

22. The largest three-digit number, which when successively divided by 6, 9 and 12, leaves 3 as remainder in each case, is
A. 575 B. 795
C. 975 D. 525

23. The greatest number that will divide 33, 64 and 80 leaving 3, 4 and 5 as remainders respectively, is
A. 10 B. 20
C. 15 D. 22

24. The H.C.F. of three numbers is 12. If the three numbers are in the ratio of 1 : 2 : 3, then the numbers are
A. 14, 28, 42 B. 12, 24, 36
C. 15, 30, 45 D. 24, 48, 72

25. The greatest four-digit number completely divisible by 2, 3, 4 and 5 is
A. 9960 B. 9690
C. 8990 D. 9980

26. Three bells ring respectively at an interval of 15 seconds, 20 seconds and 24 seconds. If they ring continuously for 12 minutes then how many times, during this period, will they ring together?
A. 2 times B. 6 times
C. 5 times D. 3 times

27. The smallest number, on being successively divided by 5, 6, 8, 9 and 12 leaves 1 as remainder in each case and is completely divisible by 13, will be
A. 4603 B. 6305
C. 4503 D. 3601

28. If in the process of finding H.C.F. of two numbers by continued division method, 49 is the last divisor and quotients obtained (from the beginning) are 17, 3 and 2 respectively, then the numbers are
A. 432 and 4929 B. 343 and 5929
C. 388 and 5880 D. 472 and 5930

29. A, B and C start running together in a particular direction from a particular point on a 12 kms long circular path. If the speeds of A, B and C are 3 kms/h, 7 kms/h and 13 kms/h respectively, then after how many hours will they meet together again?
A. 8 B. 6
C. 12 D. 10

30. Which of the following has most numbers of divisors?
A. 182 B. 176
C. 101 D. 99

ANSWERS

1	2	3	4	5	6	7	8	9	10
C	A	B	C	A	B	B	D	B	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	A	B	C	D	B	C	A	B	B
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
A	C	C	B	A	B	D	B	C	B

EXPLANATORY ANSWERS

1. $72 = 2 \times 2 \times 2 \times 3 \times 3$

$18 = 2 \times 3 \times 3$

$\therefore$ Common factors $= 2 \times 3 \times 3 = 18$

$\therefore$ H.C.F. $= 18$

2. $6 = 2 \times 3$; $8 = 2 \times 2 \times 2$

$10 = 2 \times 5$; $12 = 2 \times 2 \times 3$

It is clear that 2 occurs as prime factor maximum three times, 3 one time and 5 one time.

Hence, required L.C.M.

$= 2 \times 2 \times 2 \times 3 \times 5 = 120.$

3. H.C.F. of $\frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}$ and $\frac{9}{10}$

$$= \frac{\text{H.C.F. of } 5,6,7,8 \text{ and } 9}{\text{LCM of } 6,7,8,9 \text{ and } 10}$$

Now H.C.F. of 5, 6, 7, 8 and 9 = 1

and L.C.M. of 6, 7, 8, 9 and 10 = 2520

$\therefore$ Required H.C.F. $= \frac{1}{2520}$

4. L.C.M. of two numbers $\times$ H.C.F. of the numbers = Product of the numbers

$\therefore$ $85 \times$ H.C.F. $= 1020$

$\therefore$ H.C.F. $= \frac{1020}{85} = 12$

5. 1st number $\times$ 2nd number = LCM $\times$ HCF

$\therefore 204 \times$ 2nd number $= 4284 \times 32$

$\therefore$ 2nd number $= \frac{4284 \times 32}{204} = 672$

$\therefore$ 2nd number = 672.

6. In this question LCM of the given numbers 48, 60, 64 has to be found out.

$48 = 2 \times 2 \times 2 \times 2 \times 3;$

$60 = 2 \times 2 \times 3 \times 5$

$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$\therefore$ LCM $= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5$

$= 960$

$\because$ Largest 4-digit number = 9999

$\therefore$ $960 \overline{)\ 9999\ (\ 10}$

9600

399

$\therefore$ Required number $= 9999 - 399$

$= 9600$

7. $24 = 2 \times 2 \times 2 \times 3$

$28 = 2 \times 2 \times 7$

$36 = 2 \times 2 \times 3 \times 3$

$44 = 2 \times 2 \times 11$

$\therefore$ Required LCM

$= 2 \times 2 \times 2 \times 3 \times 3 \times 7 \times 11$

$= 24 \times 231$

Therefore, it is obvious that LCM of the given number is a multiple of 24 and 231.

8. $315 \overline{)\ 420\ (\ 1}$

315

$105 \overline{)\ 315\ (\ 3}$

315

$\times$

$\therefore$ H.C.F. of 315 and 420 is 105

Now, H.C.F. of 105 and 462 :

105) 462 (4
420
42) 105 (2
84
21) 42 (2
42
×

∴ Required H.C.F. = 21.

9. L.C.M. of 3, 4, 6 and 8

2	3, 4, 6, 8
2	3, 2, 3, 4
3	3, 1, 3, 2
	1, 1, 1, 2

∴ The required number = LCM of the given numbers = 2 × 2 × 3 × 2 = 24.

10. L.C.M. of the given numbers 12, 18 and 24

2	12, 18, 24
2	6, 9, 12
3	3, 9, 6
	1, 3, 2

∴ L.C.M. = 2 × 2 × 3 × 3 × 2 = 72

∴ The required 3-digit number which is smallest as well as divisible by 12, 18, and 24 will be 72 × 2 = 144.

11. L.C.M. of 6, 9 and 12

3	6, 9, 12
2	2, 3, 4
	1, 3, 2

∴ LCM = 3 × 2 × 3 × 2 = 36.

∵ Largest 3-digit number = 999

36) 999 (27
72
279
252
× 27

∴ Largest 3-digit number which is exactly divisible by 6, 9 and 12

= 999 – 27 = 972

∴ The required number = 972 + 1 = 973

12. Let the numbers be $8x$ and $15x$

$8x = 2 \times 2 \times 2 \times x$

$15x = 3 \times 5 \times x$

∴ LCM of $8x$ and $15x$

$= 2 \times 2 \times 2 \times x \times 3 \times 5$

$= 120x$

Now, 1st number × 2nd number = HCF × LCM

$\Rightarrow \quad 8x \times 15x = 4 \times 120x$

$\Rightarrow \quad 120x^2 = 4 \times 120x$

$\Rightarrow \quad x = 4$

∴ Numbers are 8×4

$= 32$ and $15 \times 4 = 60$

13. 226 – 1 = 225 and 272 – 2 = 270

Now, HCF of 225 and 270

225) 270 (1
225
45) 225 (5
225
×

∴ The required number is 45.

14. $1170 = 2 \times 5 \times 3 \times 3 \times 13$

$102 = 2 \times 3 \times 17$

∴ Greatest common divisor = 2 × 3 = 6

15. It is clear from the given conditions of the problem that the smallest number will be 3 less than the LCM of 36, 45 and 50.

∴ LCM of 36, 45 and 50

3	36, 45, 50
2	12, 15, 50
3	6, 15, 25
5	2, 5, 25
	2, 1, 5

∴ LCM = 3 × 2 × 3 × 5 × 2 × 5 = 900

∴ Required number = 900 – 3 = 897.

16. LCM of 10, 20, 30 and 40

2	10, 20, 30, 40
5	5, 10, 15, 20
2	1, 2, 3, 4
	1, 1, 3, 2

∴ LCM = 2 × 2 × 5 × 3 × 2

But the number is a perfect square number

$\therefore$ Required number

$= 2 \times 2 \times 5 \times 5 \times 3 \times 3 \times 2 \times 2 = 3600.$

17. Product of two numbers

= their HCF × their LCM

$2160 = 12 \times \text{LCM}$

$$\therefore \quad \text{LCM} = \frac{2160}{12} = 180$$

Therefore such pairs of numbers in which product of numbers is 2160 and HCF is 12 will be only 2.

i.e., 12×180 and 36×60.

18. Difference between 366 and 513

$= 513 - 366 = 147$

and difference between 513 and 324

$= 513 - 324 = 189$

$\therefore$ HCF of 147 and 189

$147 \overline{)\ 189\ (\ 1}$

$\underline{147}$

$\times\ 42 \overline{)\ 147\ (\ 3}$

$\underline{126}$

$\times\ 21 \overline{)\ 42\ (\ 2}$

$\underline{42}$

$\times$

$\therefore$ The required largest number is 21.

19. Let the numbers be x and y.

$\therefore \quad x + y = 216 = 27 \times 8$

Since HCF of these two numbers is 27, hence, common factor of these two numbers is 27. Therefore these numbers will be of the form of 27×1, 27×2, 27×3, ... etc.

According to the condition of the problem sum of these numbers is 216.

$\therefore$ The numbers will be

$27 \times 3 = 81$

and $27 \times 5 = 135$

20. LCM of the two numbers = 45 × HCF

and LCM + HCF = 1150

$\Rightarrow$ $45 \times \text{HCF} + \text{HCF} = 1150$

$\Rightarrow$ $\text{HCF}(45 + 1) = 1150$

$$\Rightarrow \quad \text{HCF} = \frac{1150}{46} = 25$$

$\therefore$ LCM = 45 × 25 = 1125

$\because$ 1st number × 2nd number

= LCM × HCF

$\therefore$ $125 \times$ 2nd number $= 1125 \times 25$

$$\therefore \quad \text{2nd number} = \frac{1125 \times 25}{125} = 225.$$

21. According to the condition of the problem, 50 is obtained on dividing one of the numbers by 2

$\therefore$ One of the numbers $= 50 \times 2 = 100$

Now, 1st number × 2nd number

= LCM × HCF

$\therefore$ $100 \times$ 2nd number $= 250 \times 50$

$$\therefore \quad \text{2nd number} = \frac{250 \times 50}{100} = 125$$

Hence, numbers are 100 and 125.

22. LCM of 6, 9 and 12

= 36 and largest 3-digit number = 999

$\therefore$ HCF of 36 and 999

$36 \overline{)\ 999\ (\ 27}$

$\underline{72}$

279

$\underline{252}$

27

$\therefore$ Largest three-digit number completely divisible by 6, 9 and 12

$= 999 - 27 = 972$

Since 3 is left as remainder in each case,

$\therefore$ Required largest number of 3-digit

$= 972 + 3 = 975.$

23. $33 - 3 = 30$, $64 - 4 = 60$ and $80 - 5 = 75$

Now, HCF of 30, 60 and 75:

$30 = 2 \times \underline{3 \times 5}$

$60 = 2 \times 2 \times \underline{3 \times 5}$

$75 = \underline{3 \times 5} \times 5$

$\because$ Common factor $= 3 \times 5 = 15$

$\therefore$ Required largest number = 15.

24. Let the numbers be x, $2x$ and $3x$ respectively. Here, HCF of the three numbers is 12, therefore 12 is the largest common factor of these three numbers. Thus, it is clear that $x = 12$

$\therefore$ These numbers are 12, 24 and 36 respectively.

25. LCM of 2, 3, 4 and 5= 60

Largest 4-digit number = 9999

Now,
$$\begin{array}{r} 60\overline{)9999}(166 \\ 60 \\ \hline 399 \\ 360 \\ \hline \times\ 399 \\ 360 \\ \hline 39 \end{array}$$

$\therefore$ Largest 4-digit number completely divisible by 2, 3, 4 and 5

$= 9999 - 39 = 9960$

$\therefore$ Required number $= 9960$

26. LCM of 15, 20 and 24

$$\begin{array}{rl} 5 & 15,\ 20,\ 24 \\ 4 & 3,\ 4,\ 24 \\ 3 & 3,\ 1,\ 6 \\ & 1,\ 1,\ 2 \end{array}$$

LCM $= 5 \times 4 \times 3 \times 2 = 120$

$\because$ 12 minutes $= 12 \times 60 = 720$ seconds

$\therefore$ Number of times the bells will ring together during 12 minutes $= \dfrac{720}{120} = 6$ times.

27. LCM of 5, 6, 8, 9 and 12 = 360. Hence, the smallest number which when divided by 5, 6, 8, 9 and 12 leaves 1 as remainder in each case will be 360 + 1 = 361.

But 361 is not completely divisible by 13. Hence, on considering $360 \times 2 + 1$, $360 \times 3 + 1$,... , $360 \times n + 1$, we conclude that $360 \times 10 + 1 = 3601$ is the required number.

28. This question is based on finding HCF by continued division method. Now according to the condition of the problem,

Last divisor = 49

and Last quotient = 2

$\therefore$ dividend $= 49 \times 2 = 98$

Now, divisor = 98 and quotient = 3

and remainder = 49

$\therefore$ dividend $= 98 \times 3 + 49 = 343$

Now, divisor = 343

quotient = 17

and remainder = 98

$\therefore$ Dividend $= 343 \times 17 + 98 = 5929$

Therefore, these numbers are 343 and 5929.

29. A, B and C will take 4 hours, $\dfrac{12}{7}$ hours and $\dfrac{12}{13}$ hours respectively in completing one round on the circular path.

$\therefore$ LCM of $\dfrac{4}{1}$, $\dfrac{12}{7}$ and $\dfrac{12}{13}$

$$= \frac{\text{LCM of } 4, 12 \text{ and } 12}{\text{HCF of } 1, 7 \text{ and } 13}$$

$\because$ LCM of 4, 12 and 12 = 12 and HCF of 1, 7 and 13 = 1

$\therefore$ Required LCM $= \dfrac{12}{1} = 12$

Hence, they will meet together again after 12 hrs.

30. ***Numbers*** ***Their divisors***

182 $\rightarrow$ 1, 2, 7, 13, 14, 26, 91 and 182

176 $\rightarrow$ 1, 2, 4, 8, 16, 22, 44, 88 and 176

101 $\rightarrow$ 1 and 101

99 $\rightarrow$ 1, 3, 9, 11, 33 and 99

Therefore, 176 has the most number of divisors.

●●●

8 Mensuration

AREA & PERIMETER

In this part of mensuration we often have to deal with the problem of finding the areas and perimeters of plane figures.

Triangle

1. Perimeter = 3 × side (Equilateral triangle)
2. Area = $\frac{1}{2} \times \text{base} \times \text{height}$, or

   Area = $\sqrt{s(s-a)(s-b)(s-c)}$

   where *a, b, c,* are the lengths of the sides of triangle and $s = \frac{a+b+c}{2}$

Right Angled Triangle

It is one whose one of the angles is right angle, *i.e.*, 90°.

1. $(\text{Hypotenuse})^2 = (\text{Perpendicular})^2 + (\text{Base})^2$
2. Area = $\frac{1}{2} \times \text{Base} \times \text{Perpendicular}$

Equilateral Triangle

All three sides are equal in length and all three angles are equal to 60°.

1. Area = $\frac{\sqrt{3}}{4} \times (\text{Side})^2$
2. Area = $\frac{(\text{Height})^2}{\sqrt{3}}$
3. Height = $\frac{\sqrt{3}}{2} \times \text{side}$
4. Perimeter = 3 × side

Isosceles Triangle

Two sides are equal in lengths.

1. Area = $\frac{b}{4}\sqrt{4a^2 - b^2}$

   where, a = lengths of equal sides

   b = length of unequal side
2. In an isosceles right triangle,

   (*a*) Hypotenuse = $\sqrt{2} \times$ congruent side (a)

   (*b*) Area = $\frac{1}{2} \times a^2$

   (*c*) Perimeter = $\sqrt{2} \times a\left(\sqrt{2}+1\right)$

Rectangle

1. Area = length(l) × breadth(b)
2. Perimeter = 2(l + b)
3. Diagonal = $\sqrt{l^2 + b^2}$

Square

1. Area = $(\text{Side})^2$
2. Perimeter = 4 × side
3. Diagonal = $\text{side} \times \sqrt{2}$

Parallelogram

In parallelogram opposite sides are parallel and equal. The two diagonals are not always equal but they bisect each other at the point of intersection.

Area = Base × Height.

Trapezium

It is a quadrilateral whose one pair of opposite sides is parallel. Other two opposite sides are oblique.

Area = $\frac{1}{2} \times$ Height $\times$ (Sum of parallel sides).

Here, height is the distance between the two parallel sides.

Rhombus

It is parallelogram whose all sides are equal and diagonals are bisect each other at right angle.

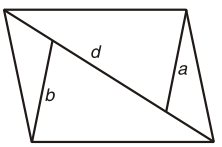
1. Area = $\frac{1}{2} \times$ Product of diagonals
2. Side = $\sqrt{\left(\frac{d_1}{2}\right)^2 + \left(\frac{d_2}{2}\right)^2}$, where d_1 and d_2 are diagonals
3. Perimeter = 4 × side

Quadrilateral

Area = $\frac{1}{2} \times$ One diagonal $\times$ (Sum of perpendicular to it from the opposite vertices)

= $\frac{1}{2} \times d \times (a + b)$

Circle



1. Diameter = 2 × Radius
2. Area = $\pi r^2 = \frac{\pi}{4} d^2$;

   where d = diameter = $\sqrt{\frac{4A}{\pi}}$
3. Circumference = $2\pi r = \pi d$
4. Radius = $\frac{\text{Circumference}}{2\pi} = \frac{\sqrt{\text{Area}}}{\pi}$
5. Length of an Arc = $\frac{\theta}{360°} \times 2\pi r$
6. Area of sector = $\frac{\theta}{360°} \times \pi r^2 = \frac{1}{2} \times \text{Arc} \times r$

Polygon

1. Interior angle + Exterior angle = 180°
2. Each interior angle = $\left(\frac{2n-4}{n}\right) \times 90°$

   where n = number of sides
3. Sum of Exterior angles = 360°
4. Perimeter = Number of sides × Length of side.
5. For an equilateral triangle of side 'a' *(a)* radius of inscribed circle = $\frac{a}{2\sqrt{3}}$ and side of the triangle = $2\sqrt{3}r$, *(b)* radius of circumcircle = $\frac{a}{\sqrt{3}}$
6. Area of regular polygon = $\frac{1}{2}$(No. of sides) (Radius of the inscribed circle)
7. Area of regular hexagon

   = $\frac{3\sqrt{3}}{2}(\text{side})^2 = 2.598\ (\text{side})^2$
8. Area of a regular octagon

   = $2\left(\sqrt{2}+1\right)(\text{side})^2 = 4.828\ (\text{side})^2$
9. Area of quadrilateral,

   A = $\sqrt{s(s-a)(s-b)(s-c)(s-d)}$

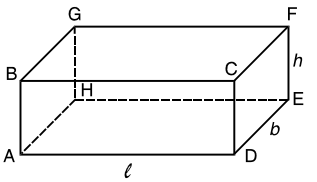
   where, $s = \frac{a+b+c+d}{2}$

VOLUME AND SURFACE AREA

In mensuration we often have to deal with the problem of finding the volume of solid figure.

Cuboid

A cuboid has six faces, each one a ractangle. It has 12 edges. For example, a rectangular brick.

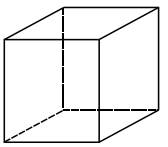


Let Length = l, Breadth = b and Height = h, then,

1. Volume = (Length × Breadth × Height)
2. Whole Surface Area = $2(lb + bh + lh)$
3. Diagonal = $\sqrt{l^2 + b^2 + h^2}$
4. Area of 4 walls of a room = $2 \times h\ (l + b)$

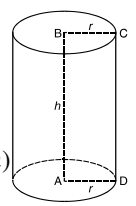
Cube

In a cube, Length = Breadth = Height



1. Volume = $(l)^3$
2. Length = $\sqrt[3]{\text{Volume}}$
3. Whole Surface Area = 6 l^2
4. Diagonal = $l \times \sqrt{3}$
5. Lateral Surface Area = 4 l^2

Cylinder

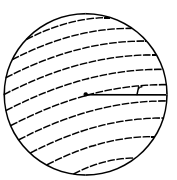


1. Volume = $\pi r^2 h$
2. Curved Surface Area = $2\pi rh$
3. Total Surface Area = $2\pi r(r + h)$
   where r = radius, h = height

Spherical Cell

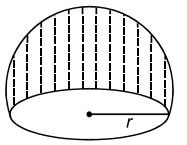
1. Volume = $\frac{4}{3}\pi\left(R^3 - r^3\right)$
2. Total Surface Area = $4\pi(R^2 - r^2)$
   where, R = Outer radius,
   r = Inner radius

Sphere



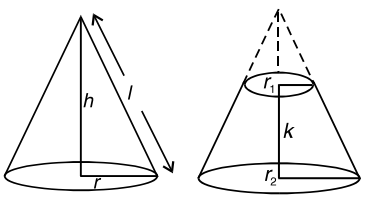
1. Volume = $\frac{4}{3}\pi r^3$
2. Surface Area = $4\pi r^2$

Semi-sphere



1. Volume = $\frac{2}{3}\pi r^3$
2. Curved surface area = $2\pi r^2$
3. Total surface area = $3\pi r^2$

Cone



1. Slant height $(l) = \sqrt{r^2 + h^2}$
2. Volume = $\frac{1}{3}\pi r^2 h$
3. Curved surface area = πrl
4. Total surface area = $\pi r\ (l + r)$
5. If the depth of the frustum of a cone be k and the radii of its ends are r_1 and r_2, then
   (*i*) Slant height of the frustum of a cone
   $= \sqrt{k^2 + (r_1 - r_2)^2}$
   (*ii*) Curved surface of the frustum
   $= \pi(r_1 + r_2)\ l.$
   (*iii*) Volume = $\frac{\pi k}{3}\left(r_1^2 + r_1 r_2 + r_2^2\right)$

Multiple Choice Questions

1. A rectangle measures 50 cm × 25 cm. Its area is
   A. 1150 sq. cm. B. 1250 sq. cm.
   C. 1275 sq. cm. D. 1280 sq. cm.
2. A field is in the form of a square whose perimeter is 580 m. Area of this field is
   A. 21025 sq. m. B. 20225 sq. m.
   C. 30025 sq. m. D. 19975 sq. m.
3. Find the area of the square whose each side measures 20 cm.
   A. 300 sq. cm. B. 380 sq. cm.
   C. 360 sq. cm. D. 400 sq. m.
4. Area of a circle is 154 sq. cm. Its circumference will be
   A. 44 cm B. 48 cm
   C. 54 cm D. 68 cm
5. The base and the height of a triangle is 8 cm and 10 cm respectively. Its area will be
   A. 40 sq. cm. B. 20 sq. cm.
   C. 49 sq. cm. D. 64 sq. cm.
6. If it is given that the parallel sides of a trapezium are 15 m and 25 m while the distance between them is 10 m. Its area will be:

A. 150 sq. m. B. 225 sq. m.
C. 200 sq. m. D. 270 sq. m.

7. Perimeter of a rectangular field is 760 m and its length and breadth are in the ratio 11 : 8. Area of this rectangular field is
A. 35200 sq. m.
B. 34700 sq. m.
C. 35600 sq. m.
D. 45200 sq. m.

8. If side of a square is reduced by 50%, its area will be reduced by
A. 50% B. 75%
C. 80% D. 60%

9. If area of a square is equal to the area of a rectangle 6.4 m long and 2.5 m wide, then each side of this square measures
A. 8 m B. 5.4 m
C. 3.8 m D. 4 m

10. If perimeter of a right angled triangle is six times its smallest side, then the three sides of this triangle are in the ratio of
A. 13 : 5 : 12 B. 13 : 12 : 5
C. 12 : 5 : 13 D. 13 : 5 : 10

11. The perimeter of a square is 24 m and that of another is 32 m. Find the perimeter of a third square, area of which is equal to sum of the areas of these two squares
A. 40 m B. 51 m
C. 37 m D. 42 m

12. If each side of a square is doubled, its area will become
A. double B. four times
C. three times D. eight times

13. The difference between the areas of two squares is 225 sq. metres and each side of the bigger square is 25 metres. The side of the smaller square is
A. 18 m B. 21 m
C. 20 m D. 22 m

14. If the perimeter of an equilateral triangle is 72 cm, its area will be
A. $144\sqrt{3}$ sq. cm B. $142\sqrt{3}$ sq. cm
C. $154\sqrt{2}$ sq. cm. D. $144\sqrt{2}$ sq. cm.

15. The radii of two circles are 5 cm and 12 cm respectively. Find the radius of a circle which is equal in area to these two circles.
A. 15 cm B. 13 cm
C. 10 cm D. 8 cm

16. If the circumference of a circle is equal to the perimeter of a square, then their areas are in the ratio of
A. 14 : 11 B. 7 : 8
C. 14 : 13 D. 13 : 11

17. Three sides of a triangle are in the ratio of 17 : 15 : 8. If the perimeter of this triangle is 40 m, find its area
A. 50 sq. m. B. 49 sq. m.
C. 60 sq. m. D. 69 sq. m.

18. If the length of a rectangle is increased by 20% and width is decreased by 15%, then its area
A. decreases by 4% B. increases by 2%
C. decreases by 2% D. increases by 3%

19. Find the perimeter of a rhombus whose diagonals measure 16 cm and 12 cm.
A. 38 cm B. 40 cm
C. 41 cm D. 46 cm

20. If the difference between the circumference and the radius of a circle is 37 cm, find its diameter.
A. 11 cm B. 12 cm
C. 16 cm D. 14 cm

21. A solid in the form of a cuboid is 4 cm × 3 cm × 2 cm. Its volume will be
A. 20 cu cm B. 22 cu cm
C. 28 cu cm D. 24 cu cm

22. A reservoir is 3 m long, 2 m wide and 1 m deep. Its capacity in litres is
A. 8000 litres B. 10000 litres
C. 6500 litres D. 6000 litres

23. Surface area of a cube is 1014 sq. cm. Its volume will be
A. 2197 cu cm B. 2297 cu cm
C. 2179 cu cm D. 2117 cu cm

24. If the volumes of two cubical blocks are in the ratio of 8 : 1, what will be the ratio of their edges?
A. 1 : 2 B. 2 : 1
C. 4 : 1 D. 2 : 3

25. Two spheres have their surface areas in the ratio 9 : 16. Their volumes are in the ratio of
A. 64 : 27 B. 27 : 64
C. 16 : 27 D. 11 : 27

26. The length of the longest rod that can be placed in a room 12 m long, 9 m broad and 8 m high is
A. 17 m *(b)* 18 m
C. 25 m D. 16 m

27. The radius and the height of a right circular cone are in the ratio of 3 : 5. If its volume is 120p cu m, its slant height is
A. $3\sqrt{34}$ m B. $2\sqrt{28}$ m
C. $2\sqrt{44}$ m D. $2\sqrt{34}$ m

28. Circumference of the base of a cylinder is 88 cm and height of the cylinder is 42 cm. Its volume is
A. 25872 cu cm
B. 28572 cu cm
C. 25870 cu cm
D. 22584 cu cm

29. If two cubes each of 10 cm side are kept close to each other, then the cuboid so formed will have surface area equal to
A. 1200 sq. cm B. 5000 sq. cm
C. 1000 sq. cm D. 1250 sq. cm

30. A rectangular piece of paper is 30 cm long and 20 cm wide. How many ways can be adopted if one wants to give this rectangular piece of paper a cylindrical form?
A. Three B. Two
C. One D. Four

31. In the above question, the cylinders formed will have their volumes in the ratio of
A. 2 : 3 B. 3 : 1
C. 3 : 2 D. 1 : 3

32. If a solid sphere of 3 cm radius is melted and recast into a right circular cone whose base radius is same as that of the sphere, the height of the cone will be
A. 8 cm B. 12 cm
C. 6 cm D. 5 cm

33. Diameter of a roller is 2.4 m and it is 1.68 m long. If it takes 1000 complete revolutions once over to level a field, the area of the field is
A. 12672 sq. m B. 12671 sq. m
C. 12762 sq. m D. 11768 sq. m

34. If each edge of a cube is increased by 10%, then by how much per cent will the surface area of this cube be increased?
A. 21% B. 18%
C. 15% D. 20%

35. Height and base radius of a solid cylinder are 14 m and 4 m respectively. It is melted and recast into a solid cone of the same base radius as that of the cylinder, what will be the height of the cone?
A. 21 m B. 42 m
C. 48 m D. 54 m

36. A room is in the form of a cube of side 10 m. How many bales of cotton can be kept in it if each bale covers 5 cu m space?
A. 100 B. 175
C. 200 D. 225

37. Three cubes having side 2 cm, 3 cm and 4 cm respectively are melted together to form a new cube. The side of the new cube will be
A. 3.526 cm B. 4.628 cm
C. 4.626 cm D. 4.528 cm

38. If base diameter of a cylinder is increased by 50%, then by how much per cent its height must be decreased so as to keep its volume unaltered?
A. 45.56% B. 55.56%
C. 50.16% D. 62.33%

39. The surface area of a cube is 600 sq. m. Its diagonal is
A. $10\sqrt{3}$ cm B. $5\sqrt{3}$ cm
C. $4\sqrt{2}$ cm D. $10\sqrt{2}$ cm

40. The base diameter of a conical tomb is 28 m and its slant height is 50 m. Find the cost of white washing its curved surface at the rate of 80 paise per sq. m?
A. ₹ 1860 B. ₹ 1760
C. ₹ 1950 D. ₹ 1875

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	A	D	A	A	C	A	B	D	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	B	C	A	B	A	C	B	B	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
D	D	A	B	B	A	D	A	C	B
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
C	B	A	A	B	C	C	B	A	B

EXPLANATORY ANSWERS

1. Area of the rectangle
$= l \times b = 50 \times 25 = 1250$ sq. cm

2. Here, $4 \times$ side $= 580$

$\Rightarrow$ side $= \frac{580}{4} = 145$ m

$\therefore$ Area $= (\text{side})^2 = (145)^2$
$= 21025$ sq. m.

3. Area of the square $= (\text{side})^2$
$= (20)^2 = 400$ sq. cm.

4. Area of the circle $= \pi r^2$

$\Rightarrow$ $\pi r^2 = 154$

$\Rightarrow$ $r^2 = \frac{154 \times 7}{22} \Rightarrow r = 7$ cm

$\therefore$ Circumference of the circle
$= 2\pi r = 2 \times \frac{22}{7} \times 7 = 44$ cm.

5. Area of the triangle $= \frac{1}{2} \times 8 \times 10 = 40$ sq. cm.

6. Area of the trapezium
$= \frac{1}{2} \times (15 + 25) \times 10 = 200$ sq. m.

7. Suppose length and breadth of the rectangular field are $11x$ m and $8x$ m.

$\therefore$ Perimeter of the field
$= 2(11x + 8x)$
$= 2 \times 19x = 38x$ m.

Now, $38x = 760$

$\Rightarrow x = \frac{760}{38} = 20$

$\therefore$ Length of the field $= 11 \times 20 = 220$ m
Breadth of the field $= 8 \times 20 = 160$ m

$\therefore$ Area of the field $= 220 \times 160$
$= 35200$ sq. m.

8. Area of the square $= x^2$ sq. m.
Side of the new square

$= x - 50\%$ of $x = \frac{x}{2}$ m

$\therefore$ Area of the new square

$= \left(\frac{x}{2}\right)^2 = \frac{x^2}{4}$ sq. m.

$\therefore$ Reduction in area of the square

$= x^2 - \frac{x^2}{4} = \frac{3x^2}{4}$ sq. m.

$\therefore$ Percentage reduction

$= \frac{3x^2/4}{x^2} \times 100 = 75\%$

9. Area of the rectangle $= 6.4 \times 2.5 = 16.00$ sq.m.

$\therefore$ Side of the square $= \sqrt{16} = \sqrt{4 \times 4} = 4$ m.

10. Suppose, the three sides of the triangle are a, b and c and a is the largest while c is the smallest side of the triangle.

Now, $(a + b + c) = c \times 6$

$\Rightarrow$ $a + b = 5c$

Again, $a^2 - b^2 = c^2$

$\Rightarrow$ $(a + b)(a - b) = c^2$

$\Rightarrow$ $5c(a - b) = c^2$

$\Rightarrow \quad a - b = \frac{c}{5}$ [$\because$ $a + b = 5c$]

Now, $a + b = 5c$, $a - b = \frac{c}{5}$

Since, $a = \frac{1}{2}\left(5c + \frac{c}{5}\right) = \frac{13c}{5}$

and $b = \frac{1}{2}\left(5c - \frac{c}{5}\right) = \frac{12c}{5}$

Hence, $a : b : c = \frac{13c}{5} : \frac{12c}{5} : c$

$= 13 : 12 : 5.$

11. Side of the 1st square $= \frac{24}{4} = 6$ m

And side of the 2nd square $= \frac{32}{4} = 8$ m

Now, area of the third square

$= 6^2 + 8^2 = 36 + 64 = 100$ sq. m.

$\therefore$ Side of the third square $= \sqrt{100} = 10$ m

Hence, Perimeter of the third square

$= 4 \times$ side $= 4 \times 10 = 40$ m.

12. Area of the square $= x^2$ sq. m

Now, area of the new square

$= (2x)^2 = 4x^2$ sq. m

Hence, it is clear that if side of a square is doubled, its area becomes four times.

13. Area of smaller square,

$x^2 = 25^2 - 225 = 625 - 225 = 400$

$\Rightarrow \quad x = \sqrt{400} = 20$ m

$\therefore$ Side of the smaller square = 20 m.

14. Here, $3x = 72$

$\Rightarrow \quad x = \frac{72}{3} = 24$ cm.

$\therefore$ Area of the equilateral triangle

$= \frac{\sqrt{3}}{4} \times x^2 = \frac{\sqrt{3}}{4} \times (24)^2$

$= 144\sqrt{3}$ sq. cm.

15. Area of the new circle

$= \pi.5^2 + \pi.12^2$

$= 25\pi + 144\pi = 169\pi$ sq. cm.

$= \pi(13)^2$ sq. cm

Hence, it is clear that the radius of the new circle will be 13 cm.

16. Here, $2\pi R = 4x$

$\Rightarrow \quad R = \frac{2x}{\pi}$

$\therefore$ Ratio between the areas of the circle and the square $= \pi R^2 : x^2$

$= \pi \times \left(\frac{2x}{p}\right)^2 : x^2 = \frac{4x^2}{\pi} : x^2 = 4 : \frac{22}{7} = 14 : 11$

17. Suppose sides of the triangle are $17x$ m, $15x$ m and $8x$ metres

$\therefore \quad$ Perimeter $= 17x + 15x + 8x = 40x$

Now, $40x = 40$

$\Rightarrow \quad x = 1$ m

Therefore, the sides are $17 \times 1 = 17$ m, $15 \times 1 = 15$ m and $8 \times 1 = 8$ m

$\because \quad (17)^2 = (15)^2 + (8)^2$,

i.e., it is a right angled triangle

$\therefore$ Area of the right angled triangle

$= \frac{1}{2} \times 8 \times 15 = 60$ sq.m.

18. Area of the rectangle $= xy$ sq. metre

Area of the new rectangle $= \frac{120}{100}x \times \frac{85}{100}y$

$= 1.020\ xy$ sq. metre

$\therefore$ Increase in the area

$= 1.02\ xy - xy = .02\ xy$ sq. m.

$\therefore$ Percentage increase

$= \frac{.02xy}{xy} \times 100 = 2\%.$

19. Side of rhombus

$= \sqrt{\left(\frac{16}{2}\right)^2 + \left(\frac{12}{2}\right)^2} = \sqrt{8^2 + 6^2} = \sqrt{100}$

$= 10$ cm.

$\therefore$ Perimeter of the rhombus

$= 4 \times$ side $= 4 \times 10 = 40$ cm.

20. Here, $2\pi R - R = 37$

$\Rightarrow \quad R\left(2 \times \frac{22}{7} - 1\right) = 37$

$\Rightarrow \quad R(44 - 7) = 37 \times 7$

$\Rightarrow \quad R \times 37 = 37 \times 7$

$\therefore \quad R = 7$ cm

Hence, diameter of the circle

$= 2R = 2 \times 7 = 14$ cm.

21. Volume of the cuboid
$= l \times b \times h = 4 \times 3 \times 2 = 24$ cu. cm.

22. Volume of the reservoir
$= l \times b \times h = 3 \times 2 \times 1 = 6$ cu. m
($\because$ 1 cu m = 1000 litre)
$\therefore$ Capacity of the reservoir
$= 6 \times 1000 = 6000$ litre.

23. Here, $6 \times (\text{side})^2 = 1014$

$\Rightarrow \quad (\text{side})^2 = \dfrac{1014}{6} = 169$

$\therefore \quad \text{side} = \sqrt{169} = 13$ cm

Hence, Volume of the cube
$= (\text{side})^3 = (13)^3$
$= 2197$ cu cm.

24. Here, $a_1^3 : a_2^3 = 8 : 1$

$\therefore \quad \left(\dfrac{a_1}{a_2}\right)^3 = \left(\dfrac{2}{1}\right)^3 \Rightarrow a_1 : a_2 = 2 : 1$

Therefore, ratio of their edges = 2 : 1.

25. Here, $4\pi r_1^2 : 4\pi r_2^2$

$= 9 : 16 \Rightarrow r_1^2 : r_2^2 = 9 : 16$

$\Rightarrow \left(\dfrac{r_1}{r_2}\right)^2 = \left(\dfrac{3}{4}\right)^2 \Rightarrow r_1 : r_2 = 3 : 4$

$\Rightarrow \dfrac{r_1^3}{r_2^3} = \dfrac{27}{64} \Rightarrow r_1^3 : r_2^3 = 27 : 64.$

Therefore, ratio of their volumes

$= \dfrac{4}{3}\pi r_1^3 : \dfrac{4}{3}\pi r_2^3 = r_1^3 : r_2^3 = 27 : 64$

26. The longest rod that can be placed in the cuboidal room = Length of the diagonal

$= \sqrt{l^2 + b^2 + h^2} = \sqrt{(12)^2 + (9)^2 + (8)^2}$

$= \sqrt{144 + 81 + 64} = \sqrt{289} = 17$ m

27. Suppose the base radius and the height of the right circular cone are $3x$ m and $5x$ m respectively.
$\therefore$ Volume of the cone

$= \dfrac{1}{3}\pi r^2 h = \dfrac{1}{3}\pi (3x)^2 \times 5x$ cu m

Now, $\dfrac{1}{3}\pi \times 9x^2 \times 5x = 120\pi$

$\Rightarrow \quad x^3 = \dfrac{120 \times 3}{9 \times 5}$

$\Rightarrow \quad x^3 = 8$

$\Rightarrow \quad x^3 = (2)^3$

$\Rightarrow \quad x = 2$ m

$\therefore$ The radius and the height of the cone will be $3 \times 2 = 6$ m and $5 \times 2 = 10$ m respectively.
$\therefore$ Slant height of the cone

$= \sqrt{r^2 + h^2} = \sqrt{(6)^2 + (10)^2}$

$= \sqrt{36 + 100} = \sqrt{136} = 2\sqrt{34}$ m.

28. Here, $2\pi r = 88$

$\therefore \quad r = \dfrac{88}{2\pi} = \dfrac{88 \times 7}{2 \times 22} = 14$ cm

Since, volume of the cylinder

$= \pi r^2 h = \dfrac{22}{7} \times (14)^2 \times 42$
$= 22 \times 2 \times 14 \times 42$
$= 25872$ cu cm.

29. Here, length of the cuboid = Edge of the first cube + Edge of the second cube
$= 10 + 10 = 20$ cm
$\therefore$ Surface area of the cuboid
$= 2(20 \times 10 + 10 \times 10 + 10 \times 20)$
$= 2(200 + 100 + 200)$
$= 2 \times 500 = 1000$ sq. cm.

30. Obviously, two ways can be adopted if one wants to give the rectangular piece of paper a cylindrical form, *i.e.,*

1. *When the paper is bent towards its length.* In this case, the circumference of the base of the cylinder will be equal to the length of the rectangular piece of paper and the height of the cylinder will be equal to the breadth of the rectangular piece of paper.
2. *When the paper is bent towards its breadth.* In this case, the circumference of the base of the cylinder will be equal to the breadth of the rectangular piece of paper and the height of the cylinder will be equal to the length of the rectangular piece of paper.

31. In the first case:

$2\pi r = 30$

$r = \frac{15}{\pi}$ cm and $h = 20$ cm

$\Rightarrow$ Volume $(V_1) = \pi r^2 h$

$= \frac{15 \times 15 \times 20}{\pi} = \frac{4500}{\pi}$ cu cm

In the second case :

$2\pi r = 20$

$\Rightarrow \quad r = \frac{10}{\pi}$ cm and $h = 30$ cm

$\therefore$ Volume $(V_2) = \pi r^2 h$

$= \frac{10 \times 10 \times 30}{\pi} = \frac{3000}{\pi}$ cu cm

Hence, ratio of the two volumes

$= V_1 : V_2 = \frac{4500}{\pi} : \frac{3000}{\pi} = 3 : 2$

32. Volume of the cone = Volume of the sphere

$\therefore \quad \frac{1}{3}\pi(3)^2 \times h = \frac{4}{3}\pi \times 3^3 \Rightarrow h = 12$ cm

Hence, height of the cone = 12 cm.

33. Surface area of the roller = $2\pi rh$

$= 2 \times \frac{22}{7} \times 1.2 \times 1.68 = 12.672$ sq. m

In one complete revolution, the roller covers = 12.672 sq. m.

$\therefore$ It will cover in 1000 revolutions

= 12.672 × 1000 = 12672 sq. m

Hence, area of the field = 12672 sq. m.

34. Percentage increase in the surface area of the cube

$= \left(x + y + \frac{xy}{100}\right)\% = \left(10 + 10 + \frac{10 \times 10}{100}\right)\%$

= 21%.

35. Here, volume of the cone = Volume of the cylinder

$\Rightarrow \quad \frac{1}{3}\pi r^2 \times \text{height} = \pi r^2 \times 14$

$\therefore \quad$ Height = 14 × 3 = 42 m

Thus, height of the cone = 42 m.

36. Volume of the cubical room

$= (10)^3 = 1000$ cu m

Number of cotton bales which can be placed in the room

$= \frac{\text{Volume of the room}}{\text{Volume of each cotton bale}} = \frac{1000}{5} = 200.$

37. Volume of the new cube

$= 2^3 + 3^3 + 4^3 = 8 + 27 + 64 = 99$cu cm

$\therefore$ Side of the new cube = $\sqrt[3]{99} = 4.626$ cm.

38. Change in the volume of the cylinder

$= \left(x + y + (-z) + \frac{xy + y(-z) + (-zx)}{100} + \frac{xy(-z)}{100^2}\right)\%$

Since volume of the cylinder remains unchanged.

$\therefore \quad$ Change = 0%

Now,

$\left(50 + 50 + (-z) + \frac{50 \times 50 - 50z - 50z}{100} + \frac{50 \times 50 \times (-z)}{100^2}\right) = 0$

$\therefore \quad 100 - z + 25 - z - .25z = 0$

$\Rightarrow 2.25z = 125 \Rightarrow z = \frac{125}{2.25} = 55.56$

$\therefore$ Height of the cylinder should be decreased by 55.56%.

39. Here, $6 \times (\text{side})^2 = 600$

$\Rightarrow \quad \text{side}^2 = 100$

$\Rightarrow \quad \text{side} = \sqrt{100} = 10$ cm

$\therefore$ Diagonal of the cube

$= \sqrt{3} \times \text{side} = \sqrt{3} \times 10 = 10\sqrt{3}$ cm.

40. Area of the curved surface of the cone

$= \frac{22}{7} \times \frac{28}{2} \times 50 = 2200$ sq. m.

$\therefore$ Cost of white washing at 80 paise per sq. m

$= 2200 \times \frac{80}{100} = ₹\ 1760.$

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Basic Reasoning

1 Analogies

Word Analogy

In Analogy Tests the relationship between two given words is established and then applied to the other words.

The type of relationship may vary, so while attempting such questions the first step is to identify the type of relationship, which is generally any one of the following.

Letter Analogy

In this type of analogy the relationship between two given set of letters is established and then applied to the other set to obtain the required set of letters as the answer.

These letters can be moved some steps backward or forward; reversed in whole or in sections or have some common identity between each other.

Number Analogy

In number analogy also, the relationship between the given numbers is detected and then applied to the second part to find the missing numbers. This relationship between the numbers can be based on any of the following patterns:

(*i*) numbers can be odd/even/prime numbers;
(*ii*) numbers can be multiple of one number;
(*iii*) numbers can be squares/cubes of different numbers;
(*iv*) some numbers can be added to/subtracted from/multiplied to/divided into the first number to get the second number;
(*v*) the second number can be the sum/product/difference of the digits of first number; and
(*vi*) combinations of any mathematical calculations given above can apply to the relationship between the two given numbers.

Multiple Choice Questions

Directions(1-15): *In each of the following questions find out the alternative which will replace the question mark.*

1. Peacock : India :: Bear : ?
A. Australia B. America
C. Russia D. China

2. Flow : River :: Stagnant : ?
A. Rain B. Stream
C. Pool D. Sea

3. Architect : Building :: Sculptor : ?
A. Museum B. Stone
C. Wall D. Statue

4. Carbon : Diamond :: Corundum : ?
A. Garnet B. Ruby
C. Graphite D. Pearl

5. Eye : Myopia :: Teeth : ?
A. pyrrhoea B. Cataract
C. Trachoma D. Eczema

6. Conference : Chairman :: Newspaper : ?
A. Reporter B. Distributor
C. Reader D. Editor

7. Safe : Secure :: Protect : ?
A. Lock B. Sure
C. Guard D. Conserve

8. College : Student :: Hospital : ?
A. Nurse B. Doctor
C. Medicines D. Patient

9. South : North-West :: West : ?
A. North B. South-West
C. North-East D. East-South

10. Poles : Magnet :: ? : Battery
A. Cells B. Power
C. Terminals D. Energy

Directions (11-15): *Each of the following questions has a group. Find out which one of the given alternatives will be another member of the group or of that class.*

11. Lucknow, Patna, Bhopal, Jaipur
A. Shimla B. Mysore
C. Nagpur D. Indore

12. Volleyball, Hockey, Football
A. Aquatics B. Baseball
C. Athletics D. Chess

13. Mars, Earth, Jupiter
A. Planets B. Cosmos
C. Orbits D. Sun

14. 'Reading' is related to 'knowledge' in the same way as 'Work' is related to:
A. Money B. Employment
C. Experience D. Goal

15. 'Dress' is related to 'Body' in the same way as 'Bangles' is related to:
A. Bride B. Lady
C. Wrist D. Beauty

Directions (16 to 30): *In the questions given below establish the relationship between the two words. Then from the given options select one which has the same relationship as of the given two words.*

16. *Mania* is to *Craze* as *Phobia* is to…..
A. Desires B. Hobbies
C. Want D. Fear

17. *Stammering* is to *Speech* as *Deafness* is to …..
A. Ear B. Hearing
C. Noise D. Silence

18. *Secretive* is to *Open* as *Snide* is to …..
A. Forthright B. Hidden
C. Outcome D. Forward

19. *Leash* is to *Pet* as *Handcuffs* is to …..
A. Cunning B. Dacoits
C. Criminals D. Robbers

20. *Ride* is to *Horse* as *Smoke* is to …..
A. Chimney B. Sparkling
C. Pipe D. Ashes

21. *Guilt* is to *Past* as *Hope* is to …..
A. Present B. Future
C. Today D. Despair

22. *Stars* are to *Night* as *Sun* is to…..
A. Noon B. Dawn
C. Day D. Light

23. ….. is to *Nose* as *Skin* is to *Touch*
A. Smell B. Face
C. Breath D. Perfume

24. *War* is to ….. as *Smoke* is to *pollution.*
A. Alliance B. Peace
C. Victory D. Destruction

25. *Treatment* is to ….. as *Education* is to *Teacher*
A. Doctor B. Matron
C. Hospital D. Clinic

26. *Train* is to *Track* as *Bullet* is to ……
A. Barrel B. Kill
C. Firing D. Ammunition

27. *Psychology* is to *Emotions* as *Philosophy* is to …..
A. Knowledge B. Scholar
C. Research D. Wisdom

28. *Mermaid* is to *Fish* as *Centaur* is to …..
A. Pegasus B. Unicorn
C. Deer D. Horse

29. *Punishment* is to *Imprisonment* as *Reward* is to …..
A. Prize B. Remand
C. Money D. Rebuke

30. *Star* is to ….. as *Drop* is to *Ocean.*
A. Sky B. Shine
C. Earth D. Twinkle

Directions (31 to 40) : *In the questions given below one term is missing. Based on the relationship of the two given words find the missing term from the given options.*

31. GFC : CFG : : RPJ : ?
A. JRP B. JPR
C. PJR D. RJP

32. BCF : DEG : : MNQ : ?
A. OPR B. PQS
C. OPP D. QRT

33. NATION : ANITNO : : HUNGRY : ?
A. HNUGRY B. UNHGYR
C. YRNGUH D. UHGNYR

34. SSTU : MMNO : : AABC : ?
A. GGHH B. IJKK
C. XXYZ D. NOOP

35. BaBy : TaTa : : LiLy : ?
A. PooL B. ROse
C. HaNd D. DoWN

36. AEI : LPT : : CGK : ?
A. OSV B. RUY
C. TXC D. FJN

37. BCDE : WVUT : : QRST : ?
A. EFHG B. JIHG
C. POML D. GEDC

38. DIMO : DMIO : : JUVR : ?
A. JVRU B. JRVU
C. JVUR D. JUVR

39. SUW : RST : : DFH : ?
A. DEF B. FGH
C. CDE D. GHI

40. CHJR : RHJC : : TARD : ?
A. DART B. ATRD
C. DRAT D. ARDT

Directions (41 to 50): *In the following questions, select the number from the given options which follows the same relationship as shared between the first two numbers.*

41. 1 : 11 : : 2 : ?
A. 20 B. 22
C. 24 D. 44

42. 18 : 27 : : 22 : ?
A. 42 B. 39
C. 33 D. 54

43. 14 : 20 : : 16 : ?
A. 23 B. 10
C. 48 D. 32

44. 8 : 27 : : 64 : ?
A. 277 B. 125
C. 250 D. 99

45. 0.16 : 0.0016 : : 1.02 : ?
A. 10.20 B. 0.102
C. 0.0102 D. 1.020

46. 23 : 53 : : 7 : ?
A. 66 B. 57
C. 27 D. 19

47. 11 : 35 : : 17 : ?
A. 3 B. 22
C. 58 D. 10

48. 65 : 30 : : 44 : ?
A. 79 B. 62
C. 28 D. 16

49. 731 : 902 : : 655 : ?
A. 646 B. 800
C. 793 D. 556

50. 411 : 441 : : 755 : ?
A. 705 B. 775
C. 635 D. 665

ANSWERS

1	2	3	4	5	6	7	8	9	10
C	C	D	B	A	D	C	D	C	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	B	A	C	C	D	B	A	C	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	C	A	D	A	A	D	D	C	A
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
B	A	D	C	C	D	B	C	C	A
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
B	C	A	B	C	D	A	D	A	B

EXPLANATORY ANSWERS

1. As Peacock is the national bird of India, similarly Bear is the national animal of Russia.

2. As Water of a River flows similarly water of Pool is Stagnant.

3. As 'Architect' makes 'Building' similarly 'Sculptor' makes 'Statue'.

4. As Diamond is made of Carbon similarly Ruby is made of Corundum.

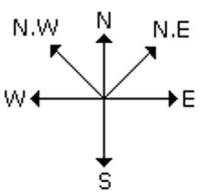
5. As Myopia is disease of eye similarly pyorrhoea is a disease of teeth.

6. As Chairman is the highest authority in a conference similarly Editor is in Newspaper.

7. Related words are synonyms.

8. As Students read in College similarly Patients are treated in Hospital.

9. As North-West is 135° clockwise from South in the same were North-East is 135° clockwise from the West.



10. As magnet has poles similarly battery has terminals.

11. All the cities given in the question are state capitals similarly Shimla is also a capital.

12. Baseball is like volleyball, Hockey and Football.

13. All these are planets.

14. As 'Knowledge' is achieved by 'Reading' in the same way 'Experience' is achieved by 'Work'.

15. As 'Dress' is worn on 'Body' similarly 'Bangles' are worn on 'Wrist'.

16. The related words are synonyms.

17. Defect in speech causes stammering and in hearing causes deafness.

18. The related words are antonyms.

19. Leash is used to tie a pet, handcuffs to tie criminals.

20. Horse is the object of action 'to ride' and pipe is the object of action 'to smoke'.

21. Feeling of guilt comes with mistakes in past and that of hope for a good future.

22. Stars are visible during the night and sun during day.

23. Sense organ skin senses the touch and nose senses smell.

24. Smoke causes pollution and war causes destruction.

25. Education is sought by the teacher and treatment by doctor.

26. Track is the path of train, barrel is of bullet.

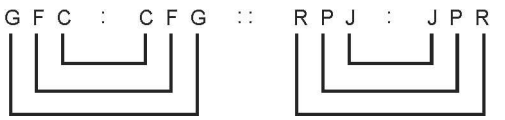
27. Psychology is the study of emotions as philosophy is of wisdom.

28. Mermaid is a mythological fish and centaur a mythological horse.

29. Imprisonment is the form of punishment, money a kind of reward.

30. A single drop is a very tiny part in an ocean so is a star in the sky.

31. The letters of the first group are reversed



32. The three letters are moved 2, 2 and 1 steps forward respectively.

33. The word is divided in sections of two letters and the letters are reversed.

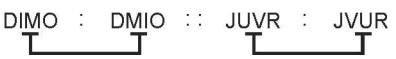
34. The first letter in each group is repeated and followed by two consecutive letters.

35. In each group the alternate letters are capitals.

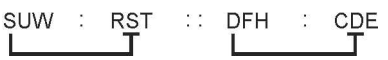
36. In each group the letters jump three letters between them, *i.e.,* they are moving to the fourth letter.

37. The consecutive letters in the first set are in natural order and in the second set, they are in reverse order.

38. Only the middle letters are reversed to obtain the second set of letters.



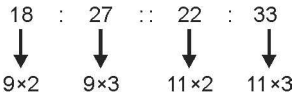
39. The first letter in the first set of letters has its consecutive letters on either side in the second set.



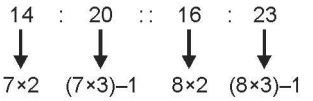
40. Only the places of first and last letters are interchanged.

41. The first number is repeated to obtain the second number.

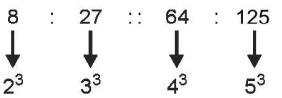
42. In the given set, the numbers are multiples of 9 and in the second set, multiples of 11.



43. The relationship between the numbers is :



44. The numbers are cubes of different numbers



45. The decimals are divided by 100.

46. All the numbers are prime numbers.

47. All the numbers are odd numbers.

48. The second number is the product of digits of first number

65 : 30 :: 44 : 16
6 × 5 4 × 4

49. The sum of the digits of both the numbers is same.
731 : 902 → 7 + 3 + 1 = 9 + 0 + 2
i.e. 11 = 11
655 : 646 → 6 + 5 + 5 = 6 + 4 + 6
i.e. 16 = 16

50. In the first number the second digit is repeated and in the second number the first digit is repeated.

411 : 441 :: 755 : 775

●●●

2 Relationship Concepts

While attempting questions on blood relations, one should be clear of all the relation patterns that can exist between any two individuals. These type of questions are given mainly to test one's relationship ability.

Very well known relations are :

Mother	Grandmother
Father	Grandfather
Son	Grandson
Daughter	Granddaughter
Brother	Brother-in-law
Sister	Sister-in-law
Niece	Father-in-law
Nephew	Mother-in-law
Uncle	Son-in-law
Aunt	Daughter-in-law
Husband	Cousin
Wife	

The patterns of some relationships which help in solving questions in these tests are :

Father's *or* Mother's Father	—	Grandfather (Paternal *or* Maternal)
Father's *or* Mother's Mother	—	Grandmother (Paternal *or* Maternal
Father's *or* Mother's Son	—	Brother
Father's *or* Mother's Daughter	—	Sister
Father's Brother	—	Paternal Uncle
Father's Sister	—	Paternal Aunt
Mother's Brother	—	Maternal Uncle
Mother's Sister	—	Maternal Aunt
Uncle *or* Aunt's Son *or* Daughter	—	Cousin
Son's Wife	—	Daughter-in-law
Daughter's Husband	—	Son-in-law
Husband's *or* Wife's Brother	—	Brother-in-law
Husband's *or* Wife's Sister	—	Sister-in-law
Brother's Wife	—	Sister-in-law
Sister's Husband	—	Brother-in-law
Brother's Son	—	Nephew
Brother's Daughter	—	Niece

Multiple Choice Questions

1. Amit said, ''This girl is the wife of the grandson of my mother''. Who is Amit to the girl?
A. Father B. Grandfather
C. Husband D. Father-in-law

2. Showing the man receiving the prize, Seema said, ''He is the brother of my uncle's daughter''. Who is the man to Seema?
A. Son B. Brother-in-law
C. Nephew D. Cousin

3. Introducing a girl, Vipin said, ''Her mother is the only daughter of my mother-in-law''. How is Vipin related to the girl?
A. Uncle B. Husband
C. Brother D. Father

4. Pointing to an old man, Kailash said, ''His son is my son's uncle''. How is the old man related to Kailash?
A. Brother B. Uncle
C. Father D. Grandfather

5. Pointing to the lady on the platform, Ranju said, ''She is the sister of the father of my mother's son. Who is the lady of Ranju?
A. Mother B. Sister
C. Aunt D. Niece

6. While walking with his friend, Suresh meets another man whose mother is the wife of Suresh's father's only son. How is the man related to Suresh?
A. Son B. Nephew
C. Cousin D. Uncle

7. If A is the brother of the son of B's son, how is A related to B?
A. Son B. Brother
C. Cousin D. Grandson

8. Pointing to a photograph, a person tells his friend, ''She is the granddaughter of the elder brother of my father''. How is the girl in the photograph related to this man?
A. Niece B. Sister
C. Aunt D. Sister-in-law

9. Pushpa told Rinku, ''The girl I met yesterday at the beach was the youngest daughter of the brother-in-law of my friend's mother''. How is the girl related to Pushpa's friend?
A. Cousin B. Daughter
C. Niece D. Friend

10. Prakash told Prabhat, Yesterday I defeated the only brother of the daughter of my grandmother. Whom did Prakash defeat?
A. Son B. Father
C. Brother D. Grandfather

Directions (11–16) : *Read the following information carefully and answer the questions given below.*
A family consists of six members A, B, C, D, E, F. B is the son of C but C is not the member of B. A and C are a married couple. E is the brother of C. D is the daughter of A. F is the brother of A.

11. Who is the brother-in-law of C?
A. A B. F
C. E D. D

12. Who is the father of B?
A. A
B. F
C. C
D. Can't be determined

13. How many children does A have?
A. Four B. Three
C. Two D. One

14. How many female members are there in the family?
A. One B. Two
C. Three D. Four

15. How is B related to D?
A. Uncle B. Brother
C. Father D. Husband

16. Which is a pair of brothers?
A. C and E B. B and D
C. A and F D. A and D

17. A and B both are children of C. If C is the mother of A, A is the son of C but B is not the daughter of C. How are A and B mutually related?

A. A is the brother of B.
B. A is the sister of B.
C. A is the cousin of B.
D. A is the nephew of B.

18. J is the brother of K and L. M is L's mother. N is J's Father. Which of the following statements cannot be definitely true?
A. N is K's fathers.
B. M is J' mothers.
C. J is M's son.
D. K is N's son.

19. A woman walking with a boy meets another woman and on being asked about her relationship with the boy. She says, ''My maternal uncle and his maternal uncle's meternal uncle are brothers.'' How is the boy related to the woman?
A. Nephew B. Son
C. Grandson D. Husband

20. A party consists of grandmother, father, mother, four sons and their wives and one son and two daughters to each of the sons. How many females are there in all?
A. 14 B. 16
C. 18 D. 24

Directions (21–25) : *Read the following information carefully and answer the questions below.*
A family consists of six members J, K, L, M, N and O. There are two married couples. K is a doctor and the father of N. O is the grandfather of L and is a contractor. M is grandfather of N and is housewife. There is one doctor, one contractor, one nurse, one housewife and two students in the family.

21. Who is the husband of J?
A. L B. O
C. K D. M

22. Who is the sister of N?
A. L
B. O
C. N
D. Information insufficient

23. What is the profession of J?
A. Doctor B. Nurse
C. Doctor or Nurse D. Housewife

24. Which of the following are two married couples?
A. OM, KN B. OM, KJ
C. NM, LO D. OM, LJ

25. Which of the following is definitely a group of male members?
A. KO B. KON
C. KOJ D. ON

26. In A + B means 'A is the brother of B', A ÷ B means 'A is the father of B' and A × B means 'A is the sister of B'. Which of the following means 'M' is the uncle of 'P'?
A. M ÷ N × P B. N × P ÷ M
C. M + S ÷ R + P D. M + K ÷ T × P

27. If A + B means A is the son of B; A – B means A is the husband of B; A × B means A is the sister of B, then which of the following shows the relation Q is the maternal uncle of P?
A. P + B – R × Q B. P – B + R × Q
C. P + B × R – Q D. P × B – R + Q

28. If P + Q means P is the brother of Q; P × Q means P is the mother of Q; and P ÷ Q means P is the sister of Q, which of the following would means R is the uncle of S?
A. R × P + S B. R × S + P
C. R + P × S D. R ÷ P + S

Directions (29–35) : *Read the following information carefully and answer the questions that follow.*
A + B means A is the father of B, A – B means A is the wife of B, A × B means A is the brother of B, A ÷ B means A is the daughter of B.

29. If P – R × Q, which of the following is true?
A. P is the sister of Q.
B. Q is the husband of P.
C. P is the sister-in-law of Q.
D. Q is the son of P.

30. If P × R + Q, which of the following is true?
A. P is the uncle of Q.
B. P is the father of Q.
C. P is brother-in-law of Q.
D. P is grandfather of Q.

31. If P ÷ R + Q, which of the following is true?
A. P is the father of Q.
B. P is the brother of Q.
C. P is the mother of Q.
D. P is the sister of Q.

32. If P + R ÷ Q, which of the following is true?
A. P is the brother of Q.
B. P is the son of Q.
C. P is the husband of Q.
D. P is the father of Q.

33. If P × R – Q, which of the following is true?
A. P is brother-in-law of Q.
B. P is the brother of Q.
C. P is the the uncle of Q.
D. P is the father of Q

34. If P × R ÷ Q, which of the following statements is true?
A. P is the uncle of Q.
B. P is the father of Q.
C. P is the brother of Q.
D. P is the son of Q.

35. If P ÷ R + S + Q, which of the following statement is true?
A. P is the daughter of Q.
B. Q is the aunt of P.
C. P is the aunt of Q.
D. P is the mother of Q.

36. A × B means A is the sister of B, A ÷ B means A is the daughter of B, A – B means A is the son of B. On the basis of this information you have to tell, how is P related to S in the relationship P – Q × R ÷ S.
A. Brother
B. Son
C. Grandson
D. Daughter's son

37. If 'P + Q' means 'P is the sister of Q', 'P – Q' means 'P is the mother of Q', 'P × Q' means P is the brother of Q. P ÷ Q means P is the father of Q. Which of the following means M is the maternal-uncle of R?
A. M × T – R
B. M ÷ T × R
C. M + T ÷ K – R
D. M ÷ N + J

38. P + Q means P is the brother of Q. P – Q means P is the mother of Q and P × Q means P is the sister of Q. Which of the following means that M is the maternal-uncle of R?
A. M – R + K
B. M + K – R
C. M + K × Q
D. There is no such symbol

39. If S × T means S is brother of T, S + T means S is the father of T. Which of the following shows 'O' is the cousin of R?
A. R × T + O
B. R + T × O
C. R × O × T
D. None of these

40. Q's mother is the sister of R and daughter of S, N is the daughter of R and sister of M. How M is related to S?
A. Son
B. Son's son
C. Brother
D. Data inadequate

41. Pointing to a gentleman Deepak said. '' His only brother is the father of my daughter's father.'' How is the gentleman related to Deepak?
A. Father
B. Grandfather
C. Brother-in-law
D. Uncle

42. Pushpa said to her friend, ''Yesterday I attended the birthday party of the son of the only son-in-law of my brother's fathers.'' How is Puspha related to the man, whose birthday party she attended?
A. Niece
B. Daughter
C. Sister
D. Mother

43. Pointing towards a man in the photograph. Ranjana said, ''He is the son of the only son of my grandfather.'' How is the man related to Ranjana?
A. Cousin
B. Nephew
C. Brother
D. Son

44. Pointing to Rajan in the photograph. Aditi said, ''The only son of his mother is my father.'' How is Aditi related to Rajan?
A. Mother's sister
B. Bua (Father's sister)
C. Daughter
D. Niece

45. Pointing towards a woman in the photograph, Suresh said, ''The only daughter of her grandfather is my wife.'' How is Suresh related to that woman?
A. Uncle (Fufa) B. Maternal uncle
C. Father D. Brother

46. A is the brother of B, C is the brother of A. To establish a relationship between B and C, which of the following information is required?
(I) Sex of C (II) Sex of B
A. Only (I) is required
B. Only (II) is required
C. Both (I) and (II) are required
D. Neither (I) nor (II) is required

47. The son of M is the father of N and grandfather (Mother's father) of R. S is the daughter of N and sister of B. On the basis of this information how is M related to B?
A. Grandfather
B. Grandmother
C. Data inadequate
D. Grandmother's mother

48. Pointing to a man in a photograph, a main said to a woman, ''His mother is the only daughter of your father.'' How is the woman related to the man in the photograph?
A. Sister B. Mother
C. Wife D. Daughter

49. Prakash said to Amit, ''That boy in blue shirt is younger of the two brothers of the daughter of my father's wife.'' How is the boy in blue shirt related to Prakash?
A. Father B. Nephew
C. Brother D. Uncle

50. If P $ Q means P is the father of Q, P # Q means P is the mother of Q, P * Q means P is the sister of Q. Then how is Q related to N in N # L $ P * Q?
A. Grandson B. Granddaughter
C. Nephew D. Data inadequate

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	D	D	C	C	A	D	A	A	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	C	C	B	B	A	A	D	B	A
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	A	B	B	A	D	A	C	C	A
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
D	C	A	D	B	D	A	B	D	D
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
D	C	C	C	A	B	C	B	C	D

EXPLANATORY ANSWERS

1. Mother's grandson – Son; Son's wife daughter-in-law.

2. Brother of uncle's daughter – Uncle's son – Cousin; Man is Seema's Cousin.

3. Only daughter of mother-in-law. Wife; Girl's mother is Vipin's wife.

4. Kailash's son's Uncle – Kailash's brother; Old man's son is Kailash's brother. So, old man is Kailash's father.

5. Mother's son – brother; My brother's father my father; my father's sister – aunt. So, the lady is Ranju's aunt.

6. Suresh's father's only son – Suresh, Suresh's wife is the mother of his son. So, the man is Suresh's son.

7. Son of B's son – B's grandson; brother of B's grandson – B's grandson.

8. Brother of father – Uncle; Uncle's grand daughter – daughter of uncle's son – daughter of cousin-niece.

9. Daughter of brother-in-law is niece. Mother's niece – Cousin. So, the girl is the cousin of Pushpa's friend.

10. Daughter of grandmother – aunt; Aunt's only brother – father.

11. C is the husband of A and F is the brother of A. So, F is the brother-in-law of C.

12. C is the father of B.

13. Clearly, B is the son of A and D is the daughter of A. So, A has two children.

14. There are two females only – mother A and daughter D.

15. D is the sister of B who is a male. So, B is brother of D.

16. Clearly, E is brother of C who is a male. So, E and C are a pair of brothers.

17. B is the child of C but not daughter means B is the son of C. Also, A is the son of C. So, A is the brother of B.

18. J, K, L are children of same parents. So, M who is L's mother and N, who is J's father will be mother and father of all three. However, it is not mentioned whether K is male or female. So, (D) cannot be definitely true.

19. Boy's maternal uncle will be brother of boy's mother. Maternal uncle of mother's brother and maternal uncle of lady are brother means lady is sister to mother's brothers *i.e.* lady is the mother of the boy. So, the boy is woman's son.

20. Grandmother is one female, mother is another, wives of four sons are the four females and two daughters of all sons are eight females. So, in all there are 1 + 1 + 4 + 8 = 14 females.

21. The husband of J will be K.

22. Clearly, L and N are children of same parents. So, L will be the sister of N.

23. J is the nurse.

24. The two married couples are K, J and O, M.

25. Clearly, for definite the males are K, the father and O, the grandfather.

26. Analysing and testing we find that option M + K ÷ T × P shows the required relationship as explained below.

(*i*) T × P means T is the sister of P.

(*ii*) K ÷ T means K is the father of T. Hence, from information (*i*) K is also the father of P.

(*iii*) M + K means M is the brother of K. Therefore using information (*ii*) we find that M is the uncle of P.

27. Q is the maternal uncle of P means P is the son of the sister of B *i.e.* P is the son of the husband (say B) of the sister (say R) of B *i.e.* P + B – R × Q.

28. Clearly, R is the uncle of S means R is the brother of the mother (say P) of S *i.e.* R + P × S.

29. P – R × Q means P is the wife of R who is the brother of Q *i.e.* P is the sister-in-law of Q.

30. P × R + Q means P is the brother of R who is the father of Q *i.e.* P is the uncle of Q.

31. P ÷ R + Q means P is the daughter of R who is the father of Q *i.e.* P is the sister of Q.

32. P + R ÷ Q means P is the father of R who is the daughter of Q *i.e.* P is the father of R and Q is the mother of R *i.e.* P is the husband of Q.

33. P × R – Q means P is the brother of R who is the wife of Q *i.e.* P is the brother-in-law of Q.

34. P × R ÷ Q means P is the brother of R who is the daughter of Q *i.e.* P is the son of Q.

35. P ÷ R + S + Q means P is the daughter of R who is the father of S who is the father of Q *i.e.* P is the sister of S who is the father of Q *i.e.* P is the brother-in-law of Q.

36. P – Q × R ÷ S, on the basis of the information given in the question, R is the daughter of S, Q is the sister of R. Hence Q is also daughter of S and P is the son of Q. Hence, P is the son of Q, who is daughter of S. Therefore, P is related as daughter's son of S.

37. 'T – R' means T is the mother of R, 'M × T' means M is the brother of T. Hence, M is the maternal uncle of R.

38. 'K – R' means K is the mother of R. 'M + K' means M is the brother of K. Hence on combining both the information, we get that M is the maternal uncle of R.

39. Testing every options for the relationship given in the question, we find that none of the options shows relationship that O is cousin of R.

40. From the information given in the question, it is clear that S is the mother of R (who's sex is not known). N is the daughter of R and sister of M (whose sex is not known). Hence on the basis of information we conclude that M may be male or female hence may be son or daughter of (R) son or daughter of S. Hence data are not adequate.

41. Father of Deepak's daughter's is daughter's father is the father of Deepak and brother of father is the uncle. Hence, gentleman is related as brother of Deepak.

42. Only son-in-law of mother of Pushpa's mother is the father of Puspha and his son is the brother of Pushpa. Therefore, Pushpa attended the birthday party of her brother.

43. The only son of Ranjana's grandfather means Ranjana's father and his son is Ranjana's brother. Hence, the man is related as brother of Ranjana.

44. The only son of Rajan's mother is the Rajan himself and Aditi says that he is her father. Therefore, Aditi is related as daughter of Raman.

45. It is clear from the information given in the question that Suresh is the husband of woman's father's sister. Hence, option (A) is the correct answer.

46. From the information, it is clear that C is the brother of B but how B is related to C depends on the sex of B. Hence, to establish the relationship between B and C, sex of B should be known.

47. From the information given in the question, the sex of M is not determined, hence, none of the options is a definite answer.

48. From the information given in the question it is clear that the only daughter of the woman's father is the woman herself, and hence the man in the photograph is her son. Therefore, the woman is the mother of the man in the photograph.

49. The daughter of Prakash's father's wife is the sister of Prakash and brother of the daughter is the brother of Prakash. Hence, the boy in blue shirt is the brother of the Prakash.

50. In the above question, the sex of Q is not given, hence exact relationship between N and Q cannot be established. In other words, we can say that data are not adequate to answer the question.

● ● ●

3 Figure Odd One Out

Classification means arranging the given content in groups or classes having qualities of same kind. In classification type questions, the figures or items are sorted out in groups on the basis of their similarities in qualities in shapes, size, pattern, structure, genus, order, species, grade, style, constituents and other specifications, and thus the answer is found out.

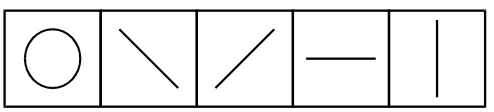
Classification of this type does not have two sets of figures known as Problem Figures and Answer Figures; instead they have only one set of four or five figures known as Problem Figures.

One of these Problem Figures is not like the other four figures.

In other words, three or four of the Answer Figures belong to a class while one which is the odd figures, does not belong to it.

Solved Examples

1.



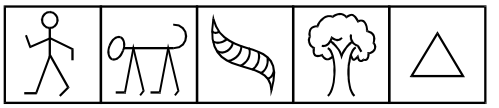
A B C D E

Answer A : A is a circle, whereas B, C, D and E are straight lines pointing to different directions. Note that the common characteristic in each of the four figures B, C, D and E is that they are straight lines.

Thus, they belong to a class. As against these figures, A is a circle and does not belong to that class.

Therefore, the figure that does not belong to the class is A.

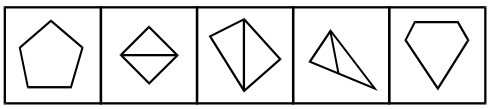
2.



A B C D E

Answer E : Figure A is a man, B is an animal, C is an insect, D is a tree and E is a triangle. There is a common characteristic in four of the five figures. Figures A, B, C and D (man, animal, insect and tree) are of the living beings. Figure E is a triangle is not a living being. Therefore, figure E does not belong to that class.

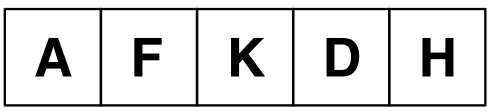
3.



A B C D E

Answer D : Figures A, B, C and E are made of 5 straight lines, while D has only four straight lines. Thus A, B, C and E have a common characteristic (they have 5 straight lines each), but D does not have this characteristic. Therefore, D is different from the other four figures.

4.



A B C D E

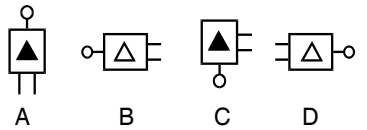
Answer D : Figures A, B, C and E are made up of three straight lines as against D which is made up of only one straight line and a curve.

Thus figures A, B, C and E have some common characteristics. Figure D is different and does not possess the common characteristics.

Now solve the following questions on the basis of what has been explained above.

Multiple Choice Questions

Directions : *In each of the following questions one of the figures is different from the rest. Spot the figure.*

1.


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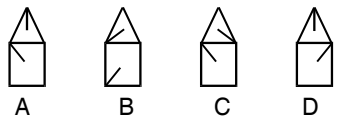

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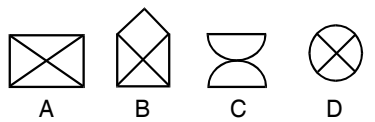

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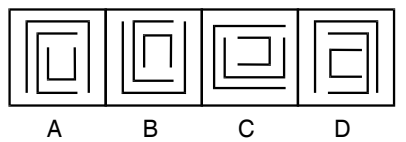

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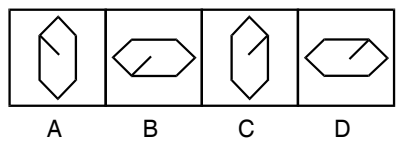

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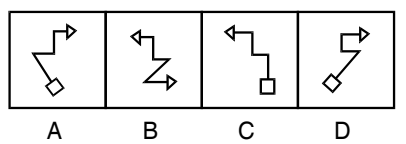

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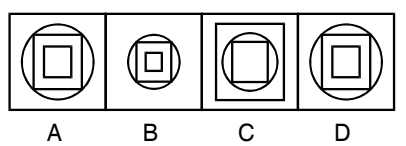

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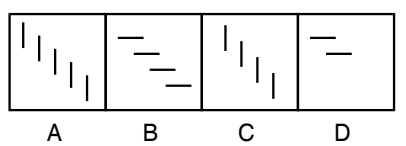

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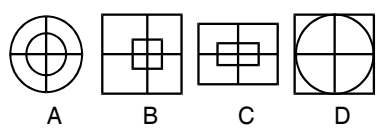

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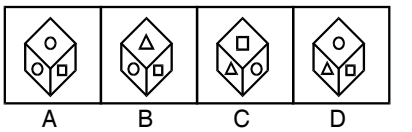

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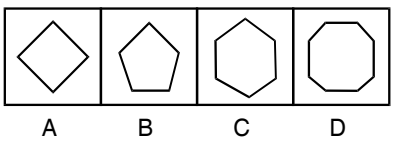

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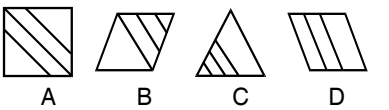

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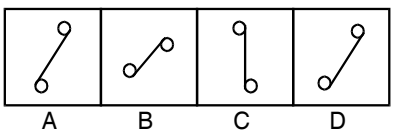

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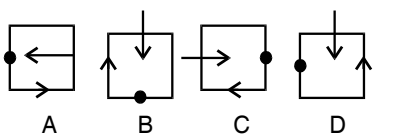

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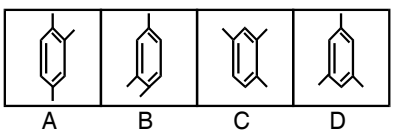

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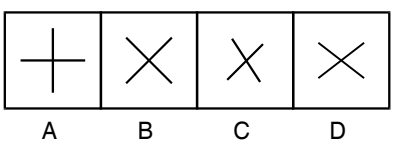

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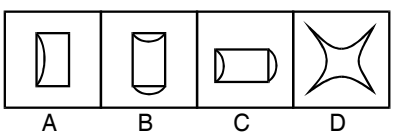

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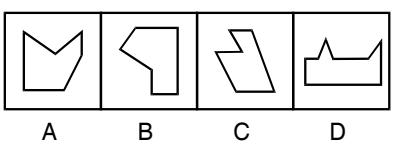

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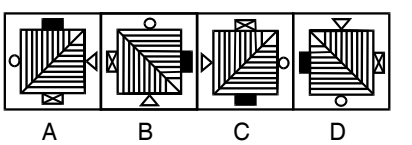

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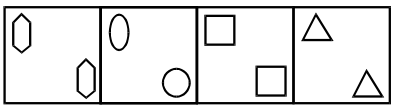

A B C D

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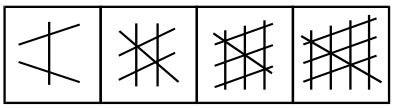

A B C D

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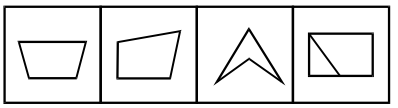

A B C D

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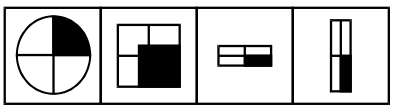

A B C D

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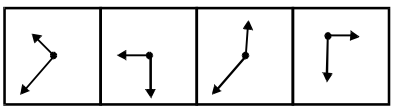

A B C D

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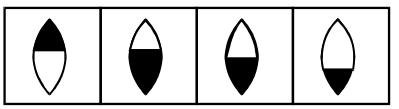

A B C D

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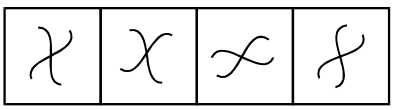

A B C D

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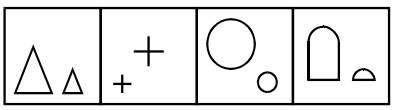

A B C D

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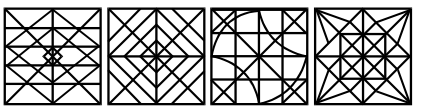

A B C D

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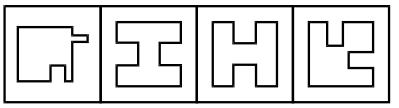

A B C D

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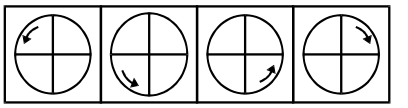

A B C D

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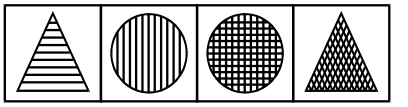

A B C D

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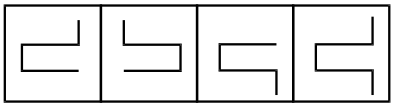

A B C D

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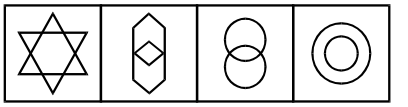

A B C D

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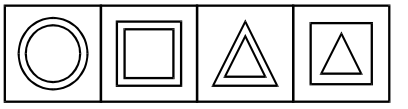

A B C D

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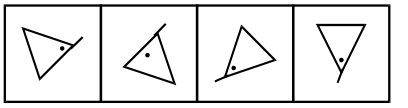

A B C D

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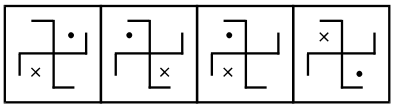

A B C D

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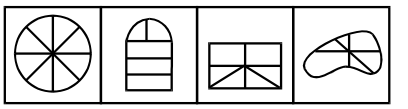

A B C D

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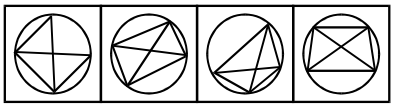

A B C D

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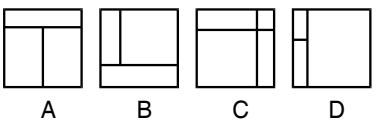

A B C D

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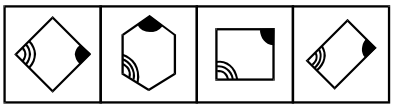

A B C D

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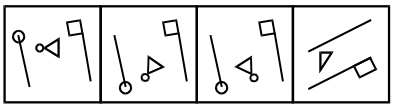

A B C D

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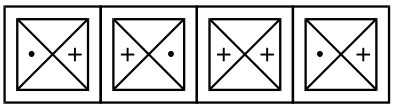

A B C D

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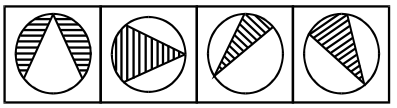

A B C D

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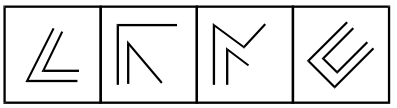

A B C D

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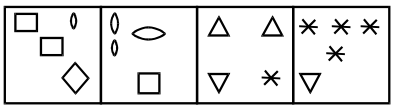

A B C D

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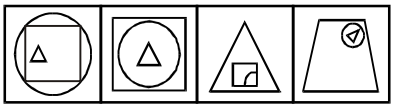

A B C D

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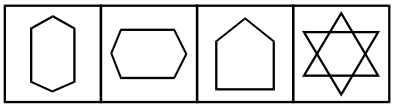

A B C D

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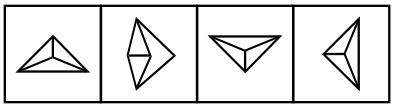
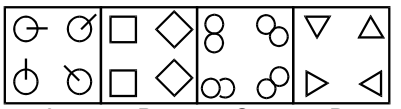


A B C D

49.

A B C D

50.



A B C D

ANSWERS

1	2	3	4	5	6	7	8	9	10
C	C	C	D	C	B	C	A	D	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	D	D	A	D	D	D	D	C	B
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
A	D	B	C	A	A	D	C	A	D
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
D	D	D	D	B	C	A	A	C	B
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
D	C	A	C	D	B	C	B	A	C

EXPLANATORY ANSWERS

1. In all other figures the line with a circle and the two line segments are on opposite sides of the square.

2. In all other figures the two line segments are drawn on same side from the corners of same line. In this figure they are drawn on opposite sides.

3. All other figures are divided into four parts.

4. Only in this figure the middle and the centre shapes are opposite to each other.

5. All other figures can be rotated into each other. In this figure the line segment is on the wrong side.

6. Only this figure has identical design on the corners of the bent line.

7. In all other figures the middle and the centre designs are identical.

8. Only this figure has odd number of line segments.

9. Only this figure has two different shapes divided into equal parts.

10. Only this figure has two identical shapes (circles).

11. Only this figure is made of odd number of lines.

12. All other figures are divided into four parts.

13. Only in this figure the circles are on the same side of the line.

14. Only in this figure the arrow is not crossing the side of the square.

15. Only in this figure the lines outside the design as well as inside are evenly placed.

16. In all other figures the bisecting lines are at right angle to each other.

17. Only this whole figure is made of all curved lines.

18. All other figures are made of six straight lines.

19. All other figures can be rotated into each other.

20. In all other figures the two shapes are identical.

21. Except lines in fig A, fig B, C and D contain atleast a pair do parallel lines.

22. Only this figure has two parts and is made of five straight lines.

23. In all other figures only one-fourth section is shaded.

24. In all other figures the two arrows are at right angle to each other.

25. In all other figures the lower side is shaded.

26. All other figures are symmetrical from the joint.

27. In all other figures the larger and the smaller shapes are same designs.

28. In all other figures all the four sections of the square bear the same pattern.

29. In all other figures the cuts are identical along the two sides of the square.

30. In all other figures the direction of the arrow is anticlockwise.

31. In all other figures the lines inside the shapes are straight. Only in this figure they are oblique.

32. Only in this figure both ends of the design are drawn further.

33. In all other figures the two identical shapes are overlapping each other.

34. Only this figure has two different shapes.

35. In all other figures the dot is in the corner. Only in this figure it is in the middle.

36. In all other figures the dot and the cross are in diagonally opposite sections of the shape.

37. Only in this figure all the sections are equal.

38. In all other figures the quadrant inside the circle is complete.

39. All other figures are divided into three parts.

40. In all other figures the shade and the curved lines are in diagonally opposite corner of the shape.

41. All other figures have three common elements.

42. In all other figures a dot and a plus sign are in opposite sections.

43. In all other figures the area inside the triangle is shaded.

44. In all other figures the two shapes are made of equal number of lines.

45. Only this figure has four identical and one different element. In all other figures there are three identical and one different element.

46. In all other figures the shape in the centre is not touching the middle shape.

47. In all other figures the design is made of even number of lines.

48. All other figures can be rotated into each other.

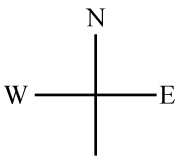
49. All other figures are divided into six parts.

50. Only in this figure one of the designs is incomplete.

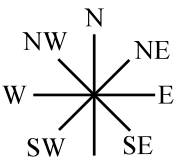
●●●

4 Direction Sense

In these type of tests, the directions in questions needs to be perceived. Such questions are based on the direction chart.



N = North S = South E = East W = West



The sense of the different directions are guided by the left and right turns or angular turns.

Multiple Choice Questions

1. Lakshman went 15 kms to the west from my house, then turned left and walked 20 kms. He then turned east and walked 25 kms and finally turning left covered 20 kms. How far was he from his house?

A. 5 kms B. 10 kms
C. 40 kms D. 80 kms

2. Going 50 m to the south of her house, Radhika turns left and goes another 20 m. Then, turning to the North, she goes 30 m and then starts walking to her house. In which direction is she walking now?

A. North-West B. North
C. South-East D. East

3. Keshav goes 30 metres North, then turns right and walks 40 metres, then again turns right and walks 20 metres, then again turns right and walks 40 metres. How many metres is he from his original position?

A. 0 B. 10
C. 20 D. 40

4. Ramakant walks northwards. After a while, he turns to his right and a little further to his left. Finally, after walking a distance of one km, he turns to his left again. In which direction is he moving now?

A. North B. South
C. East D. West

5. Varun travelled 7 kms eastward, then turned left and travelled 5 kms. Next, he turned left and travelled 7 kms. How far was he from the starting point?

A. 19 kms B. 12 kms
C. 7 kms D. 5 kms

6. Deepak starts walking straight towards east. After walking 75 metres, he turns to the left and walks 25 metres straight. Again he turns to the left and walks a distance of 25 metres. How far is he from the starting point?

A. 140 metres B. 50 metres
C. 115 metres D. None of these

7. Gaurav walks 20 metres towards North. He then turns left and walks 40 metres. He again turns

left and walks 20 metres. Further, he moves 20 metres after turning to the right. How far is he from his original position?

A. 20 metres B. 30 metres
C. 50 metres D. 60 metres

8. A girl leaves from her home. She first walks 30 metres in North-West direction and then 30 metres in South-West direction. Next, she walks 30 metres in the South-East direction. Finally, she turns towards her house. In which direction is she moving?

A. North-East B. North-West
C. South-East D. South-west

9. Rekha who is facing South turns to her left and walks 15 metres, then she turns to her left and walks 7 metres, then facing West she walks 15 metres. How far is she from her original position?

A. 22 metres B. 37 metres
C. 44 metres D. 7 metres

10. The door of Aditya's house faces the East. From the backside of the house, he walks straight 50 metres, then turns to the right and walks 50 metres again. Finally, he turns towards left and stops after walking 25 metres. Now, Aditya is in which direction from the starting point?

A. South-East B. North-East
C. South-West D. North-West

11. Madhuri wants to go the university. She starts from her home which is in the east and comes to a crossing. The road to her left ends in a theatre, straight ahead is the hospital. In which direction is the university?

A. East B. West
C. North D. South

12. A, B, C and D are playing cards. A and B are partners. D faces towards North. If A faces towards West, then who faces towards South?

A. C B. B
C. D D. Data inadequate

13. A watch reads 4.30. If the minute hand points East, in what direction will the hour hand point?

A. North B. North-West
C. South-East D. North-East

14. Preeti wants to go the market. She starts from her home which is in the North and comes to the crossing. The road to her left ends in a park and straight ahead is the office complex. In which direction is the market?

A. East B. West
C. North D. South

15. If A is to the south of B and C is to the east of B, in what direction is A with respect to C?

A. North-East B. North-West
C. South-East D. South-West

16. Six persons A, B, C, D, E and F are standing in a circle. B is between F and C, A is between E and D; F is to the left of D. Who is between A and F?

A. B B. C
C. D D. E

17. There are four towns P, Q, R and T. Q is to the South-West of P, R is to the East of Q and South-East of P, and T is to the north of R in line with QP. In which direction of P is T located?

A. South-East B. North
C. North-East D. East

18. The post office is to the East of the school while my house is to the South of the school. The market is to the North of the post office. If the distance of the market from the post office is equal to the distance of my house from the school, in which direction is the market with respect to my school?

A. North B. East
C. North-East D. South-West

19. One morning after sunrise, Vikram and Shailesh were standing in a lawn with their backs towards each other. Vikram's shadow fell exactly towards left hand side. Which direction was Shailesh facing?

A. East B. West
C. North D. South

20. The town of Paranda is located on Green Lake. The town of Akram is West of Paranda. Tokhada is East of Akram but West of Paranda. Kakran is East of Bopri but West of Tokhada

and Akram. If they are all in the same district, which town is the farthest West?
A. Paranda B. Kakran
C. Akram D. Bopri

21. A rat runs 20' towards East and turns to right, runs 10' and turns to right run 9' and again turns to left, runs 5' and then turns to left, runs 12' and finally turns to left and runs 6'. Now, which direction is the rat facing?
A. East B. North
C. West D. South

22. Vijayan started walking towards South. After walking 15 metres, he turned to the left and walked 15 metres. He again turned to his left and walked 15 metres. How far is he from his original position and in which direction?
A. 15 metres, North B. 15 metres, South
C. 30 metres, East D. None of these

23. Rahim started from point X and walked straight 5 km. West, then turned left and walked straight 2 km. and again turned left and walked straight 7 km. In which direction is he from the point X?
A. North-East B. South-West
C. South-East D. North-West

24. Ravi travelled 4 kms. straight towards South. He turned left and travelled 6 kms. straight, then turned right and travelled 4 kms. straight. How far is he from the starting point?
A. 8 kms B. 10 kms
C. 12 kms D. None of these

25. B is the South-West of A, C is to the East of B and South-East of A and D is to the North of C in line with B and A. In which direction of A is D located?
A. North B. East
C. South-East D. North-East

26. A man walks 30 metres towards South. Then turning to his right he walks 30 metres. Then turning to his left he walks 20 metres. Again turning to his left he walks 30 metres. How far is he from his starting position?
A. 30 metres B. 20 metres
C. 80 metres D. None of these

27. A is to the South-East of C, B is to the East of C and North-East of A. If D is to the North of A and North-West of B, in which direction of C is D located?
A. North-West B. South-West
C. North-East D. South-East

28. Facing towards South, Ram started walking and turned left after walking 30 metres, he walked 25 metres and turned left and walked 30 metres. How far is he from his starting position and in which direction?
A. At the starting point only
B. 25 metres West
C. 25 metres East
D. 30 metres East

29. Shehnaz wants to go to the market. She starts from her home which is in North and comes to the crossing. The road to her left ends in a park and straight ahead is the office complex. In which direction is the market?
A. East B. West
C. North D. South

30. Anoop starts walking towards South. After walking 15 metres he turns towards North. After walking 20 metres, he turns towards East and walks 10 metres. He then turns towards South and walks 5 metres. How far is he from his original position and in which direction?
A. 10 metres, North B. 10 metres, South
C. 10 metres, West D. 10 metres, East

31. Rama Travels a distance of 5 km. from a place. A towards North, turns left and walks 3 km., again turns right and walks 3 km. Finally turns right & walks 3 km. to reach the place B. What is the distance between A and B?
A. 7 km. B. 13 km.
C. 2 km. D. 10 km.

32. M. A goes for her morning walk at 6 O'clock towards sun for 2 km., then she turns to her right and walks 3 km. She again turns to her left and walks 2 km., finally she turns to her left to walk another 6 km. In which direction is she moving and at what distance from the last turn, she is standing?
A. 6 km. East B. 9 km. East
C. 6 km. North D. 9 km. North

33. A walks 10 metres towards East and then 10 metres to his right. Then every time turning to his left, he walks 5, 15 and 15 metres respectively. How far is he now from his starting point?
A. South-East B. North-East
C. North D. North-West

34. Starting from a point, a person walked 12 metres North, he turned right and walked 10 metres, he again turned right and walked 12 metres, then he turned left and walked 5 metres. How far is he now and in which direction from the starting point?
A. 10 metres towards West
B. 15 metres towards East
C. 10 metres towards East
D. 5 metres towards West

35. A man starts from his house and walks 10 km in South direction, then he turns right and goes 6 km, again he turns right and goes 10 km and finally turns right and goes 6 km. At what distance is he from the starting point and in which direction?
A. 2 km. North
B. 3 km. South
C. At the starting point
D. 4 km. East

36. Ramesh started walking towards east and after walking 20 metres, turned to my left and walked 15 metres. Then, Ramesh turned to my left and walked 20 metres. Again Ramesh turned to his left and walked 15 metres. Now, Ramesh walking in which direction with respect to starting point?
A. South B. North
C. East D. West

37. Dilip walks 20 metres North. Then he turns right and walks 30 metres. Now he turns right and walks 35 metres. Now turning left, he walks 15 metres. Again, he turns left and moves 15 metres. Finally turning left he again walks 15 metres. In which direction and how far is he from his original position?
A. 15 metres East B. 45 metres East
C. 15 metres West D. 45 metres West

38. Reshma was going to her house from school. She first moves 8 km Southwards and then turning to her left moved 7 km. Then, turning to her left walked 8 km. further. Again, she turned to her left and moved 6 km. and reached her house. In which direction was her house from her school?
A. North-West B. East
C. South D. North

39. Vijaya started walking towards South and after walking 15 metres he turned to the left and walked 15 metres. He again turned to his left and walked 15 metres. How far is he from his original position and in which direction?
A. 15 metres, North B. 15 metres, South
C. 30 metres, West D. None of these

40. Raman starts walking towards West. After walking 10 metres, he turns towards North. After walking 20 metres, he turns towards East and walks 10 metres. How far is he from his original position and in which direction?
A. 20 metres, North B. 10 metres, North
C. 10 metres, South D. 20 metres, South

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	A	B	D	D	D	D	A	D	D
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	A	D	B	D	C	C	C	D	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	D	C	D	D	D	C	C	B	D
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
A	C	A	B	C	A	B	B	D	A

EXPLANATORY ANSWERS

1. The movement of Lakshman are as shown in fig. 1

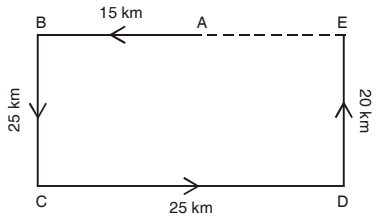


Fig. 1

Lakshman's distance from his house at

A = AE = (BE – AB)

= (CD – AB)

= (25 – 15) km = 10 km.

2. The movement of Radhika are as shown in fig. 2.

Thus, she is now moving in the direction DA *i.e.* North-West.

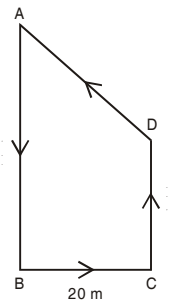


Fig. 2

3. The movement of Keshav are as shown in fig.3. (A to B, B to C, C to D, D to E) Keshav's distance from his original position A.

= AE = (AB – BE) = (AB – CD)

= (30 – 20) m = 10 m.

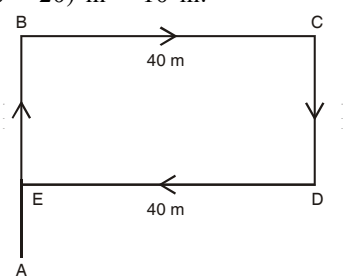


Fig. 3

4. The movement of Ramakant are as shown in fig. 4.

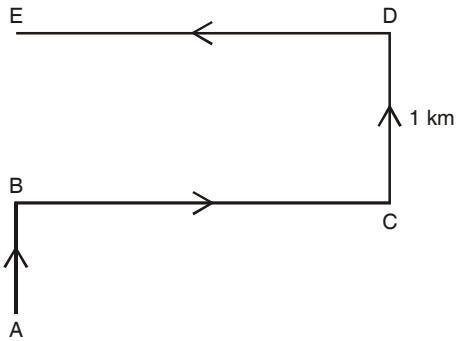


Fig. 4

Clearly, he is now walking in the direction DE *i.e.* West.

5. The movement of Varun are as shown in fig. 5.

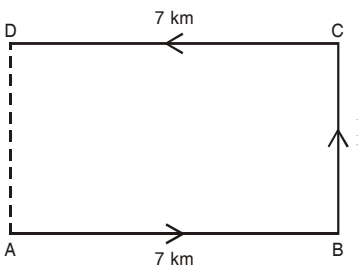


Fig. 5

Varun's distance from the starting point A = AD = BC = 5 km.

6. The movement of Deepak are as shown in fig. 6.

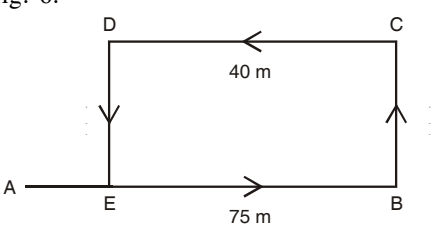


Fig. 6

Clearly, EB = DC = 40 m.

Deepak's distance from the starting point A = (AB – EB) = (75 – 40) m = 35 m.

7. The movement of Gourav are as shown in fig. 7.

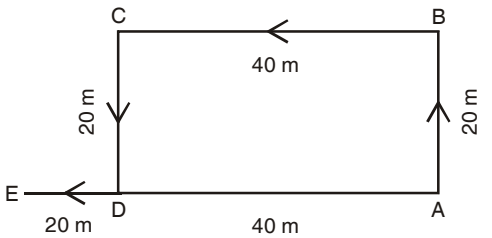


Fig. 7

Clearly, Gaurav's distance from his initial position A = AE = (AD + DE)
= (BC + DE) = 60 m.

8. The movement of the girl are as shown in fig. 8.

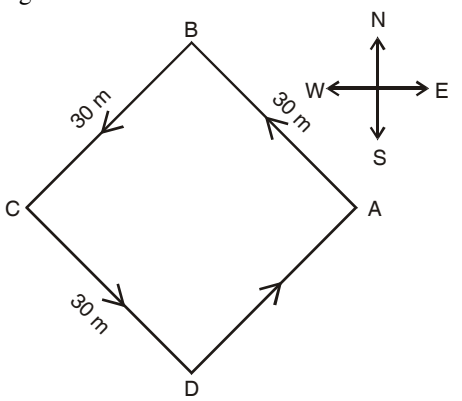


Fig. 8

Clearly, She is now moving in the direction DA *i.e.* North-East.

9. The movements of Rekha are as shown in fig. 9.

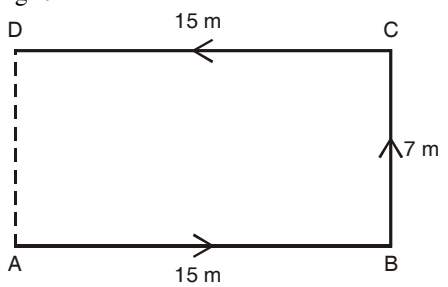


Fig. 9

Rekha's distance from the starting point A = AD = BC = 7 m.

10. The movements of Aditya are as shown in fig. 10.

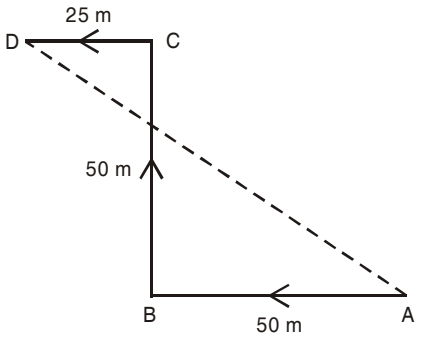


Fig. 10

Since his house faces towards East and he walks from the backside of his house, he will start walking towards West. Now, Aditya's final position is D which is to the North-West of his starting point A.

11. Starting from her house in the East Madhuri moves West. Then, the theatre, which is to the left, will be in the South. The hospital, which is straight ahead, will be to the west. So, the University will be to the North.

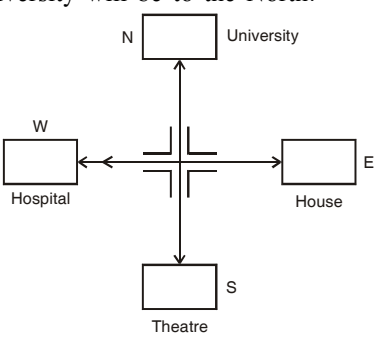
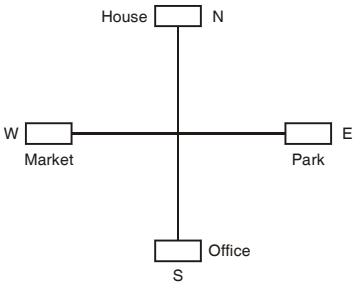


Fig. 11

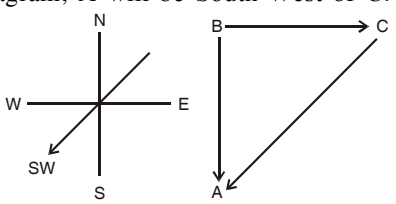
12. As per the data, D faces North. A faces towards West. So, its partner B will face towards A and hence towards East. So, C who will face D will face South.

13. Clearly, to show 4.30, the position of the minute and hour hands of the clock will be as shown. So, again as shown, if the minute hand points East, the hour hand will point in the North-East.

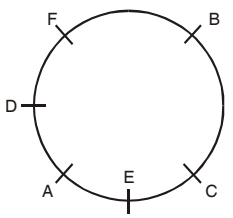
14. Preeti's house is North means she is walking towards South. So the park, which is to her left, will be in the East. The office, which is straight ahead will be in the South. So, the market will be in the west.



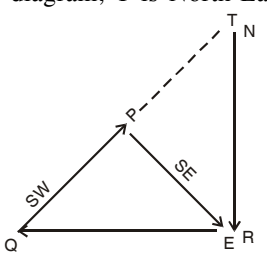
15. Clearly comparing the direction of A w.r.t. C in the second diagram with that in the first diagram, A will be South-West of C.



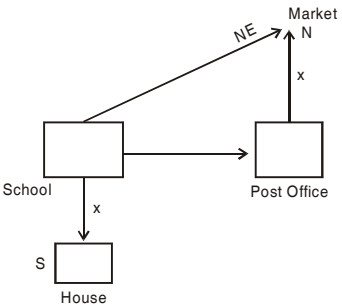
16. B is between F and C means FBC. F is to the left of D (in circle) means DF. A is between E and D means EAD. Combining these, the circular arrangement is as shown. So, D is between A and F.



17. Clearly, the arrangement according to the given directions is as shown. So, comparing with direction diagram, T is North-East of P.



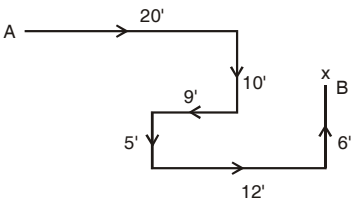
18. Clearly, the positions of various places are office = distance of house from school = x as shown. Distance of market from post. So, direciton of the market from the school is North-East.



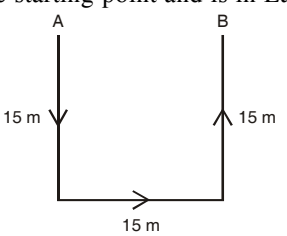
19. Since Vikram's shadow fell towards left, therefore, Vikram is facing North. So, Shailesh standing with his back towards Vikram, will be facing South.

20. The directions East and West are as shown. So, the town of Akram (A) is West of Paranda (P) means A, P. Tokhada (T) is East of Akram but West of Paranda means A, T, P. Kakran (K) is East of Bopri (B) but West of Tokhada and Akram means B, K, A, T. Combining all the arrangements, we have B, K, A, T, P. So, farthest West is Bopri.

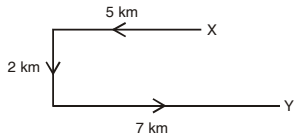
21. A and B are the starting and finishing positions respectively of the rat. It is clear that B is facing North directon.



22. Vijayan finally reaches a point which is 15 m from the starting point and is in East direction.



23. Y represents the finishing point of Rahim and it is to the South-East of point X.



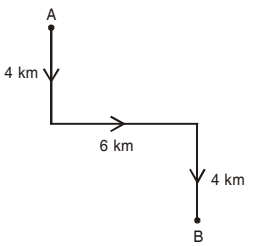
24. B is the finishing point is 10 km. from the point A. The Aerial distance of A from B is 20 km. Calculated as below

$(AB)^2 = (AD)^2 + (DB)^2$

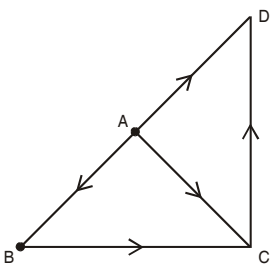
$= (8)^2 + (6)^2$

$= 64 + 36 = 100$

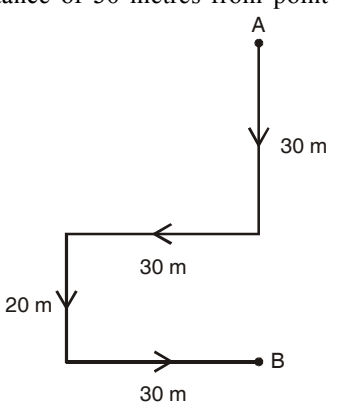
$\therefore \quad AB = 10$ km.



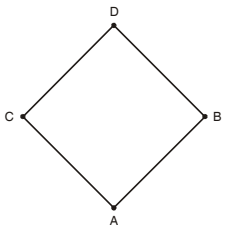
25. D, which is to the North of C, is located to the North-East of A.



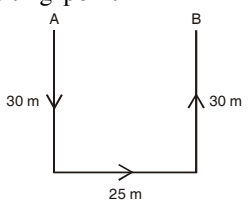
26. Point B is the finishing point and is located at a distance of 50 metres from point A.



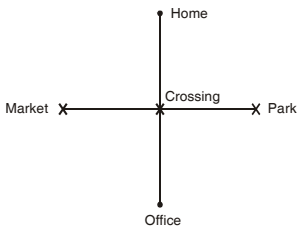
27. D is located to the North-East of C.



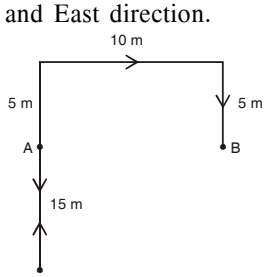
28. Finishing point B is at a distance of 25 m. East to the starting point A.



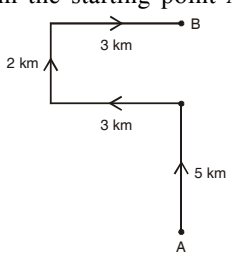
29. Market is in the West direction to the crossing.



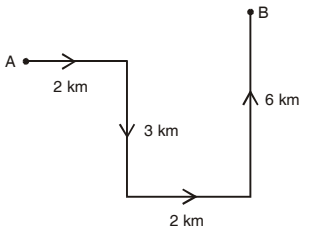
30. Anoop starts his journey from point A and finishes his journey at point B. It can be seen that point B is at a distance of 10 m. from point A and East direction.



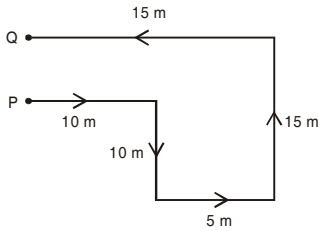
31. B is the finishing point and is at a distance of 7 km. from the starting point A.



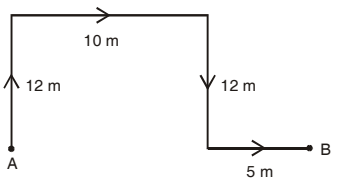
32. Final position B is at a distance of 6 km. towards North from the last turn.



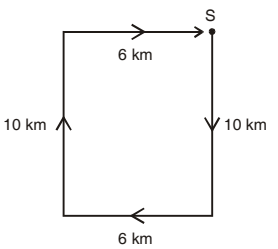
33. Q is the finishing point and is 5 metres away from the starting point P.



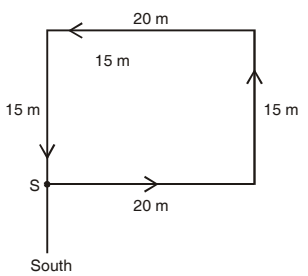
34. Person is at a distance of 15 metres and towards East from the starting point.



35. Clearly the man reached at the starting point.



36.

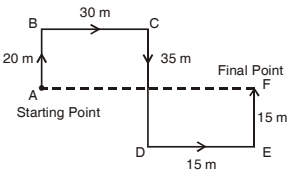


37. Dilip's distance from his original positions

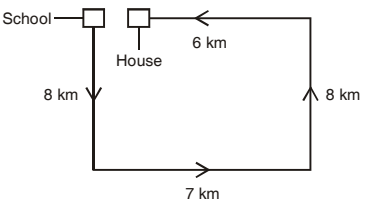
AF = BC + DE

= 30 + 15 = 45

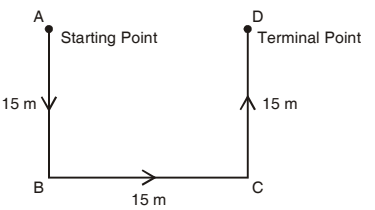
Also 'F' lies to East of 'A'.



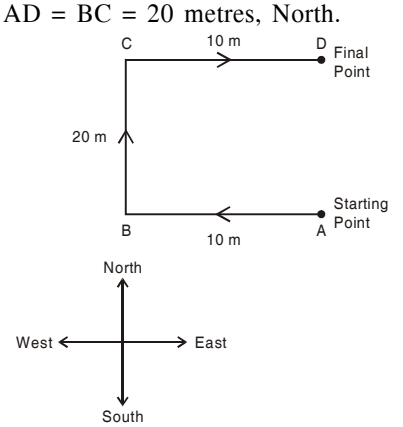
38. The movement of Reshma are shown in the figure. Clearly, Reshma's house is to the East of her school.



39. Hence, Vijaya is 15 metres East from the starting points.



40. Raman's distance from the starting point A = AD = BC = 20 metres, North.



●●●

5 Figure Series Completion

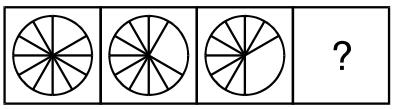
In this form of non-verbal series, which are the most common, four or five consecutive problem figures form a definite sequence and one is required to select the one figure from the given set of Answer Figures that will continue the same sequence.

One has to try different set of moves, changes, replacements, rotations, repetitions and a lot more variations to arrive at the logical pattern making the series. Practising alone will sharpen one's skill of solving such sequences.

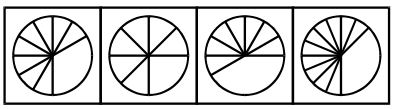
Multiple Choice Questions

Direction : *Each of the following questions consist of problem figures followed by answer figures. Select a figure from amongst the answer figures which will continue the same series or pattern as established by the problem figures.*

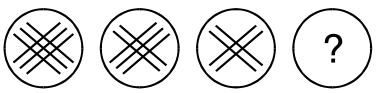
1. Problem Figures



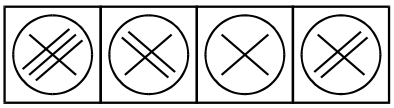
Answer Figures



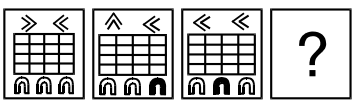
2. Problem Figures



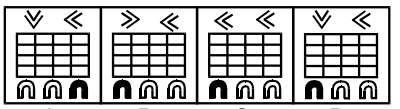
Answer Figures



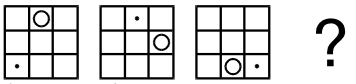
3. Problem Figures



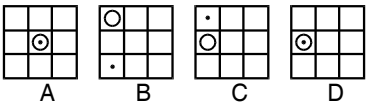
Answer Figures



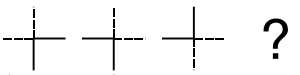
4. Problem Figures



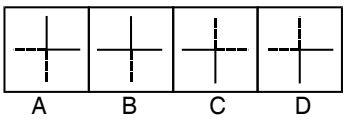
Answer Figures



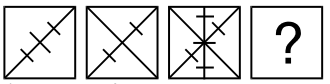
5. Problem Figures



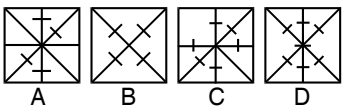
Answer Figures



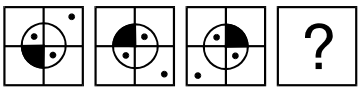
6. Problem Figures



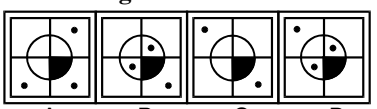
Answer Figures



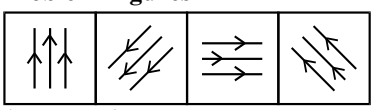
7. Problem Figures



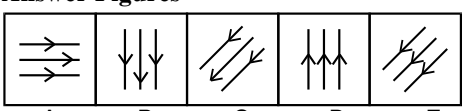
Answer Figures



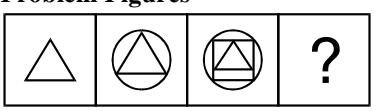
8. Problem Figures



Answer Figures



9. Problem Figures



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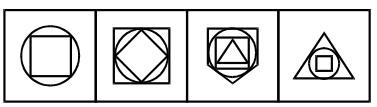
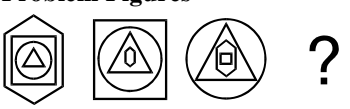
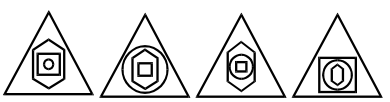


10. Problem Figures



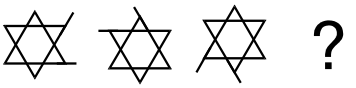
Answer Figures



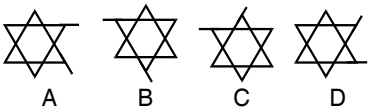
11. Problem Figures

Answer Figures

12. Problem Figures



Answer Figures



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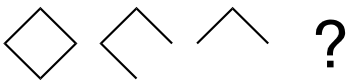
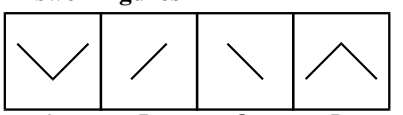


Answer Figures



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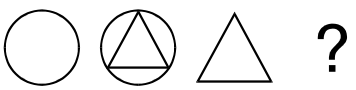

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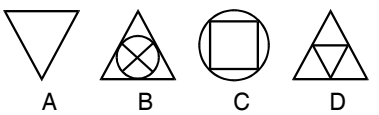
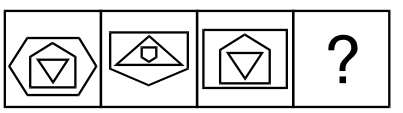
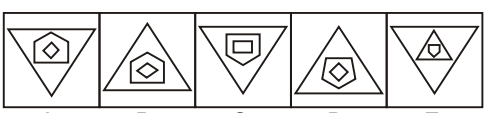


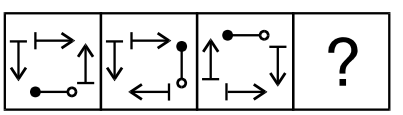
15. Problem Figures



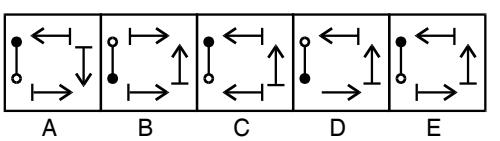
Answer Figures



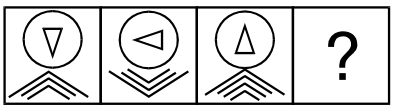
16. Problem Figures



Answer Figures



17. Problem Figures



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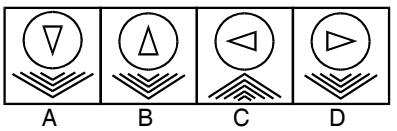
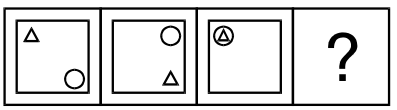


18. Problem Figures



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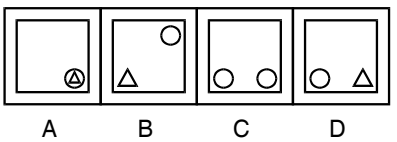
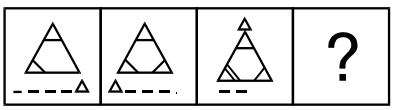
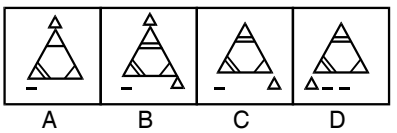


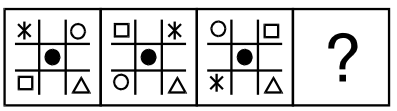
19. Problem Figures



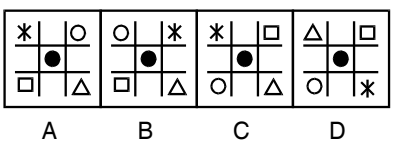
Answer Figures



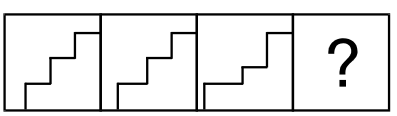
20. Problem Figures



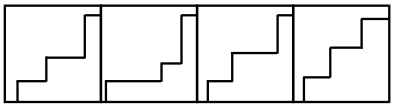
Answer Figures



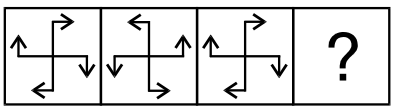
21. Problem Figures



Answer Figures



22. Problem Figures



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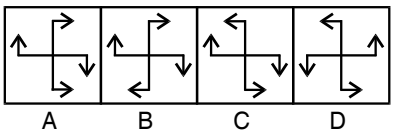
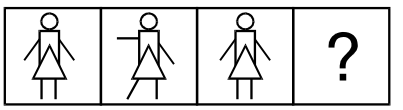
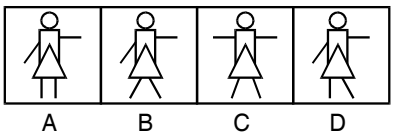


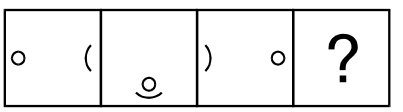
23. Problem Figures



Answer Figures



24. Problem Figures



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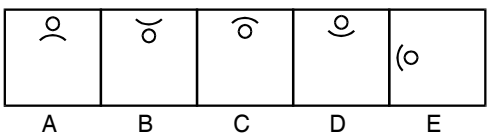

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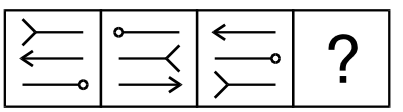

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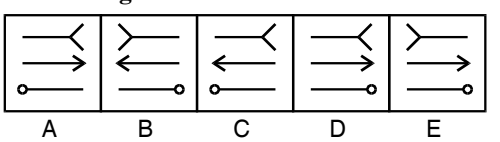

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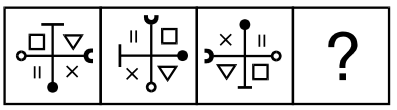

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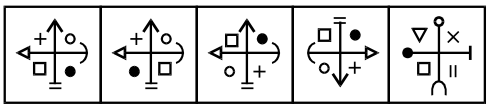

A B C D E

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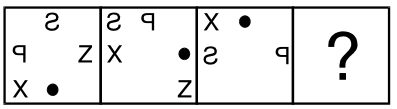

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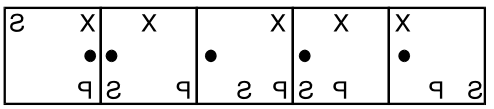

A B C D E

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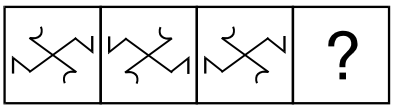

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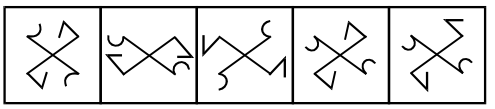

A B C D E

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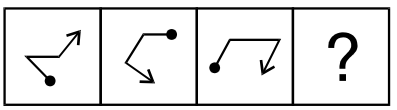

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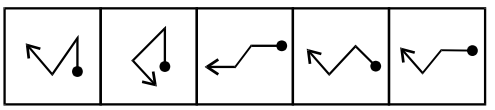

A B C D E

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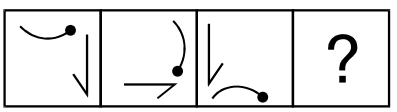

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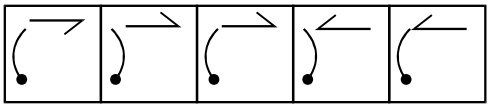

A B C D E

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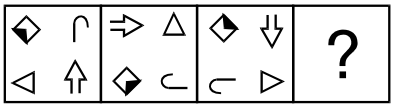

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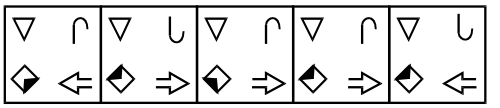
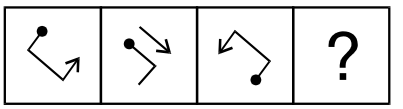


A B C D E

32. Problem Figures



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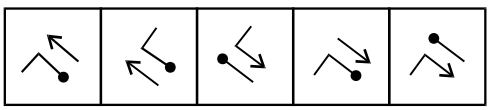

A B C D E

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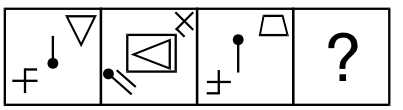

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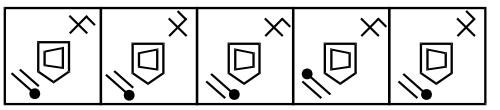

A B C D E

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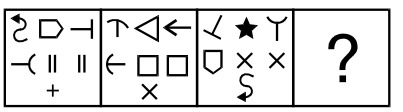

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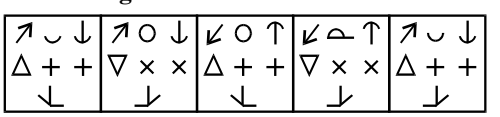
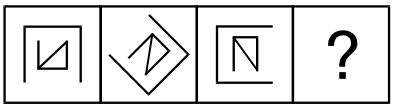


A B C D E

35. Problem Figures



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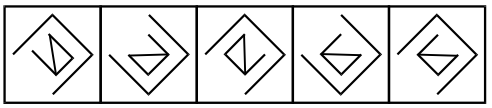

A B C D E

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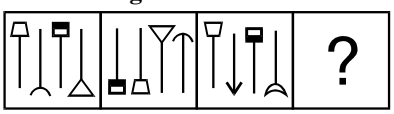

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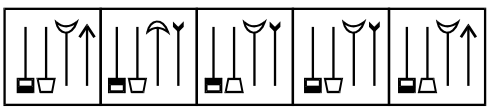

A B C D E

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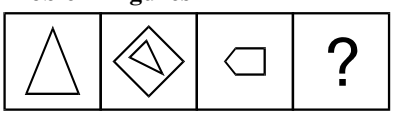

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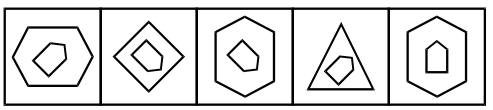
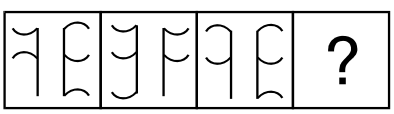


A B C D E

38. Problem Figures



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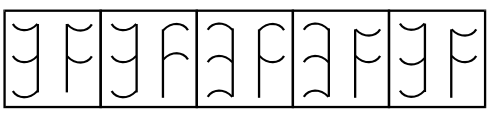

A B C D E

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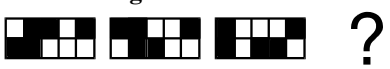

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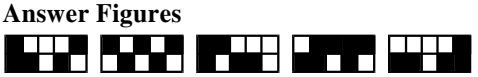

A B C D E

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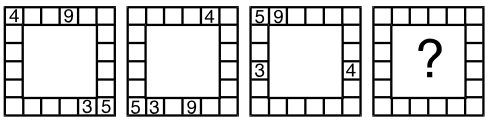

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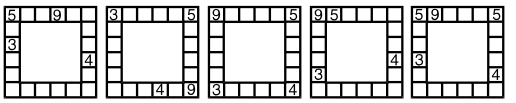

A B C D E

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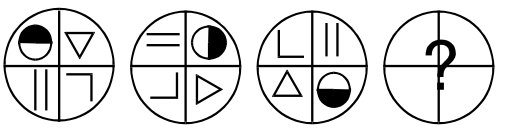

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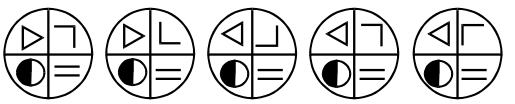

A B C D E

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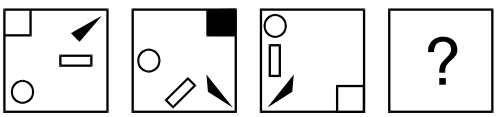

Answer Figures

A B C D E

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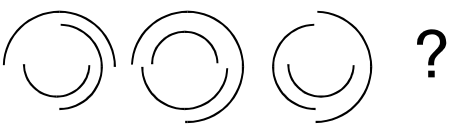

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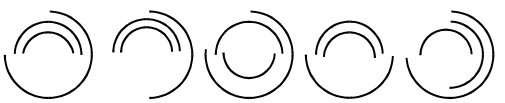
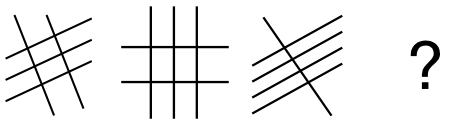


A B C D E

44. Problem Figures

Answer Figures

45. Problem Figures



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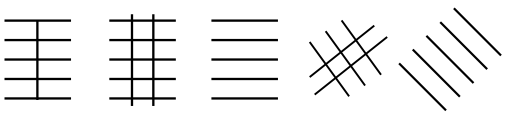

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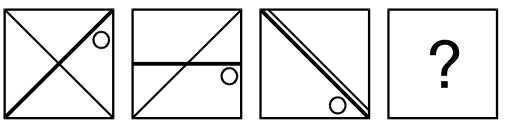

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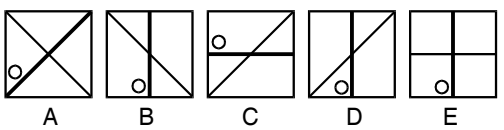

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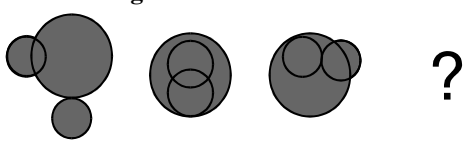

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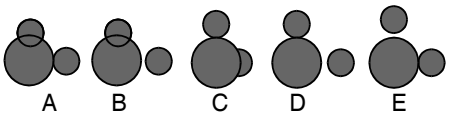

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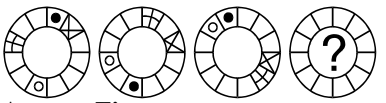

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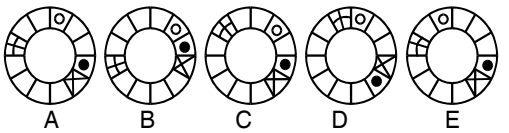

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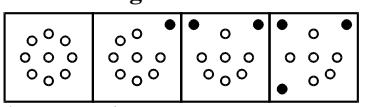

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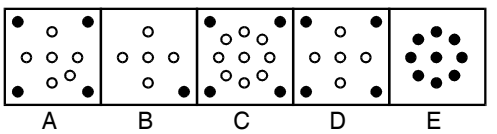

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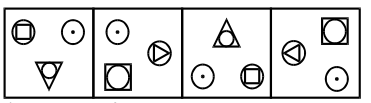

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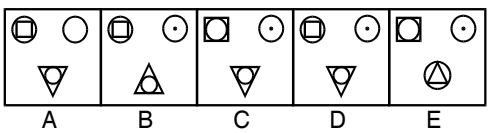


ANSWERS

1	2	3	4	5	6	7	8	9	10
C	D	D	D	A	A	D	B	C	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	D	C	D	E	A	D	D	C	A
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	D	D	C	A	E	D	C	A	C
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
E	B	E	E	A	D	A	D	E	B
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
E	B	A	B	C	D	D	A	D	D

EXPLANATORY ANSWERS

1. Clockwise, the circle is turned by 30° and also one radial line segment is removed.

2. The diagonal line segments are removed one by one in a set order.

3. The 'V' shape on the top left is rotated 90° anticlockwise. The three figures at the bottom are shaded one at a time beginning from the right figure and moving to the left.

4. The circle and the dot are moved two and three sections clockwise respectively.

5. The cross is turned 90° clockwise at each step.

6. The middle line segment on the diagonal is extended to touch the corners of the square. In the next figure a new line with three line segments is added. To continue the series the middle line segment should be extended to touch the sides of the square.

7. The complete figure is turned 90° clockwise at each step.

8. In alternate figures the arrows are turned 90° clockwise and the positioning of arrow heads is shifted from front to back and vice versa.

9. A new figure is added to the previous set of figures at each step.

10. The outermost shape is made the innermost shape in the next figure.

11. In alternate figures, the horizontal line is moved to the other side of the slanting line and one more horizontal lines are then added.

12. The star shape is rotated 90° anticlockwise at each step.

13. Clockwise, one side of the rhombus is removed at each step.

14. A new figure is introduced inside the existing figure and in the next step the later is removed. To continue the series a new figure must be introduced inside the triangle.

15. The places of the triangle and pentagon are exchanged at each step and also they are inverted. The number of sides of the outer figure is reduced by one at each step.

16. In alternate figures the places of opposite elements are interchanged.

17. The triangle is rotated 90° clockwise at each step. The parallel 'V' lines are turned upside down at each step and increased by one in alternate figures.

18. The triangle is moved diagonally to and fro and the circle one step anticlockwise to get the next figure.

19. The small triangle is moved clockwise and one line segment at the base is added clockwise inside the large triangle.

20. The places of star, circle and square are moved one step clockwise at each step.

21. The two corner steps are enlarged equally.

22. The arrows are turned to the opposite side at each step. *OR* Alternate figures are identical.

23. Left arm and left leg of the figure are raised and then bent. To continue the series, the right arm and right leg of the figure must be raised.

24. The arc is turned 90° anticlockwise and moved one step clockwise while the circle is moved one step anticlockwise, when both are together the circle remains inside the arc.

25. All the three elements are laterally inverted and the element at the bottom moved to the top at each step.

26. The elements in the four quadrants are moved one step clockwise and the elements at the ends of the cross are moved one step anticlockwise in this series.

27. Inverted 'S' shape is moved half step anticlockwise, the inverted 'P' shapes one step clockwise, the 'X' half step clockwise, and the dot one step anticlockwise.

28. In this series alternate figures are identical.

29. In alternate figures the line with the dot is turned 90° clockwise and the arrow 135° clockwise.

30. In alternate figures the angle and the arc are turned by 180° and moved to the opposite side.

31. In alternate figures, the shade inside the square is moved to the opposite side, the places of other three elements are inter changed anticlockwise. The triangle and arrow are turned by 180°, while the hook is turned 90° anticlockwise and horizontally inverted.

32. In alternate figures the design is rotated by 180°.

33. In alternate figures the elements are turned by 180° and the number of lines making the geometrical figure is increased by one.

34. In alternate figures the element in the top left position is horizontally inverted and moved one and half steps anticlockwise, the top middle element is turned 90° clockwise and moved one step anticlockwise, the top right element is turned 135° clockwise and moved one step anticlockwise, the element at the bottom is replaced by a new element and moved to the top middle position, and the two identical elements are replaced by two new identical elements.

35. In alternate figures the outer shape is turned 90° anticlockwise and the other shape is horizontally inverted.

36. In alternate figures, the elements attatched to the line segments are turned upside down and the triangle is replaced by a semicircle.

37. In alternate figures the geometrical shapes are turned 135° clockwise and the number of lines making the shape are increased by one.

38. In alternate figures only the direction of arcs on the left line are changed.

39. The two consecutive shades are moved one step anticlockwise.

40. The numbers rotate clockwise by the numbers (value) given.

41. All the elements are moved one section at a time and rotated 90° clockwise except the triangle which is rotated 90° anticlockwise.

42. The square which is alternately shaded, the pin which is turned 90° clockwise and the rectangle which is turned 45° anticlockwise are moved one step clockwise, only the circle is moved half step clockwise.

43. In alternate figures only the outer most arc and the middle arc by rotated by 90° and 180° clockwise respectively.

44. All the letters in this series are made of three lines.

45. All the lines are rotated gradually, the three initial parallel lines are removed one by one and added to the other set of parallel lines.

46. One diagonal changes position from one set of corners to the other, while the line with the ball is turned 45° clockwise.

47. The small circles move left to right and bottom to top.

48. The cross and the circle move one and two steps clockwise respectively (at each step), the plus moves 3, 4 and 5 steps clockwise, and the dot 6, 5 and 4 steps clockwise.

49. Alternate circles are shaded and shifted to the corners anticlockwise.

50. In alternate figures the whole set of elements is turned by 180°, so that when turned again the first figure will be obtained.

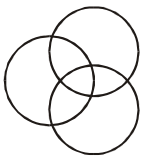
● ● ●

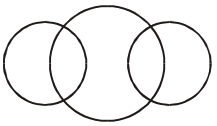
6 Venn Diagram

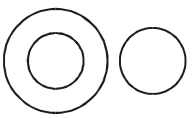
In these type of questions diagrammatic representation presents a logical illustration of particular class or statements based on which the questions are asked. A clear view of the diagram makes the concepts clear for attempting such questions.

Multiple Choice Questions

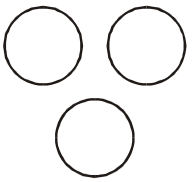
Directions (1–5) : *Each of the questions given below contains three elements. These elements may or may not have some intense linkage. Each group of elements may fit into one of the diagrams named (A), (B), (C), (D) or (E). You have to indicate the diagram in which the group of elements fits correctly?*

A. 

B. 

C. 

D. 

E. 

1. Teachers, Saints, Human beings

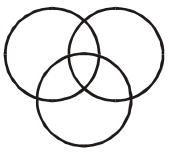
2. Sweets, Oranges, Fruits

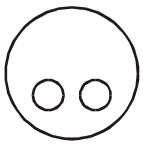
3. Father, Mother, God

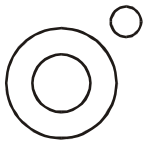
4. Person, Philosopher, Writer

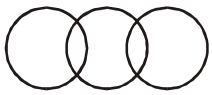
5. Clerks, Educated Persons, Government Servants.

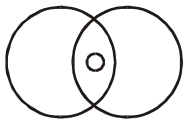
Directions (6–10) : *In each of the following questions three items are given. Out of the five figures, select that figure which will best represent the relationship amongst the three items.*

A. 

B. 

C. 

D. 

E. 

6. Judges, Thieves, Criminals

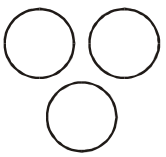
7. Hebrew, Hindi, Language

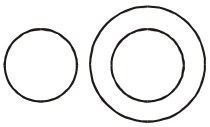
8. Tall Persons, Black-haired, Indians

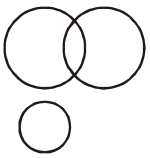
9. Women, Married Persons, Wives

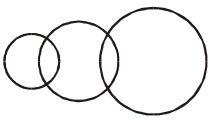
10. Teachers, Hardworking, Students

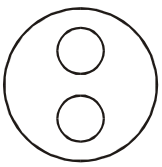
Directions (11–15) : *In each of the following questions three items are given. Out of the five figures, select that figure which will best represent the relationship amongst the three items.*

A. 

B. 

C. 

D. 

E. 

11. Men, Women, Teachers

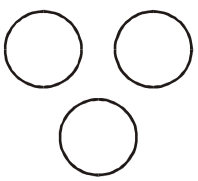
12. Ministers, Females, Cars

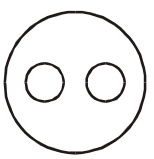
13. Vehicles, Cars, Jeeps

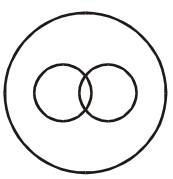
14. Insects, Butterflies, Cats

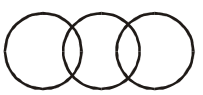
15. Relatives, Aunt, Uncle

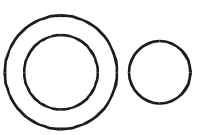
Directions (16–20) : *Each one of the following questions contains three items using the relationship between these items, match each question with the most suitable diagram.*

A. 

B. 

C. 

D. 

E. 

16. Deer, Rabbit, Mammals

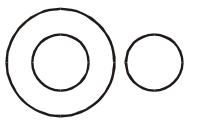
17. Human beings, Teachers, Graduates

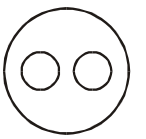
18. Whales, Fishes, Crocodiles

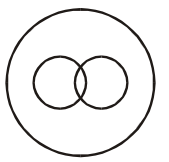
19. Plums, Tomatoes, Fruits

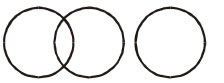
20. Mountains, Forests, Earth

Directions (21–28) : *Choose the Venn diagram which best illustrates the three given classes in each question.*

A. 

B. 

C. 

D. 

21. Protons, Electrons, Atoms

22. Sun, Planets, Earths

23. Dog, Animal, Pet

24. Science, Physics, Chemistry

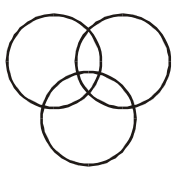
25. Atmosphere, Hydrogen, Oxygen

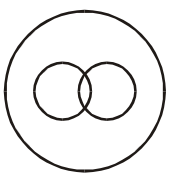
26. Wheat, Grains, Maize

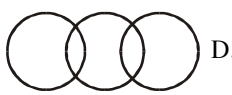
27. Machine, Lathe, Mathematics

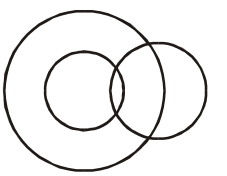
28. Biology, Botany, Zoology

29. Which one of the following diagrams correctly represents the relationship among tennis fans, cricket players and students?

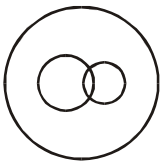
A. 

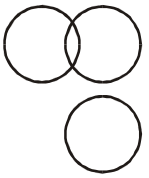
B. 

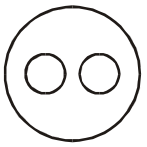
C. 

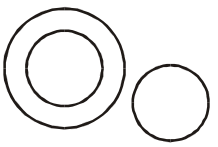
D. 

30. Which of the following figure correctly represents the relations between Doctors, Lawyers, Professionals:

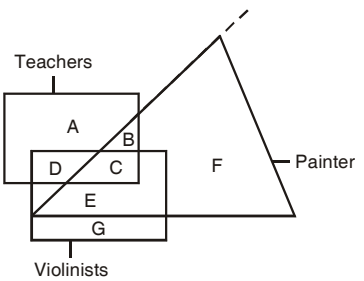
A. 

B. 

C. 

D. 

Directions (31–35) : *In the following diagram, there are three figures interlocking each other – a rectangle, a square and a triangle. Each figure represents the class mentioned against it.*



Study the figure and answer the questions that follows.

31. Teachers who are painters but not violinists are represented by
A. B B. C
C. D D. F

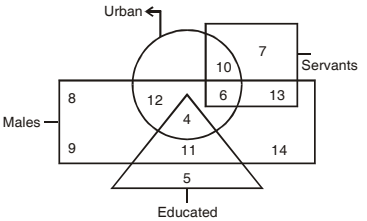
32. The region which represents painters and violinists but not teachers, is denoted by
A. B B. D
C. E D. F

33. Which letter represents teachers who are painters as well as violinists?
A. B B. C
C. D D. E

34. Painters who are neither teachers nor violinists are represented by
A. A B. B
C. C D. F

35. Which letter represents teachers who are violinists but not painters?
A. B B. C
C. D D. E

Directions (36–43) : *The following questions are based on the diagram given below:*



36. Who among the following is an educated male who is not an urban resident?
A. 4 B. 5
C. 9 D. 11

37. Who among the following is neither a civil servant nor educated but is urban and not a male?
A. 2 B. 3
C. 6 D. 10

38. Who among the following is a male civil servant, who is neither educated nor belongs to urban area?
A. 7 B. 13
C. 4 D. 1

39. Who among the following is a female, urban resident and also a civil servant?
A. 6 B. 7
C. 10 D. 13

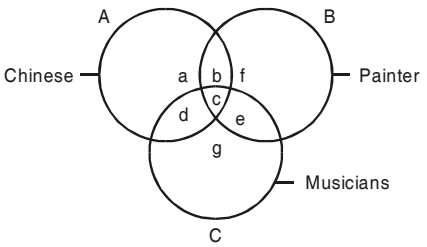
40. Who among the following is a male, urban oriented and also a civil servant but not educated?
A. 13 B. 12
C. 6 D. 10

41. Who among the following is a educated male who hails from urban area?
A. 4 B. 2
C. 11 D. 5

42. Who among the following is only a civil servant but not a male nor urban oriented and uneducated?
A. 7 B. 8
C. 9 D. 14

43. Who among the following is uneducated and also an urban male?
A. 2 B. 3
C. 11 D. 12

Directions (44–46) : *In the figure given below, there are three interesting circles each representing certain section of people. Different regions are marked a-g. Read the statements in each of the following questions and choose the letter of the region which correctly represents the statements?*

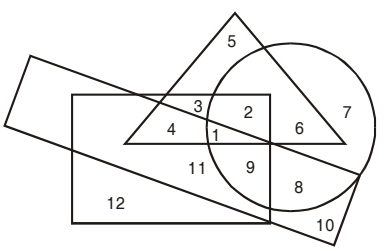


44. Chinese who are painters but not musicians?
A. b B. c
C. d D. g

45. Chinese who are musicians but not painters.
A. d B. c
C. b D. a

46. Painters who are neither Chinese nor musicians.
A. b B. c
C. f D. g

Directions (47–56) : *In the following figure, the circle stands for employed, the square stands for hard-working, the triangle stands for rural and the rectangle stands for intelligent. Study the figure carefully and answer the questions that follow.*



47. Rural employed people who are neither intelligent nor hard-working are indicated by region.
A. 10 B. 9
C. 6 D. 4

48. Unemployed rural hard-working and intelligent people are indicated by region.
A. 1 B. 2
C. 3 D. 4

49. Rural people who are hard-working and employed but not intelligent are indicated by region.
A. 1 B. 2
C. 3 D. 4

50. Rural employed people who are neither intelligent nor hard-working are indicated by region.
A. 2 B. 4
C. 6 D. 9

51. Rural hard-working people who are neither employed nor intelligent are indicated by region.
A. 6 B. 5
C. 4 D. 3

52. Employed, hard-working and intelligent rural people are indicated by region.
A. 1 B. 2
C. 3 D. 4

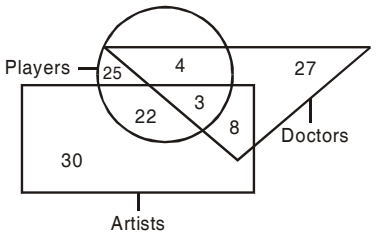
53. Hard-working non-rural people who are neither employed nor intelligent are shown by region.
A. 8 B. 7
C. 6 D. 12

54. Intelligent employed and hard-working non-rural people are indicated by region.
A. 11 B. 6
C. 9 D. 4

55. Non-rural, employed people who are neither intelligent non hard-working are represented by region.
A. 12 B. 11
C. 10 D. 7

56. Non-rural, employed, hard-working and intelligent people are indicated by region.
A. 8 B. 9
C. 10 D. 11

Directions (57–60) : *Study the following figure carefully and answer the questions given below it. The rectangle represents artists, the circle represents players and the triangle represents doctors.*



57. How many artists are neither players nor doctors?
A. 22 B. 24
C. 25 D. None of these

58. How many doctors are neither players nor doctors?
A. 30 B. 27
C. 22 D. 8

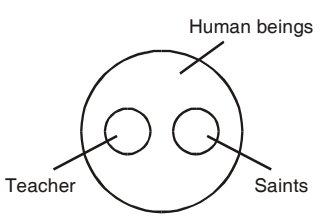
59. How many doctors are both players and artists?
A. 3 B. 4
C. 8 D. 11

60. How many artists are players?
A. 30 B. 29
C. 25 D. 22

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	C	E	B	A	C	B	A	E	D
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
D	C	E	B	E	B	C	A	E	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	A	C	B	B	B	A	B	A	C
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
A	C	B	D	C	D	B	B	C	C
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
A	A	D	A	A	C	C	D	B	C
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
D	A	D	C	D	B	D	B	A	C

EXPLANATORY ANSWERS

1.


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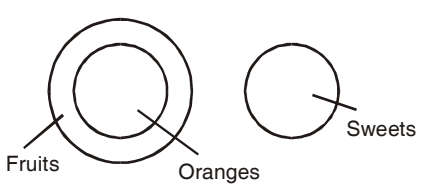
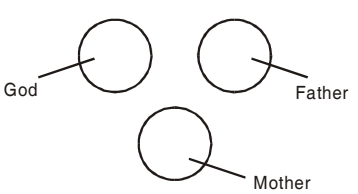
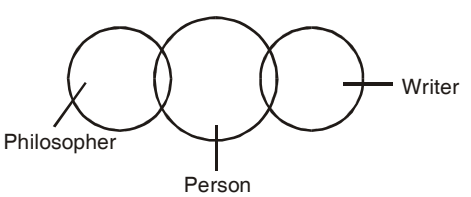
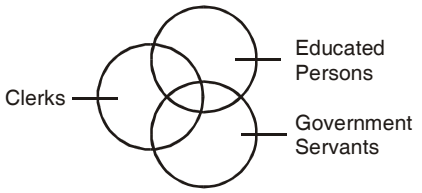


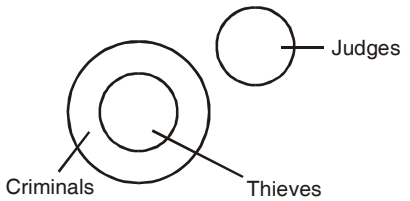
3.


4.


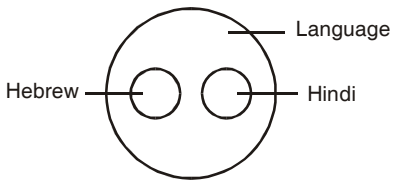
5.



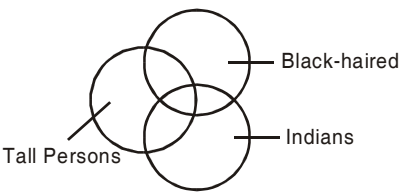
6.



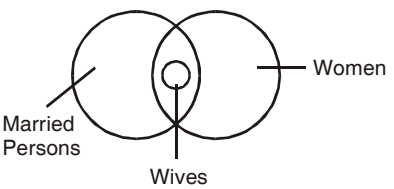
7.



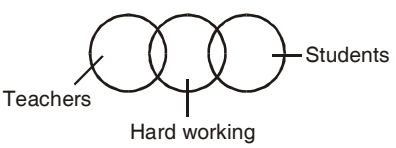
8. Some tall persons are black haired and some black haired tall persons are Indians.



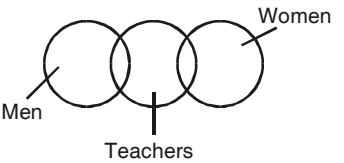
9. Some women are married *i.e.* some married persons are women. All wives are women or some women are wives.



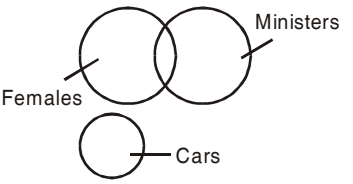
10. Some teachers are hard working. Some students are hard working.



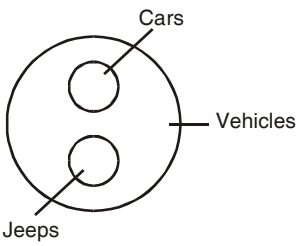
11. Some men and women may be teachers.



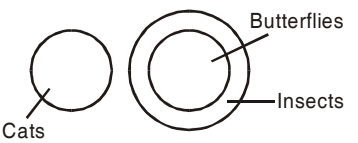
12. Some females may be ministers. Car is a separate class.



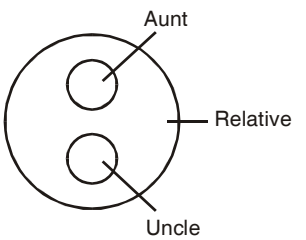
13. Both cars and jeeps come under the class vehicles



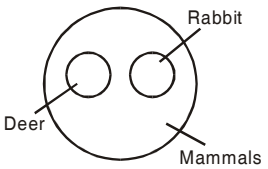
14. Butterflies come under the class insects. Cat is an animal forming a separate class.



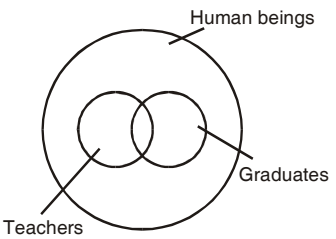
15. Both aunt and uncle come under the class relatives.



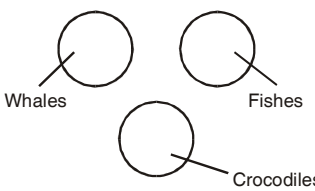
16. Deer and Rabbit are unrelated items. But, both are mammals.



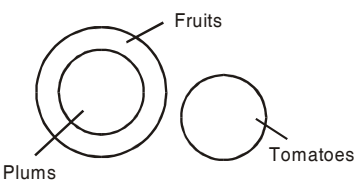
17. All teachers and graduates are human beings. But, some teachers can be graduates and some graduates can be teachers.



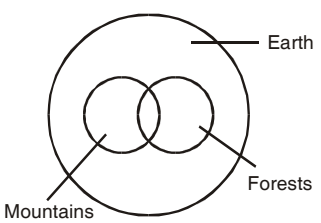
18. Whales, Fishes and Crocodiles are all separate items, entirely different from each other.



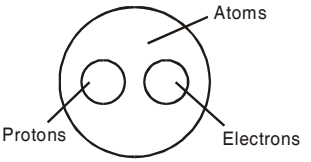
19. All plums are fruits. But, tomatoes are entirely different.



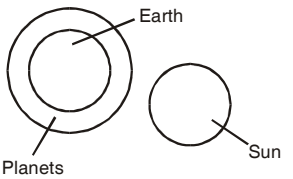
20. Mountains and Forests are parts of earth. But, some mountains are forested and some forests are mountainous.



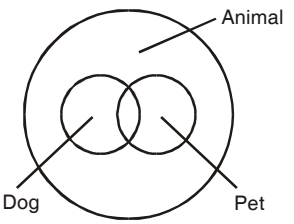
21. Protons and Electrons are entirely different from each other. But, both are parts of atoms.



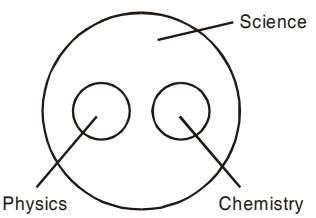
22. Earth belongs to the class of Planets. But, Sun is entirely different from the two.



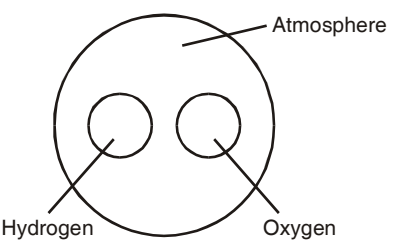
23. Some dogs are pets and some pets are dogs. Both, dog and pet are animals.



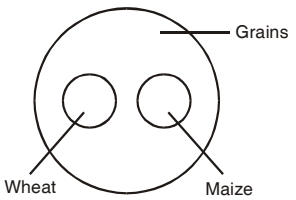
24. Physics and Chemistry are entirely different from each other. But, both belong to the class of Science.



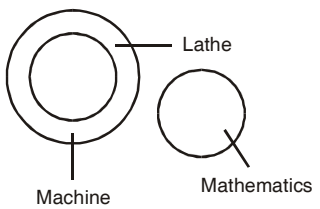
25. Hydrogen and Oxygen are entirely different from each other. But, both are parts of atmosphere.



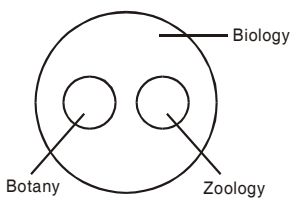
26. Wheat and Maize are two different items. But both belong to the class of Grains.



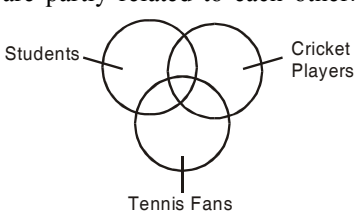
27. Lathe is a type of machine. But, Mathematics is entirely different from the two.



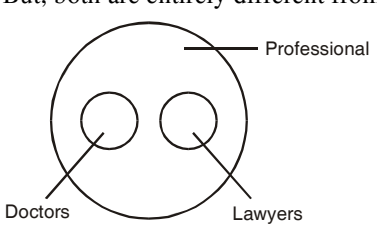
28. Botany and Zoology are entirely different from each other. But, both are branches of Biology.



29. Some students can be cricket players. Some cricket players can be tennis fans. Some students can be tennis fans. So, the given items are partly related to each other.



30. Both Doctors and Lawyers are Professionals. But, both are entirely different from each other.



31. The persons satisfying the given conditions are represented by the region which is common to the rectangle and the triangle but not the square *i.e.* B.

32. The persons satisfying the given conditions are represented by the region which is common to the triangle and the square but is not a part of the rectangle *i.e.* E.

33. The required set of persons is represented by the letter denoting the region common to the rectangle, triangle and the square *i.e.* C.

34. The persons satisfying the given conditions are represented by the region which lies inside the triangle but outside the rectangle and the square *i.e.* F.

35. The required set of persons is represented by the region which is common to the rectangle and the square but is not a part of the triangle *i.e.* D.

36. The person satisfying the given conditions is represented by the region which is common to the triangle and the rectangle but lies outside the circle *i.e.* 11.

37. The person satisfying the given conditions is represented by the region which lies inside the circle but outside the square, the rectangle and the triangle *i.e.* 3.

38. The person satisfying the given conditions is represented by the region common to the rectangle and the square but lying outside the triangle and the circle *i.e.* 13.

39. The person satisfying the given conditions is represented by the region which lies outside the rectangle and is common to the circle and the square *i.e.* 10.

40. The person satisfying the given conditions is denoted by the region which is common to the rectangle, circle and the square but lies outside the triangle *i.e.* 6.

41. The person satisfying the given conditions is represented by the region which is common to the triangle and the rectangle and also lies inside the circle *i.e.* 4.

42. The person satisfying the given conditions is denoted by the region which lies inside the square but outside the circle, rectangle and triangle *i.e.* 7.

43. The person satisfying the given conditions is represented by the region which lies outside the triangle and is common to the circle and the rectangle *i.e.* 12.

44. The required region is the one which is common to the circles A and B and lies outside circle C *i.e.* b.

45. The required region is the one which is common to the circles A and C but is not a part of circle B *i.e.* d.

46. The required region is the one which lies inside the circle B but is not a part of either circle A or circle C *i.e.* f.

47. The required set of people is represented by the region which is common to the triangle and circle but is not a part of either the rectangle or the square *i.e.* 6.

48. The required set of people is represented by the region which lies outside the circle and is common to the triangle, square and rectangle *i.e.* 4.

49. The required set of people is represented by the region which is common to the triangle, square and circle but is not a part of the rectangle *i.e.* 2.

50. The required set of people is denoted by the region which is common to the triangle and the circle but is not a part of the rectangle *i.e.* 2.

51. The required set of people is represented by the region which is common to the triangle and the square but lies outside the circle and rectangle *i.e.* 3.

52. The required set of people is denoted by the region which is common to the circle, square, rectangle and triangle *i.e.* 1.

53. The required set of people is denoted by the region which lies inside the square but outside the triangle, circle and rectangle *i.e.* 12.

54. The required set of people is represented by the region which is common to the rectangle, circle and square but lies outside the triangle *i.e.* 9.

55. The required set of people is represented by the region which lies outside the triangle, inside the circle but outside the rectangle and the square *i.e.* 7.

56. The required set of people is represented by the region which lies outside the triangle and is common to the circle, square and rectangle *i.e.* 9.

57. The region which lies inside the rectangle but outside the triangle and the circle represents the required set of persons. Thus, number of artists who are neither players nor doctors = 30.

58. The region which lies inside the triangle but outside the circle and the rectangle represents the persons satisfying the given conditions. Thus, number of doctors who are neither players nor artists = 27.

59. The region common to the circle, triangle and the square represents the required set of persons. Thus, number of doctors who are both players and artists = 3.

60. The region common to the circle, triangle and the rectangle represents the required set of persons. Thus, number of artists who are players = (22 + 3) = 25.

● ● ●

7 Number Series

In this type of series, the set of given numbers in a series are related to one another in a particular pattern or manner.

The relationship between the numbers may be:

(*i*) consecutive odd/even numbers;
(*ii*) consecutive prime numbers;
(*iii*) squares/cubes of some numbers with/without variation of addition or subtraction of some number;
(*iv*) sum/product/difference of preceding numbers;
(*v*) addition/subtraction/multiplication/division by some number; and
(*vi*) many more combinations of the relationships given above.

Multiple Choice Questions

Directions (1–21) : *In each of the following questions, one term in the number series is wrong. Find out the wrong term.*

1. 3, 4, 10, 32, 136, 685, 4116
A. 136 B. 10
C. 4116 D. 32

2. 125, 126, 124, 127, 123, 129
A. 123 B. 124
C. 126 D. 129

3. 112, 114, 120, 124, 132, 142, 154
A. 114 B. 120
C. 124 D. 132

4. 325, 259, 202, 160, 127, 105, 94
A. 94 B. 127
C. 105 D. 202

5. 105, 85, 60, 30, 0, – 45, –90
A. 0 B. 85
C. 60 D. 105

6. 196, 169, 144, 121, 100, 80, 64
A. 169 B. 144
C. 121 D. 80

7. 8, 14, 26, 48, 98, 194, 386
A. 194 B. 98
C. 14 D. 386

8. 8, 13, 21, 32, 47, 63, 83
A. 21 B. 13
C. 32 D. 47

9. 380, 188, 92, 48, 20, 8, 2
A. 188 B. 48
C. 92 D. 20

10. 1, 3, 10, 21, 64, 129, 356, 777
A. 10 B. 21
C. 356 D. 129

11. 52, 51, 48, 43, 34, 27, 16
A. 51 B. 48
C. 34 D. 43

12. 46080, 3840, 384, 48, 24, 2, 1
A. 1 B. 2
C. 24 D. 48

13. 2, 5, 10, 50, 500, 5000
A. 5 B. 10
C. 50 D. 5000

14. 2, 5, 10, 17, 26, 37, 50, 64
A. 50 B. 17
C. 26 D. 64

15. 1, 2, 6, 15, 31, 56, 91
A. 31 B. 15
C. 56 D. 91

16. 8, 27, 125, 343, 1331
A. 1331 B. 343
C. 125 D. None of these

17. 445, 221, 109, 46, 25, 11, 4
A. 221 B. 109
C. 46 D. 25

18. 3, 7, 15, 39, 63, 127, 255, 511
A. 39 B. 15
C. 7 D. 63

19. 10, 26, 74, 218, 654, 1946, 5834
A. 26 B. 74
C. 218 D. 654

20. 6, 12, 48, 100, 384, 768, 3072
A. 768 B. 384
C. 100 D. 48

21. 3, 8, 15, 24, 34, 48, 63
A. 15 B. 24
C. 34 D. 48

Directions (22–50) : *In each of the following questions, a number is given with one term missing. Choose the correct alternative that will continue the same pattern and fill in the blank spaces.*

22. 1, 5, 11, 19, 29, (.....).
A. 45 B. 39
C. 41 D. 47

23. 50, 49, 46, 41, 34, (.....).
A. 32 B. 25
C. 21 D. 19

24. 4, 9, 5, 12, 7, 15, 8, (.....), 10.
A. 25 B. 18
C. 21 D. 24

25. 3, 5, 6, 10, 9, 15, 12, A, B.
A. A = 18, B = 18
B. A = 15, B = 20
C. A = 15, B = 18
D. A = 20, B = 15

26. 9, 12, 11, 14, 13, (.....), 15.
A. 12 B. 16
C. 10 D. 17

27. 2, 5, 9, 19, 37, (.....).
A. 76 B. 75
C. 74 D. 72

28. 3, 7, 15, 31, 63, (.....).
A. 92 B. 127
C. 115 D. 131

29. 2, 9, 28, 65, 126, (.....).
A. 137 B. 223
C. 217 D. 199

30. 5, 11, 17, 25, 33, 43, (.....).
A. 49 B. 51
C. 52 D. 53

31. 2, 3, 5, 7, 11, (.....), 17
A. 12 B. 13
C. 14 D. 15

32. 5, 10, 13, 26, 29, 58, 61, (.....).
A. 12 B. 125
C. 128 D. 64

33. $\frac{1}{81}, \frac{1}{54}, \frac{1}{36}, \frac{1}{24}$, (.....).
A. $\frac{1}{32}$ B. $\frac{1}{9}$
C. $\frac{1}{16}$ D. $\frac{1}{18}$

34. 1, 3, 4, 8, 15, 27, (.....).
A. 37 B. 44
C. 50 D. 55

35. 212, 179, 146, 113, (.....).
A. 91 B. 79
C. 112 D. 80

36. 0, 2, 3, 5, 8, 10, 15, 17, 24, 26, (.....).
A. 28 B. 30
C. 32 D. 35

37. 3, 10, 20, 33, 49, 68, (.....).
A. 75 B. 85
C. 90 D. 91

38. 1, 9, 17, 33, 49, 73, (.....).
A. 97 B. 98
C. 99 D. 100

39. 13, 31, 63, 127, 255, (.....).
A. 513 B. 511
C. 517 D. 523

40. 2, 6, 12, 20, 30, 42, 56, (.....).
A. 60 B. 64
C. 70 D. 72

41. 8, 24, 12, 36, 18, 54, (.....).
A. 27 B. 68
C. 72 D. 108

42. 165, 195, 255, 285, 345, (.....).
A. 375 B. 420
C. 435 D. 390

43. 2, 4, 12, 48, 240, (.....).
A. 960 B. 1080
C. 1440 D. 1920

44. 10, 5, 13, 10, 16, 20, 19, (.....).
A. 22 B. 23
C. 38 D. 40

45. 1, 2, 4, 8, 16, 32, 64, (.....), 256.
A. 148 B. 128
C. 154 D. 164

46. 71, 76, 69, 74, 67, 72, (.....).
A. 65 B. 76
C. 77 D. 80

47. 2, 6, 3, 4, 20, 5, 6, (.....), 7.
A. 25 B. 30
C. 42 D. 28

48. 2, 5, 11, 23, 47, (.....).
A. 49 B. 52
C. 95 D. 106

49. 3, 15, 35, (.....), 99, 143.
A. 48 B. 63
C. 80 D. 95

50. 64, 32, 16, 8, (.....).
A. 0 B. 1
C. 2 D. 4

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	D	B	D	A	D	D	D	B	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	C	D	D	D	D	C	A	D	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	C	B	B	D	B	B	B	C	D
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
B	A	C	C	D	D	C	A	B	B
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
A	C	C	D	B	A	C	C	B	D

EXPLANATORY ANSWERS

1. The sequence is as follows :
2nd term = (1st term +1) × 1
3rd term = (2nd term +1) × 2
4th term = (3rd term +1) × 3 and so on.
So, 32 is wrong, the correct term being 33.

2. The sequence is +1, –2, +3, –4, +5.
So, 129 is wrong. The correct term should be 128.

3. The squence is +2, +4, +6, +8, +10, +12.
So, 120 is wrong.

4. The sequence is –66, –55, –44, –33, –22, –11.
So, 202 is wrong.
The correct term is 204.

5. The sequence is –20, –25, –30, –35, –40, – 45,
So, 0 is wrong.

6. The sequence is $(14)^2$, $(13)^2$, $(12)^2$, $(11)^2$, $(10)^2$, $(9)^2$, $(8)^2$.

So, 80 is wrong. Since $9^2 = 81$.

7. Each term, except 48 in the series is less than twice the preceding term by 2. The correct term is 50.

8. The sequence is +5, +5, +11, +14, +17, +20. However, 47 breaks this sequence. The correct term is 46.

9. Each term, except 48 in the series is four more than two times the next term. The correct term is 44.

10. Suppose the terms of the series are A, B, C, D, ...

Then, the sequence is A × 2 + 1, B × 3 + 1, C × 2 + 1, D × 3 + 1 and so on.

∴ 356 is wrong.

11. The sequence is –1, –3, –5, –7, –9, –11. So, 34 is wrong.

12. The terms are successively divided by 12, 10, 8, 6 ..... etc. So, 24 is wrong.

13. The pattern is : 1st × 2nd = 3rd; 2nd × 3rd = 4th; 3rd × 4th = 5th. But, 4th × 5th = 50 × 500 = 25000 ≠ 5000 = 6th.

14. The numbers are 1^2+1, 2^2+1, 3^2+1 and so on

∴ 64 is wrong.

The correct term is (8^2+1) *i.e.* 65.

15. The sequence is $+1^2$, $+2^2$, $+3^2$, $+4^2$, $+5^2$, $+6^2$.

16. The numbers are cubes of prime numbers *i.e.* 2^3, 3^3, 5^3, 7^3, 11^3. Clearly, none is wrong.

17. 3 is subtracted from each number and the result is divided by 2 to obtain the next number of the series.

Thus, $221 = \frac{(445-3)}{2}, 102 = \frac{221-3}{2}$ and so on.

∴ 46 is wrong, the correct term being 53.

18. Each number in the series is multiplied by 2 and the result increased by 1 to obtain the next number.

∴ 39 is wrong the correct term being 31.

19. Each term is four less than the preceding number multiplied by 3.

Thus, $26 = (10 \times 3 - 4)$; $74 = (26 \times 3 - 4)$ and so on.

∴ 654 is wrong, the correct term being 650.

20. Each term at even place in the series, except 100 is obtained by multiplying the preceding term by 2.

∴ 100 is wrong, the correct term being 96.

21. The difference between consecutive terms of the given series are respectively 5, 7, 9, 11 and 13. Clearly, 34 is a wrong number.

22. The sequence is +4, +6, +8, +10, ...

∴ Missing number = 29 + 12 = 41.

23. The sequence is –1, –3, –5, –7, ...

∴ Missing number = 34 – 9 = 25.

24. The given sequence is a combination of two series : 4, 5, 7, 8, 10 and 9, 12, 15, (.....). Clearly, the missing term is 18.

25. The given sequence is a combination of two series – 3, 6, 9, 12, B and 5, 10, 15, A Clearly, A = 20 & B = 15.

26. Alternately we add 3 and subtract 1.

Thus, 9 + 3 = 12,
12 – 1 = 11,
11 + 3 = 14 and so on.

∴ Missing number = 13 + 3 = 16.

27. The second number is one more than twice the first; third number is one less than twice the second, fourth number is one more than twice the third; fifth number is one less than twice the fourth.

Thus, the sixth number is one more than twice the fifth.

So, the missing number is 75.

28. Each number in the series is the preceding number multiplied by 2 and then increased by 1.

Thus, (3 × 2) + 1 = 7, (7 × 2) + 1 = 15, (15 × 2) + 1 = 31 and so on.

∴ Missing number = (63 × 2) + 1
= 126 + 1 = 127.

29. The sequence is $1^3 + 1$, $2^3 + 1$, $3^3 + 1$, $4^3 + 1$, $5^3 + 1$, ...

$\therefore$ Missing number = $(6^3 + 1) = 216 + 1 = 217$.

30. The sequence is +6, +6, +8, +8, +10, ...

So, missing number = 43 + 10 = 53.

31. Clearly, the given series consists of prime numbers starting from 2. The prime number after 11 is 13. So, 13 is the missing number.

32. The numbers are alternately multiplied by 2 and increased by 3. Thus, $5 \times 2 = 10$, $10 + 3 = 13$, $13 \times 2 = 26$, $26 + 3 = 29$ and so on.

$\therefore$ Missing number = $(61 \times 2) = 122$.

33. Each term of the series is multiplied by $\frac{3}{2}$ to obtain the next term.

$\therefore$ Missing term = $\frac{1}{24} \times \frac{3}{2} = \frac{1}{16}$.

34. The sum of any three consecutive terms of the series gives the next term.

Thus, $1 + 3 + 4 = 8$;

$3 + 4 + 8 = 15$,

$4 + 8 + 15 = 27$ and so on.

$\therefore$ Missing number = $8 + 15 + 27 = 50$.

35. 33 is subtracted from each term of the series to obtain the next term.

$\therefore$ Missing number = $113 - 33 = 80$.

36. The sequence is +2, +1, +2, +3, +2, +5, +2, +7, +2, ...

$\therefore$ Missing number = $26 + 9 = 35$.

37. The sequence is +7, +10, +13, +16, +19, ...

$\therefore$ Missing number = $68 + 22 = 90$.

38. The sequence is +8, +8, +16, +16, +24, ...

$\therefore$ Missing number = $73 + 24 = 97$.

39. Each number is double the preceding one plus 1.

So, the next number is = $(255 \times 2) + 1 = 511$.

40. The sequence is 1×2, 2×3, 3×4, 4×5, 5×6, 6×7, 7×8.

$\therefore$ Next number = $8 \times 9 = 72$.

41. The terms are alternately multiplied by 3 and divided by 2.

Thus,

$8 \times 3 = 24$,

$24 \div 2 = 12$,

$12 \times 3 = 36$,

$36 \div 2 = 18$ and so on.

$\therefore$ Missing number = $54 \div 2 = 27$.

42. Each number is 15 multiplied by a prime number *i.e.*

15×11, 15×13, 15×17, 15×19, 15×23.

$\therefore$ Missing term = $15 \times 29 = 435$.

43. The terms are respectively multiplied by 2, 3, 4, and 5 to obtain the successive terms.

Clearly, missing term = $240 \times 6 = 1440$.

44. There are two series : 10, 13, 16, 19 and 5, 10, 20, (.....).

$\therefore$ Missing number = 40.

45. Each term is multiplied by 2 to obtain the next term.

46. Alternately 5 is added and 7 is subtracted.

Thus, $71 + 5 = 76$,

$76 - 7 = 69$,

$69 + 5 = 74$,

$74 - 7 = 67$ and so on.

$\therefore$ Missing number = $72 - 7 = 65$.

47. The arrangement in the series is as under:

$2 \times 3 = 6$; $4 \times 5 = 20$ and so on.

$\therefore$ Missing number = $6 \times 7 = 42$.

48. The sequence is +3, +6, +12, +24, ...

$\therefore$ Missing number = $47 + 48 = 95$.

49. The terms of the series are $2^2 - 1$, $4^2 - 1$, $6^2 - 1$, ..., $10^2 - 1$, $12^2 - 1$.

$\therefore$ Missing number = $8^2 - 1 = 64 - 1 = 63$.

50. Each number is half of the preceding number.

$\therefore$ Missing number = $\frac{1}{2} \times 8 = 4$.

●●●

8 Coding/Decoding

Type-I

Coding is a secretive language which is used to change the representation of the actual term/word/value. This coded language can be framed by

(*i*) moving the letters one or more steps forward or backward;

(*ii*) substituting numbers for letters and vice–versa;

(*iii*) writing the letters of the given word in reverse order in part or in whole; and

(*iv*) replacing the letters in their natural series by the same positioned letters in their reverse series.

Alphabet in natural series are :

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
↓				↓					↓					↓					↓						↓	
1st				5th					10th					15th					20th						25th	

Alphabet in reverse series are :

Z	Y	X	W	V	U	T	S	R	Q	P	O	N	M	L	K	J	I	H	G	F	E	D	C	B	A
↓				↓					↓					↓					↓						↓	
1st				5th					10th					15th					20th						25th	

Note : On reaching Z, the series restarts from A and on reaching A, it restarts from Z.

Type-II

There is variety in ways of coding. Coding language is not only for words and numbers but also for hiding a group of words, statements or even sentences. This form of coding pattern may appear to be confusing but after solving only a few questions it is very easy to understand. Questions based on this coding pattern require no moving of steps or straining efforts of calculations, but only quick tallying or comparing ability. The codes can be letters or numbers.

Type-III

In yet another manner of coding particular words are assigned code names which are further coded. The questions on this pattern may appear meaningless but the codes must not be confused with the basic properties of reality.

Type-IV

Coding-Decoding can be really easy and simplified if one has to tally the given codes. In this type of coding, the Digits and its coded Letters or *vice versa* are already given. One has to find out the answers to the given questions just by tallying the given codes.

Type-V

In this type of coding, the capital letters A to Z are coded by using the small letters a to z. With the help of the coding pattern, one has to find the right code from the columns which has equivalent to the group of capital letters.

Type-VI

Column coding is a very complex form of coding. It needs a lot of attention and swift eye movement to decode the code for each letter of the given words. Proper words in capital letters are given in one column and the codes in small letters are given in another column. Based on the information given in both columns the candidate has to arrive at the correct answer option.

Multiple Choice Questions

Directions (1–12) : *In each of the following questions below, find out the correct answer from the given alternatives.*

1. If in a certain code YELLOW is written as XFKMNX, how is COUNTRY coded?
A. DPVOSQX B. BNTMSQX
C. BPTMSSX D. AMSLRPW

2. If in a certain language KNIFE is coded as IFEKN, how is DOCTOR coded in that language?
A. ROTCOD B. TORDOC
C. CTORDO D. ROTDOC

3. If in a certain language HUNTER is coded as UHNTRE, how is MANAGE coded in that code?
A. MAANGE B. MNAAEG
C. AMNAEG D. EGNAAM

4. If in a certain language MECHANICS is coded as HCEMASCIN, how is POSTER coded in that code?
A. OPTSRE B. SOPRET
C. RETSOP D. TERPOS

5. If in a certain language CASUAL is coded as GEWYEP, how is PEOPLE coded in that code?
A. SHRSOH B. TISTPI
C. SIRTOI D. THSTOI

6. If in a certain language CURTAIN is coded as CAITURN, how is HILLOCK coded in that code?
A. HOCLILK B. HCOLLIK
C. HKLIOC D. HOLLICK

7. If in a certain language CHAMPION is coded as HCMAIPNO, how is NEGATIVE coded in that code?
A. ENAGITEV B. NEAGVEIT
C. MGAETVIE D. EGAITEVN

8. If in a certain language PEARL is coded as SHDUO, how is COVET coded in that code?
A. FRXHV B. EQXHV
C. FRYHW D. FNYDW

9. If FOUGHT is coded as EQRKCZ, how is MALE coded?
A. LCII B. NZMD
C. KCMI D. NBIF

10. If ADVENTURE is coded as ERUTNEVDA, how is GREEN coded in that code?
A. NEERG B. ENEGR
C. GEREN D. NEEGR

11. If TABLE is coded as GZYOV, how is JUICE coded?
A. OZLFJ B. QFRXV
C. HOFAD D. QZHMT

12. If RAMAYANA is coded as AMARANAY how is TULSIDAS written?
A. SLUTSADI B. UTSLIDSA
C. SADISLUT D. SADITULS

Directions (13–20) : *In the following questions some capital alphabets are written in a row, below them their coding have been given. Now in questions a particular word has been coded in a particular manner using codes as given below the capital letters. You have to understand the pattern of coding and have to answer the question asked subsequently.*

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
u	a	2	v	b	w	3	t	4	x	s	y	5	z	6	c	d	8	7	e	r	h	g	i	p	q

13. If DAS is to 2a84, then SMASH is to:
A. 75U7t B. eya84
C. 8zqe3 D. 8zqe4

14. If FASHION is to z64t7uw, then POSITION is to:
A. z64e476c B. z64e47c6
C. c674e46z D. c674e4z6

15. If LONDON is to 5c62z5, then EUROPE is to:
A. wh7cdw B. wh7z6V
C. br76cb D. wh76cb

16. If DEER is to vw8 and TOSS is to be e6e, then DOTT is to:
A. v6r B. bce
C. bcr D. vr6

17. If BAFFLE is to aat4cx, then DANGER is to:
A. vacx49 B. vacxh9
C. vacxhi D. vacxhr

18. If MAY is to yzqaiq, then TIE is to:
A. 7rtxwv B. 7rtxvw
C. 7rtxbw D. 7rtxwb

19. If MAIDEN is to yux2b6, then FIBRES is to:
A. b428w8 B. b4288w
C. b42dbe D. b42bde

20. If MAIDEN is to u5v4zb, then DANGER is to:
A. vuz3b8 B. 8b3zuv
C. uv3z8b D. uv3zb8

Directions (21–28) : *Question are based on following informations.*

If in a certain language CHARCOAL is coded as 45164913 and MORALE is coded as 296137, how are the following words coded in that language?

21. MECHRALE
A. 95378165 B. 25378195
C. 27456137 D. 27386195

22. ROCHEL
A. 694573 B. 693578
C. 673958 D. 693857

23. COACH
A. 38137 B. 49148
C. 48246 D. 49145

24. ARCHER
A. 193859 B. 163546
C. 164576 D. 193476

25. COLLER
A. 397758 B. 497758
C. 483359 D. 493376

26. ALLOCHRE
A. 19943785 B. 19394567
C. 16693895 D. 13396875

27. HEARL
A. 57163 B. 75163
C. 75198 D. 57193

28. REAL
A. 8519 B. 6713
C. 6513 D. 6719

29. In a certain code, RIPSLE is written as 613082 and WIFE is written as 4192, how is PEWSLE written in that code?
A. 32408 B. 69824
C. 41632 D. 35612

30. In a certain code language 24685 is written as 33776. How is 35791 written in that code?
A. 44882 B. 44880
C. 46682 D. 44682

Directions (31–36) : *In a certain language, the numbers are coded as follows:*

4	3	9	2	1	6	7	8	5	2	0
A	W	P	Q	R	B	E	S	G	J	M

How are the following figures coded in that code?

31. 439216
A. PQRWAB B. AQRWPB
C. APWQRB D. AWPQRB

32. 3215
A. WJRG B. WJGR
C. JWRG D. JWGR

33. 720435
A. EJMAGW B. MAGJRW
C. EJMAWG D. MGARJW

34. 55218
A. GJGRS B. GGJSR
C. GGRJS D. GGJRS

35. 421665
A. AQRBBG B. PQBRSE
C. ASGRBE D. QRPSSE

36. 67852
A. BSEJG B. BESJG
C. BSEGJ D. BESGJ

37. If **room** is called **bed**, **bed** is called **window**, **window** is called **flower** and **flower** is called **cooler** on what would a man sleep?
A. Window B. Bed
C. Flower D. Cooler

38. If **sand** is called **air**, **air** is called **plateau**, **plateau** is called **well**, **well** is called **island** and **island** is called **sky**, then from where will a woman draw water?
A. Well B. Island
C. Orange D. Air

39. If **book** is called **watch**, **watch** is called **bag**, **bag** is called **dictionary** and **dictionary** is called **window**, which is used to carry the books?

A. Dictionary B. Bag
C. Book D. Watch

40. If **water** is called **food**, **food** is called **tree**, **tree** is called **sky**, **sky** is called **wall**, on which of the following grows a fruit?
A. Water B. Food
C. Sky D. Tree

41. If **pen** is **table**, **table** is **fan**, **fan** is **chair** and **chair** is **roof**, on which of the following will a person sit?
A. Fan B. Chair
C. Roof D. Table

42. If **banana** is **apple**, **apple** is **grapes**, **grapes** is **mango**, **mango** is **nuts**, **nuts** is **guava**, which of the following is a yellow fruit?
A. Mango B. Guava
C. Apple D. Nuts

43. If **man** is called **girl**, **girl** is called **woman**, **woman** is called **boy**, **boy** is called **butler** and **butler** is called **rogue**, who will serve in a restaurant?
A. Butler B. Girl
C. Man D. Rogue

44. If **lead** is called **stick**, **stick** is called **nib**, **nib** is called **needle**, **needle** is called **rope** and **rope** is called **thread**, what will be fitted in a pen to write with it?
A. Stick B. Lead
C. Needle D. Nib

45. If **rat** is called **dog**, **dog** is called **mongoose**, **mongoose** is called **lion**, **lion** is called **snake** and **snake** is called **elephant**, which is reared as pet?
A. Rat B. Dog
C. Mongoose D. Lion

46. If **eraser** is called **box**, **box** is called **pencil**, **pencil** is called **sharpener** and **sharpener** is called **bag**, what will a child write with?
A. Eraser B. Box
C. Pencil D. Sharpener

47. In a certain code **nee tim see** means how are you; **ble nee see** means where are you. What is the code for where?
A. nee B. tim
C. see D. None of these

48. In a certain code language, **pit nae tom** means apple is green; **nae ho tap** means green and white and **ho tom ka** means shirt is white. Which of the following represents apple in that language?
A. nae B. tom
C. pit D. ho

49. If in a certain language, **mxy das zci** means good little frock; **jmx cos zci** means girl behaves good; **nvg drs cos** means girl makes mischief and **das ajp cos** means little girl fell; which word in that language stands for frock?
A. zci B. das
C. nvg D. None of these

50. In a certain code language, **Mink Yang Pe** means Fruits are ripe; **Pe Lao May Mink** means Oranges are not ripe and **May Pe Nue Mink** means Mangoes are not ripe. Which word in that languages means Mangoes?
A. May B. Pe
C. Nue D. Mink

ANSWERS

1	2	3	4	5	6	7	8	9	10
C	C	C	B	B	A	A	C	A	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	A	C	A	B	A	A	B	C	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	A	D	C	D	B	A	B	A	A
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
D	A	C	D	A	D	A	B	A	C
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
C	D	D	C	C	D	D	C	D	C

EXPLANATORY ANSWERS

1. In the code, the letters in the odd places are one before and those in the even places are one ahead than the corresponding letter in the word.

2. The last three letters of the word are placed as it is in the first three places in the code. The remaining letters are shifted forward keeping their mutual arrangement unchanged.

3. In the code, the middle two letters are kept unchanged, while on either side every two letters are mutually reversed in order.

4. In the code the first four and the last four letters are reversed in order.

5. In the code, each letter is the fourth alphabet after the corresponding letter in the word.

6. In the code, the first, the middle and the last letters of the word are kept the same. The two letters between first and middle letters are replaced by the two letters between the middle and last letters and vice-versa. Also, the mutual arrangement of each of the two letters is reversed.

7. In the code, each of the two letters are reversed in arrangement.

8. Each letter in the code is two ahead than the corresponding letter in the word.

9. In the code, first letter is one place before, second letter is two places ahead, third letter is two places before, fourth letter is three places ahead and so on.

10. In the code, the first and last letters, the second and second last letters, the third and third last letters and so on are mutually replaced.

11. If in the word, a letter is nth alphabet from the beginning, then in the code the corresponding letter is the nth alphabet from the end.

12. In the code, the first four letters are reversed in arrangement and the last four letters are reversed in arrangement.

13. Letters at the odd places have been moved one place back, and letters at the even places have been moved one place ahead regarding the position of codes given in the table.

14. Codes for the respective letters as per table have been reversed in the coding.

15. First three letters have been coded one position in forward direction, and last three letters have been coded one position in backward direction.

16. In both the words DEER and TOSS, codes for each letters have been used from just below the letters in the table except for the letter that has been written twice *i.e.* E and S. For these letters, codes have been used just one position ahead in the table that too only once. Therefore, codes for D, O and T will be V, 6 and r respectively.

17. Codes for the letters have been moved in forward direction with a gap of 0, 1, 2, 3, 4 and 5 positions, regarding position of their codes in the given table.

18. For each of the letters of the word MAY, adjacent codes have been used.

19. For the second and fifth letter, codes have been used from just below the letters, for the first and fourth letter, codes have been used from one position back, and for third and sixth letter codes have been used one position ahead as their position in the table.

20. In the word MAIDEN code for MA, ID and EN have been exchanged.

(21–28) : The alphabets in the given words are coded as follows :

C	H	A	R	O	L	M	E
4	5	1	6	9	3	2	7

21. M is coded as 2, E as 7, C as 4, H as 5, A as 1 and L as 3. So, MECHRALE is coded as 27456137.

22. R is coded as 6, O as 9, L as 3, E as 7, R as 6. So, ROCHEL is coded as 694573.

23. C is coded as 4, O as 9, A as 1 and H as 5. So, COACH is coded as 49145.

24. A is coded as 1, R as 6, C as 4, H as 5 and E as 7. So, ARCHER is coded as 164576.

25. C is coded as 4, O as 9, L as 3, E as 7 and R as 6. So, COLLER is coded as 493376.

26. A is coded as 1, L as 3, O as 9, C as 4, H as 5, R as 6 and E as 7. So, ALLOCHRE is coded as 13394567.

27. H is coded as 5, E as 7, A as 1, R as 6, L as 3. So, HEARL is coded as 57163.

28. R is coded as 6, E as 7, A as 1 and L as 3. So, REAL is coded as 6713.

29. The alphabets are coded as shown *i.e.* P as 3, E as 2, W as 4, S as 0 and L as 8. So, PEWSLE is coded as 32408.

R	I	P	S	L	E	W	F
6	1	3	0	8	2	4	9

30. Clearly, in the code the letters at odd places are one place ahead and those as even places are one place before the corresponding letter in the word. So, in 35791, 3 is written as 4, 5 as 4, 7 as 8, 9 as 8 and 1 as 0. *i.e.* the code becomes 44880.

31. As given, 4 is coded as A, 3 as W, 9 as P, 2 as Q, 1 as R and 6 as B. So, 439216 is coded as AWPQRB.

32. As given, 3 is coded as W, 2 as J, 1 as R, and 5 as G. So, 3215 is coded as WJRG.

33. As given, 7 is coded as E, 2 as J, 0 as M, 4 as A, 3 as W and 5 as G. So 720435 is coded as EJMAWG.

34. As given, 5 is coded as G, 2 as J, 1 as R, and 8 as S. So, 55218 is coded as GGJRS.

35. As given, 4 is coded as B, 2 as Q, 1 as R, 6 as B and 5 as G. So, 421665 is coded as AQRBBG.

36. As given, 6 is coded as B, 7 as E, 8 as S, 5 as G and 2 as J. So, 67852 is coded as BESGJ.

37. A man sleeps on a 'bed' and as given, 'bed' is called window. So, the man will sleep on the 'window'.

38. A woman shall draw water from a 'well' but a 'well' is called island. So, the woman will draw water from an 'island'.

39. Clearly, a 'bag' is used to carry the books but a 'bag' is called 'dictionary'. So, a dictionary will be used to carry the 'books'.

40. The fruits grow on a tree and tree is called 'sky'. So, the fruits grow on the 'sky'.

41. A person will sit on the 'Chair' but a 'chair 'is called 'roof'. So, the person will sit on the 'roof'.

42. Clearly, 'mango' is the yellow fruit but 'mango' is called 'nuts'. So, 'nuts' is the yellow fruit.

43. A 'butler' serves in a restaurant but 'butler' is called 'rogue'. So, a 'rogue' will serve in the restaurant.

44. Clearly, a 'nib' is fitted in the pen to write with it. But a 'nib' is called 'needle'. So, a 'needle' will be fitted in the pen.

45. Clearly, 'dog' is reared as pet. But 'dog' is called 'mongoose'. So, a 'mongoose' is reared as pet.

46. The child will write with a 'pencil' and 'pencil' is called 'sharpener'. So, the child will write with a 'sharpener'.

47. In the first and second statements, the common code words **nee** and **see** mean are and you. So, in the second statement, the remaining code **ble** means where.

48. In the first and second statements the common code word is **nae** and the common word is **green**. So, **nae** means **green**.

In the first and third statements, the common code word is **tom** and the common word is **is**. So, **tom** means **is**. Therefore in the first statement **pit** means **apple**.

49. In the first and second statements, the common code word is **zci** and the common word is **good**. So, **zci** means **good**.

In the first and fourth statements, the common code word is **das** and the common word is **little**. So, **das** means **little**. Thus, in the first statement **mxy** means **frock**.

50. In the second and third statements, the common code words are **Pe**, **Mink** and **May** and the common words are **are**, **not** and **ripe**. So, in the third statement, **Nue** stands for mangoes.

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Basic English

1 Articles

Definite and Indefinite Articles

(*i*) 'A' and 'an' are Indefinite Articles.

(*ii*) 'The' is Definite Article.

(*iii*) 'A' and 'an' modify a noun in a general way.

(*iv*) 'The' particularises it. *e.g.*,

Mohan has **a pen.**

The pen which you gave me was expensive.

Vowel and Consonant Sounds

(*i*) 'A' is used before words starting with the sound of a consonant.

(*ii*) 'An' is used before a vowel sound (vowels a, e, i, o, u) *e.g.,*

a book, a cat, a useful thing, a European girl, a university,

but an FDR, an MA, an honest boy, an hour, an owl, an egg, an umbrella, etc.

Use of Articles 'A' and 'An'

A cat mews. (*i.e.,* every cat)

The cat of my neighbour mews day and night. (*i.e.,* a particular cat)

He gave me **an** egg. (Here 'an' means 'one')

Use of Article 'The'

1. 'The' is used before names of rivers, mountains, seas, oceans:

   The Himalayas, the Ganga, the Yamuna, the Bay of Bengal, the Indian Ocean, the Nile, the English Channel, *etc.*

2. Names of newspapers and magazines:

   The Times of India, the Tribune, The Sun, *etc.*

3. Names of the famous and holy books:
   The Guru Granth Sahib, The Gita, The Ramayana, *etc.*

4. Names of creations of nature:
   the sun, the earth, the moon, the sky, *etc.*

5. While using Adjectives as Nouns:
   The poor should be helped by **the rich.**

6. Sometimes with the Comparative Degree:
   The more you think, **the more** you worry.

7. With the Superlative Degree:
   She is **the most intelligent** girl in our school.

8. Before the imaginary lines and directions:

   The Latitude, The Equator, the east, the west, etc.

9. Before the names of musical instruments:
   the violin, the piano, the flute, etc.

10. While using a Proper Noun as a Common Noun:

    Mohan is **the Sachin** of our team.

Omission of Article 'The'

1. Before some Nouns used to convey general sense, articles are not used but are used to particularise them:
   Man is mortal.

2. Before Proper Nouns:
   Rakesh is an intelligent boy.

3. With Abstract Noun:
   Childhood is the prime time of one's life.
   The childhood of Sohan was full of sorrow.

4. With Material Nouns:
   Milk is an essential food.
   The milk of the cow is sweet.

5. Usually no article is used before names of diseases:
   Cancer is a fatal disease.
   However, when we talk about a disease figuratively, we use an article before its name, *e.g.*
   Corruption is a cancer.
6. Names of games and language:
   I like football.
   I can speak Punjabi, Hindi and English.
7. Gold is a precious metal.

NOTE: As you must have noted above, the definite article 'the' has been used where a noun is particularised.

Double Use of Article 'The'

Read the following sentences carefully to understand this :

1. The poet and novelist has been honoured.
   (The same person is the poet as well as novelist)
2. The poet and the novelist have been honoured.
   (The poet and the novelist are two different persons).
3. I have a black and white dog.
   (that is, one dog)
4. I have a black and a white dog.
   (that is, two dogs)

Multiple Choice Questions

Directions : *Fill in the blanks with suitable articles. Mark 'D' if no article required.*

1. Do you know ..... boy in white?
A. a B. an
C. the D. No article

2. She is ..... girl I am looking for.
A. a B. an
C. the D. No article

3. Have you read ..... Mahabharat?
A. a B. an
C. the D. No article

4. .....rich are not always happy.
A. A B. An
C. The D. No article

5. Oranges are sold by ..... dozen.
A. a B. an
C. the D. No article

6. Milk is sold by ..... litre.
A. a B. an
C. the D. No article

7. ..... Amazon is the longest river in the world.
A. A B. An
C. The D. No article

8. ..... higher you climb, the colder it gets.
A. A B. An
C. The D. No article

9. She is ..... untidy girl.
A. a B. an
C. the D. No article

10. I am ..... M.A. is English.
A. a B. an
C. the D. No article

11. I have already spent ..... few rupees I had.
A. a B. an
C. the D. No article

12. ..... English are very hard-working.
A. A B. An
C. The D. No article

13. April is the fourth month of ..... year.
A. a B. an
C. the D. No article

14. Rice is sold by ..... kilogram
A. a B. an
C. the D. No article

15. She is ..... best of the three girls.
A. a B. an
C. the D. No article

16. ..... man in the car is a friend of mine.
A. A B. An
C. The D. No article

17. Brevity is ..... soul of wit.
A. a B. an
C. the D. No article

18. ..... thing of beauty is a joy for ever.
A. A B. An
C. The D. No article

19. ..... little learning is a dangerous thing.
A. A B. An
C. The D. No article

20. ..... best sauce for food is hunger.
A. A B. An
C. The D. No article

21. Birds of ..... feather flock together.
A. a B. an
C. the D. No article

22. He makes ..... living by begging.
A. a B. an
C. the D. No article

23. It is ..... pity that he died so young.
A. a B. an
C. the D. No article

24. What ..... nuisance it is?
A. a B. an
C. the D. No article

25. Delhi is ..... London of India.
A. a B. an
C. the D. No article

26. Where is ..... will, there is a way.
A. a B. an
C. the D. No article

27. Her father is ..... physician and surgeon.
A. a B. an
C. the D. No article

28. This will benefit ..... poor.
A. a B. an
C. the D. No article

29. .....bird in hand is better than two in a bush.
A. A B. An
C. The D. No article

30. As he is hard-working, he will win ..... prize.
A. a B. an
C. the D. No article

31. ..... water of this well is dirty.
A. A B. An
C. The D. No article

32. Only ..... wearer knows where the shoe pinches.
A. a B. an
C. the D. No article

33. ..... action will be taken against you.
A. A B. An
C. The D. No article

34. ..... sun rises in the east.
A. A B. An
C. The D. No article

35. She was promoted to ..... highest post.
A. a B. an
C. the D. No article

36. Did you see ..... Taj Mahal?
A. a B. an
C. the D. No article

37. He is ..... one-eyed man.
A. a B. an
C. the D. No article

38. This is ..... useful book.
A. a B. an
C. the D. No article

39. Cloth is sold by ..... metre.
A. a B. an
C. the D. No article

40. The sun sets in ..... west.
A. a B. an
C. the D. No article

41. Amar bought.....umbrella yesterday.
A. a B. an
C. the D. No article

42. Surinder is ..... honest boy.
A. a B. an
C. the D. No article

43. She wrote ..... book in French.
A. a B. an
C. the D. No article

44. ..... lion roars.
A. A B. An
C. The D. No article

45. ..... apple a day keeps the doctor away.
A. A B. An
C. The D. No article

46. John bought ..... car yesterday.
A. a B. an
C. the D. No article

47. His father is ..... engineer in the U.S.A.
A. a B. an
C. the D. No article

48. It is hard for ..... owl to fly during the day times.
A. a B. an
C. the D. No article

49. She had ..... rimmed hat.
A. a B. an
C. the D. No article

50. My uncle is ..... heart specialist.
A. a B. an
C. the D. No article

51. He looks as foolish as ..... ass.
A. a B. an
C. the D. No article

52. Did you go to ..... prison to visit him?
A. a B. an
C. the D. No article

53. I found ..... one-rupee note in the market.
A. a B. an
C. the D. No article

54. It is a pleasure to meet such ..... efficient man.
A. a B. an
C. the D. No article

55. The Sanyasi lived in a cave in ..... Himalayas.
A. a B. an
C. the D. No article

56. There is ..... union in our factory.
A. a B. an
C. the D. No article

57. He hit his wife on the head with ..... umbrella.
A. a B. an
C. the D. No article

58. I caught him by ..... collar.
A. a B. an
C. the D. No article

59. Child is ..... father of man.
A. a B. an
C. the D. No article

60. He gazed at ..... moon for two hours.
A. a B. an
C. the D. No article

ANSWERS

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
C	C	C	C	C	C	C	C	B	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	C	C	C	C	C	C	A	A	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
A	A	A	A	C	A	A	C	A	A
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
C	C	B	C	C	C	A	A	C	C
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
B	B	A	A	B	A	B	B	A	A
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
B	C	A	B	C	A	B	C	C	C

❑❑❑

2 Synonyms & Antonyms

There are thousands of words in English language. No one can remember their meanings easily but with regular practice one can memorise most of them. A number of words with their Synonyms and Antonyms are compiled here. Try to learn as many as you can and answer the questions thereafter.

Words	*Synonyms*	*Antonyms*
Abandon	Cease, Forsake	Continue
Abhor	Hate, Loathe, Detest	Like, Love
Abiding	Enduring, Durable	Fleeting
Able	Proficient, Competent	Incompetent, Unfit
Ability	Skill, Power	Disability, Inability
Abortive	Fruitless, Futile	Fruitful, Successful
Abolish	Destroy, Undo	Restore, Revive
Abridge	Shorten, Curtail	Lengthen, Expand
Absolve	Forgive, Pardon, Excuse	Condemn
Accelerate	Hasten	Retard
Accord	Agreement, Harmony	Discord, Disagreement
Accumulate	Collect, Store, Amass	Distribute, Scatter
Adamant	Hard, Inflexible	Flexible
Adversity	Misfortune, Distress	Prosperity
Adept	Expert, Skilful	Inexpert, Unskillful
Aggravate	Heighten, Intensify	Quell, Suppress
Agile	Nimble	Clumsy, Undeft
Alert	Vigilant	Heedless
Allay	Calm, Soothe, Assuage	Arouse
Ameliorate	Improve, Advance, Amend	Worsen, Deteriorate
Ambiguous	Vague, Unclear	Clear
Amiable	Lovable, Agreeable	Disagreeable
Annihilate	Destroy	Create
Arduous	Hard, Strenuous	Easy

Words	*Synonyms*	*Antonyms*
Attacks	Assault	Defend
Audacity	Boldness	Cowardice
Auspicious	Favourable, Propitious, Lucky	Ominous, Inauspicious, Unlucky
Austere	Harsh, Severe, Rigorous	Easy-going
Authentic	True, Genuine	Spurious, False
Avarice	Greed	Generosity
Averse	Unwilling, Loath, Disinclined	Willing, Inclined
Aversion	Hostility, Hatred	Affinity, Liking
Base	Low, Mean, Ignoble	Noble, Exalted
Boisterous	Noisy, Stormy	Calm, Quiet
Brave	Courageous, Daring, Bold, Plucky	Cowardly, Dastardly, Timid
Brief	Short, Concise, Laconic	Lengthy, Diffuse
Bright	Vivid, Radiant	Dull, Dark
Brutal	Savage, Cruel	Humane, Kindly
Callous	Hard, Cruel, Indifferent	Soft, Tender, Concerned
Cautious	Careful, Wary	Rash, Reckless, Foolhardy
Censure (*n*)	Blame, Condemnation	Praise
Censure (*vb*)	Blame, Condemn	Praise, Commend
Circumscribed	Restricted, Confined, Limited	Unconfined, Unrestricted
Civil	Polite, Courteous, Gracious, Urbane	Rude, Uncivil, Impolite, Ungracious
Coerce	Compel, Force	Volunteer
Compassionate	Pitiful, Sympathetic, Merciful	Unsympathetic, Merciless, Cruel
Compress	Condense, Abbreviate	Expand, Lengthen
Conspicuous	Noticeable, Manifest	Inconspicuous
Constant	Steady, Steadfast, Uniform	Inconstant, Variable
Cordial	Friendly, Warm, Hearty	Cold, Unfriendly
Covert	Hidden, Secret	Overt, Open
Cruel	Savage, Ruthless, Vicious	Kind, Gentle, Benevolent
Cursory	Rapid, Superficial	Thorough, Exhaustive, Intensive
Credible	Believable, Probable, Plausible	Incredible, Unbelievable, Fantastic
Crafty	Cunning, Sly	Artless, Simple, Ingenuous
Costly	Expensive, Dear	Cheap, Inexpensive
Confidence	Trust, Reliance	Distrust, Doubt
Death	Decease, Demise	Existence, Life
Dearth	Scarcity, Lack, Want, Paucity, Shortage	Plenty, Abundance
Decay	Dissolution, Decline, Decomposition, Disintegration	Regeneration

Words	*Synonyms*	*Antonyms*
Deference	Respect, Reverence	Disrespect, Irreverence
Deficient	Lacking, Inadequate	Complete, Sufficient
Desolate	Lonely, Deserted	Crowded, Occupied
Destitute	Wanting, Needy	Rich, Affluent
Diligence	Industry, Perseverance	Idleness
Disgrace	Dishonour, Discredit	Honour, Credit
Dwindle	Decrease, Shrink	Grow, Increase
Earthly	Terrestrial, Mundane	Celestial, Heavenly, Unearthly
Eligible	Qualified, Suitable	Ineligible, Unsuitable
Emancipate	Liberate, Free	Enslave
Excited	Impassioned, Stimulated	Composed, Cool, Impassive
Extraordinary	Uncommon, Remarkable, Marvellous	Commonplace, Ordinary
Extravagant	Lavish, Prodigal, Wastrel, Spendthrift	Thrifty, Economical, Frugal
Fabricate	Construct, Make	Destroy
Fabulous	Fictitious, Mythical	Actual, Real
False	Untrue, Mendacious	True, Genuine
Famous	Well-known, Renowned	Obscure, Unknown
Fantastic	Fanciful, Imaginative, Visionary	Practical, Down to earth
Fearful	Nervous, Anxious, Afraid, Scared	Fearless, Dauntless
Felicity	Happiness	Sorrow
Gaiety	Joyousness, Hilarity	Mourning, Dullness
Garrulous	Talkative, Loquacious	Taciturn, Silent, Reserved
Generous	Liberal, Magnanimous	Stingy, Miserly
Gigantic	Huge, Colossal	Minute, Small
Graphic	Vivid, Pictorial, Meaningful	Vague
Guest	Visitor	Host
Guile	Fraud, Trickery	Artlessness, Ingenuousness
Gratitude	Gratefulness	Ingratitude, Ungratefulness
Gratuitous	Voluntary, Spontaneous, Unwarranted	Involuntary, Forced
Hamper	Hinder, Obstruct	Facilitate, Ease
Haughty	Arrogant, Proud	Humble, Modest
Hazardous	Dangerous, Perilous	Safe, Secure Protected
Headstrong	Obstinate, Stubborn	Weak-willed, Flexible

Words	*Synonyms*	*Antonyms*
Hope	Belief, Conviction, Expectation	Despair, Hopelessness
Improvident	Prodigal, Carelessness	Provident, Economical
Incessant	Unceasing, Continuous	Discontinuous
Indolent	Slothful, Lethargic	Active, Energetic
Joy	Delight, Pleasure	Sadness, Gloom
Jolly	Jovial, Merry	Gloomy, Sad
Judicious	Discreet, Prudent	Indiscreet, Injudicious
Knowledge	Enlightenment, Learning	Ignorance, Stupidity
Laborious	Industrious, Assiduous	Slothful, Lazy
Laxity	Slackness, Looseness	Firmness
Lenient	Mild, Forbearing	Strict, Stern
Lethal	Deadly, Fatal, Mortal	Life-giving, Vital, Vivifying
Liberal	Generous, Tolerant	Intolerant, Illiberal
Liberty	Freedom, Independence	Slavery, Bondage
Lively	Animated, Active	Dull, Listless
Loyal	Faithful, Devoted	Treacherous, Disloyal, Unfaithful
Lucky	Fortunate	Unlucky, Unfortunate
Lucrative	Profitable	Unprofitable
Magnanimous	Generous, Largehearted	Ungenerous, Stingy
Malady	Illness, Ailment	Health
Manifest	Noticeable, Obvious	Obscure, Puzzling
Meagre	Small	Plentiful, Large
Mean	Low, Abject	Noble, Exalted
Mendacious	False, Untruthful	Truthful
Misery	Sorrow, Distress	Happiness, Joy
Morbid	Sick, Diseased	Healthy
Mournful	Sorrowful, Sad	Joyful, Happy
Negligent	Careless, Heedless	Careful
Notorious	Infamous, Disreputable	Reputable
Obedient	Submissive, Compliant, Docile	Disobedient, Recalcitrant, Wayward
Obsolete	Antiquated, Out-of-Date	Current, Modern
Opportune	Timely, Seasonable	Inopportune
Opulence	Wealth, Riches	Penury, Poverty
Onerous	Heavy, Burdensome	Light, Easy
Palatable	Tasty, Delicious	Unpalatable
Pathetic	Touching	Joyous, Cheery
Persuade	Urge, Induce	Dissuade
Praise (***vb***)	Applaud, Eulogise	Condemn

Words	*Synonyms*	*Antonyms*
Praise (*n*)	Applause, Eulogy	Condemnation
Precarious	Risky, Uncertain	Safe, Certain
Pretence	Pretext, Excuse	Candour, Frankness
Propagate	Breed, Circulate	Terminate, Restrict
Quaint	Odd, Singular	Usual, Ordinary
Quell	Suppress, Subdue	Agitate, Arouse
Rare	Uncommon, Scarce	Common, Ordinary
Refined	Polished, Elegant	Crude, Coarse
Remote	Distant	Near, Close
Renown	Fame, Reputation	Infamy, Notoriety
Rigid	Stiff, Unyielding	Flexible, Yielding
Remorseful	Regretful, Repentant	Unrepentant
Rebellion	Revolt, Mutiny, Insurgency	Loyalty
Scared	Holy, Consecrated	Profane, Unholy
Sane	Sensible, Sound	Insane
Scold	Chide, Rebuke	Praise
Serious	Grave, Earnest	Frivolous
Shy	Bashful	Bold, Impudent
Simple	Plain, Artless	Complex, Cunning, Shrewd
Solitary	Single, Lonely, Secluded	Numerous, Multitude
Shallow	Superficial	Deep
Solace	Comfort, Relief	Discomfort, Grief
Spurious	Sham, False	Genuine, Authentic
Stagnant	Still, Motionless	Moving
Surplus	Excess	Deficit, Shortage
Tame	Gentle, Mild, Domesticated	Savage, Wild
Teacher	Instructor, Educator	Student, Pupil
Tedious	Wearisome, Monotonous	Agreeable, Lively
Temporal	Worldly, Secular	Spiritual
Temperate	Moderate	Immoderate, Intemperate
Tortuous	Winding, Circuitous	Straight, Direct
Tough	Hard, Strong	Tender, Soft, Flexible
Transient	Temporary, Fleeting	Lasting, Durable, Permanent
Trusworthy	Reliable	Unreliable, Untrustworthy
Tranquil	Calm	Agitated
Ugly	Unsightly, Repulsive	Beautiful, Attractive
Useful	Advantageous, Serviceable	Useless
Vehemence	Passion, Force	Apathy, Indifference

Words	*Synonyms*	*Antonyms*
Vindictive	Revengeful	Forgiving
Wholesome	Healthy	Unwholesome, Morbid, Unhealthy, Diseased
Wicked	Evil, Impious	Pious, Good
Wise	Sagacious, Erudite	Foolish, Stupid
Wrath	Anger, Fury, Rage	Love, Peace, Calm
Wreck	Ruin, Destroy	Create, Construct
Yield	Surrender, Submit	Resist, Revolt
Yielding	Submissive, Supple	Inflexible, Intractable
Yoke	Oppression, Bondage	Freedom
Zeal	Passion, Fervour	Apathy, Indifference
Zest	Relish, Enthusiasm	Distaste, Disrelish

Multiple Choice Questions

Directions (Qs. 1 to 50): *In the following questions choose the word which best expresses the MEANING of the given word.*

1. TEPID
A. Hot B. Warm
C. Cold D. Boiling

2. MAYHEM
A. Jubilation B. Havoc
C. Excitement D. Defeat

3. TIMID
A. Fast B. Slow
C. Medium D. Shy

4. CANTANKEROUS
A. Quarrelsome B. Rash
C. Disrespectful D. Noisy

5. PRECARIOUS
A. Cautious B. Critical
C. Perilous D. Brittle

6. TACITURNITY
A. Dumbness B. Changeableness
C. Hesitation D. Reserve

7. INEBRIATE
A. Dreamy B. Stupefied
C. Unsteady D. Drunken

8. HARBINGER
A. Massenger B. Steward
C. Forerunner D. Pilot

9. INTIMIDATE
A. To hint B. Frighten
C. Bluff D. Harass

10. IRONIC
A. Inflexible
B. Bitter
C. Good-natured
D. Disguisedly sarcastic

11. STRINGENT
A. Tense B. Stringy
C. Strict D. Causing to shrink

12. ECSTATIC
A. Animated B. Bewildered
C. Enraptured D. Willful

13. COMMENSURATE
A. Measurable B. Proportionate
C. Beginning D. Appropriate

14. DESTITUTION
A. Humility B. Moderation
C. Poverty D. Beggary

15. ASCEND
A. Leap B. Grow
C. Deviate D. Mount

16. UNCOUTH
A. Ungraceful B. Rough
C. Slovenly D. Dirty

17. LYNCH
A. Hang B. Madden
C. Killed D. Shoot

18. LAUD
A. Lord B. Eulogy
C. Praise D. Extolled

19. CORRESPONDENCE
A. Agreements B. Contracts
C. Documents D. Letters

20. VENUE
A. Place B. Agenda
C. Time D. Duration

21. STERILE
A. Barren B. Arid
C. Childless D. Dry

22. SYNOPSIS
A. Index B. Mixture
C. Summary D. Puzzle

23. GERMANE
A. Responsible B. Logical
C. Possible D. Relevant

24. PONDER
A. Think B. Evaluate
C. Anticipate D. Increase

25. CANNY
A. Obstinate B. Handsome
C. Clever D. Stout

26. ABUNDANT
A. Ripe B. Cheap
C. Plenty D. Absent

27. CONSEQUENCES
A. Results B. Conclusions
C. Difficulties D. Applications

28. SHIVER
A. Shake B. Rock
C. Tremble D. Move

29. DILIGENT
A. Progressive B. Brilliant
C. Inventive D. Hard-working

30. DISTANT
A. Far B. Removed
C. Reserved D. Separate

31. FORAY
A. Excursion B. Contest
C. Ranger D. Intuition

32. FRUGALITY
A. Foolishness B. Extremity
C. Enthusiasm D. Economy

33. GARNISH
A. Paint B. Garner
C. Adorn D. Abuse

34. VIGOUR
A. Strength B. Boldness
C. Warmth D. Enthusiasm

35. CANDID
A. Apparent B. Explicit
C. Frank D. Bright

36. BRIEF
A. Limited B. Small
C. Little D. Short

37. GARRULITY
A. Credulity B. Senility
C. Loquaciousness D. Speciousness

38. FURORE
A. Excitement B. Worry
C. Flux D. Anteroom

39. NEUTRAL
A. Unbiased B. Non-aligned
C. Undecided D. Indifferent

40. LAMENT
A. Complain B. Comment
C. Condone D. Console

41. ADVERSITY
A. Failure B. Helplessness
C. Misfortune D. Crisis

42. TURN UP
A. Land up B. Show up
C. Crop up D. Come up

43. DEIFY
A. Flatter B. Challenge
C. Worship D. Face

44. ERROR
A. Misadventure B. Misgiving
C. Ambiguity D. Blunder

45. SHALLOW
A. Artificial B. Superficial
C. Foolish D. Worthless

46. MASSACRE
A. Murder B. Stab
C. Assassinate D. Slaughter

47. COMBAT
A. Conflict B. Quarrel
C. Feud D. Fight

48. VORACIOUS
A. Wild B. Hungry
C. Angry D. Quick

49. IMPROMPTU
A. Offhand B. Unimportant
C. Unreal D. Effective

50. RABBLE
A. Mob B. Noise
C. Roar D. Rubbish

Directions (Qs. 51 to 100): *In the following questions choose the word which is the exact OPPOSITE of the given words.*

51. STRINGENT
A. General B. Vehement
C. Lenient D. Magnanimous

52. FLIMSY
A. Frail B. Filthy
C. Firm D. Flippant

53. BUSY
A. Occupied B. Engrossed
C. Relaxed D. Engaged

54. ADAPTABLE
A. Adoptable B. Flexible
C. Yielding D. Rigid

55. LOVE
A. Villainy B. Hatred
C. Compulsion D. Force

56. BALANCE
A. Disbalance B. Misbalance
C. Debalance D. Imbalance

57. RELINQUISH
A. Abdicate B. Renounce
C. Possess D. Deny

58. MOUNTAIN
A. Plain B. Plateau
C. Precipice D. Valley

59. FICKLE
A. Courageous B. Sincere
C. Steadfast D. Humble

60. PERENNIAL
A. Frequent B. Regular
C. Lasting D. Rare

61. RARELY
A. Hardly B. Definitely
C. Frequently D. Periodically

62. STARTLED
A. Amused B. Relaxed
C. Endless D. Astonished

63. ADHERENT
A. Detractor B. Enemy
C. Alien D. Rival

64. QUIESCENT
A. Indifferent B. Troublesome
C. Weak D. Unconcerned

65. CONDENSE
A. Expand B. Distribute
C. Interpret D. Lengthen

66. BENIGN
A. Malevolent B. Soft
C. Friendly D. Unwise

67. OBSCURE
A. Implicit B. Obnoxious
C. Explicit D. Pedantic

68. HYPOCRITICAL
A. Gentle B. Sincere
C. Amiable D. Dependable

69. EVASIVE
A. Free B. Honest
C. Liberal D. Frank

70. INDUSTRIOUS
A. Indifferent B. Indolent
C. Casual D. Passive

71. EXTRICATE
A. Manifest B. Palpable
C. Release D. Entangle

72. LUCID
A. Glory B. Noisy
C. Obscure D. Distinct

73. INSIPID
A. Tasty B. Stupid
C. Discreet D. Feast

74. OBEYING
A. Ordering B. Following
C. Refusing D. Contradicting

75. VICTORIOUS
A. Defeated B. Annexed
C. Destroyed D. Vanquished

76. COMMISSIONED
A. Started B. Closed
C. Finished D. Terminated

77. VANITY
A. Pride B. Humility
C. Conceit D. Ostentious

78. ZENITH
A. Acme B. Top
C. Nadir D. Pinnacle

79. TANGIBLE
A. Ethereal B. Concrete
C. Actual D. Solid

80. REPRESS
A. Inhibit B. Liberate
C. Curb D. Quell

81. EPILOGUE
A. Dialogue B. Prelude
C. Post script D. Epigram

82. FRAUDULENT
A. Candid B. Direct
C. Forthright D. Genuine

83. LOQUACIOUS
A. Reticent B. Talkative
C. Garrulous D. Verbose

84. NIGGARDLY
A. Frugal B. Thrifty
C. Stingy D. Generous

85. PERTINENT
A. Irrational B. Irregular
C. Insistent D. Irrelevant

86. FAINT-HEARTED
A. Warm-hearted B. Full-blooded
C. Hot-blooded D. Stout-hearted

87. VIOLENT
A. Humble B. Harmless
C. Gentle D. Tame

88. STATIONARY
A. Active B. Mobile
C. Rapid D. Busy

89. HONORARY
A. Dishonourable B. Reputed
C. Paid D. Official

90. COMMON
A. Rare B. Small
C. Petty D. Poor

91. REPEL
A. Attend B. Concentrate
C. Continue D. Attract

92. ARTIFICIAL
A. Red B. Natural
C. Truthful D. Solid

93. CAPACIOUS
A. Limited B. Caring
C. Foolish D. Changeable

94. PROVOCATION
A. Vocation B. Pacification
C. Peace D. Destruction

95. METICULOUS
A. Mutual B. Shaggy
C. Meretricious D. Slovenly

96. ABLE
A. Disable B. Inable
C. Unable D. Enable

97. COMFORT
A. Uncomfort B. Miscomfort
C. Discomfort D. None of these

98. GAIN
A. Loose B. Fall
C. Lost D. Lose

99. SYNTHETIC
A. Affable B. Natural
C. Plastic D. Cosmetic

100. ACQUITTED
A. Freed B. Burdened
C. Convicted D. Entrusted

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	B	D	A	B	D	D	C	B	D
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	C	B	C	D	A	C	C	D	A
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
A	C	D	A	C	C	A	C	D	A
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
A	D	C	A	C	D	C	A	A	A
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
C	B	C	D	B	D	D	B	A	A
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
C	C	C	D	B	D	C	D	C	D
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
D	B	B	A	C	A	C	B	B	B
71	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
D	C	A	A	A	D	B	C	A	B
81	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**
B	D	B	D	D	D	C	B	C	A
91	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
D	B	A	B	D	C	C	D	B	C

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3 Prepositions

A Preposition is a word that comes before a Pronoun or a Noun and expresses the relationship between Noun or Pronoun and some part of the remaining sentence.

(*a*) He is busy **with** his work.
(*b*) The boy jumped **into** the river.
(*c*) The birds are chirping **in** the trees.

In these sentences the words **with**, **into** and **in** show the relationship between the verbs **busy, jumped** and **chirping** with the nouns **work, river** and **trees** respectively.

Position of the Preposition

A. A Preposition usually precedes its object.
(*i*) He laughs **at** the poor.
(*ii*) He is angry **with** you.
(*iii*) She agrees **with** me.

B. In the case of Relative Pronouns it comes after the subject.
(*i*) This is the boy whom I was looking **for**.
(*ii*) That is the pen whose mention I was making **of**.

C. In the following cases, the Preposition comes after its object.
(*i*) Where is the boy you were complaining **against**?
(*ii*) What things are there you are looking **for**?
(*iii*) Who is there, you are waiting **for**?

Omission of the Prepositon

In many cases when the sentences contain Nouns of Time or Place, the Prepositions **from**, **in** and **for** are often omitted.

(*i*) He walked many kilometres.
(*ii*) He came to see me last year.
(*iii*) As I could not find my puppy anywhere, I looked here and there.

Prepositions are small words that show the relationship between one word and another. Prepositions in the following sentences show the position of the paper in relation to the desk, the book, hand and the door.

The paper is **on** the desk.
The paper is **under** the book.
The paper is **in** his hand.
The paper is **by** the door.

Common Prepositions

about	at	by
in	onto	toward
above	before	concerning
inside	out	under
across	behind	despite
into	over	until
after	below	down
like	since	up
against	beneath	during
near	through	upon
along	beside	except
of	throughout	with
amid	between	for
off	till	within
among	beyond	from
on	to	without

Multiple Choice Questions

Directions: *Select the most appropriate preposition from the given alternatives to fill in the blanks and make the sentence meaningfully complete.*

1. Don't try to be an advocate ..... these criminals.
A. for B. with
C. across D. in

2. The audience admired him ..... his sweet voice.
A. to B. on
C. for D. at

3. I want to check your bag ..... fake currency notes.
A. to B. for
C. upon D. on

4. The dew drops clung .... the blades of grass.
A. for B. on
C. to D. in

5. The thief was chased ..... by the police.
A. on B. after
C. into D. at

6. Please carry this bag ..... my room.
A. on B. for
C. to D. in

7. A lorry bumped ..... a car.
A. on B. over
C. into D. to

8. They were begging ..... food.
A. for B. on
C. to D. after

9. She always boasts ..... her wealth.
A. of B. for
C. on D. after

10. She banged ..... the door violently.
A. for B. to
C. on D. down

11. I applied ..... the post of a clerk.
A. for B. on
C. in D. to

12. I applied ..... the Principal for the post of a teacher.
A. to B. on
C. with D. for

13. I begged ..... him not to divulge the secret.
A. for B. of
C. with D. to

14. You had better borrow a pen ..... Rakesh.
A. over B. into
C. from D. by

15. I baked a cake ..... the guests.
A. to B. for
C. on D. of

16. She is confident ..... (her) success.
A. with B. on
C. of D. for

17. The doctor will cure you ..... malaria.
A. of B. with
C. for D. from

18. This law is common ..... all.
A. to B. upon
C. over D. at

19. She was condemned ..... her bad hand writing.
A. on B. for
C. into D. of

20. In summer there will be a great demand ..... desert cooler.
A. on B. with
C. for D. of

21. We shall wait ..... you.
A. on B. for
C. towards D. after

22. Tom displayed his injury ..... all his friends.
A. for B. upon
C. to D. at

23. She distributed the sweets ..... the two brothers.
A. among B. between
C. for D. in

24. Please distribute these apples ..... all.
A. among B. to
C. for D. at

25. It rarely happened that he defended ..... an innocent person.
A. against B. for
C. upon D. at

26. The parents were disappointed ..... the performance of their son.
A. on B. with
C. at D. of

27. Common salt dissolves ..... water.
A. for B. in
C. with D. by

28. This medicare is free ..... sugar.
A. on B. to
C. from D. of

29. The manager granted leave ..... the clerk.
A. to B. on
C. into D. for

30. The air was heavy ..... aroma of perfumes.
A. on B. with
C. into D. from

31. She had a quick glance ..... the magazine.
A. at B. from
C. into D. to

32. The climate of Kashmir is favourable ..... me.
A. with B. in
C. to D. for

33. They hate you ..... your poverty.
A. for B. on
C. in D. of

34. He is eligible ..... this post.
A. for B. to
C. with D. at

35. The smoke was emerging ..... down the foot of the hill.
A. on B. to
C. from D. at

36. The criminal managed to escape ..... the prison.
A. upon B. from
C. with D. of

37. You should educate your friends ..... the benefits of living in villages.
A. on B. towards
C. upon D. in

38. She made a lot of efforts ..... win the match.
A. for B. to
C. upon D. at

39. The new inspector will enquire ..... the murder case.
A. on B. for
C. into D. at

40. The retired soldiers were exempted ..... all taxes.
A. from B. to
C. on D. of

41. She was adept ..... journalism.
A. at B. on
C. with D. in

42. She is afraid ..... snakes.
A. on B. to
C. of D. with

43. I agree ..... your proposal.
A. for B. on
C. to D. with

44. The children were amazed ..... so big a python.
A. at B. on
C. in D. with

45. She was anxious ..... the final match.
A. about B. on
C. with D. for

46. He apologized ..... his being late.
A. towards B. for
C. on D. as

47. The children were amused ..... his jokes.
A. for B. to
C. at D. on

48. She is angry ..... you.
A. to B. with
C. on D. for

49. She is angry ..... your teasing remark.
A. at B. in
C. for D. with

50. A big patch of land was allocated ..... the refugees.
A. to B. for
C. in D. upon

ANSWERS

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A	C	B	C	B	C	C	A	A	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	A	B	C	B	C	A	A	B	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	C	B	A	A	C	B	C	A	B
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
A	C	A	A	C	B	A	B	C	A
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
A	C	C	A	A	B	C	B	A	A

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4 Verbs

A Verb is a word that tells something about the action or state of or happenning to a person or thing.

A Verb tells the following:

1. What a person or thing does. *e.g.*,
- (i) Sachin goes to school daily.
- (ii) The bell *rang* loudly.
- (iii) Many birds *fly* in the sky.
- (iv) She *sang* a song.

2. What a person or thing is. *e.g.*,
- (i) India *is* the biggest democracy in the world.
- (ii) Ram Mehar *is* very rich.
- (iii) They *are* happy.

3. What is done to a person or thing. *e.g.*,
- (i) You *are liked* by all.
- (ii) Two thieves *were arrested.*
- (iii) Four students *were punished* by the teacher.

4. What happens to a person or thing. *e.g.*,
- (i) His maternal uncle *died* last week.
- (ii) Two ships *sank* yesterday.
- (iii) Leaves *turn* yellow in autumn.

5. What a person or thing has, had, and so on. *e.g.*,
- (i) I *have* a new car.
- (ii) He *had* a scooter last year.
- (iii) He *has* several cows and goats.

It goes without saying that a verb is the most important part of a sentence. No sentence is complete without a Verb.

Important Information

1. If two or more singular nouns are joined by 'and' the verb used will be plural.

   Example:
   - (i) He and I *were* going to the market.
   - (ii) Ram and Mohan *are* friends.

2. If two singular nouns joined by 'and' points out to the same thing or person, the verb used must be singular.

   Example:
   - (i) Rice and curry *is* the favourite food of the Punjabis.
   - (ii) The Collector and District Magistrate *is* away.

3. In case two subjects are joined by 'as well as' the verb agrees with the first subject.

   Example :
   - (i) Kanta as well as *her* children is playing.
   - (ii) Children as well as their mother *are* playing.

   In the case of first sentence the verb 'is' agrees with Kanta and in the case of second sentence the verb 'are' agrees with the children.

4. 'Neither', 'Either', 'Every', 'Each', 'Everyone', and 'Many a' are followed by a singular verb.

   Example :
   - (i) Either of the plans *is* to be adopted.
   - (ii) Neither of the two brothers *is* sure to pass.
   - (iii) Every student *is* expected to be obedient.
   - (iv) Everyone of them *desires* this.
   - (v) Many a person *is* drowned in the sea.

5. If two subjects are joined by 'Either ..... or' / 'Neither ..... nor', the verb agrees with the subject near to 'or' or 'nor'.

   Example :
   - (i) Either my brother or I *am* to do this work.
   - (ii) Neither he nor they *are* prepared to do this work.

6. 'A great many' is always followed by a 'plural noun' and a 'plural verb'. *e.g.*,
   A great many *students have* been declared successful.
7. Similarly if two subjects are joined by 'with', 'together with', 'no less than', in addition to 'and not', etc. the verb agrees with the first subject.

   Example :
   (i) The boy with his parents *has* arrived.
   (ii) He, no less than I, *is* to blame.
8. Nouns, plural in form, but singular in meaning, take a singular verb.
   Example :
   This news *was* broadcast from television yesterday.

Multiple Choice Questions

Directions (Qs. 1-20): *Fill in the blanks with correct present tense forms of the verbs given in brackets.*

1. They ..... (live) in Shri Nagar for five years.
A. are living B. were living
C. has been living D. have been living

2. At the moment the child ..... (play) in the garden.
A. playing B. plays
C. is playing D. has been playing

3. I ..... (tell) you already about it.
A. told B. have told
C. tells D. am telling

4. If you .... (study) hard, you will secure a first division.
A. studied B. study
C. have studies D. are study

5. She .....(pass) the post office on her way to school every day.
A. is passing B. has been passing
C. passes D. passed

6. He ..... (read) since morning.
A. have been reading B. has been reading
C. is reading D. had been reading

7. This pen ..... (cost) me ten rupees.
A. costs B. costing
C. has cost D. costed

8. He ..... (wait) for me since morning.
A. has been waiting B. have been waiting
C. had been waiting D. is waiting

9. The sun ..... (shine) by day.
A. shining B. has been shining
C. shines D. is shining

10. The bell ..... (ring) just now.
A. rings B. ringing
C. rung D. has rung

11. She ..... (attend) college since 4th July.
A. has been attending B. attends
C. is attending D. attended

12. Why ..... (you come) late every day?
A. do you come B. did you come
C. have you come D. did you come

13. When he ..... (meet) you, he will love you.
A. will meet B. is meeting
C. meets D. has met

14. It ..... (not rain) now.
A. does not rain B. did not rain
C. has not rained D. is not raining

15. I ..... (not yet give) up hope.
A. have not yet given B. do not yet given
C. did not yet give D. am not giving

16. If you ..... (be) hungry, you can eat.
A. being B. are
C. have been D. will be

17. The earth ..... (move) round the sun.
A. is moving B. has been moving
C. moves D. moving

18. The sun ..... (rise) in the east and ..... (set) in the west.
A. rising, is setting
B. rises, sets
C. rising, setting
D. has been rising, has been setting

19. He ..... (suffer) from malaria since day before yesterday.

A. has been suffering
B. have been suffering
C. suffers
D. is suffering

20. It ..... (rain) all the year round here.
A. has rained B. is raining
C. rains D. has been raining

Directions (Qs. 21-25): *Fill in the blanks with correct future tense forms of the verbs given in brackets.*

21. I don't think we ..... (meet) again.
A. are meeting B. will be meeting
C. will meet D. can meet

22. He ..... (be) here early next month.
A. was B. has been
C. had been D. will be

23. If I go to school late, the teacher ..... (punish) me.
A. is punishing B. punishing
C. will punish D. shall punish

24. If you study hard, you ..... (get) a first class.
A. are getting B. will get
C. will be getting D. shall get

25. He ..... (leave) for Shri Nagar next week.
A. will leave B. shall leave
C. going to leave D. will be leaving

Directions (Qs. 26-35): *Fill in the blanks with correct past tense forms of the verbs given in brackets.*

26. He ..... (buy) a car one month ago.
A. bought B. has bought
C. has been buying D. had been buying

27. She ..... (leave) for Jammu yesterday.
A. leaves B. is leaving
C. has been leaving D. left

28. He ..... (teach) in this college for five years.
A. teaches B. is teaching
C. taught D. has been teaching

29. I ..... (write) to her last week.
A. wrote
B. have been writing
C. had been writing
D. written

30. He ..... (be) weak in English in the beginning.
A. being B. been
C. was D. had been

31. People ..... (vote) them out in the recent elections.
A. were voting B. have been voting
C. voted D. have voted

32. I ..... (have) my breakfast at 8.30 a.m. yesterday.
A. am having B. was having
C. will be having D. have been doing

33. I ..... (write) a letter when she knocked at the door.
A. wrote B. had writing
C. have written D. was writing

34. We ..... (bathe) in the river when it was raining.
A. were bathing B. have been bathing
C. are bathing D. did bath

35. He ..... (watch) television when I came in.
A. watched B. was watching
C. had watched D. has been watching

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	C	B	B	C	B	C	A	C	D
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	A	C	D	A	B	C	B	A	A
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	D	C	B	A	A	D	C	A	C
31	**32**	**33**	**34**	**35**					
C	B	D	A	B					

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5 Comprehension Passages

In the English language paper, questions on comprehension test are very important for the students appearing in the competitive examinations.

Comprehension means the act of comprehending or the capacity of the mind to understand. In the examination papers, questions on comprehension test are included to judge the ability of the examinees to understand the given passage.

Therefore, you should understand how to solve these questions. Practice of solving these questions will greatly help you in the examination.

Multiple Choice Questions

Directions: *Read the following passages carefully and answer the questions given after each passage. Out of the four alternatives, choose the correct answer according to the context of the passage.*

PASSAGE-1

Courage is not only the basis of all virtue; it is its expression. Faith, hope, charity and all the rest don't become virtues until it takes courage to exercise them. There are roughly two types of courage. The first, an emotional state which urges a man to risk injury or death, is physical courage. The second, a more reasoning attitude which enables him to take coolly his career, happiness, his whole future, or his judgement of what he thinks either right or worthwhile, is moral courage.

I have known many men, who had marked physical courage, but lacked moral courage. Some of them were in high places, but they failed to be great in themselves because they lacked moral courage. On the other hand, I have seen men who undoubtedly possessed moral courage but were very cautious about taking physical risks. But I have never met a man with moral courage who couldn't, when it was really necessary, face a situation boldly.

1. All virtues become meaningful because of:
A. faith B. charity
C. courage D. hope

2. Physical courage is an expression of:
A. emotions B. deliberation
C. uncertainty D. defiance

3. People with physical courage often lack:
A. mental balance
B. capacity for reasoning
C. emotional stability
D. will to fight

4. A man with moral courage can:
A. defy his enemies
B. overcome all difficulties

C. face a situation boldly
D. be very pragmatic

5. A man of courage is:
A. cunning B. intelligent
C. curious D. careful

PASSAGE-2

With human beings the world ever ensnared by the performance of mechanical tasks and the pursuit of equally mechanical distractions, the time is not distant when nothing but the most abominable entertainments will succeed in steering them. If it happens so, the present civilisation will emerge as a mere imitation of the Roman in which the Romans desired more gladiators, tightrope walking elephants and fantastically rare animals to be slaughtered. This is one danger which is likely to cut at the roots of the modern civilisation because it threatens the existence of mental activities.

I would prefer to be bored by an eight hour job in an office or writing streams of words of journalism rather than be amused by the monotony of modern pleasures. It is the lack of participation which is the most damaging aspect of modern pleasures. This organised distraction combines within itself the performance of movies, gramophones, radios and the press which go a long way in killing the residue of initiative or sense of participation. Even in the case of newspapers, no mental effort is required on the part of the readers as the contents are presented in such a cut and dried manner that one need not undergo the fatigue of a single thought. Consequently for years together men continue scanning newspapers and magazines by merely moving their eyes.

If idealists failed to stem the rot, in future, pleasures will take on incredibly monstrous shape.

1. The writer feels that human activities and distractions are:
A. logical B. interesting
C. intellectual D. mechanical

2. According to the passage, entertainments:
A. relieve a man
B. are badly needed
C. threaten the existence of mental activities
D. are useless

3. The writer prefers:
A. modern pleasures to office work
B. modern pleasures to journalism
C. neither journalism nor office work
D. journalism and office work to modern pleasures

4. Modern pleasures, according to the writer:
A. are indispensable
B. are useless because they don't amuse men
C. cripple the sense of participation
D. do not make men take the initiative

5. Which of the following is correct?
A. The author says that reading newspapers is bad
B. Mental effort is not required in reading newspapers
C. We should imitate Romans
D. We should slaughter animals

PASSAGE-3

Life is a struggle. "We live in deeds and not in years." If we rest, we rust. If we work, we shine like jewels. Adventures are the essence of life but action also entails contemplation. Proper action needs the proper initiative. Napoleon took the wrong initiative and brought the downfall of France. Proper action is always taken by the wise persons. The wise persons always foreshadow the hardships for executing a policy. They become passive when they forecast that their efforts are at stake. All great leaders and diplomats take the steps keeping in view their reputation.

We should strike when the iron is hot. Some persons take the steps haphazardly with the result that they lose the opportunity and thus they are treated as fools. Angels are wise people and very particular about their action. It has been the aim of all philosophers to understand the world. After understanding, they move very gradually and not like fools who plunge into the situation without contemplation. Mr. Ayub Khan under Bhutto's

influence plunged into war with India inflicting destruction to humanity. Our ex-Prime Minister Lal Bahadur Shastri gauged the situation. He responded to the challenge of Pakistan and won the battle. Fools always meddle with the situation without bringing about any change but wise persons penetrate into the matter and take the appropriate action.

1. According to the writer:
   A. Napoleon acted wisely
   B. we may rust like iron
   C. we may shine like metals
   D. leaders and diplomats act keeping in view their reputation

2. Some people are treated as fools because:
   A. they act haphazardly
   B. they strike when the iron is hot
   C. they act like philosophers
   D. all of the above

3. Mr. Ayub Khan was:
   A. wise to decalre war against India
   B. foolish to disobey Bhutto
   C. not wise in declaring war against India
   D. none of the above

4. What is the aim of the philosopher?
   A. To act like angels
   B. To act like Ayub Khan
   C. To act like Bhutto
   D. To understand the world

5. The passage implies that:
   A. one should act quickly
   B. understanding should precede action
   C. fools penetrate into the matter
   D. none of the above

PASSAGE-4

Every genius that comes to the world, achieves greatness through the capacity of taking trouble. All great men of the world who have achieved impossible things in their lifetime have undergone hardships, sacrifices, trials and tribulations. There is no easy victory over failure. No hard achievement is smooth and easy. History of great men reminds us that with strong determination man can achieve anything he may set his mind upon, however impossible it may seem apparently.

A man with determination and iron will can defeat all hurdles in the way of his mission. Even the most intelligent people suffer in life if they cannot cope with their circumstances and labour hard to achieve the goal of their life. A genius who is fired with real zeal and determination to achieve his ideal comes to possess the necessary capacity to bear the hardships, cross the hurdles and achieve the final victory. Genius and hard work go together to bring the desired results. The stage of greatness comes after many stages of frustration and disappointment. The weaker man gives way to those frustrations but the genius perseveres and holds on to their mission until they achieve the object of their life.

1. The writer feels that victory over failure:
   A. is not possible
   B. is not good
   C. is absolute
   D. is not easy

2. According to the passage genius implies:
   A. failing again and again
   B. capacity of taking trouble and hardship
   C. stages of frustration and disappointment
   D. escape from hardship

3. Which of the following is correct?
   A. Only dull people should work hard
   B. Intelligent people need not labour hard
   C. Even intelligent people have to cope with circumstances
   D. None of the above

4. It can be inferred that:
   A. genius and hard work go together
   B. genius and hard work are opposed to each other
   C. genius and hard work end in frustration
   D. all of the above

5. A man can defeat all hurdles by:
   A. coping with all situations
   B. strong determination and iron will
   C. becoming strong
   D. becoming tall

PASSAGE-5

It is said that wars are fought for the sake of peace. Many a politician justifies wars as being the means of bringing about stability in the international relations. So far as the aim of those who are always busy in society is concerned, their motive is not always to achieve freedom from work. Their ultimate purpose is not to be idle. To be busy is a mode of life or habit. Those who are busy in society, say, businessmen, or people in authority, politicians or statesmen, officials or employees, are all part of the continuous machine which keeps the society going.

People are busy so that different activities of a society are carried out and the wherewithals which mankind badly needs are provided. No society, however, prosperous and endowed with bounties of nature, can afford to have the objective of being idle in the long run. No doubt, advanced countries ensured minimum facilities of living and amenities of work for their workmen; they even fix their working hours so that after their busy day's life they can have some leisure at their disposal for self development or peace of mind. Yet, with the passage of time a busy society has the tendency to become busier. Even with the best computers and automations at the disposal of the modern technocrats manpower continues to remain busy, as one phase of achievement leads automatically to the second phase of work. War may have the intention of peace but business is unending so long as a society has the objective of progress and does not become stationary or stagnant or decadent.

1. According to the passage, busy people:
- A. want freedom from work
- B. want to be idle
- C. do not like rest
- D. are part of a machine which runs society

2. Why are people busy?
- A. to carry out different activities of society
- B. to provide needs of mankind
- C. both A and B
- D. none of the above

3. Author says that:
- A. no society can be idle
- B. developed countries can be idle
- C. underdeveloped countries can be idle
- D. all of the above

4. Computers and automations:
- A. have made man idle
- B. could not relieve man from busy life
- C. both of the above
- D. none of the above

5. With the passage of time man is becoming busier because:
- A. he likes to be busy
- B. he is born to be busy
- C. to be busy is mode of life or habit
- D. all of the above

PASSAGE-6

The history of civilization shows how man always has to choose between making the right and wrong use of the discoveries of science. This has never been more true than in our own age. In a brief period amazing discoveries have been made and applied to practical purpose.

It would be ungrateful not to recognize how immense are the boons, which science has given to mankind. It has brought within the reach of multitudes benefits and advantages which only a short time ago were the privilege of the few. It has shown how malnutrition, hunger and disease can be overcome. It has not only lengthened life but has deepened its quality also. Fields of knowledge, experience and recreation open in the past only for a few, have been thrown open to millions. Through the work of science the ordinary man today has been given the opportunity of a longer and fuller life than was ever possible to his grandparents.

1. Amazing discoveries of science have been made:
- A. in a brief period
- B. in a long period
- C. in our forefather's age
- D. in centuries

2. The boons of science are:
- A. few
- B. found nowhere
- C. immense
- D. very few

3. Which of the following can be overcome with the help of science?
A. Malnutrition B. Disease
C. Hunger D. All of these

4. Science provides a chance of:
A. shorter and fuller life
B. longer and fuller life
C. longer and dull life
D. none of these

5. What on the whole, has science done to mankind?
A. It has reduced the quality of our life
B. It has shortened our life
C. It has deepened the quality of life
D. It has done a great harm to mankind

PASSAGE-7

Each nation has its own peculiar character which distinguishes it from others. But the peoples of the world have more points in which they are all like each other than points in which they are different. One type of person that is common in every country is the one who always tries to do as little as he possibly can and to get as much in return as he can. His opposite, the man who is in the habit of doing more than is strictly necessary and is ready to accept what is offered in return, is rare everywhere.

Both these types are usually unconscious of their character. The man who avoids effort is always talking about his 'rights'; he appears to think that society owes him a pleasant easy life. The man who is always doing more than his sheer talks of 'duties' feels that the individual is in debt to society, and not society to the individual. As a result of their view, neither of these men thinks that he behaves at all strangely.

1. What type of person is common in every nation?
A. A person who wants to do little and get more
B. A person who wants to do more and get little
C. Each person is different
D. There is no such type of person that is common in every country

2. A person doing more and getting little:
A. is rare everywhere
B. is found in our country
C. is common in all countries
D. is found nowhere

3. The man who talks about his 'rights':
A. avoids meeting other people
B. avoids hard work
C. knows his duties well
D. believes in hard work

4. The man who talks of 'duties':
A. is always hard working
B. avoids hard work
C. does not know his duties well
D. always thinks of his 'right' first

5. Which one of the following thinks that the individual is in debt to the society?
A. a person who talks of his 'rights only'
B. a person who is always doing more than his sheer talks of 'duties'
C. every citizen of the country
D. a person who talks of his 'duties' only

PASSAGE-8

English education, which was introduced in India in the earlier part of the nineteenth century, established her cultural contact with the West. Prior to this, India had for centuries remained in a state of isolation, although in very early times she had sent out cultural missions to the other Asiatic countries. India really began to borrow from the West and assimilate new ideas on an extensive scale only after the British had taken up the direction of her educational policy.

It is true that Western education at first exerted an unsettling influence on young men and led to errors in life and conduct. They hated everything Indian, aped Western manners and modes of life, and forgot their glorious past. There were scholars who ignored modern Indian languages, avoided classical Indian literature, and made a fetish of speaking and writing English.

1. When was English education introduced in India?

A. in the twentieth century
B. in the later part of the nineteenth century
C. in the earlier part of the nineteenth century
D. in the eighteenth century

2. When did India begin to borrow from the West?
A. after the British had taken up the direction of her educational policy
B. before the British had taken up the direction of her educational policy
C. in the twentieth century
D. none of the above is correct

3. What did India send out to other Asiatic countries?
A. economic mission B. military forces
C. cultural missions D. none of these

4. Western education exerted an unsettling influence on:
A. old men B. young men
C. old women D. children

5. Young men forgot their:
A. glorious past B. present
C. future D. originality

PASSAGE-9

The purpose of education is to make the student an expert in his subject. This must be clearly understood, and mere muddling through lessons and lectures and books and passing examination are relegated to secondary importance as means to the end—which is excellence in the field choosen.

But there are so many fields, and no man can become an expert in all the fields. It is necessary to decide which fields are the important ones that a man should know well.

It is clear that one's own work is the most important. This has been realised and modern civilization has accordingly provided vocational education. It is now possible to acquire high professional skill in the various fields, medicine, engineering, production, commerce and so on—but with good and bad mixed together, and no standard for guidance.

1. The purpose of education is to make the student:
A. an expert in all fields
B. an expert in his subject
C. only capable of earning
D. confident only

2. What, according to the writer, is the end?
A. excellence in the field choosen
B. passing the examination
C. earning more and more money
D. cramming lectures and books

3. According to the passage, can a man become an expert in all fields?
A. Yes B. Partially yes
C. Sometimes D. No

4. According to the writer, which of the following is the most important work?
A. someone else's work
B. one's own work
C. nobody's work
D. everyone's work

5. The modern civilization has provided:
A. vocational education
B. art of conversation
C. adult education
D. higher education

PASSAGE-10

What are the good parts of our civilization? First and foremost there are order and safety. If today I have a quarrel with another man, I do not get beaten merely because I am physically weaker and he can knock me down. I go to law and the law will decide as fairly as it can between the two of us. Thus in disputes between man and man. Right has taken the place of might. Moreover, the law protects me from robbery and violence. Nobody may come and break into my house, steal my books or run off with my children. Of course, there are burglars, but they are very rare and the law punishes them whenever, it catches them.

It is difficult for us to realize how much this safety means. Without safety those higher activities of mankind which make up civilization could not

go on. The inventor could not invent, the scientist find out or the artist make beautiful things. Hence, order and safety, although they are not themselves civilization, are things without which civilization could be impossible. They are as necessary to our civilization as the air we breathe is to us; and we have grown so used to them that we do not notice them any more than we notice the air.

1. The first and foremost good parts of civilization are:
   A. order and insecurity
   B. only insecurity
   C. order and safety
   D. insecurity and lawlessness

2. In disputes between man and man:
   A. right has taken the place of might
   B. might has taken the place of right
   C. might is right
   D. none of the above

3. According to the passage, the burglars are:
   A. many B. rare
   C. found nowhere D. not punished

4. An artist can create beautiful things only if:
   A. there is disorder
   B. there is no safety
   C. there is safety
   D. there is neither safety nor order

5. According to the writer, man does not notice order and safety as:
   A. he does not notice the air he breathes
   B. he does not notice the food he eats
   C. he does not notice the shelter he needs
   D. none of the above is correct

PASSAGE-11

This is the age of the machine. Machines are everywhere, in the fields, in the factory, at home, in the street, in the city, in the country, everywhere. To fly, it is not necessary to have wings; there are machines. To swim under the sea, it is not necessary to have gills; there are machines. To kill our fellowmen in overwhelming numbers, there are machines. Petrol driven machines alone provide ten times more power than all human beings in the world. In the busiest countries, each individual has fixed hundreds human slaves in his machines.

What are the consequences of this abnormal power? Before the War, it looked as though it might be possible, for the first time in history to provide food and clothing and shelter for the teeming population of the world—every man, woman and child. This would have been the greatest triumphs of science. And yet, if you remember, we saw the world crammed, full of food and people hungry. Today, the larders are bare and millions, starving. That's the war, you would say. When the machines of peace once more begin to hum, will we see more and more food and less people hungry? For what's the way of science and machine age — it produces the goods, it makes the goods but ignores the consequences.

1. According to the passage, which of the following is not necessary to fly?
   A. Wings B. Arms
   C. Feet D. Machines

2. Petrol machinery is used to provide:
   A. ten times more power than human beings in the world
   B. less power than human beings in the world
   C. as much power as human beings in the world
   D. none of the above is correct

3. What could be one of the greatest triumphs of science?
   A. to provide food, clothing and shelter to everyone
   B. none would get food, clothing and shelter
   C. only rich people would get food, clothing and shelter
   D. people would get only clothing

4. This is the age of the:
   A. machine B. animal husbandry
   C. agriculture D. wars

5. The machine age produces:
   A. goods
   B. food
   C. goods but avoids the consequences
   D. none of the above

ANSWERS

PASSAGE-1

1	2	3	4	5
C	A	B	C	D

PASSAGE-2

1	2	3	4	5
D	C	D	C	B

PASSAGE-3

1	2	3	4	5
D	A	C	D	B

PASSAGE-4

1	2	3	4	5
D	B	C	A	B

PASSAGE-5

1	2	3	4	5
D	C	A	B	C

PASSAGE-6

1	2	3	4	5
A	C	D	B	C

PASSAGE-7

1	2	3	4	5
A	A	B	A	C

PASSAGE-8

1	2	3	4	5
C	A	C	B	A

PASSAGE-9

1	2	3	4	5
B	A	D	B	A

PASSAGE-10

1	2	3	4	5
C	A	B	C	A

PASSAGE-11

1	2	3	4	5
A	A	A	A	C

❑❑❑

6 Cloze Test

A cloze test is a procedure in which a person is asked to supply words that have been removed from a passage as a test of his ability to comprehend text. Practise it regularly to score well.

PASSAGES

Directions: *In each of the following passages some numbered blank spaces are given. For each numbered blank space four answer choices are given. Pick out the one which is the most appropriate for that blank space, keeping the trend of the passage in mind.*

Passage-1

Mankind's most ....(1).... treasure of thoughts is carefully preserved in the golden casket of books. The ....(2).... of books is as vast as the universe, for there is no corner of it which they have left ....(3).... . There is no ....(4).... of books on any topic, be it as simple as the composition of sodium nitrate or as ....(5).... as the mechanism of a spacecraft rocketing towards Mars. The ....(6).... of books is not only most easily available but is enlightened, dependable and lifelong. In times of distress they make us stoically ....(7).... of the object that causes uneasiness and we learn to ....(8).... with the sting of adversity.

Questions

1. A. costly B. important C. valuable D. vast

2. A. area B. scope C. storage D. kingdom

3. A. unexplored B. unseen C. untouched D. unapproached

4. A. lack B. dearth C. shortage D. insufficiency

5. A. extricate B. intricate C. intrinsic D. internecine

6. A. company B. assistance C. friendship D. companionship

7. A. defiant B. defendant C. defensible D. delusive

8. A. adapt B. adopt C. exist D. co-exist

Passage-2

Though the government has tried to ....(1).... Naxalism with all its might, much more needs to be done to totally root out the ....(2).... of Naxalism. The roots of Naxalism ....(3).... economic backwardness and social exploitation of the peasants and the weaker classes. Thus, the best way to ....(4).... Naxalism is to bring the naxals ....(5).... the mainstream. ....(6).... policies and schemes should be implemented effectively ....(7).... the Naxals economically stable. They should be ....(8).... to participate in democratic processes. The government has to ....(9).... the social upliftment of the Naxals. Use of force in ....(10).... Naxalism will yield little success.

Questions

1. A. crush B. handle C. tackle D. suppress

2. A. menace B. whole C. gamut D. stems

3. A. lies in B. are in C. abound in D. exist in

4. A. crash B. crush C. break D. defy

5. A. in B. on C. into D. within

6. A. Current B. Latest C. Occurring D. Existing

7. A. so that B. so as to make C. such that D. to make

8. A. insisted B. brought C. encouraged D. forced

9. A. assure B. insure C. guarantee D. ensure

10. A. countering B. defying C. banishing D. desecrating

Passage-3

We are living in very exciting ....(1).... . The ....(2).... change is dizzying and the impact this progress is having on our present and — more importantly — on our future is difficult to ....(3).... in its ...(4).... . This is the age of ....(5).... micro-processors, sophisticated software, new hardware technology and high bandwidth, high-speed networks. The PC gave us a new way to work, play and ....(6).... . In fact, it brought ....(7).... our desktops computing power, which until a few years ....(8).... had only been available to corporates. With the ....(9).... of the internet, the PC ....(10).... us the most convenient and flexible way to head on to the Net.

Questions

1. A. periods B. days C. phase D. times

2. A. phase B. pace C. sphere D. drastic

3. A. guess B. forecast C. comprehend D. approximate

4. A. whole B. entirety C. fruition D. fullness

5. A. strong B. changing C. powerful D. sonorous

6. A. convey B. communicate C. entertain D. enjoy

7. A. onto B. to C. on D. at

8. A. back B. earlier C. behind D. before

9. A. addendum B. adherence C. afoot D. advent

10. A. allowed B. privileged C. brought D. offered

Passage-4

What is required today in our country is ....(1).... of a new political culture based on full respect for human liberty, on pluralism and on a better social deal for all. The major ....(2).... facing us today is to carry out democratic transformation in all the ....(3)...., social, cultural, economic and political. The events of the 20th century ....(4).... one thing absolutely clear that human ....(5)...., everywhere, specially in countries whose political structures were ....(6).... to reflect the revolutionary aspirations of the people ....(7).... not only under stress and strain but are ....(8).... vast upheavals because of the ....(9).... of democracy. At the same time it has also to be understood that democracy cannot be ....(10).... into a static mould.

Questions

1. A. growing B. developing C. creating D. creation

2. A. development B. crisis C. challenge D. drawback

3. A. corners B. context C. realm D. spheres

4. A. have made B. has made C. had made D. made

5. A. travails B. traverse
C. traps D. transverse

6. A. supposed B. meant
C. caused D. forced

7. A. were B. was
C. are D. have been

8. A. developing B. evolving
C. experiencing D. faced with

9. A. denial B. rebuff
C. rebuttal D. absence

10. A. shaped B. flex
C. frozen D. caused

Passage-5

For centuries, women not only in India but all over the world ....(1).... treated as ....(2).... secondary position to men. ....(3).... human history men ....(4).... far greater power then women to name, classify, and order the worlds in which they both live. ....(5).... studies in various parts of the world point out to a wide ....(6).... in male and female roles ....(7).... cultures and demonstrate the possibility of change in these sex-determined roles. The 20th century in particular ....(8).... the cause of gender justice by internationalizing struggles for equality ....(9).... women and other oppressed people. Women's struggles against their ....(10).... were intertwined in ....(11).... degrees with ideologies and movements based on the values of freedom, self-determination, equality, democracy and justice.

Questions

1. A. has been B. have been
C. had been D. were

2. A. occupying B. taking
C. possessing D. serving

3. A. All through B. Throughout
C. Since D. From

4. A. have B. had
C. have had D. enjoy

5. A. Sociological B. Anthropological
C. General D. Practical

6. A. concord B. repulsion
C. disagreement D. variation

7. A. among B. across
C. between D. of

8. A. developed B. evolved
C. promoted D. entertained

9. A. for B. to
C. among D. by

10. A. subsidiary B. subsequent
C. subservience D. subordination

11. A. various B. varying
C changing D. differing

Passage-6

Visualisation is a strong ....(1).... to memory. Those persons who .....(2)..... a powerful memory cannot do so without taking the help of visualisation. Such persons have developed the skills to ....(3).... visualisation even in such ....(4).... tasks as remembering names and numbers. These persons have the names and numbers ....(5).... in their brain even after hearing those names and figures only once. On the other hand those who take the help of revising to memorise ....(6).... to forget it once they have ....(7).... the practice of revising ....(8).... the ones who have applied visualisation to memorise. Psychologists ....(9).... in visualisation a powerful tool for personality development. The more you visualise, the more you are ....(10).... your attitude and behaviour to the blue prints of your vision and ....(11).... more you are inching towards success.

Questions

1. A. way B. path
C. aid D. symptom

2. A. command B. master
C. rule D. enjoy

3. A. use B. apply
C. put D. place

4. A. trivial B. difficult
C. mundane D. unscrupulous

5. A. impress B. imprinted
C. impinge D. store

6. A. bent B. incline
C. prone d. tend

7. A. dropped B. left
C. gave up D. given up

8. A. unlike B. opposite
C. contrary D. not like

9. A. found B. have found
C. sees D. finds

10. A. shaping B. moulding
C. making D. attuning

11. A. actually B. factually
C. subsequently D. consequently

Passage-7

The development of an area depends on the resources ....(1).... in the area, the needs and ....(2).... of the people living there and the technological skill ....(3).... by them. Humans play an important and decisive role in the ....(4).... of development of an area. We choose the ....(5).... of resources which could be developed to our ....(6).... . The natural ....(7).... available in an area ....(8).... value as a resource only when people find a use for them. There are ....(9).... where large potential resources are available, but they ....(10).... developed for economic reasons. Lack of capital for investments, roads and railway lines, and other ....(11).... facilities may stand in the way of resource development.

Questions

1. A. present B. prevalent
C. available D. exist

2. A. inspirations B. aspirations
C. ambitions D. curiosity

3. A. handled B. practised
C. availed D. possessed

4. A. system B. design
C. pattern D. style

5. A. class B. group
C. variety D. types

6. A. good B. advantage
C. approach D. favour

7. A. secrets B. phenomenon
C. products D. endowments

8. A. get B. acquire
C. possess D. takes

9. A. instances B. events
C. circumstances D. happenings

10. A. have not yet been
B. haven't been
C. are not yet
D. yet have not been

11. A. common B. general
C. infrastructural D. structural

Passage-8

The Naxal problem in India is basically socio-economic in ....(1).... . The main reasons ....(2).... the Naxal movement in India are the ....(3).... of peasants and their weak social and economic position. ....(4).... of the peasants are landless labourers whose lands have been ....(5).... occupied by the landlords. Moreover, the landlords give ....(6).... wages to the peasants. Their ....(7).... suffering at the hands of the landlords thus encourage many peasants to take law ....(8).... their own hands. Due to their poor economic condition the peasants easily ....(9).... the trap of the naxal leaders who have their ....(10).... interests. Illiteracy, unemployment, police excesses, corruption and ....(11).... administration further ....(12).... this complex problem.

Questions

1. A. form B. shape
C. behaviour D. nature

2. A. for B. of
C. in D. behind

3. A. complaisance B. exploitation
C. domination D. exculpation

4. A. Many B. Much
C. Most D. All

5. A. imperiously B. imperatively
C. forcefully D. forcibly

6. A. improper B. small
C. inadequate D. insufficient

7. A. long B. brutal
C. pathetic D. great

8. A. in B. into
C. on D. by

9. A. fall into B. fall in
C. fell in D. fell into

10. A. selfish B. vested
C. vicious D. vindictive

11. A. failed B. improper
C. inefficient D. bureaucratic

12. A. heighten B. deepen
C. add D. worsen

Passage-9

No doubt various ....(1).... and Acts are there to eliminate the ....(2).... practice of child labour. But the ....(3).... is that, these are not being implemented in both letter and spirit, for which the ....(4).... of the problem remains as it was. Therefore a judicious, pragmatic, integrated and time-bound ....(5).... supplemented by ....(6).... follow-up action is essential to ....(7).... the problem that ....(8).... deep root in our Society. It is true that child labour can't be ....(9)... with a magic wand. If we ....(10).... time-bound goals and follow, of course, with the ....(11).... assistance of ILO and UNICEF, it is possible to eliminate the problem of child labour. With strong political will power and people's backing nothing is ....(12).... . Rather ....(13).... the bud we should let it blossom and spread its fragrance all around. ....(14).... lies the progress and prosperity of the society.

Questions

1. A. means B. methods
C. source D. provisions

2. A. unjust B. inhuman
C. mal D. illegal

3. A. anxiety B. abrasion
C. tragedy D. conclusion

4. A. magnitude B. depth
C. gravity D. soaring

5. A. approach B. analysis
C. survey D. scheme

6. A. continuous B. thorough
C. throughout D. regular

7. A. outroot B. uproot
C. downroot D. grassroot

8. A. have B. has
C. had D. has taken

9. A. wipe out B. wipe off
C. wipe up D. wiped

10. A. keep B. put
C. put up D. set

11. A. ongoing B. continuing
C. unending D. frequent

12. A. insurmountable B. intangible
C. inscrutable D. incorrigible

13. A. killing B. hurting
C. destroying D. nipping

14. A. Here B. There
C. Therein D. Herein

Passage-10

Every action we perform ....(1).... a result. And, naturally, we lay claim ....(2).... the results or fruits ....(3).... from that action in the ....(4).... that it is we who perform the action. This is .....(5).... ignorance because ....(6).... is it the Lord who ....(7).... the result of any action, it is by His will ....(8).... that even the action is accomplished. The will of the Lord ....(9).... whether we cooperate with His will or strive ....(10).... . If God wills that an action takes place, he arranges for the ....(11).... for it to happen. It is ....(12).... experience that sometimes despite our best efforts we ....(13).... achieve the results we desire, and at other times the seemingly most ....(14).... situations mysteriously get ....(15).... . ....(16).... way man chooses to act, both the act and the outcome of the cost are dependent ....(17).... on the will of the Lord.

Questions

1. A. produce B. produces
C. causes D. undergoes

2. A. on B. at
C. to D. for

3. A. occurring B. obtaining
C. deriving D. falling

4. A. belief B. hope
C. fantasy D. folly

5. A. sheen B. keen
C. sheer D. sheathe

6. A. alone B. only that
C. not only D. for only

7. A. declares B. decides
C. ordains D. ornate

8. A. completely B. entirely
C. only D. alone

9. A. prevails always
B. prevails everywhere
C. is prevalent
D. always prevails

10. A. alone B. always
C. constantly D. independently

11. A. wherewithal B. whereabouts
C. whatsoever D. wherefore

12. A. usual B. general
C. universal D. common

13. A. does not B. may not
C. do not D. might not

14. A. intractable B. intangible
C. internecine D. intricate

15. A. subsided B. resolved
C. solved D. converted

16. A. Whatever B. All the
C. All those D. Whichever

17. A. mainly B. actually
C. entirely D. generally

ANSWERS

PASSAGE-1

1	2	3	4	5	6
C	D	A	B	B	D
7	**8**				
A	D				

PASSAGE-2

1	2	3	4	5	6
C	A	A	B	C	D
7	**8**	**9**	**10**		
B	C	D	A		

PASSAGE-3

1	2	3	4	5	6
D	B	C	B	C	B
7	**8**	**9**	**10**		
A	D	D	D		

PASSAGE-4

1	2	3	4	5	6
D	C	D	A	A	B
7	**8**	**9**	**10**		
C	C	A	C		

PASSAGE-5

1	2	3	4	5	6
B	A	B	C	B	D
7	**8**	**9**	**10**	**11**	
B	C	D	D	B	

PASSAGE-6

1	2	3	4	5	6
C	A	B	C	B	D
7	**8**	**9**	**10**	**11**	
A	A	B	D	D	

PASSAGE-7

1	2	3	4	5	6
C	B	D	C	D	B
7	**8**	**9**	**10**	**11**	
D	B	A	A	C	

PASSAGE-8

1	2	3	4	5	6
D	A	B	C	D	C
7	**8**	**9**	**10**	**11**	**12**
A	B	A	B	C	D

PASSAGE-9

1	2	3	4	5	6
D	B	C	A	A	D
7	**8**	**9**	**10**	**11**	**12**
B	D	B	D	B	A
13	**14**				
D	C				

PASSAGE-10

1	2	3	4	5	6
B	C	B	A	C	C
7	**8**	**9**	**10**	**11**	**12**
C	D	D	D	A	D
13	**14**	**15**	**16**	**17**	
C	A	B	D	C	

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7 Determiners

Determiners are actually Adjectives. They are always followed by nouns.

Determiners are of the following kinds:

1. Demonstrative Determiners

e.g., this, that, these, those

2. Possessive Determiners

e.g., my, our, your, his, her, its, their

3. Quantitative Determiners

e.g., some, any, much, enough, sufficient, whole, a little, the little, little, all, both

4. Numerical Determiners

e.g., a few, some, few, the few, any, several, many, no, etc.

One, two, three ... (Cardinals)

First, second, third ... (Ordinals)

5. Distributive Determiners

e.g., either, neither

6. Articles

Indefinite: a, an

Definite: the

Multiple Choice Questions

Directions: *In the following questions choose the correct options to fill the blanks.*

1. Give me ..... rice.
A. some B. few
C. a few D. any

2. ..... sheep grazing on the slope of the hill had gone away.
A. Any B. The few
C. This D. Much

3. Have you got ..... magazines to read?
A. all B. much
C. some D. little

4. I have ..... money that I want to spend on shares.
A. any B. much
C. less D. some

5. There is ..... owl on the branch of the tree.
A. a B. the
C. an D. some

6. My brother is ..... MBA.
A. a B. an
C. the D. any

7. Have you got ..... cheese?
A. some B. many
C. a few D. few

8. No, I haven't got ..... cheese.
A. many B. few
C. any D. some

9. There is only ..... milk left in the bottle.
A. enough B. few
C. much D. a little

10. There is ..... hope of his recovery.
A. any B. little
C. many D. few

11. ..... dogs were barking at the strangers.
A. some B. any
C. much D. less

12. The girl bought her father ..... juice.
A. few B. some
C. any D. many

13. You should take ..... honey everyday.
A. any B. many
C. a little D. a few

14. ..... boy was punished by the teacher.
A. Either B. All
C. Any D. Many

15. ..... girl was asked to join the army.
A. None B. Neither
C. All D. Any

16. ..... water in the jug has been drunk by Mohan.
A. The little B. The few
C. A few D. Few

17. I shall play ..... piano at the party.
A. some B. any
C. the D. few

18. ..... labourers were found dead in the mine.
A. Any B. Fewer
C. Many D. Less

19. Could I borrow ..... umbrella?
A. our B. your
C. yours D. my

20. My brother is standing in the ..... row.
A. any B. many
C. some D. first

21. Do you want ..... tea?
A. any B. more
C. much D. few

22. He can fly ..... aeroplane.
A. a B. an
C. some D. many

23. ..... students were asked to bring their birth certificates.
A. Many B. Any
C. Much D. Less

24. ..... gun needs oiling.
A. It B. This
C. These D. Those

25. ..... shirts are mine.
A. These B. This
C. It D. That

26. ..... child was allowed to enter the kitchen.
A. The B. All
C. Many D. A few

27. I have been waiting for you for ..... hour.
A. a B. an
C. the D. a few

28. You must pay ..... visit to your brothers.
A. the B. an
C. a few D. a

29. Why are you making ..... noise?
A. your B. enough
C. a D. whole

30. He is ..... honourable man.
A. a B. the
C. an D. much

ANSWERS

1	2	3	4	5	6	7	8	9	10
A	B	C	D	C	B	A	C	D	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	B	C	A	B	A	C	C	B	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	B	A	B	A	A	B	D	C	C

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8 Spelling Errors

The most common errors in English are of spellings of words. Even the most learned men are sometimes confused about the correct spellings of some words. One must keep and use a dictionary religiously. Never ignore and let pass a new word casually.

A number of question to test your knowledge of spellings are compiled here. Try to solve as many as you can.

Multiple Choice Questions

Directions: *Find the correctly spelt word out of the four options in each question.*

1. A. Accompalish B. Ackmplesh C. Acomplush D. Accomplish

2. A. Acommodation B. Acomodation C. Accomodation D. Accommodation

3. A. Astonished B. Astronished C. Astoneshed D. Asstonished

4. A. Benefeted B. Benefitted C. Benifited D. Benefited

5. A. Belligerent B. Beligirent C. Belligarant D. Belligerrent

6. A. Chancelery B. Chancellery C. Chancellary D. Chancelary

7. A. Discriminate B. Discremineta C. Discrimenate D. Discriminat

8. A. Damage B. Dammage C. Damaige D. Dammege

9. A. Efficiant B. Effecient C. Efficient D. Eficient

10. A. Extravagant B. Extreragent C. Extreregant D. Extravegent

11. A. Efflorascence B. Eflorescene C. Effllorescence D. Efflorescence

12. A. Equinimity B. Equanimmity C. Equannimity D. Equanimity

13. A. Farmament B. Farmement C. Fermament D. Fremament

14. A. Grieff B. Grief C. Grieef D. Grrief

15. A. Guarantee B. Garuntee C. Guaruntee D. Gaurantee

16. A. Hypocritical B. Hypocretical C. Hypocriticel D. Hypocirticel

17. A. Humurous B. Humorous C. Humoreus D. Humorrous

18. A. Itenerary B. Itinarery C. Itinarary D. Itinerary

19. A. Indipenseble B. Indispansible C. Indispensable D. Indipensable

20. A. Imprecticability B. Impracticebility
C. Impracticibility D. Impracticability

21. A. Incradulous B. Incredulous
C. Incridulous D. Incredalous

22. A. Juddicious B. Judiceous
C. Judicious D. Judiceus

23. A. Kleptomonia B. Kleptemonia
C. Kleptomania D. Klaptomania

24. A. Lackdaisical B. Lackadaisical
C. Lckadaisicle D. Lackadisical

25. A. Licentious B. Licontious
C. Licenttious D. Licientious

26. A. Meddicine B. Medicine
C. Medicene D. Medicinne

27. A. Meritricious B. Merefrecious
C. Meretricious D. Merritricious

28. A. Missunderstood B. Miesunderstood
C. Misunderstood D. Misunderstod

29. A. Occurad B. Occurred
C. Ocurred D. Occured

30. A. Osttentatious B. Ostentetious
C. Ostentatious D. Ostenttatious

31. A. Obnosious B. Obnoxeous
C. Obnoxious D. Obnoseous

32. A. Omenous B. Ominous
C. Ommineous D. Omineous

33. A. Pecification B. Pacification
C. Pecifacation D. Pecefication

34. A. Prograssive B. Progressive
C. Progresive D. Prograsive

35. A. Pasiveness B. Passiveness
C. Passeveniss D. Passivines

36. A. Polyendry B. Poliendry
C. Pollyendry D. Polyandry

37. A. Puerille B. Puerrile
C. Puerile D. Purrile

38. A. Pesanger B. Passenger
C. Pessenger D. Pasanger

39. A. Querrelsome B. Quarrelsame
C. Quarrelsome D. Querralsome

40. A. Rigourous B. Rigerous
C. Rigorous D. Regerous

41. A. Survellance B. Surveilance
C. Surveillance D. Survaillance

42. A. Schedule B. Schdule
C. Schedale D. Schedeule

43. A. Sepalchrle B. Sepalchral
C. Sepulchrle D. Sepulchral

44. A. Sympathetic B. Smypathetic
C. Sympothetic D. Sympethetic

45. A. Sincerely B. Sencerely
C. Sincerelly D. Sincerrely

46. A. Satellite B. Sattellite
C. Satelite D. Sattelite

47. A. Teracherous B. Treacherous
C. Treacheraus D. Treachereans

48. A. Uncivilized B. Uncevilized
C. Uncivillized D. Uncevelized

49. A. Vainglorious B. Vaniglorious
C. Vaniglerious D. Vaingloreus

50. A. Vulnarable B. Valnerable
C. Velnerable D. Vulnerable

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	D	A	B	A	C	A	A	C	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
D	D	C	B	A	A	B	D	C	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	C	C	B	A	B	C	C	B	C
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
C	B	B	B	B	D	C	B	C	C
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
C	A	D	A	A	A	B	A	A	D

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9 Sentence Completion

Sentence completion or Filling the blanks is such an exercise that begins with the primary schools and continues at the highest level of competitive examinations. One must practise it regularly to score well.

Multiple Choice Questions

Directions: *In the following questions choose the correct options to fill in the blanks to complete the sentences.*

1. 'Please' and 'Thank you' are the little courtesies by which we keep the ..... of life oiled and running smoothly.
A. path B. machine
C. garden D. river

2. Catching the earlier train will give us the ..... to do some shopping.
A. chance B. luck
C. possibility D. occasion

3. Leave a two-inch ..... on each page for the teacher's remarks.
A. border B. margin
C. blank D. gap

4. What is the ..... for an airletter?
A. fare B. value
C. postage D. stamp

5. The manner in which bombs exploded in five trains within a short span of time suggests that it is a part of a ..... .
A. game B. conspiracy
C. villainy D. sabotage

6. Some regions of our country still remain ..... to the average man.
A. inaccessible B. impossible
C. impermeable D. impenetrable

7. The old 'Nature versus .....' debate regarding crime continues even today.
A. Man B. Universe
C. Culture D. Nurture

8. Known as devout and serious person, she also has ..... sense of humour.
A. better B. plentiful
C. quick D. good

9. The matter would have become serious if ..... action had not been taken.
A. hasty B. fast
C. timely D. unusual

10. The ..... with which he is able to yield the paint brush is really remarkable.
A. ease B. practice
C. majesty D. sweep

11. The speaker did not properly use the time as he went on ..... on one point alone.
A. devoting B. deliberating
C. diluting D. dilating

12. They decided to ..... down their original plans for the bigger house and make it smaller.
A. climb B. turn
C. scale D. play

13. Many of the advances of civilisation have been conceived by young people just on the ..... of adulthood.
A. boundary B. threshold
C. peak D. horizon

14. Sonika is quite intelligent but rather ..... .
A. idealistic B. generous
C. lazy D. optimistic

15. About twenty clerks were made ..... when the bank introduced computers.
A. dispensable B. redundant
C. expendable D. obsolete

16. To err is ..... to forgive divine.
A. beastly B. human
C. inhuman D. natural

17. God is ..... .
A. graceful B. gracious
C. grateful D. greatful

18. The victim tried to tell us what had happened but his ..... were not audible.
A. assailants B. sounds
C. letters D. words

19. The ..... between the twins is so slight that it is very difficult to identify one from the other.
A. similarity B. distance
C. resemblance D. difference

20. The members were ..... of the date of the meeting well in advance.
A. communicated B. conveyed
C. ignorant D. informed

21. A ..... of ships was kept ready to scour the sea in case of an emergency.
A. group B. pack
C. unit D. fleet

22. I had not expected to meet him; it was quite an ..... meeting.
A. organised B. intentional
C. undesirable D. accidental

23. The window of our room ..... the rear.
A. overlooks B. opens
C. opposes D. adjoins

24. I could ..... see the sight since it was dark.
A. clearly B. barely
C. obviously D. aptly

25. The top-ranking manager ..... his success in the profession to his Managing Director's guidance.
A. account B. agrees
C. attributes D. claims

26. Does your pride keep you ..... making the decision you know you should?
A. away B. alert
C. from D. quiet

27. Their ..... to scale the mountain peak was an absolute failure.
A. attempt B. desire
C. anxiety D. proposal

28. The writer, like a spider ..... a web; the creatures caught in the web have no substance, no reality.
A. spins B. catches
C. writes D. compiles

29. In a ..... move the Chief Minister today dropped two ministers from the cabinet.
A. secret B. delicate
C. continuous D. surprise

30. In his address to the teachers, the Vice-Chancellor ..... certain measures being taken for improving the quality of college education.
A. declined B. directed
C. advised D. highlighted

31. Changes in the legal system are inevitable for we are not working for a ..... society.
A. backward B. dynamic
C. stagnant D. modern

32. Modern science began ..... the influence of Copernicus, Kepler, Galileo and Newton.
A. by B. under
C. from D. upon

33. A meeting of senior police officers was held to ..... the law and order situation of the town.
A. review B. curb
C. cover D. support

34. The problems that India's economic development faces are ..... .
A. myopic B. dubious
C. enormous D. strong

35. In our zeal for progress we should not ..... the executive with more powers.
A. avoid B. arm
C. give D. enhance

36. At present, all over the world, moral standards, ... to have fallen.
A. look B. wish
C. started D. appear

37. He was one of the ..... spirits behind the successful agitation of the citizens for keeping the city clean.
A. revolving B. moving
C. evolving D. amazing

38. You've never ..... me about your experiences in Scotland.
A. described B. explained
C. told D. said

39. The student ..... that book from the library to study at home.
A. issued B. borrowed
C. hired D. lent

40. I wish I ..... a king.
A. was B. am
C. should be D. were

41. He ..... to listen to my arguments and walked away.
A. denied B. disliked
C. objected D. refused

42. The flow of blood was so ..... that the patient died.
A. intense B. adequate
C. profuse D. extensive

43. When I met her yesterday, it was the first time I ..... her since Christmas.
A. saw B. have seen
C. had seen D. have been seeing

44. Can you pay ..... all these articles?
A. for B. of
C. off D. out

45. He ..... the role of the organisation in creating environmental awareness among the people.
A. commanded B. commended
C. commented D. commemorated

46. I ..... you to be at the party this evening.
A. expect B. hope
C. look forward to D. desire

47. The consequence of economic growth has now ..... to the lowest level.
A. flowed B. percolated
C. gone D. crept

48. The employees were unhappy because their salary was not increased ..... .
A. marginally B. abruptly
C. substantially D. superfluously

49. ..... the being a handicapped person, he is very co-operative and self-reliant.
A. Because B. Although
C. Since D. Despite

50. The child broke ..... from his mother and ran towards the painting.
A. away B. after
C. down D. with

51. With his ..... income, he finds it difficult to live a comfortable life.
A. brief B. sufficient
C. meagre D. huge

52. He could ..... a lot of money in such a short time by using his intelligence and working hard.
A. spend B. spoil
C. exchange D. accumulate

53. Though the brothers are twins, they look ..... .
A. alike B. handsome
C. indifferent D. different

54. Unfavourable weather conditions can ..... illness.
A. cure B. detect
C. treat D. enhance

55. No sooner did the bell ring, ... the actor started singing.
A. when B. than
C. after D. before

56. If I ..... realised it, I would not have acted on his advice.
A. was B. had
C. were D. have

57. Why don't you ..... your work in advance before commencing it.
A. start B. complete
C. finish D. plan

58. Contemporary economic development differs ..... from the Industrial Revolution of the 19th century.
A. usually B. specially
C. literally D. markedly

59. Mounting unemployment is the most serious and ..... problem faced by India today.
A. profound B. intractable
C. unpopular D. dubious

60. Unemployment is not only ..... throughout the emerging world, but is growing worse, especially in urban areas.
A. endemic B. peripheral
C. absorbing D. prolific

61. Manpower is the ..... means of converting other resources to mankind's use and benefit.
A. inimitable B. indivisible
C. indispensable D. inequitable

62. This article tries to ..... us with problems of poor nations so that we help them more effectively.
A. enable B. convince
C. allow D. acquaint

63. Among human beings, language is the principal ..... of communication.
A. methodology B. instrument
C. accomplishment D. theory

64. These essays are intellectually ..... and represent various levels of complexity.
A. persistent B. superior
C. modern D. demanding

65. ..... the doctor's advice he started taking some daily exercise.
A. In B. To
C. On D. Towards

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	A	B	C	B	A	D	D	C	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
D	C	B	C	B	B	B	D	D	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
D	D	A	B	C	C	A	A	D	D
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
C	B	A	C	B	D	B	C	B	D
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
D	C	C	A	B	A	B	C	D	A
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
C	D	D	D	B	B	D	D	B	A
61	**62**	**63**	**64**	**65**					
C	D	B	D	C					

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10 Active and Passive Voice

A sentence in active voice focuses on the person or thing doing the action.

A sentence in passive voice focuses on the person or thing affected by the action. e.g.,

The idol was built. (Active voice)

Someone built the idol. (Passive voice)

Transformation of voice

- Voice and Tense are closely associated with each other.
- Tense remains the same while transforming the voice.

Multiple Choice Questions

Directions (Qs. 1 to 40): *In each of the following questions, a sentence is given in Active Voice. Below it are given four alternatives suggesting the Passive Voice form of the above sentence. Choose the correct alternative.*

1. They will have helped you.
A. You will have helped by them.
B. You will have been helped by them.
C. You will be helped by them.
D. You will be helped by them.

2. Open the door.
A. Door may be opened.
B. Let the door be open.
C. Let the door be opened.
D. Door be opened.

3. I am reading a book.
A. A book is read by me.
B. A book is being read by me.
C. A book has been read by me.
D. A book is been read by me.

4. Why did your brother write such a letter?
A. Why your brother wrote such a letter?
B. Why was by brother written such a letter?
C. Why was such a letter written by your brother?
D. Why was written such a letter by your brother?

5. Did you run a great risk?
A. Was a great risk run by you?
B. Was run a great risk by you?
C. Was by you run a great risk?
D. Had you run a great risk?

6. Was he knocking at the door?
A. Was the door being knocked at by him?
B. Was the door being knocked by him?
C. Was the door knocked by him?
D. Was the door knocking at him?

7. What was Rani doing?
A. What was done by Rani?
B. What was Rani being done?
C. What was being done by Rani?
D. What was being doing Rani?

8. Why were you wasting your Time?
A. Why was your time being wasted?
B. Why was your time being wasted by you?
C. Why was your time wasted by you?
D. Why was your time wasted?

9. She has laid out a small garden.
A. A small garden has been laid by her.
B. A small garden has laid out her.
C. A small garden being laid by her.
D. A small garden has been laid out by her.

10. She had already solved all the sums.
A. All the sums had already been solved by her.
B. All the sums have already been solved by her.
C. All the sums have been solved by her.
D. All the sums are solved by her.

11. He will have posted the letter.
A. The letter has been posted by him.
B. The letter will be posted by him.
C. The letter will have been posted by him.
D. The letter is posted by him.

12. They will have sold all the books by 4 P.M.
A. All the books will be sold by 4 P.M.
B. All the books will have been sold by 4 P.M.
C. All the books were being sold by 4 P.M.
D. All the books must be sold by 4 P.M.

13. Do you speak English?
A. Is English spoken by you?
B. Does English spoken by you?
C. Is English being spoken by you?
D. Does English being spoken by you?

14. Had they seen me before?
A. Had myself been seen by them before?
B. Had me being seen by them before?
C. Had I been seen by them before?
D. Had I being seen by them before?

15. May I take this pen?
A. May this pen will be taken by me?
B. May this pen shall be taken by me?
C. May this pen should be taken by me?
D. May this pen be taken by me?

16. Can we send it by air?
A. Can this be sent by air?
B. Can it be sent by air?
C. Can it go by air?
D. Can it be send by air?

17. Who wrote this book?
A. By whom was this book written?
B. By whom is this book written?
C. By whom was this book being written?
D. By whom is this book being written?

18. What did you buy?
A. What is bought by you?
B. What is being bought by you?
C. What was bought by you?
D. What was being bought by you?

19. Whom do you want?
A. Who is wanted by you?
B. Who is being wanted by you?
C. You are wanted by whom?
D. You are being wanted by whom?

20. When will you raise this question?
A. When this question will be raised by you?
B. When will this question be raised by you?
C. When this question is being raised by you?
D. When is this question being raised by you?

21. Who did this?
A. This was done by whom?
B. By whom was this done?
C. Who has done this?
D. By whom this was done?

22. One should keep one's promises.
A. Promises should be kept.
B. One's promises should be kept by one.
C. Promises must be kept.
D. One's promises one should keep.

23. Give the order.
A. Order given.
B. Order be given.
C. Let the order be given.
D. Order may be given by you.

24. You will have to do it.
A. It will be done by you.
B. It will have to be done by you.
C. It has to be done by you.
D. It would have to be done by you.

25. Keep to the left.
A. You are ordered to keep to the left.
B. You ought to keep to the left.
C. You are advised to keep to the left.
D. You must keep to the left.

26. They will arrange a party.
A. A party will have to be arranged by them.
B. A party they will have to arrange.
C. A party will be arranged by them.
D. A party by them will be arranged.

27. Someone has picked my pocket.
A. My pocket is picked.
B. My pocket has picked.
C. My pocket has been picked.
D. My pocket was picked.

28. He kept me waiting.
A. I kept waiting for him.
B. I kept waiting by him.
C. I was waiting for him.
D. I was kept waiting by him.

29. Why do you tell a lie?
A. Why is a lie told by you?
B. Why is told a lie by you?
C. Why is told by you a lie?
D. Why has a lie been told by you?

30. I have written a letter.
A. A letter is written by me.
B. A letter has been written by me.
C. A letter was written by me.
D. A letter had been written by me.

31. Circumstances will oblige me to go.
A. I will oblige the circumstances and go.
B. I shall be obliged to go by the circumstances.
C. Under the circumstances, I should go.
D. I shall be obliged by the circumstances to go.

32. We waste much time on trifles.
A. Much time was wasted on trifles.
B. Much time will be wasted on trifles.
C. Much time is wasted by us on trifles.
D. Much time is wasted on trifles.

33. Mohan gave the beggar an old shirt.
A. An old shirt was given to Mohan by the beggar.
B. An old shirt was given to the beggar by Mohan.
C. The beggar is given an old shirt by Mohan.
D. An old shirt is given to the beggar by Mohan.

34. They have made him a king.
A. A king has been made by him.
B. He was made a king by them.
C. They have been made king by him.
D. He has been made a king by them.

35. Who taught you English?
A. By whom English was taught to you?
B. By whom you were taught English?
C. By whom was English taught to you?
D. By whom are you taught English?

36. Help the poor.
A. The poor should be helped.
B. The poor would be helped.
C. The poor must be helped.
D. The poor will be helped.

37. Bring a glass of water.
A. A glass of water will be brought.
B. A glass of water should be brought.
C. Let a glass of water be brought.
D. Let a glass of water will be brought.

38. He gave me a beautiful flower pot.
A. A beautiful flower pot was given to me by him.
B. A beautiful flower pot had given to me by him.
C. A beautiful flower pot had been giving by him.
D. I was giving him a beautiful flower pot.

39. Is he answering the question?
A. The question is answered by him.
B. The question is being answered by him.
C. Is the question being answered by him?
D. Is the question being answering by him?

40. Who gave you this letter?
A. This letter was given to you by whom?
B. This letter had given to you by whom?
C. Was this letter given to you?
D. By whom was this letter given to you?

Directions (Qs. 41 to 50): *In each of the following questions, a sentence is given in Passive Voice. Below it are given four alternatives suggesting the Active Voice form of the above sentence. Choose the correct alternative.*

41. He was made a king.
A. He became a king.
B. They made him a king.
C. They had made him a king.
D. He has been made a king.

42. Good news is expected by us.
A. We are expecting good news.
B. We have been expecting good news.
C. We had expected good news.
D. We expect good news.

43. The child must be looked after.
A. The child you must look after.
B. You must look after the child.
C. You must look the child after.
D. You may look after the child.

44. What is wanted by you?
A. What you want?
B. What did you want?
C. What do you want?
D. What you do want?

45. Your father is known to me.
A. I am known to your father.
B. I know your father.
C. I have known your father.
D. I knew your father.

46. She may be told the story by you.
A. The story may be told by you to her.
B. You may tell the story to her.
C. You may tell her the story.
D. You may tell to her the story.

47. Duty ought to be done.
A. Let duty be done.
B. One ought to do one's duty.
C. One should do his duty.
D. Do your duty.

48. Is English spoken by you?
A. Did you speak English?
B. Do you speak English?
C. Have you spoken English?
D. Do you know how to speak English?

49. Gold coins are contained in this box.
A. This box contains gold coins.
B. This box has contained gold coins.
C. This box is containing gold coins.
D. This box has gold coins.

50. Character is revealed by manners.
A. Manners revealed character.
B. Manners reveal character.
C. Manners have revealed character.
D. Manners do reveal character.

ANSWERS

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
B	C	B	C	A	A	C	B	D	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	B	A	C	D	B	A	C	A	B
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	A	C	B	C	C	C	D	A	B
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
D	C	B	D	C	A	C	A	C	D
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
B	D	B	C	B	C	B	B	A	B

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11 Direct and Indirect Narration

The words spoken by a speaker are known to be in Direct Speech.
The words spoken by somebody and expressed by someone else with some modification are known as Indirect Speech. e.g.,
(a) Rohit says to me, "You do not understand me." (Direct Speech)
(b) Rohit tells me that I do not understand him. (Indirect Speech)

Multiple Choice Questions

Directions (Qs. 1 to 13): *Select the correct indirect speech for the following sentences:*

1. I said to him, "I shall help you."
A. I told him that I can help him.
B. I told him that I would help him.
C. I told him that I will help him.
D. I told him that I shall be helping him.

2. My Teacher said to me, "The earth revolves round the sun."
A. My teacher told me that the earth revolves round the sun.
B. My teacher told me that the earth revolve round the sun.
C. My teacher told me that the earth had been revolving round the sun.
D. My teacher told me that the earth has been revolving round the sun.

3. I said to my friend, "My father daily goes for a walk."
A. I told my friend that my father daily goes for a walk.
B. I told my friend that my father daily went for a walk.
C. I told my friend that my father has to go for a walk.
D. I told my friend that my father had gone for a walk.

4. He said to me, "May God bless you!"
A. He requested that God can bless me.
B. He prayed that God can bless me.
C. He prayed that God might bless me.
D. He prayed that God will bless me.

5. The patient said, "Thank you, doctor."
A. The patient thanked the doctor.
B. The patient requested the doctor with thanks.
C. The patient told the doctor thanks.
D. The patient suggested the doctor thanks.

6. Satish said, "No, I shall not talk to him."
A. Satish told that he should not talk to him.
B. Satish suggested that he would not have talked to him.
C. Satish exclaimed with sorrow that he would not talk with him.
D. Satish refused to talk to him.

7. The child said, "What a lovely place!"
A. The child exclaimed with sorrow that it was a lovely place.
B. The child thought that the place was lovely.
C. The child exclaimed with joy that the place was very lovely.
D. The child suggested that the place was lovely.

8. He said, "What a fool I have been!"
A. He told himself with sorrow that he was a fool.
B. He confessed with regret that he had been a great fool.
C. He said himself a fool.
D. He suggested that he could be a fool.

9. He said, "Alas! I am ruined."
A. He told me that he had been ruined.
B. He exclaimed with joy that he had been ruined.
C. He exclaimed with sorrow that he was ruined.
D. He told me that he should not be ruined.

10. The accused said, "I am not guilty."
A. The accused exclaimed with sorrow that I am not guilty.
B. The accused exclaimed with joy that he was not guilty.
C. The accused stated that he was not guilty.
D. The accused told me that he has not been guilty.

11. My teacher said, "The earth is round".
A. My teacher said that the earth was round.
B. My teacher says that the earth is round.
C. My teacher said that the earth is round.
D. My teacher ordered that the earth is round.

12. He said, "What a place it is!"
A. He said that it was a very fine place.
B. He said that is a very fine place.
C. He said that the place is fine.
D. He exclaimed with joy/surprise that it was a very fine place.

13. Ria said, "Shall I thread the needle?"
A. Ria asked if she should thread the needle.
B. Ria asked if she shall thread the needle.
C. Ria ordered if she should thread the needle.
D. Ria says that if she would thread the needle.

Directions (Qs. 14 to 33): *Pick out the correct alternative that completes the incomplete sentence which is changed into indirect narration.*

14. She said to me, "I shall see you as soon as I get time."
She told me:
A. that she will see me as soon as she will get time.
B. that she would see me as soon as she would get time.
C. she would see me whenever she got time.
D. that she would see me whenever she gets time.

15. My secretary said to me, "Your plane will leave if you do not go at once."
My secretary told me that:
A. her plane would leave if she did not go at that time.
B. her plane would leave if I do not go at once.
C. my plane would leave if I did not go at that very time.
D. my plane will leave if I did not go at that time.

16. My mother said to me, "Don't quarrel among yourselves".
My mother:
A. forbade me to quarrel among ourselves.
B. asked me not to quarrel among ourselves.
C. asked me that not to quarrel among ourselves.
D. asked me to quarrel not among ourselves.

17. Her father said to her mother, "Excuse the daughter."
Her father:
A. requested her mother to excuse the daughter.
B. asked her mother to excuse the daughter.
C. asked her mother to have excused the daughter.
D. asked her mother to have been excused.

18. He said to his friend, "Wait here till father comes."
He requested his friend:
A. to wait here till father had come.
B. that to wait there till his friend came.
C. to wait there till father came.
D. to wait here until his friend came.

19. She said to her maid, "Run and catch the thief."
She ordered her maid:
A. ran and catch the thief.
B. that to run and to catch the thief.
C. ran and caught the thief.
D. to run and catch the thief.

20. Anita said to Sunita, "What are you doing?"
Anita asked Sunita:
A. what she will be doing.
B. that what she is doing.
C. that what she was doing.
D. what she was doing.

21. She said to me, "Are you meeting me today?"
She enquired of me:
A. whether I am meeting her that day.
B. whether I was meeting her today.
C. whether I was meeting her that day.
D. I was meeting her that day.

22. Nitish said to me, "When did you buy this pen?"
Nitish asked me:
A. when I was to buy that pen.
B. when I would buy that pen.
C. when I had bought that pen.
D. when I was buying that pen.

23. She said to me, "Are you going to market?"
She enquired of me:
A. I am going to market.
B. I was going to market.
C. if I was going to market.
D. if I had been going to the market.

24. Damini said, "Why did not you change your clothes?"
Damini asked me:
A. why I had not changed my clothes.
B. why I did not change my clothes.
C. why I would not change my clothes.
D. why I have not been changing my clothes.

25. Umesh said to me, "Have you read that novel?"
Umesh asked me:
A. if he was reading that novel.
B. if he had read that novel.
C. if I had read that novel.
D. if I was reading that novel.

26. She said to me, "I shall forgive you."
She told me:
A. that she will forgive me.
B. that she was going to forgive me.
C. that she will not forgive me.
D. that she would forgive me.

27. I said to her, "It was very hot last night."
I told her:
A. that it had been very hot the previous night.
B. that it was very hot the previous night.
C. that it has been very hot the last night.
D. that it had been very hot this night.

28. She said to me, "I thank you for the help you have given."
She:
A. told me that she thanked me for the help I had given.
B. thanked me for the help I have given.
C. thanked to me for the help I have given.
D. thanked me for the help I had given.

29. Mohini said to me, "Trust in God."
Mohini advised me:
A. that I should trust in God.
B. should trust in God.
C. trusted in God.
D. to trust in God.

30. I said to him, "Let us go to school."
I told him:
A. we would go to school.
B. we shall go to school.
C. that we would go to school.
D. that we should go to school.

31. Rajni said, "May God bless you?"
Rajni:
A. exclaimed with wish that God might bless me.
B. expressed a wish that God might bless me.
C. asked God to bless me.
D. shouted with joy to bless me.

32. My mother said to me, "Do not have so many friends."
My mother forbade me:
A. to have so many friends.
B. not to have so many friends.
C. to have been so many friends.
D. to possess so many friends.

33. Ram said, "Pay attention to me."
Ram asked:
A. pay attention to him.
B. paid attention to him.
C. having paid attention to him.
D. to pay attention to him.

Directions (Qs. 34 to 50): *In questions below, the sentences have been given in Direct/Indirect Speech. Out of the four alternatives suggested select the one which best expresses the given sentence in Indirect/Direct Speech.*

34. She said that her brother was getting married.
A. She said, "Her brother is getting married."
B. She told, "My brother is getting married."
C. She said, "My brother is getting married."
D. She said, "My brother was married."

35. "Please don't go away", she said.
A. She said to please her and not go away.
B. She told me to go away.
C. She begged me not to go away.
D. She begged that I not go away.

36. "If you don't keep quiet I shall shoot you", he said to her in a calm voice.
A. He warned her to shoot if she didn't keep quiet calmly.
B. He said calmly that I shall shoot you if you don't be quiet.
C. He warned her calmly that he would shoot her if she didn't keep quiet.
D. Calmly he warned her that be quiet or else he will have to shoot her.

37. I told him that he was not working hard.
A. I said to him, "You are not working hard."
B. I told him, "You are not working hard."
C. I said, "You are not working hard."
D. I said to him, "He is not working hard."

38. She said that she would finish the work the next day.
A. She said, "I will finish the work the next day."
B. She said, "I will finish the work tomorrow."
C. She said, "You will finish the work tomorrow."
D. She said, "I finished the work."

39. She said to him, "Why don't you go today?"
A. She asked him why he did not go that day.
B. She said to him that why he don't go today.
C. She asked him not to go today.
D. She asked him why he did not go today.

40. "Are you alone, my son?" asked a soft voice close behind me.
A. A soft voice asked that what I was doing there alone.
B. A soft voice said to me are you alone son.
C. A soft voice from my back asked if I was alone.
D. A soft voice close behind me asked if I was alone.

41. My cousin said, "My room-mate had snored throughout the night."
A. My cousin said that her room-mate snored throughout the night.
B. My cousin told me that her room-mate snored throughout the night.
C. My cousin complained to me that her room-mate is snoring throughout the night.
D. My cousin felt that her room-mate may be snoring throughout the night.

42. He asked Rama if he needed his help then.
A. He said to Rama, "Do you need my help?"
B. He told Rama, "Tell me if you need help."
C. He asked Rama, "Do I need your help?"
D. He said to Rama, "Do you need my help now?"

43. Nita ordered her servant to bring her a cup of tea.
A. Nita told her servant, "Bring a cup of tea."
B. Nita said, "Bring me a cup of tea."
C. Nita said to her servant, "Bring me a cup of tea."
D. Nita said to her servant, "Bring her that cup of tea."

44. He exclaimed with joy that India had won the Sahara Cup.
A. He said, "India has won the Sahara Cup."
B. He said, "India won the Sahara Cup."
C. He said, "How! India will win the Sahara Cup."
D. He said, "Hurrah! India has won the Sahara Cup."

45. The boy said, "Who dare call you a thief?"
A. The boy enquired who dared call him a thief.
B. The boy asked who called him a thief.
C. The boy told that who dared call him a thief.
D. The boy wondered who dared call a thief.

46. The little girl said to her mother, "Did the sun rise in the East?
A. The little girl said to her mother that the sun rose in the East.
B. The little girl asked her mother if the sun rose in the East.
C. The little girl said to her mother if the sun rises in the East.
D. The little girl asked her mother if the sun is in the East.

47. Dhruv said that he was sick and tired of working for that Company.
A. Dhruv said, "I am sick and tired of working for this Company."
B. Dhruv said, "He was tired of that Company."
C. Dhruv said to me, "I am sick and tired of working for this Company."
D. Dhruv said, "I will be tired of working for that Company."

48. He said to his father, "Please increase my pocket-money."
A. He told his father, please increase the pocket-money.
B. He pleaded his father to please increase my pocket-money.
C. He requested his father to increase his pocket-money.
D. He asked his father increase his pocket-money.

49. She said to her friend, "I know where is everyone."
A. She told that she knew where was everyone.
B. She told her friend that she knew where was everyone.
C. She told her friend she knew where is everyone.
D. She told her friend that she knows where was everyone.

50. His father ordered him to go to his room and study.
A. His father said, "Go to your room and study."
B. His father said to him, "Go and study in your room."
C. His father shouted, "Go right now to your study room."
D. His father said firmly, "Go and study in your room."

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	A	A	C	A	D	C	B	C	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	D	A	B	C	A	B	C	D	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	C	C	A	C	D	A	A	A	D
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
B	A	D	C	C	C	A	B	A	D
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
A	D	C	B	A	B	A	C	B	A

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12 Spotting Errors

The most common errors in English are of grammar and usage of words. By regular practice, the errors can be easily spotted and minimised.

Multiple Choice Questions

Directions: *In the following questions, some of the sentences have errors and some are correct. Find out which part of a sentence has an error, the option of that part is your answer. If a sentence is free from errors, then your answer is D i.e., No error.*

1. A. I have B. bought C. new furnitures. D. No error

2. A. The wages B. of sin C. are death. D. No error

3. A. She told B. these news C. to her mother. D. No error

4. A. He took B. troubles to do C. his work. D. No error

5. A. The cattles B. were C. grazing. D. No error

6. A. Rohan is not
B. one of those
C. who betray his friends.
D. No error

7. A. You and he
B. tried his best
C. to pass the examination but failed.
D. No error

8. A. Each B. of these C. boys play. D. No error

9. A. Whoever B. does best C. he will get a prize. D. No error

10. A. One B. should not C. waste his time. D. No error

11. A. These all B. oranges C. are good. D. No error

12. A. He held B. the book in C. the both hands. D. No error

13. A. I had not
B. had some breakfast
C. and I was getting hungry.
D. No error

14. A. That man
B. should do
C. some or other work.
D. No error

15. A. He is B. elder C. than I. D. No error

16. A. He asked B. had we taken C. our luggage. D. No error

17. A. She asked B. what C. are you doing. D. No error

18. A. Rama asked B. Anil why
C. he is angry. D. No error

19. A. He does not B. care for
C. his money. D. No error

20. A. The father
B. no less than
C. the children are to blame.
D. No error

21. A. The owners B. of this factory
C. is very rich. D. No error

22. A. The pleasures of nature
B. that one can experience at Shimla
C. is beyond description.
D. No error

23. A. There is B. no street lights
C. in our colony. D. No error

24. A. He and I am B. entrusted with
C. the job. D. No error

25. A. Rice and curry B. are his
C. favourite dish. D. No error

26. A. When B. I shall see him
C. I shall tell him this. D. No error

27. A. If I should do wrong,
B. he would
C. punish me.
D. No error

28. A. Until he
B. will confess his fault,
C. he will be kept in prison.
D. No error

29. A. She will B. obey
C. me. D. No error

30. A. You would B. work
C. hard. D. No error

31. A. He is B. very much
C. angry. D. No error

32. A. She was
B. very good enough
C. to help me.
D. No error

33. A. She B. runs
C. much fast. D. No error

34. A. She runs B. very faster
C. than Seema. D. No error

35. A. It is B. bitter cold
C. today. D. No error

36. A. As he is fat B. so he runs
C. slowly. D. No error

37. A. If he is fat B. then he will
C. run slowly. D. No error

38. A. Though B. he is fat
C. still he runs fast. D. No error

39. A. As I pulled
B. the trigger at the same time
C. he shook my arm.
D. No error

40. A. No sooner B. I had spoken
C. than he left. D. No error

ANSWERS

1	2	3	4	5	6	7	8	9	10
C	C	B	B	A	D	B	C	C	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	C	B	C	B	B	C	C	B	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	C	A	A	B	B	A	B	A	A
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
B	B	C	B	B	B	B	C	B	B

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13 Sentences with Jumbled Words

Different words form a sentence and convey their true meaning only when they are arranged in a proper order. One must study and practise it regularly.

Multiple Choice Questions

Directions: *In the following questions, some parts of the sentence have been jumbled up. You are required to rearrange these parts which are labelled P, Q, R and S to produce the correct sentence. Choose the option with proper sequence.*

1. We are doing
P : to the people
Q : to give relief
R : all we can
S : but more funds are needed
The correct sequence should be
A. P Q R S B. R Q P S
C. Q P R S D. S P Q R

2. The man
P : when he was
Q : in the office last evening
R : could not finish
S : all his work
The correct sequence should be
A. P Q R S B. Q R S P
C. R Q P S D. R S P Q

3. The people decided
P : they were going
Q : how much
R : to spend
S : on the construction of the school building
The correct sequence should be
A. Q P R S B. P Q R S
C. P R Q S D. S Q P R

4. The man said that
P : those workers
Q : would be given a raise
R : who did not go on
S : strike last month
The correct sequence should be
A. P Q R S B. P R S Q
C. Q P R S D. R S P Q

5. I think
P : the members
Q : are basically in agreement
R : of the group
S : on the following points.
The correct sequence should be
A. R Q P S B. S Q R P
C. P R Q S D. P Q S R

6. While it was true that
P : I had
Q : to invest in industry
R : some lands and houses
S : I did not have ready cash
The correct sequence should be
A. P Q R S B. P R S Q
C. S Q P R D. Q P R S

7. P : But your help
Q : to finish this work
R : it would not have been possible
S : in time
The correct sequence should be
A. P R Q S B. S P Q R
C. R P Q S D. P Q R S

8. The boy
P : in the competition
Q : who was wearing spectacles
R : won many prizes
S : held in our college
The correct sequence should be
A. P Q R S B. R P S Q
C. Q R P S D. Q P S R

9. About 200 years ago,
P : in the south of India
Q : an old king
R : ruled over a kingdom
S : called Rajavarman
The correct sequence should be
A. Q S R P B. P Q R S
C. Q P S R D. Q S P R

10. P : his land
Q : a wooden plough
R : the Indian peasant still uses
S : to cultivate
The correct sequence should be
A. R Q P S B. Q P S R
C. S R Q P D. R Q S P

11. He was a man,
P : even if he had to starve
Q : who would not beg
R : borrow or steal
S : from anyone
The correct sequence should be
A. P Q R S B. P R Q S
C. Q R S P D. Q P R S

12. P : in the progress of
Q : universities play a crucial role
R : our civilization
S : in the present age
The correct sequence should be
A. S Q P R B. Q R S P
C. Q R P S D. S Q R P

13. P : far out into the sea
Q : for the next two weeks there were further explosions
R : which hurled
S : ashes and debris
The correct sequence should be
A. Q R P S B. R S P Q
C. Q R S P D. S R P Q

14. William Shakespeare,
P : in his lifetime
Q : the great English dramatist
R : wrote thirty-five plays
S : and several poems
The correct sequence should be
A. P Q R S B. R S P Q
C. Q S R P D. Q R S P

15. Whenever I am,
P : with an old friend of mine
Q : in New Delhi
R : to have dinner
S : I always try
The correct sequence should be
A. S Q P R B. Q S R P
C. R P S Q D. P R Q S

16. P : I don't know
Q : must have thought
R : what people sitting next to me
S : but I came away
The correct sequence should be
A. R S Q P B. R Q S P
C. P Q R S D. P R Q S

17. P : in estimating the size of the earth
Q : but they were hampered by the lack of instruments of precision
R : ancient astronomers
S : used methods which were theoretically valid
The correct sequence should be
A. R P Q S B. P R Q S
C. R S Q P D. R P S Q

18. P : It is a pity that
Q : by offering a handsome dowry
R : a number of parents think that
S : they will be able to ensure the happiness of their daughters

The correct sequence should be

A. S Q R P B. P R S Q
C. P S R Q D. P R Q S

19. The common man
P : in nurturing
Q : a more active role
R : communal harmony
S : should play
The correct sequence should be

A. P R S Q B. S Q P R
C. S Q R P D. P R Q S

20. The doctor
P : able to find out
Q : what has caused
R : the food poisoning
S : has not been
The correct sequence should be

A. S P R Q B. P R Q S
C. P R S Q D. S P Q R

21. P : was suspended
Q : the officer being corrupt
R : before his dismissal
S : from service
The correct sequence should be

A. Q P S R B. Q P R S
C. R S Q P D. R S P Q

22. With an unsteady hand
P : on my desk
Q : from his pocket
R : he took an envelope
S : and threw it
The correct sequence should be

A. Q R P S B. Q R S P
C. R Q P S D. R Q S P

23. P : she gave her old coat
Q : to a beggar
R : the one with the brown fur on it
S : shivering with cold
The correct sequence should be

A. S Q R P B. S P R Q
C. P R Q S D. P S Q R

24. It is a privilege
P : to pay tax
Q : of every citizen
R : as well as the duty
S : who is well-placed
The correct sequence should be

A. R P S Q B. S P R Q
C. R Q S P D. S Q R P

25. It is not good
P : of the wicked persons
Q : to overthrow
R : to accept the help
S : the righteous persons
The correct sequence should be

A. R S Q P B. Q S R P
C. R P Q S D. Q P R S

26. Life is judged
P : and not by
Q : of work done
R : the longevity of years
S : by the quality
The correct sequence should be

A. Q S P R B. S Q R P
C. Q S R P D. S Q P R

27. P : When he learns that
Q : you have passed the examination
R : in the first division
S : your father will be delighted
The correct sequence should be

A. Q P S R B. S P Q R
C. Q R S P D. S R Q P

28. P : The journalist
Q : saw
R : countless number of the dead
S : driving across the field of battle
The correct sequence should be

A. P Q S R B. P Q R S
C. P S Q R D. S R Q P

29. P : Jane planned
Q : some stamps
R : to buy
S : this afternoon
The correct sequence should be

A. P R Q S B. P S Q R
C. Q R P S D. Q S P R

30. Her mother
P : when she was
Q : hardly four years old
R : began to teach Neha
S : English
The correct sequence should be
A. R S Q P B. S R P Q
C. R S P Q D. S R Q P

31. P : Bill had
Q : a friend
R : an appointment
S : to meet
The correct sequence should be
A. P S R Q B. P R S Q
C. Q S R P D. Q R S P

32. The Government wants that
P : by the veterinary surgeons
Q : by the butchers
R : all the goats slaughtered
S : must be medically examined
The correct sequence should be:
A. R P S Q B. Q S R P
C. R Q S P D. P R S Q

33. The general line about television
P : is that it is very exciting,
Q : but also potentially very dangerous
R : immensely powerful
S : that I took myself
The correct sequence should be:
A. P Q R S B. S P R Q
C. P R Q S D. R P Q S

34. The second test of good government is that
P : to every man and woman
Q : and act only with their consent
R : it should give a lot of freedom
S : and should treat their personalities with respect and sympathy
The correct sequence should be:
A. Q S P R B. S R Q P
C. R P S Q D. P Q R S

35. The teacher warned that
P : he would not let
Q : go home
R : those students
S : who do not finish the classwork
The correct sequence should be:
A. P Q R S B. P R Q S
C. P R S Q D. R S P Q

36. Towards the end of the eighteenth century, quite a number of economists
P : in the near future
Q : at the possibility of
R : were seriously perturbed
S : the world facing starvation
The correct sequence should be:
A. P R Q S B. R Q S P
C. Q S P R D. R P Q S

37. The best way of understanding our own civilization
P : is to examine
Q : an ordinary man
R : in the life of
S : an ordinary day
The correct sequence should be:
A. P Q R S B. R Q P S
C. P S R Q D. R S P Q

38. What greater thing is there
P : for two human souls to feel
Q : to rest on each other in all sorrow,
R : that they are joined for life,
S : to strengthen each other in all labour
The correct sequence should be:
A. S Q R P B. R P Q S
C. Q R S P D. P R S Q

39. Fame
P : by showing off
Q : to the best advantage
R : one's ability and virtue
S : is earned
The correct sequence should be:
A. P Q R S B. S P R Q
C. P R S Q D. P Q S R

40. When he was a child
P : passed his happiest hours
Q : the boy who was to become Britain's Baron Haden
R : staring out of his apartment window
S : living in New York

The correct sequence should be:
A. Q S P R B. P R Q S
C. S Q P R D. R S Q P

41. P : The teacher had to be specially careful
Q : because he enjoyed the confidence
R : about how he faced up to this problem
S : of all the boys
The correct sequence should be:
A. P R Q S B. Q P S R
C. S P R Q D. P S R Q

42. Movies made in
P : all around the globe
Q : Hollywood in America
R : by people
S : are seen at the same time
The correct sequence should be:
A. Q S R P B. Q R P S
C. P S R Q D. Q P S R

43. P : The foundations of the prosperity of a state
Q : primary health and education but also
R : involves the creation of job oppotunities
S : does not merely rest on
The correct sequence should be:
A. P S Q R B. P Q R S
C. P R Q S D. P S R Q

44. I am sure
P : and will be happy
Q : sooner or later
R : a day will come
S : when all will be equal
The correct sequence should be:
A. Q P R S B. Q S R P
C. R Q S P D. R S Q P

45. P : To do his/her work properly
Q : it should be the pride and honour
R : without anybody forcing him/her
S : of every citizen in India
The correct sequence should be:
A. Q S R P B. P R Q S
C. Q S P R D. P Q R S

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	D	A	B	C	C	A	C	A	D
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	A	C	D	B	D	C	B	B	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	D	C	C	B	D	B	C	A	B
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
B	C	B	C	B	B	C	D	B	C
41	**42**	**43**	**44**	**45**					
A	A	A	C	C					

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14 Reordering Sentences

A paragraph is formed from sentences, it will convey its true meaning and purpose only when the sentences are arranged in a proper manner. Try and practise it in this exercise.

Multiple Choice Questions

Directions (Qs. 1 to 20): *A number of sentences are given below which when properly sequenced form a coherent paragraph. Each sentence is labelled as abcdef..... Choose the most logical order of sentences from among the given choices to construct a coherent paragraph.*

1. (a) Parts of northern region were pounded by heavy rains today,
(b) Vehicular traffic came to a near halt.
(c) As mid and high altitude areas of Himachal Pradesh were in grip of severe cold wave with snow lashing the tribal areas and mid ranges receiving showers.
(d) As the sky remained heavily overcast with dark clouds reducing the visibility considerably.
(e) A large number of tourists were forced to buy heavy woollens and stay indoors due to inclement weather.

A. ecabd B. adecb
C. edabc D. acbde

2. (a) The idea is that students should be able to find employment for themselves after the course.
(b) The Central Board of Secondary Education is planning a revamp of its vocational courses.
(c) For this it is necessary to tie up with the industry as well as mobilise schools for their support.
(d) While others will be made less academic and more in tune with the needs of the industry.
(e) A number of courses have been identified as 'deadwood' and will be done away with.

A. bedac B. abcde
C. acebd D. baced

3. (a) Clearly, age is not a deterrent in one's choice of learning.
(b) Perhaps, it was because of her childhood desire.
(c) When Rachna came to Delhi eight years back, she had not anticipated a career in the field of art.
(d) She has been successful in the various exhibitions that she has been part of in terms of business.
(e) She had got into expressing her thoughts with the help of a brush and colours only

because her daughter refused to get initiated into it.

(f) She feels that her use of colour appeals to people.

A. aedcbf B. cdefba
C. cebadf D. acdebf

4. (a) The rehabilitation record has been dismal.
(b) It has been two years years since the earthquake rudely rattled the people of Gujarat.
(c) And since then, life has been a constant struggle.
(d) The quake set Gujarat's clock back by 10 years.
(e) Things changed forever.

A. bedca B. bcade
C. dbace D. edcba

5. (a) In fact, success in exams depended on rote learning from old notes.
(b) when he was studying civil engineering in a college in Gujarat.
(c) He was detained for lack of attendance.
(d) Lectures were soporific, classes rarely worth attending and 80 per cent attendance compulsory.
(e) The college became a trap he hated.
(f) His is a plight many engineers across India would identify with.
(g) He found the going tough.

A. abcdgef B. bgdacef
C. fabcdge D. abcdefg

6. (a) In a country that has close to 600 recognised engineering colleges, there are only seven IITs.
(b) Barring a few exeptions, the academic atmosphere in these is moribund.
(c) The very best students usually get there.
(d) many waste themselves in frustration.
(e) Most of those who get into engineering are good students.
(f) but about 1.25 lakh others and up in the remaining colleges.

A. aecfbd B. abecdf
C. abcdef D. acfbed

7. (a) Whatever the job market, common wisdom says that IIT graduates will find jobs where others have failed.
(b) The IIT brand name is a ticket to success.
(c) When recruiters go headhunting, the IITs are still top of their list.
(d) Its possessor is understood to have an excellent academic record and the will to succeed.
(e) In the job market, that counts.

A. bdeac B. abcde
C. abdce D. dbace

8. (a) It will pave the way .....
(b) signalling a new beginning in strategic ties.....
(c) for a tangible Indian economic presence in Iran and Central Asia.
(d) Iran has offered India valuable road linkages to central Asia .....
(e) aimed at promoting peace and economic cooperation in the region.

A. dbeac B. debca
C. acebd D. abced

9. (a) A good college is essential for a successful career and admissions are based on marks.
(b) The marks-based system followed by all the boards in the country recognises only a small percentage of students as successful.
(c) The marks one scores in the crucial board exams dictate the path his life takes.
(d) Anyone scoring below a certain percentage is automatically branded a 'failure'.
(d) So if you cannot make it into the best college, your career is over even before it has started.

A. abcde B. bcdea
C. bdcae D. abdec

10. (a) The project has already started on an experimental basis in the west district.
(b) A website is soon going to be launched where application forms can be downloaded and submitted.
(c) Standing in a queue at a government office to submit application form will be a thing of the past.

(d) A unique code will be alloted while submitting the form which will help in finding the status of the application.

A. abcd B. dabc
C. cbda D. badc

11. (a) To curb bio-terrorism is a difficult task.
(b) To check these attacks and lessen their impact, we need an impartial team of sincere, strong and dedicated men.
(c) The media can play a strong role in stopping this unnecessary spread of panic.
(d) Since bio-terrorism is not visible or easily detectable, it can be used often.
(e) Men who honour the lives of their fellow countrymen before their own.

A. abcde B. dabce
C. adbec D. acbed

12. (a) He was dying.
(b) No one was ready to touch him as even shifting him from one place to another would lead to profuse bleeding.
(c) He was a five-day old infant, premature and bleeding profusely.
(d) Even if injected one small needle, blood would ooze out and continue to flow for an hour at a stretch.
(e) This small being had haematoma, a thick blood clot in his brain.

A. edbca B. cabde
C. eacdb D. cedba

13. (a) The day I don't treat a patient, I feel .....
(b) I have enough to eat, I crave for blessings now.
(c) But if a financially weak patient gives me only ₹ 50, I don't mind.
(d) Each month I do three to four operations free of cost.
(e) I have lost something in life.
(f) My consultation fee is ₹ 300.

A. fcdeab B. dfcbae
C. fcabde D. bdfcea

14. (a) When he was rushed to the nearby Primary Health Centre after his fall, the doctor referred him to a hospital.
(b) This worsened his injury.
(c) Had a little precaution been exercised after the accident, Tarun would have continued with his gymnastic classes.
(d) He was paralysed from waist downwards when he fell from the vaulting horse while doing gymnastics.
(e) However, the doctor forgot to tell Tarun's parents to take him on a stretcher as he had suffered spinal injuries.
(f) Tarun is wheelchair bound for two years.

A. fdeabc B. abcdef
C. fdcaeb D. fdbcae

15. (a) As the temperature rises, staying hydrated can become a greater challenge for people exercising both indoors and out.
(b) Several things can influence this process, including age, gender, physical conditioning. humidity and a lack of sufficient fluids.
(c) In hot weather, individuals can lose as much as two quarts of sweat per hour.
(d) As we age, we have a lower perceived level of thirst in response to fluid loss and early stages of dehydration.
(e) If not replenished, this can lead to dehydration, heat exhaustion and even heatstroke.

A. abcde B. dbcae
C. cbdea D. acebd

16. (a) The leopard was discovered in the servant quarters of a farmhouse.
(b) The injuries appeared to have been caused by the paws of the leopard, and were not teeth wounds.
(c) It took the wild life officials, Delhi Police and Delhi zoo vets eight hours to capture the leopard that had wandered into a factory in south Delhi.
(d) The leopard then jumped into the factory where the workers managed to lock it in a small generator room before calling in the police.
(e) Before its capture, the leopard attacked two women and a man in the farmhouse.

A. aebdc B. bdaec
C. eadbc D. adbec

17. (a) Police suspect a carpenter working at John's house as he has not reported for work since the day the boy went missing.
(b) John did not return home in the afternoon.
(c) John's mother had herself put the boy on the vehicle in the morning.
(d) John smiled at him and was last seen walking up to him.
(e) His parents called the school and were told John had not been to school at all and had been marked absent.
(f) He was about to enter the school when someone called out his name.
A. cfdbea B. debfca
C. bfdaec D. abcdef

18. (a) However, the mayhem over the last few months is deeply shocking.
(b) Yet I do not agree with the prophets of doom who see nothing but disaster ahead.
(c) When I came back to my motherland India after a stay in Switzerland, I felt I was trading a hotbed of intense religious and political violence for peace and quiet.
(d) I think our nation is searching for an identity.
(e) And a new vision of the future will emerge from this.
A. abcde B. cabde
C. cebad D. bedca

19. (a) An integrated and combined approach was required to reveal the mystery of the brain —its structure, composition and function.
(b) Since the early 80's, scientists were clear that the brain would be the final frontier to conquer.
(c) The initiative was flagged off and came to be known as the Human Brain Project.
(d) But that wasn't easy because understanding the brain involved completely integrating information from the level of the gene to the level of behaviour.
(e) To fulfill this requirement a group of American scientists from various disciplines decided to work together.
A. acbed B. bdaec
C. abdec D. badec

20. (a) A product is something that is made in a factory, a brand is something that is bought by a consumer.
(b) The trick therefore, lies in the brand positioning.
(c) For a consumer, the satisfaction of becoming associated with a name that is the 'best' and the 'leader' is far more important and at times makes him ignore the price factor.
(d) Brands come and go.
(e) Still there are those who manage to stay and develop an affinity with consumers.
A. aebcd B. debac
C. decab D. aecdb

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	A	C	A	B	D	A	A	C	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	D	B	C	D	A	A	B	B	B

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General Awareness and Science

1 Sports

OLYMPICS

- Olympics games were started in 776 BC on Mount Olympia in the honour of Greek God, 'Zeus'. The modern Olympic Games were started in **Athens,** the capital of Greece on **6th April, 1896** with great efforts made by French nobleman, **Baron Pierre de Coubertin.**
- The Olympic Games are organised after every 4 years. The Olympic Flag is made up of white silk and contains five interwined rings as the Olympic Emblem.
- The official Olympic Motto is Citius, Altius, Fortius, a Latin phrase meaning Swifter, Higher, Stronger. The Head Office of International Olympic Committee (IOC) is at Lausanne (Switzerland).

COMMONWEALTH GAMES

- The first Commonwealth Games were held in 1930 in Hamilton, Canada.
- 2018 Commonwealth Games were held in Gold Coast, Australia.

THE ASIAN GAMES

- The Asian Games, also called the Asiad, are a multi-sport event held every 4 years among athletes from all over Asia.
- The games are regulated by the Olympic Council of Asia (OCA), under the supervision of the International Olympic Committee (IOC). The first Asian Games were held in 1951 in New Delhi (India). 18th Asian Games of 2018 were held at Jakarta (Indonesia).

CRICKET WORLD CUP

- The first Cricket World Cup was organised in England in 1975. A separate women's Cricket World Cup has been held every 4 years since 1973.

HOCKEY WORLD CUP

- The first Hockey World Cup was organised in Barcelona (Spain) in 1971. Women's Hockey World Cup has been held since 1974.

FOOTBALL WORLD CUP

- The Football World Cup is organised by FIFA (Federation of International Football Association). The World Cup is called 'Jules Rimet Cup' named after the name of FIFA President Jules Rimet. The first Football World Cup was organised in Uruguay in 1930. The 21st FIFA World Cup held in the Moscow (Russia) in 2018.

National Games of Some Countries

Country	Game
Australia	Cricket
China	Table Tennis
Canada	Ice Hockey
Japan	Jujutsu
Scotland	Rugby
Spain	Bull Fighting
USA	Baseball
UK	Cricket
Pakistan	Hockey
Brazil	Football

Cups and trophies

Cup/Trophy	Game
Agha Khan Cup	Hockey (Mumbai)
Ashes	Cricket (England and Australia)
American Cup	International Yacht Race
Beighton Cup	Hockey (Kolkata)
Canada Cup/ World Cup	Golf (World Championship)
Colombo Cup	Football (India, Pakistan, Myanmar and Sri Lanka)
Davis Cup	Lawn Tennis (International)
Derby	Horse Racing (U.K.)
Dhyan Chand Trophy	Hockey (India)
Ezra Cup	Polo (India)
E.A. Cup	Football (India)
I.F.A. Shield	Football (India)
Jayalaxmi Cup	National Table Tennis Championship for Women (India)
Mohan Singh Trophy	Volleyball (New Delhi)
Maulana Azad Trophy	Inter-varsity Sports and Athletics (India)
Nehru Trophy	Hockey (India)
Prince of Wales Cup	Golf (U.K.)
Ramanujam Cup	Table Tennis (India)
Rangaswami Cup	National Hockey Championship (India)
Ranji Trophy	Cricket (India)
Rohinton Baria Trophy	Inter-varsity Cricket Championship (India)
Rovers Cup	Football
Ryder Cup	Golf (U.K.)
Santosh Trophy	National Football Championship (India)
Stevens Cup	Tennis (U.S.A.)
Subroto Cup	Inter School Football (India)
Thomas Cup	Badminton (World Championship)
Uber Cup	Badminton (Women's International)
Walker Cup	Golf
Westchester Cup	Polo
Wellington Trophy	Rowing (India)

SPORT TERMS

Badminton — Deuce, Double fault, Drop, Let, Love all, Smash.

Basketball — Basket, Blocking, Dribbling, Free throw, Held ball, Holding, Jump ball, Multiple throws, Pivot.

Baseball — Base, Battery, Bunting, Catcher, Diamond, Hitter, Home, Infield, Outfield, Pinch, Pitcher, Put out, Short stop, strike.

Billiards — Bauik line, Bolting, Cannon, Cue Hazard, In-off, Jigger, Long jenny, Pot, Scratch, Screwback, Short jenny, Spot Stroke.

Boxing — Auxiliary point system, Babit punch, Break, Cut, Defence, Hook, Jab, Lying on, Knock, Slam, Upper cut, Weight in, Win by knockout.

Bridge — Chicane, Dealer, Dummy, Finesse, Grand slam, Little slam, No trump, Revoke, Rubber, Ruff, Suit, Tricks, Vulnerable.

Chess — Bishop, Castle, Checkmate, Gambit, King, Knight, Pawn, Queen, Rook, Stalemate.

Cricket — Ashes, Boundary, Bowling, Caught, Chinaman, Cover drive, Crease, Duck, Follow on, Googly, Gully, Hat-trick, Hit Wicket, I.b.w., Legbreak, Leg bye, Maiden over, No ball, Off break, On drive, Out, Over, Pitch, Popping crease, Rubber, Run out, Sixer, Silly point, Square leg, Stone walling, Straight drive, Stumped, Wicket.

Croquet — Hoops, Mallet, Peg Out

Draughts — Huff

Football	Corner kick, Direct free kick, Dribble, Goal kick, Hat-trick, Off side, Penalty kick, Thrown in, Tripping.
Golf	Best-ball, Bogey, Bunker, Caddie, Dormy, Fairway, Fourball, Foursome, Greed holes, Links, Niblic, Par, Put, Rough, Stymied, Tee, Threesome.
Hockey	Bully, Corner, Dribble, Hat-trick, Offside, Roll-in, Scoop, Short Corner, Stick, Striking circle, Tiebreaker.
Horse Racing	Jockey, Punter, Steeple chase.
Polo	Bunker, Chukker, Mallet.
Rowing	Bow, Bucket, Cow, Ergometer, Feather, Paddle, Regatta.
Rugby Football	Tackle, Lines, Scrum, Touch, Try.
Shooting	Bag, Bull's eye, marksmanship, Nuzzle, Plug.
Skiing	Tobogganing.
Swimming	Breast stroke, Crawl, Dive.
Tennis	Backhand Stroke, Deuce, Double fault, Fault, Ground Stroke, Half volley, Let, Smash, Volley.
Volleyball	Blocking, Doubling, Heave, Love point, Service, Volley.
Wrestling	Half nelson, Head lock, Heave, Hold, Rebouts, Scissor.

Famous Sports and Stadium

Stadium	Place
Ambedkar Stadium	Delhi
National Stadium	Delhi
Arun Jaitley Stadium	Delhi
Shivaji Stadium	Delhi
Indira Gandhi Stadium	Delhi
Jawaharlal Nehru Stadium	Delhi
Wankhede Stadium	Mumbai
National Stadium	Mumbai
Brabourne Stadium	Mumbai
Eden Gardens	Kolkata
Yuva Bharti Stadium	Kolkata
Varabhati Stadium	Cuttack
Nehru (Chepak) Stadium	Chennai
Kennan Stadium	Jamshedpur
Green Park Stadium	Kanpur
Lords, Oval, Leeds	England (U.K.)
Headingley Manchester	England
Brookland	England
Twickenham	England
Trent Bridge	England
White City	England
Perth, Brisbane, Melbourne, Sydney	Australia
Sendy Lodge	Scotland
Yankee Stadium	New York (USA)
Forest Hill	USA
Flemington	Melbourn
Black Heath	London (U.K.)
Wimbledon	London

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2 Indian Culture

AKADEMIES

There are three akademies for promotion of creative art.

1. **Lalit Kala Akademi, New Delhi:** Established in 1954, the Lalit Kala Akademi strives for the popularisation of Indian art within the country and in various countries of the world through exhibitions, publications, workshops and camps. Every three year it organises the Triennale India, an international exhi-bition. It publishes research papers on Indian arts. Besides organising seminars, it honours eminent artists. The Akademi has set up regional centres called Rashtriya Lalit Kala Kendras at Lucknow, Kolkata, Chennai and Bhubaneswar and a small office at Mumbai.
2. **Sangeet Natak Akademi, New Delhi:** The Sangeet Natak Akademi, set-up in 1953, aims at the promotion and development of dance, drama and music. It holds seminars and festivals, presents awards to the eminent artists and extends financial assistance to traditional teachers and scholarships to students. It also operates a scheme of exchange of troupes.
3. **Sahitya Akademi, New Delhi:** The Sahitya Akademi, established in 1954, has the main functions of development of Indian letters, setting up high literary standards, translation of literary works of one Indian language into other Indian languages, publication of books on history of literature and criticism, bibliographies and reference books. The Akademy has regional offices at Mumbai, Kolkata, Bengaluru and Chennai.

SCULPTURE

Archaeological Survey of India, set up in 1861, is responsible for preservation and maintenance of sculptures and historical monuments and manages a numberof archaeological museums.

DANCE

India has a very rich tradition of tribal, folk and classical dances.

☞ Classical Dance

Dance	*State*	*Famous Artists*
Bharat Natyam	Tamil Nadu	Yamini Krishnamurthy, Rukmini Devi Arundale, Swapna Sundari, Sonal Mansingh, Vaijanti Mala, Mrinalini Sarabhai, Chandralekha, Indrani, Ram Gopal, Bal Saraswati
Kathakali	Kerala	Gopinath, K.K. Nayar, Kunju-Kurup, T.K. Chandu
Kuchipudi	Andhra Pradesh	Sapna Sundari, Raja Reddy, Shobha Nayar, Radha Reddy, Vedantam Satyanarayan, Vimpanti Chinna Satyam.
Kathak	North India	Birju Maharaj, Gopi Krishna, Shambhu Maharaj, Sitara Devi, Vishnu Sharma, Durga Lal, Shobhana Narayan
Odissi	Odisha	Kelucharan Mahapatra, Indrani Rehman, Madhavi Mudgal, Pratima Bedi, Samyukta Panigrahi, Sonal Mansingh, Debudas
Manipuri	Manipur	Uday Shankar, Bipin Singh, Suryamukhi, Darohra Jhaveri

STATE AND FOLK DANCES

- **Andhra Pradesh/Telangana :** Kuchipudi, Ghantamar-dala, Ottam Thedal
- **Assam :** Bihu, Bichhua, Natpuja, Maharas, Kali-gopal, Bagurumba, Naga dance, Khel Gopal, Tabal Chongli, Canoe, Jhumura Hobjanai
- **Bihar :** Jata-Jatin, Bakho-Bakhain, Pan-wariya, Sama-Chakwa, Bidesia
- **Gujarat :** Garba, Dandiya Ras, Tippani Juriun, Bhavai
- **Haryana :** Jhumar, Phag, Daph, Dhamal, Loor, Gugga, Khor, Gagor
- **Himachal Pradesh :** Jhora, Jhali, Chharhi, Dhaman, Chhapeli, Mahasu, Nati, Dangi
- **Jammu and Kashmir :** Rauf, Hikat, Mandjas, Kud Dandi Nach, Damali
- **Karnataka :** Yakshagan, Huttari, Suggi, Kunitha, Karga, Lambi
- **Kerala :** Kathakali (Classical), Ottam Thulal, Mohiniattam, Kaikottikali
- **Maharashtra :** Lavani, Nakata, Koli, Lezim, Gafa, Dahikala Dasavtar or Bohada
- **Odisha :** Odissi (Classical), Savari, Ghumara, Painka, Munari, Chhau
- **West Bengal :** Kathi, Gambhira, Dhali, Jatra, Baul, Marasia, Mahal, Keertan.
- **Punjab :** Bhangra, Giddha, Daff, Dhaman.
- **Rajasthan :** Ghumar, Chakri, Ganagor, Jhulan Leela, Jhuma, Suisini, Ghapal, Kalbeliya
- **Tamil Nadu :** Bharatanatyam, Kumi, Kolattam, Kavadi
- **Uttar Pradesh :** Nautanki, Raslila, Kajri, Jhora, Chappeli, Jatta
- **Uttarakhand :** Garhwali, Kumayuni, Kajari, Jhora, Raslila, Chappeli

MUSIC

Main Schools of Classical Music: There are two main schools of classical music, namely, the Hindustani and the Carnatic. The Hindustani school of classical music is in vogue in north-western India, eastern India and northern parts of the South India.

MUSICAL INSTRUMENTS AND INSTRUMENTALISTS

- **Been :** Asad Ali Khan, Zia Moin-ud-din Khan
- **Santoor :** Shiv Kumar Sharma
- **Sarod :** Buddhadev Dasgupta, Ali Akbar Khan, Amjad Ali Khan, Bahadur Khan, Sharan Rani, Zarin S. Sharma
- **Sarangi :** Ustand Binda Khan
- **Sitar :** Ravi Shankar, Hara Shankar Bhattacharya, Nikhil, Banerjee, Vilayat Khan, Mustaq Ali Khan
- **Surb Ahar :** Sajjad Hussain, Annapurna
- **Veena :** Soraiswamy Iyengar, Chittibabu, Emani Sankara Shastri, Dhanammal, S. Bala Chandran, K.R. Kumaraswami
- **Violin :** Gajanan Rao Joshi, M.S. Gopal Krishnan, T.N. Krishnan, Baluswamy, Dikshitar; Dwaran Venkataswamy Naidu Lalyuli G. Jayaraman, Mysore T. Chowdiah, V.G. Jog
- **Flute :** T.R. Mahalingam, N. Ramani, Hari Prasad Chaurasia, Pannalal Ghosh
- **Nadaswaran :** Sheikh Chinna Moula, Neeruswamy Pillai, Rajaratanam Pillai
- **Shehnai :** Bismillah Khan
- **Mridangam :** Palghat Mani Iyer, Karaikudi R. Mani, Palghat Raghu
- **Pakhawag :** Pt. Ayodhya Prasad, Gopal Das, Babu Ram Shanker Pagaldas
- **Tabla :** Zaikr Hussain, Nikhil Ghosh, Kishan Maharaj, Alla Rakha Khan, Pandit Samta Prasad, Kumar Bose, Laif Khan
- **Kanjira :** Pudukkotai Dakshinamurthi Pillai

MUSEUMS

Indian Art and Archaeological Museums: (1) Indian Museum, Kolkata; (2) National Museum, New Delhi; (3) Salar Jung Museum, Hyderabad.

Contemporary Historical and Art Museums: (1) National Gallery of Modern Art, New Delhi; (2) Nehru Memorial Museum and Library, New Delhi; (3) Victoria Memorial Hall, Kolkata. (4) Prince of Wales Museum of Western India, Mumbai; (5) Rail Transport Museum, New Delhi; (6) State Museum, Lucknow.

LIBRARIES

Important libraries in the country are: (1) National Library, Kolkata; (2) Central Reference Library, Kolkata; (3) Khuda Bakhsh Oriental Library, Patna; (4) Central Library, Mumbai; (5) Rampur Raza Library; (6) Tanjavur Maharaja Serfoji Sarasvati Mahal (TMSSM) Library; (7) Asiatic Society; (8) Delhi Public Library, Delhi; (9) Central Secretariat Library, Delhi; (10) Connemara Public Library, Chennai.

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3 Indian History

ANCIENT INDIA

PRE-HISTORIC INDIA

- The history of human settlements in India goes back to pre-historic times.
- The archaeological remains are found in different parts of India to reconstruct the history of this period.
- In India, the pre-historic period is divided into the Palaeolithic (Old Stone Age), Mesolithic (Middle Stone Age), Neolithic (New Stone Age) and the Metal Age.

PALAEOLITHIC OR OLD STONE AGE

- The Old Stone Age sites are widely found in various parts of the Indian subcontinent. These sites are generally located near water sources.
- Man invented fire by rubbing two pieces of flint. Man used leaves, barks of trees and skins of animals to cover his body.
- A few Old Stone Age paintings have also been found on rocks at Bhimbetka and other places.

MESOLITHIC OR MIDDLE STONE AGE

- The next stage of human life is called Mesolithic or Middle Stone Age, which falls roughly from 10000 B.C. to 6000 B.C.
- The hunting-gathering pattern of life continued during this period.
- The use of bow and arrow also began during this period. Also, there began a tendency to settle for longer periods in an area. Therefore, domestication of animals, horticulture and primitive cultivation started.

NEOLITHIC AGE OR NEW STONE AGE

- During this period, the *wheel was invented*. It was a turning point in the life of man.
- The chief characteristic features of the Neolithic culture are the practice of *agriculture, domestication of animals*, polishing of stone tools and the manufacture of pottery.
- Large urns were used as coffins for the burial of the dead.
- The people of Neolithic Age used clothes made of cotton and wool.

METAL AGE

- The Neolithic period is followed by Chalcolithic (copper-stone) period when copper and bronze came to be used.
- The Chalcolithic age is followed by Iron Age.
- In the Iron Age, ploughs and daggers were made of iron. It led to the overall development of mankind.

INDUS VALLEY CIVILISATION
(2500-1750 BC)

- The earliest excavations in the Indus valley were done at Harappa in the West Punjab and Mohanjodaro in Sindh. Both places are now in Pakistan.

Important Sites

- The most important sites are Kot Diji in Sindh, Kalibangan in Rajasthan, Ropar in the Punjab, Banawali in Haryana, Lothal, Surkotada and Dhaulavira, all the three in Gujarat.

- Mohanjodaro is the largest of all the Indus cities and it is estimated to have spread over an area of 200 hectares.

☞ Indus Valley Civilisation : An Objective Study

Major Sites	Excavators	Year Findings	River	Location	Important
1. Harappa	D.R. Sahni	1921	Ravi	West Punjab (Pakistan)	Granaries, Virgin Goddess, Cemetery, Stone symbol of Lingam and Yoni
2. Mohenjodaro	R.D. Banerjee	1922	Indus	Sindh (Pakistan)	Great Bath, Great Granary, Assembly Hall, Proto-Shiva, Brick Kilns, Meso- potamian seals
3. Chanhudaro	N.G. Mazumdar	1931	Indus	Sindh (Pakistan)	Bronze toy cart, Ink-pot, Lipstick, City without a citadel
4. Kalibangan	B.B. Lal & B.K. Thapar	1953	Ghaggar	Ganganagar (Rajasthan)	Decorated bricks, ploughed field surface, Firealtars
5. Lothal	S.R. Rao	1957	Bhogwa	Ahmedabad (Gujarat)	Dockyard, Rice husk, Fire altars, Double burial
6. Banawali	R.S. Bist	1973	Ghaggar	Hissar (Haryana)	Toy plough, Gridiron pattern of Town planning.
7. Dholavira	R.S. Bist	1990	Luni	Kutchh (Gujarat)	A Large well & a bath, A stadium
8. Surkotada	J. Joshi	1964	—	Gujarat	Bones of Horse, Pot burials

Salient Features of the Harappan Culture

- The Harappan Civilization was primarily Urban.
- Mohanjodaro and Harappa were the planned cities.
- The large-scale use of burnt bricks in almost all kinds of constructions are the important characteristics of the Harappan culture.
- Another remarkable feature was the underground drainage system connecting all houses to the street drains which were covered by stone slabs or bricks.
- The most important public place of Mohanjodaro is the Great Bath measuring 39 feet length, 23 feet breadth and 8 feet depth.
- Agriculture was the most important occupation. In the fertile soils, farmers cultivated two crops a year. They were the first who had grown paddy.
- Wheat and barley were the main crops grown besides sesame, mustard and cotton.
- Animals like sheep, goats and buffalo were domesticated. The use of horse is not yet firmly established.
- Bronze and copper vessels are the outstanding examples of the Harappan metal craft.
- A large number of seals numbering more than 2000 have been discovered.

Social Life

- Jewelleries such as bangles, bracelets, fillets, girdles, anklets, ear-rings and finger rings were worn by women. These ornaments were made of gold, silver, copper, bronze and semi precious stones.
- Fishing was a regular occupation while hunting and bull fighting were other pastimes.
- Manufacture of terracotta (burnt clay) was a major industry of the people.
- Figures of animals such as sacred bull and dove were discovered. The figures of Mother Goddesses were used for religious purposes.
- Most of the inscriptions were engraved on seals. It is interesting to note that the Indus script has not yet been deciphered.
- The Pipal tree was used as a religious symbol.
- The origin of the '*Swastika*' symbol can be traced to the Harrapan Civilization.
- The chief male deity was Pasupati, (proto-Siva) represented in seals as sitting in a yogic posture with three faces and two horns.

THE VEDIC PERIOD

RIG VEDIC AGE (1500 - 1000 B.C.)

- The Early Vedic period is known from the *Rig Veda*.
- The Rig Veda refers to Saptasindhu or the land of seven rivers. This includes the five rivers of the Punjab, namely, Jhelum, Chenab, Ravi, Beas and Sutlej along with the Indus and Saraswathi.
- Historians view that the Aryans came from Central Asia. They entered India through the Khyber pass between 2000 B.C. and 1500 B.C. They first settled in seven places in the Punjab region which they called Sapta Sindhu. Slowly, they moved towards the Gangetic Valley.
- The Aryan Civilisation was a rural civilisation.

Vedic Literature

- The word 'Veda' is derived from the root 'vid', which means to know and signifies 'superior knowledge'.
- The Vedic literature consists of the four Vedas – Rig, Yajur, Sama and Atharva.
- The *Rig Veda* is the earliest of the four Vedas divided into 10 mandalas and it consists of 1028 hymns. The hymns were sung by *Hotri* in praise of various gods.
- The *Yajur Veda* consists of various details of rules to be observed at the time of sacrifice. Its hymns were recited by *Adharvayus*.
- The *Sama Veda* is set to tune for the purpose of chanting during sacrifice. It is called the book of chants and the origins of Indian music are traced in it. Its hymns were recited by *Udgatri*.
- The *Atharva Veda* contains details of rituals.
- Besides the Vedas, there are other sacred works like the Brahmanas, the Aranyakas, the Upanishads, and the epics Ramayana and Mahabharata.

Political Organisation

- During this period, the kingdom was tribal in character. Each tribe formed a separate kingdom.
- The basic unit of political organisation was *kula* or family.
- The highest political unit was called *jana* or tribe.
- There were several tribal kingdoms during the Rig Vedic period such as Bharatas, Matsyas, Yadus and Purus. The head of the kingdom was called as *rajan* or king.
- There were two popular bodies called the *Sabha* and *Samiti*. The former seems to have been a council of elders and the latter, a general assembly of the entire people.

Social Life

- Family was the basis of the society.
- The head of the family was known as *grihapathi*.

Economic Condition

- The Rig Vedic Aryans were pastoral people and their main occupation was cattle rearing. Their wealth was estimated in terms of their cattle.
- Carpentry was another important profession.

Religion

- The important Rig Vedic gods were Prithvi (Earth), Agni (Fire), Vayu (Wind), Varuna (Rain) and Indra (Thunder).
- Indra was the most popular among them during the early Vedic period.
- There were also female gods like Aditi and Ushas. There were no temples and no idol worship during the early Vedic period.

☛ Rigvedic Rivers

River	Name in Rigveda
Indus	Sindhu
Jhelum	Vitasta
Chenab	Asikni
Ravi	Parushini
Beas	Vipasa
Sutlej	Sutudri
Gomati	Gomal
Saraswati	Sarasvati
Ghaggar	Prishadavati

LATER VEDIC PERIOD (1000–600 B.C.)

- This age is also called as the Epic Age because the two great epics the Ramayana and Mahabharata were written during this period.
- The Sama, Yajur, Atharva Vedas, Brahmanas, Aranyakas, Upanishads and the two epics are the sources of information for this period.

Political Organisation

- Larger kingdoms were formed during the later Vedic period.
- The king performed various rituals and sacrifices to strengthen his position. They include Rajasuya (consecration ceremony), Asvamedha (horse sacrifice) and Vajpeya (chariot race).
- Kingship became hereditary.
- Kings assumed titles like Ekrat, Samrat and Sarvabauma.

Economic Condition

- Iron was used extensively in this period and this enabled the people to clear forests and to bring more land under cultivation. Agriculture became the chief occupation.
- Taxes like Pali, Sulk and Bhaga were collected from the people.
- Wealth was calculated in terms of cows.

Social Life

- The four divisions of society (Brahmins, Kshatriyas, Vaisyas and Sudras) or the Varna system was thoroughly established during the Later Vedic period.
- The Ashrama system was formed to attain 4 purusharthas. They were *Dharma*, *Artha*, *Kama* and *Moksha*.

Religion

- Gods of the Early Vedic period like Indra and Agni lost their importance. Prajapathi (the creator), Vishnu (the protector) and Rudra (the destroyer) became prominent during the Later Vedic period.

JAINISM AND BUDDHISM

JAINISM

- Jainism originated in the 6th century B.C. It rejected Vedic religion and avoided its rituals.
- Founded by Rishabha Deva. Rishabha Deva was succeeded by 23 Thirthankaras (prophets). Mahavira was the 24th Thirthankara.

Vardhamana Mahavira (540-468 B.C.)

- Vardhamana was born in a village called Kundagrama near Vaishali in Bihar.
- His father was *Siddhartha*. He was the head of a famous Kshatriya clan.
- His mother was *Trisala*. She was a princess of the Lichchhavi clan. She was the sister of the ruler of Vaishali.
- Vardhamana was married to Yasoda, a princess. They had a daughter.
- At the age of 30, he left his home and family. He became an ascetic (monk). He wandered from place-to place in search of truth for 12 years.
- In the 13th year of his penance, he attained the highest spiritual knowledge called Kevalya Jnana. Thereafter, he was called Mahavira and Jina. His followers were called Jains and his religion Jainism.
- He died at the age of 72 in 468 B.C. at a place called Pavapuri near modern Rajgir.

Teachings of Jainism

- The three principles of Jainism, also known as Triratnas (three gems), are:
  1. right faith.
  2. right knowledge.
  3. right conduct.
- Mahavira preached his disciples to follow the five principles. They are:
  1. Ahimsa—not to injure any living beings
  2. Satya—to speak the truth
  3. Asteya—not to steal
  4. Tyag—not to own property
  5. Brahmacharia—to lead a virtuous life.

Spread of Jainism

- Mahavira preached his religion in Prakrit language which was the language of the masses.
- Chandragupta Maurya, Kharavela of Kalinga and the royal dynasties of south India such as the Gangas, the Kadambas, the Chalukyas and the Rashtrakutas patronised Jainism.
- Jainism was divided into two sects after Vallabhi Council, namely *Svetambaras* (wearing white dresses) under Sthulbhadra and *Digambaras* (naked) under Bhadrabahu.
- The first Jain Council was convened at Pataliputra by Sthulabahu, the leader of the *Digambaras*, in the beginning of the 3rd century B.C.

- The second Jain Council was held at Valabhi in 5th century A.D. The final compilation of Jain literature called Twelve Angas was completed in this council.

BUDDHISM

Gautama Buddha (563-483 B.C.)

- Buddha's original name was *Siddhartha*.
- Siddhartha was born in the Lumbini Garden near Kapilavastu in Nepal. His father was Suddhodana. He was a Sakya chief of Kapilavastu. His mother, Mayadevi, died when Siddhartha was only seven days old. He was brought up by his step mother Mahaprajapati Gauthami.
- At the age of sixteen Siddhartha, married Yasodhara and gave birth to a son, Rahul.
- The sight of an old man, a diseased man, a corpse and an ascetic turned him away from worldly life. He left home at the age of twenty-nine in search of Truth.
- He wandered for seven years and at last, he sat under a bodhi tree at Bodh Gaya and did intense penance, after which he got Enlightenment (Nirvana) at the age of thirty-five. Since then, he became known as the Buddha or 'the Enlightened One'.
- Buddha delivered his first sermon at Sarnath near Banaras (now Varanasi).
- He died at the age of 80 in 483 B.C. at Kushinagar in Uttar Pradesh.

Teachings of Buddha

- The Four Noble Truths of Buddha are:
  1. The world is full of suffering.
  2. The cause of suffering is desire.
  3. If desires are get rid off, suffering can be removed.
  4. This can be done by following the Eightfold Path.
- The Eightfold Path consists of:
  1. Right Thought.
  2. Right Belief.
  3. Right Speech.
  4. Right Action.
  5. Right Living.
  6. Right Efforts.
  7. Right Knowledge.
  8. Right Meditation.

Buddhist Literature

- In Pali language.
- Buddhist scriptures in Pali are commonly referred to as *Tripitakas, i.e.*, 'Three Baskets'.
- ***Vinaya Pitaka:*** Rules of discipline in Buddhist monasteries.
- ***Sutta Pitaka:*** Largest, contains collection of Buddha's sermons.
- ***Abidhamma Pitaka:*** Explanation of the philosophical principles of the Buddhist religion.

☞ Main Buddhist Councils

Buddhist Council	Time	Place	Chairman	Patron
First	483 BC	Rajagriha	Mahakashyapa	Ajatshatru
Second	383 BC	Vaishali	Sabakami	Kalashoka
Third	250 BC	Patliputra	Mogaliputta Tissa	Ashoka
Fourth	AD 72	Kundalvana	Vasumitra, Ashwaghosa	Kanishka

EMERGENCE OF MAHAJANAPADAS

- In the beginning of the 6th century B.C., the northern India consisted of a large number of independent kingdoms.
- The Buddhist literature Anguttara Nikaya gives a list of sixteen great kingdoms called 'Sixteen Mahajanapadas'.

☞ The Mahajanapadas

Mahajanapadas	Capital
1. Kashi	Varanasi
2. Kosala	Shravasti
3. Anga	Champanagri
4. Magadh	Girivraj or Rajgriha
5. Vajji	Vaishali
6. Malla	Kushinagar and Pavapuri
7. Chedi	Shuktimati
8. Vatsa	Kaushambi
9. Kuru	Hastinapur, Indraprastha and Isukara

10.	Panchal	Ahichhatra and Kampilya
11.	Matsya	Viratnagar
12.	Surasen	Mathura
13.	Asmaka	Paudanya
14.	Avanti	Ujjaini
15.	Gandhara	Taxila
16.	Kamboj	Rajpur (Hatak)

DYNASTIES OF ANCIENT INDIA

HARYANKA DYNASTY

- Bimbisara was the founder of Haryanka Dynasty.
- He was a contemporary of both Vardhamana Mahavira and Gautama Buddha.
- During his rule, Darius I, the Achaemenian emperor, conquered the Indus Valley area.
- Ajatasatru imprisoned his father Bimbisara.
- The first Buddhist Council was convened by Ajatasatru at Rajgir.
- The immediate successor of Ajatasatru was Udayin.
- Udayin laid the foundation of the new capital at Pataliputra situated at the confluence of the two rivers, the Ganges and the Son.
- Shishunaga was the founder of Shishunaga dynasty.
- After Shishunaga, the mighty empire began to collapse. His successor was Kakavarman or Kalasoka. During his reign, the second Buddhist Council was held at Vaishali.
- Kalasoka was killed by the founder of the Nanda dynasty.

NANDAS

- The fame of Magadha scaled new heights under the Nanda dynasty.
- Mahapadmananda was the founder of Nanda rule in Magadha.
- The last Nanda ruler was Dhana Nanda. Alexander invaded India during his rule.

MAURYAN EMPIRE

CHANDRAGUPTA MAURYA (322–298 B.C.)

- Chandragupta Maurya was the founder of the Mauryan Empire. He overthrew Nanda dynasty with the help of Chanakya.
- Chandragupta defeated Seleukos Nikator, the Greek general of Alexander, in a battle in 305 B.C.
- Seleukos sent Megasthenes as Greek Ambassador to the Court of Chandra-gupta. Megasthenes wrote *Indica*.
- Chandragupta was a follower of Jainism.
- He came to Sravana Belgola, near Mysore with a Jain monk called Bhadrabahu. The hill in which he lived until his death is called Chandragiri.
- Chanakya served as prime minister during the reigns of Chandragupta and Bindusara.

BINDUSARA (298–273 B.C.)

- Chandragupta Maurya was succeeded by his son Bindusara.
- Bindusara was called by the Greeks as "*Amitragatha*" meaning, slayer of enemies.

ASHOKA (273–232 B.C.)

- Ashoka was the most famous ruler of the Mauryan dynasty.
- The most important event of Ashoka's reign was his victorious war with Kalinga in 261 B.C.
- Ashoka convened the Third Buddhist Council at Pataliputra around 250 B.C. in order to strengthen the *Sangha*. It was presided over by Moggaliputta Tissa.
- Ashoka's edicts and inscriptions were deciphered by James Prinsep in 1837.
- The last Mauryan king, Brahadratha was killed by his minister Pushyamitra Sunga. It put an end to the Mauryan Empire.

SUNGAS

- The founder of the Sunga dynasty was *Pushyamitra Sunga*, who was the commander-in-chief under the Mauryas.
- He ascended the throne of Magadha in 185 B.C.
- Pushyamitra was a staunch follower of Brahmanism. He performed two asvamedha sacrifices.
- After the death of Pushyamitra, his son Agnimitra became the ruler.
- Agnimitra was a great conqueror. He was also the hero of the play Malavikagnimitram written by Kalidasa.

KANVA

- The last Sunga ruler was Devabhuti, who was murdered by his minister Vasudeva Kanva, the founder of the *Kanva dynasty*.
- The Kanva dynasty ruled for 45 years. After the fall of the Kanvas, the history of Magadha was a blank until the establishment of the Gupta dynasty.

SATAVAHANAS

- The founder of the Satavahana dynasty was Simuka.
- The greatest ruler of the Satavahana dynasty was *Gautamiputra Satakarni*.
- The greatest port of the Satavahanas was Kalyani on the west Deccan. Gandakasela and Ganjam on the east coast were the other important seaports.
- The fine painting at Amaravathi and Nagarjunakonda caves belong to this period.

GUPTA PERIOD

- The Gupta period is considered as the *Golden Age* in the history of India because this period witnessed all round developments in Religion, Literature, Science, Art and Architecture.

CHANDRAGUPTA I (320-334 A.D.)

- In the beginning of the 4th Century A.D., Sri Gupta established a small Kingdom at Pataliputra. He is considered as the founder of the Gupta dynasty.
- The first notable ruler of the Gupta dynasty was Chandragupta I. He assumed the title *Maharajadhiraja*. The Meherauli Iron Pillar inscription mentions his extensive conquests.
- Chandragupta I is considered to be the founder of the Gupta era which starts with his accession in A.D. 320.

SAMUDRAGUPTA (335-380 A.D.)

- Samudragupta was the greatest of the rulers of the Gupta dynasty. The Allahabad Pillar inscription provides a detailed account of his reign.
- Because of his military achievements, Samudragupta was hailed as '*Indian Napoleon*'.

CHANDRAGUPTA II (380-414 A.D.)

- Samudragupta was succeeded by his son Chandragupta II Vikramaditya.
- The greatest of the military achievements of Chandragupta II was his war against the Saka *satraps* of western India.
- The famous Chinese pilgrim, Fahien visited India (A.D. 399-A.D. 414) during the reign of Chandragupta II.

SUCCESSORS OF CHANDRAGUPTA II

- Kumaragupta (415-455) was the son and successor of Chandragupta II. His reign was marked by general peace and prosperity.
- Kumaragupta was the founder of the Nalanda University.
- Kumaragupta was followed by *Skandagupta* who ruled from A.D. 456 to A.D. 468.
- After Skandagupta's death, many of his successors like Purugupta, Narasimhagupta, Buddhagupta and Baladitya could not save the Gupta empire from the Huns. Ultimately, the Gupta power totally disappeared due to the Hun invasions and later by the rise of Yasodharman in Malwa.

PUSHYABHUTI DYNASTY (600 - 647 A.D.)

- The greatest king was *Harshavardhana*, son of Prabhakar Vardhana of Thaneshwar. He shifted the capital to *Kannauj*.
- *Hieun Tsang* visited during his reign.
- He established a large monastery at Nalanda. Banabhata adorned his court, wrote Harshacharita and Kadambari. Harsha himself wrote three plays– Priyadarshika, Ratnawali and Nagananda.

PALLAVAS

- The Pallavas established their kingdom in Tondaimandalam by Simhavishnu with its capital at Kanchipuram.
- Other great Pallava rulers were Mahendravarman I, Narasimhavarman I, and Narasimhavarman II.
- The *Kailasanatha temple* at Kanchipuram is the greatest architectural masterpiece of the Pallava art.

CHALUKYAS (543-755 A.D.)

- Pulakesin I was the founder of the Chalukya dynasty. He established a small kingdom with

Vatapi or Badami as its capital.

- The structural temples of the Chalukyas exist at Aihole, Badami and Pattadakal (Virupaksha temple). Cave temple architecture was also famous under the Chalukyas. Their cave temples are found in Ajanta, Ellora and Nasik.

RASHTRAKUTAS (755-975 A.D.)

- The art and architecture of the Rashtrakutas were found at Ellora and Elephanta.

CHOLAS

- Cholas became prominent in the ninth century and established an empire comprising the major portion of South India. Their capital was Tanjore.
- The founder of the Chola kingdom was Vijayalaya.
- Rajaraja Chola built the famous Brihadeeswara temple at Tanjore.
- *Dancing Figure of Shiva* (Nataraja) belong to Chola period.

MEDIEVAL INDIA

ARAB CONQUEST OF SIND

- In 712 A.D., Muhammad bin Quasim invaded Sind. Quasim defeated Dahir, the ruler of Sind and killed him in a well-contested battle.

Mahmud of Ghazni

- In 1024, Mahmud marched from Multan across Rajaputana, defeated the Solanki King Bhimadeva I, plundered Anhilwad and sacked the famous temple of Somanatha. This was his last campaign in India. Mahmud died in 1030 A.D.
- Mahmud patronized art and literature. *Firdausi* was the poet-laureate in the court of Mahmud.

Muhammad Ghori

- Prithviraj Chauhan defeated Ghori in the battle of Tarain near Delhi in 1191 A.D.
- In the Second Battle of Tarain in 1192, Muhammad Ghori thoroughly routed the army of Prithiviraj, who was captured and killed.
- After his brilliant victory over Prithviraj at Tarain, Muhammad Ghori returned to Ghazni leaving behind his favourite general Qutb-ud-din Aibak to make further conquests in India.

SULTANATE PERIOD

SLAVE DYNASTY (1206-1290)

- The Slave dynasty was also called Mamluk dynasty. Mamluk was the Quranic term for slave.

Qutb-ud-din Aibak

- Qutb-ud-din Aibak was a slave of Muhammad Ghori, who made him the Governor of his Indian possessions.
- After the death of Ghori in 1206, Aibak declared his independence. He assumed the title Sultan and made Lahore his capital.
- Muslim writers call Aibak Lakh Baksh or giver of lakhs because he gave liberal donations to them.
- He built the famous Quwat-Ul-Islam mosque at Delhi. He began the construction of the famous Qutb Minar at Delhi but did not live long to complete it. It was later completed by Iltutmish.

Iltutmish (1210-1236 A.D.)

- Iltutmish belonged to the Ilbari tribe and hence his dynasty was named as Ilbari dynasty.
- He shifted his capital from Lahore to Delhi.
- He organised the *Iqta system* and introduced reforms in civil administration and army.

Raziya (1236-1240 A.D.)

- She appointed an Abyssinian slave Yakuth as Master of the Royal Horses.
- In 1240, Altunia, the governor of Bhatinda revolted against her. She went in personally to suppress the revolt but Altunia killed Yakuth and took Raziya prisoner.
- Bahram Shah, son of Iltutmish killed her.

Balban (1266-1286 A.D.)

- Balban introduced rigorous court discipline and new customs such as prostration and kissing the Sultan's feet to prove his superiority over the nobles.
- He also introduced the Persian festival of *Nauroz* to impress the nobles and people with his wealth and power.

- He established a separate military department - *diwan-i-arz* – and reorganized the army.

KHILJI DYNASTY (1290-1320 A.D.)

- The founder of the Khilji dynasty was Jalaluddin Khilji.
- Ala-ud-din Khilji was the greatest ruler of the Khilji Dynasty.
- He was the first Muslim ruler to extend his empire right upto Rameshwaram in the South.
- The Sultan had built a new city called Siri near Delhi.
- Amir Khusrau the great Persian poet, patronised by Balban, continued to live in Ala-ud-din Khilji's court also.
- He introduced the system of *dagh* (branding of horses) and prepared *huliya* (descriptive list of soldiers).
- Ala-ud-din Khilji maintained a large permanent standing army and paid them in cash from the royal treasury.

TUGHLAQ DYNASTY

- Ghiyas-ud-din Tughlaq was the founder of the Tughlaq dynasty.
- To have the capital at the centre of the empire and safe from the Mongol raids, Tughlaq chose Devagiri as his new capital in A.D. 1327. The Sultan renamed the new capital Daulatabad.
- In 1329-30, Muhammad-bin-Tughlaq introduced a token currency.
- Firoz Shah Tughlaq became Sultan after the death of Muhammad-bin-Tughlaq in A.D. 1351.
- He was the first Sultan to impose irrigation tax.
- He had built new towns of Firozabad, Jaunpur, Hissar and Firozpur.
- Timur Mongol leader of Central Asia, ordered general massacre in Delhi (AD 1398) at the time of Nasiruddin Mahmud (later Tughlaq king).

SAYYID DYNASTY

- Before his departure from India, Timur appointed Khizr Khan as governor of Multan. He captured Delhi and founded the Sayyid dynasty in 1414.
- Mubarak Shah, Mohammed Shah and Alam Shah were some of the other important noteworthy rulers of Sayyid Dynasty.

LODHI DYNASTY

- The Lodhis were Afghans.
- Bahlol Lodhi was the first Afghan ruler while his predecessors were all Turks. He died in 1489 and was succeeded by his son, Sikandar Lodhi.
- In 1504, Sikandar Lodhi founded the city of Agra and transferred his capital from Delhi to Agra.
- Babar marched against Delhi and defeated and killed Ibrahim Lodhi in the first battle of Panipat (1526).

BAHMANI AND VIJAYANAGAR KINGDOMS

- The break up of the Delhi Sultanate provided an opportunity for the rise of a number of kingdoms in the Deccan.
- After the decline of the Tughlaqs, there arose two important kingdoms in the Deccan. They were the Bahmani and Vijayanagar kingdoms.

VIJAYANAGAR EMPIRE

- The Vijayanagar Kingdom was set up in A.D. 1336. Its aim was to check the spread of Muslim power and protect Hindu Dharma in South India.
- Four dynasties – Sangama, Saluva, Tuluva and Aravidu – ruled Vijayanagar from A.D. 1336 to 1672.
- Vijayanagar was founded in 1336 by Harihara and Bukka of the Sangama dynasty.
- The Moroccan traveller, Ibn Batuta, Venetian traveller Nicolo de Conti, Persian traveller Abdur Razzak and the Portuguese traveller Domingo Paes were among them who left valuable accounts on the socio-economic conditions of the Vijayanagar Empire.
- The Hampi ruins and other monuments of Vijayanagar provide information on the cultural contributions of the Vijayanagar rulers.

KRISHNA DEVA RAYA (1509-1530)

- The Tuluva dynasty was founded by Vira Narasimha.
- The greatest of the Vijayanagar rulers, Krishna Deva Raya belonged to the Tuluva dynasty.

- Krishna Deva Raya himself authored a Telugu work, *Amukthamalyadha* and Sanskrit works, *Jambavati Kalyanam* and *Ushaparinayam*.
- He built the famous *Vittalaswamy* and *Hazara Ramaswamy* temples at Vijayanagar.
- Krishna Deva Raya renovated Virupaksha temple in A.D. 1510.
- After his death the enemies of Vijayanagar joined together and defeated the Vijayanagar ruler in the battle of Talaikota.

BAHMANI KINGDOM

- The founder of the Bahmani kingdom was Alauddin Bahman Shah also known as Hasan Gangu in 1347. Its capital was Gulbarga.
- Ahmad Wali Shah shifted the capital from Gulbarga to Bidar.
- *Gol Gumbaj* was built by *Muhammad Adil Shah*; it is famous for the so called '*Whispering Gallery*'.
- *Quli Qutub Shah* built the famous *Golcunda Fort*.

MUGHAL EMPIRE (1526-1707 AD)

BABAR (1526-1530 AD)

- Babar was the founder of the Mughal Empire in India.
- On 21st April, 1526 the first Battle of Panipat took place between Babar and Ibrahim Lodhi, who was killed in the battle.
- Babar was the first one to use guns or artillery in a battle on the Indian soil.
- Babar defeated Rama Sanga of Mewar in the battle of Kanwah in A.D. 1527.
- Babar was a soldier-scholar and wrote his own autobiography called Babar Nama in Turkish language.

HUMAYUN (1530-1556 AD)

- Sher Shah defeated Humayun at *Chausa in A.D. 1539* and again at Kannauj in A.D. 1540.
- After losing his kingdom, Humayun became an exile for the next fifteen years.
- In 1555, Humayun defeated the Afghans and recovered the Mughal throne. After six months, he died in 1556 due to his fall from the staircase of his library.
- *Gulbadan Begum*, Humayun's half-sister wrote *Humayun-nama*.

SHER SHAH SURI

- The founder of the Sur dynasty was Sher Shah, whose original name was Farid.
- Sher Shah became the ruler of Delhi in 1540.
- Sher Shah organized a brilliant administrative system. The central government consisted of several departments.
- He built a new city on the banks of the river Yamuna near Delhi. Now the old fort called Purana Quila and its mosque is alone surviving.
- He built a Mausoleum at Sasaram, which is considered as one of the master pieces of Indian architecture.

AKBAR (1556-1605 AD)

- When Akbar ascended the throne in A.D. 1556 he was only 14 years old. His guardian Bairam Khan served him as a faithful minister and tutor.
- Bairam Khan, along with Akbar met Hemu in the second Battle of Panipat in 1556. Hemu was initially successful, but lost his consciousness after an arrow hit him. Akbar killed him.
- In the Battle of Haldighati, Rana Pratap Singh was severely defeated by the Mughal army led by Man Singh in 1576.
- Akbar abolished the pilgrim tax and in 1562, he abolished Jaziya.
- Akbar evolved a new faith called Din-i-Illahi or Divine Faith.

JAHANGIR (1605-1627 AD)

- When Akbar died, Prince Salim succeeded with the title Jahangir (Conqueror of World) in 1605.
- Jahangir's eldest son, Khusrau, rebelled against him. He was arrested and put into prison. *Guru Arjun Dev, the fifth Sikh Guru* was executed by Jahangir.
- In 1611, Jahangir married Mehrunnisa who was known as Nurjahan (Light of World).
- Jahangir died in A.D. 1627.

SHAHJAHAN (1628-1658 AD)

- The reign of Shahjahan is generally considered as the *Golden Age* of the Mughal period.

- Shahjahan is called as the *Prince of Builders*. He had built the Jama Masjid and *Red Fort* in Delhi and Taj Mahal in Agra.
- Fine arts like painting, music and literature reached high level of development during Shahjahan's time.

AURANGAZEB (1658-1707 AD)

- Aurangazeb was the last great Mughal ruler. He ascended the throne after killing his three brothers Dara, Shuja and Murad in a fratricidal war.
- Aurangazeb defeated Sikandar Shah of Bijapur and annexed his kingdom.
- Aurangazeb was against the Sikhs and he executed the ninth Sikh Guru Tegh Bahadur.
- He was called *Darvesh* or a *Zinda Pir*. He forbade *Sati*. Conquered Bijapur (AD 1686) and Golconda (AD 1687) and reimposed Jaziya and Pilgrim tax in AD 1679.
- He built *Biwi ka Makbara* on the tomb of his queen *Rabaud-Durani* at Aurangabad; *Moti Masjid* within Red Fort, Delhi; and the Jami or Badshahi Mosque at Lahore.
- Aurangazeb died in A.D. 1707.

LATER MUGHALS / FALL OF THE MUGHALS

Bahadur Shah (1707-1712)

- Assumed the title of *Shah Alam I*.

Jahandar Shah (1712-1713)

- First puppet Mughal emperor. He abolished *jaziya*.

Farrukhsiyar (1713-1719)

Mohammad Shah (1719-1748)

- Nadir Shah (*of Iran*) defeated him in the Battle of Karnal (1739) and took away *Peacock throne* and *Kohinoor diamond*.

Ahmad Shah (1748-1754)

Alamgir II (1754-1759),
Shah Alam II (1759-1806)

Akbar II (1806-1837)

- He gave Ram Mohan Roy the title '*Raja*'. He sent Raja Ram Mohan Roy to London to seek a raise in his allowance.

Bahadur Shah II (1837-1857)

- He was confined by the British to the Red Fort. During the revolt of 1857, he was proclaimed the Emperor by the rebels. He was deported to Rangoon after that.

☞ Literature of Mughal Period

Author	Work
Babar	Tuzuk-i-Babari
Abul Fazal	Ain-i-Akbari, Akbarnamah
Jahangir	Tuzuk-i-Jahangir
Hamid	Padshahnama
Darashikoh	Majn-ul-Bahrain
Mirza Md Qasim	Alamgirnama

THE MARATHAS

SHIVAJI (1627-1680 AD)

- Shivaji was born at Shivner in 1627. His father was Shahji Bhonsle and mother Jija Bai.
- His religious teacher was Samarth Ramdas and guardian was Dadaji Kondadev.
- In 1674, Shivaji crowned himself at Raigarh and assumed the title Chatrapathi.
- *Ashtapradhan* (eight ministers) helped in administration. These were Peshwas, Sar-i-Naubat (Military), Mazumdar or Amatya (Accounts); Waqenavis (Intelligence); Surnavis (Correspondence); *Dabir* or *Sumanta* (Ceremonies); *Nyayadhish* (Justice); and *Panditrao* (Charity).
- Successors of Shivaji were Shambhaji, Rajaram and *Shahu* (fought at Battle of Khed in AD 1708).

THE PESHWAS

- Balaji Vishwanath was the first Peshwa. He began his career as a small revenue official and became Peshwa in 1713.
- Baji Rao I was the eldest son of Balaji Vishwanath. He was considered as the "greatest exponent of guerilla tactics after Shivaji".
- It was during reign of Balaji Baji Rao (Nanasaheb) when the Marathas lost the Third Battle of Panipat.
- Baji Rao II (last Peshwa) was the first Maratha to have fled from the British attacks instead of fighting with them. Baji Rao II surrendered to Sir John Malcom.

THE SIKH

- Guru Nanak Dev was the founder of Sikhism, the religion that draws its elements from both Hinduism and Islam.
- Name of the ten Sikh Gurus and their works are given below:
  1. **Guru Nanak Dev (1469-1539AD):** The founder of Sikhism.
  2. **Guru Angad Dev (1504-1552AD):** Developed Gurmukhi.
  3. **Guru Amar Das (1479-1574AD):** Struggled against Sati system and Purdah system.
  4. **Guru Ram Das (1534-1581AD):** Founded Amritsar, the holy city of Sikhism.
  5. **Guru Arjun Dev (1563-1606AD):** He built the *Swarn Mandir* (Golden Temple).
  6. **Guru Hargobind (1595-1644 AD):** Established Akal Takht.
  7. **Guru Har Rai (1630-1661 AD)**
  8. **Guru Har Krishan (1656-1664 AD)**
  9. **Guru Tegh Bahadur (1621-1675 AD)**
  10. **Guru Gobind Singh (1666-1708 AD):** Founded the Khalsa and Sikh baptism, composed many poems, and nominated the Sikh sacred text as the final and enduring Guru.

MODERN INDIA

THE ADVENT OF THE EUROPEANS

THE PORTUGUESE

- Vasco-da-Gama, a Portuguese explorer, sailed through the route of cape of Good Hope and reached near Calicut on 20th May 1498 A.D. during the reign of King Zamorin (Hindu King of Calicut).
- Vasco-da-Gama founded a factory at Cannanore on his second visit to India in 1501. In due course, Calicut, Cochin and Cannanore became the Portuguese trading centres.
- Francisco Almeida came to India in 1505. He was the first Governor of Portuguese possessions in India.
- The real founder of Portuguese power in India was *Alfonso de Albuquerque*. He captured Goa from the rulers of Bijapur in 1510. It was made their headquarters.

THE DUTCH

- The United East India Company of the Netherlands founded a factory at Masulipatnam in 1605. They built their first fort on the main land of India at Pulicut in 1609, near Madras (Chennai). They captured Nagapattinam from the Portuguese.
- They made Agra, Surat, Masulipatnam and Chinsura in Bengal as their trading centres.

THE DANES

- The Danish East India Company was established in 1616 in Denmark.
- They came to South India and founded a factory at Tranquebar (Tharangambadi) in 1620. They also made settlements at Serampore near Calcutta (Kolkata).

THE ENGLISH

- The English East India Company was formed in 1599 under a charter granted by Queen Elizabeth in 1600.
- The East India Company sent Sir William Hawkins to the court of the Mughal Emperor Jahangir in 1609 to obtain permission to erect a factory at Surat.
- In 1615, Sir Thomas Roe, another British merchant, came to Jahangir's court. He stayed for three years and succeeded in getting permission to set up their trading centres at Agra, Surat, Ahmedabad and Broach.
- In 1690, the British got permission from Aurangazeb to build a factory on the site of Calcutta. In 1696 a fort was built at that place. It was called Fort William.

THE FRENCH

- The French East India Company was established in 1664 under the inspiring and energetic leadership of Colbert, the economic adviser of the French King Louis XIV.
- In 1667, the first French factory was established at Surat by Francis Caron who was nominated as Director-General.
- French were defeated by English in *Battle of Wandiwash* (1760).

NATIONAL MOVEMENT (1885-1947)

Indian National Congress (1885)

- Allan Octavian Hume, a retired civil servant in the British Government took the initiative to form an all-India organization. Thus, the Indian National Congress was founded and its first session was held at Bombay in 1885. W.C. Banerjee was its first president. It was attended by 72 delegates from all over India.
- The second session was held in Calcutta in 1886 and the third in Madras in 1887.
- Between 1885 and 1905, the Congress leaders were moderates. The Moderates had faith in the British justice and goodwill. They were called moderates because they adopted peaceful and constitutional means to achieve their demands.
- In 1905, Gopal Krishna Gokhale founded the Servants of India Society to train Indians to dedicate their lives to the cause of the country.

Partition of Bengal (1905)

- By Lord Curzon on 16th October, 1905 through a royal proclamation, reducing the old province of Bengal in size by creating East Bengal and Assam out of the rest of Bengal.
- The partition of Bengal in 1905 provided a spark for the rise of extremism in the Indian National Movement.
- Curzon's real motives behind this partition were:
  - ❐ To break the growing strength of Bengali nationalism since Bengal was the base of Indian nationalism.
  - ❐ To divide the Hindus and Muslims in Bengal.
  - ❐ To show the enormous power of the British Government in doing whatever it liked.

Swadeshi Movement (1905)

- The Swadeshi Movement involved programmes like the boycott of government service, courts, schools and colleges and of foreign goods. It was both a political and economic movement.
- Lal, Bal, Pal and Aurobindo Ghosh played an important role.

Muslim League (1906)

- In December 1906, Muslim delegates from all over India met at Dacca for the Muslim Educational Conference.
- Taking advantage of this occasion, Nawab Salimullah of Dacca proposed the setting up of an organisation to look after the Muslim interests. The proposal was accepted.
- The All-India Muslim League was finally set up on December 30, 1906.

Minto Morley Reforms (1909)

- Minto, the Viceroy and Morley, the Secretary of State for India jointly proposed reforms to the Indian Councils. An Act, called the Indian Councils Act or the Minto-Morley Reforms Act was passed in 1909.
- A separate communal electorate was introduced for the Muslims.

The Lucknow Pact (1916)

- During the 1916 Congress session at Lucknow two major events occurred. The divided Congress became united. An understanding for joint action against the British was reached between the Congress and the Muslim League and it was called the Lucknow Pact.
- The signing of the Lucknow Pact by the Congress and the Muslim League in 1916 marked an important step in the Hindu-Muslim unity.

The Home Rule Movement (1916)

- Two Home Rule Leagues were established, one by B.G. Tilak at Poona in April 1916 and the other by Mrs. Annie Besant at Madras in September 1916.

- While Tilak's Movement concentrated on Maharashtra, Annie Besant's Movement covered the rest of the country.

August Declaration

- On 20 August, 1917, Montague, the Secretary of State in England, promised the gradual development of self-governing institutions in India.
- This August Declaration led to the end of the Home Rule Movement.

Rowlatt Act (1919)

- In 1917, a committee was set up under the presidentship of Sir Sydney Rowlatt to look into the militant Nationalist activities. On the basis of its report the Rowlatt Act was passed in March 1919 by the Central Legislative Council. As per this Act, any person could be arrested on the basis of suspicion. No appeal or petition could be filed against such arrests.
- This Act was called the Black Act and it was widely opposed. An all-India hartal was organized on 6 April, 1919.

Jallianwala Bagh Massacre (13 April, 1919)

- On 13th April, the Baisakhi day (harvest festival), a public meeting was organized at the Jallianwala Bagh (garden). Gen. Dyer marched in and without any warning opened fire on the crowd. The firing continued for about 10 to 15 minutes and it stopped only after the ammunition exhausted.
- According to official report 379 people were killed and 1137 wounded in the incident. There was a nationwide protest against this massacre and Rabindranath Tagore renounced his knighthood as a protest.

Khilafat Movement (1920)

- The chief cause of the Khilafat Movement was the defeat of Turkey in the First World War.
- The Muslims in India were upset over the British attitude against Turkey and launched the Khilafat Movement.
- Ali brothers, *Mohd Ali* and *Shaukat Ali* started this movement. It was jointly led by the Khilafat leaders and the Congress.

Non-Co-operation Movement (1920-22)

- Mahatma Gandhi announced his plan to begin Non-Cooperation with the government as a sequel to the Rowlatt Act, Jallianwala Bagh massacre and the Khilafat Movement. It was approved by the Indian National Congress at the Nagpur session in December, 1920.
- The Congress observed the Non-Co-operation movement in 1920. The main aim of this movement was to attain Swaraj through non-violent and peaceful means.
- The whole movement was abruptly called off on 11th February, 1922 by Gandhi following the Chauri-Chaura incident in the Gorakhpur district of U.P. Many top leaders of the country were stunned at this sudden suspension of the Non-Co-operation Movement.
- On 5th February an angry mob set fire to the police station at *Chauri-Chaura* and twenty two police men were burnt to death.

Swaraj Party

- Leaders like Motilal Nehru and Chittranjan Das formed a separate group within the Congress known as the Swaraj Party on 1 January, 1923.
- The Swarajists wanted to contest the council elections and wreck the government from within.

Simon Commission (1927)

- The Act of 1919 included a provision for its review after a lapse of ten years. However, the review commission under the chairmanship of Sir John Simon was appointed by the British Government two years earlier of its schedule in 1927.
- Indian leaders opposed the commission, as there were no Indians in it, they cried *Simon Go Back*.
- The government used brutal repression and at Lahore, *Lala Lajpat Rai* was severely beaten in lathi-charge.

Nehru Report (1928)

- The Secretary of State, Lord Birkenhead, challenged the Indians to produce a Constitution that would be acceptable to all. The challenge was accepted by the Congress, which convened an all party meeting on 28 February, 1928.

- A committee consisting of eight was constituted to draw up a blueprint for the future Constitution of India. It was headed by Motilal Nehru. The Report published by this Committee came to be known as the Nehru Report.

Lahore Session (1929)

- On Dec. 19, 1929, under the Presidentship of J.L. Nehru, the INC, as its Lahore session, declared Poorna Swaraj (Complete Independence) as its ultimate goal.
- On Dec. 31, 1929, the newly adopted tricolour flag was unfurled and Jan. 26, 1930 was fixed as the First Independence Day, which was to be celebrated every year.

Dandi March (1930)

- On 12th March, 1930, Gandhi began his famous March to Dandi with his chosen 79 followers to break the salt laws. He reached the coast of Dandi on 5 April, 1930 after marching a distance of 200 miles and on 6 April formally launched the Civil Disobedience Movement by breaking the salt laws.

Civil Disobedience Movement

- Countrywide mass participation by women.
- The Garhwal soldiers refused to fire on the people at Peshawar.

Round Table Conference

- The first Round Table Conference was held in November 1930 at London and it was boycotted by the Congress.
- On 8 March, 1931 the Gandhi-Irwin Pact was signed. As per this pact, Mahatma Gandhi agreed to suspend the Civil-Disobedience Movement and participate in the Second-Round Table Conference.
- In September 1931, the Second Round Table Conference was held at London. Mahatma Gandhi participated in the Conference but returned to India disappointed.
- In January 1932, the Civil-Disobedience Movement was resumed.

Poona Pact (1932)

- The idea of separate electorate for the depressed classes was abandoned, but seats reserved for them in the provincial legislature were increased.
- Thus, Poona Pact agreed upon a joint electorate for upper and lower castes.

Demand for Pakistan

- *Chaudhary Rehmat Ali* gave the term *Pakistan* in 1933.
- In March 1940, the Muslim League demanded the creation of Pakistan.

Cripps Mission (1942)

- The British Government in its effort to secure Indian co-operation in the Second World War sent Sir Stafford Cripps to India on 23 March, 1942. This is known as Cripps Mission.
- The main recommendations of Cripps was the promise of Dominion Status to India.
- Congress rejected it. Gandhi called Cripp's proposals as a "Post-dated Cheque".

Quit India Movement (1942-1944)

- The All India Congress Committee met at Bombay on 8 August, 1942 and passed the famous Quit India Resolution. On the same day, Gandhi gave his call of 'do or die'.
- On 8th and 9th August, 1942, the government arrested all the prominent leaders of the Congress. Mahatma Gandhi was kept in prison at Poona. Pandit Jawaharlal Nehru, Abul Kalam Azad, and other leaders were imprisoned in the Ahamednagar Fort.
- Quit India Movement was the final attempt for country's freedom.

Indian National Army (INA)

- On July 2, 1943, Subhash Chandra Bose reached Singapore and gave the rousing war cry of 'Dilli Chalo'. He was made the President of Indian Independence League and soon became the supreme commander of the Indian National Army. He gave the country the slogan of Jai Hind.
- INA had three fighting brigades names after Gandhi, Azad and Nehru. Rani of Jhansi Brigade was an exclusive women force. INA headquarters at Rangoon and Singapore.

Cabinet Mission (1946)

- The Cabinet Mission put forward a plan for solution of the constitutional problem. A proposal was envisaged for setting up an Interim

Government, which would remain in office till a new government was elected on the basis of the new Constitution framed by the Constituent Assembly.

- Elections were held in July 1946 for the formation of a Constituent Assembly.
- Muslim league observed the *Direct Action Day* on 16 August, 1946.
- An Interim Government was formed under the leadership of Jawaharlal Nehru on 2 September, 1946.

Mountbatten Plan (1947)

- On 20 February 1947, Prime Minister Atlee announced in the House of Commons the definite intention of the British Government to transfer power to responsible Indian hands by a date not later than June 1948.
- Lord Mountbatten armed with vast powers became India's Viceroy on 24 March, 1947. The partition of India and the creation of Pakistan appeared inevitable to him.
- After extensive consultation Lord Mountbatten put forth the plan of partition of India on 3 June, 1947. The Congress and the Muslim League ultimately approved the Mountbatten Plan.

Indian Independence Act, 1947

- The salient features of this Act was the partition of the country into India and Pakistan would come into effect from 15 August, 1947.
- On 15th August, 1947 India, and on the 14th August Pakistan came into existence as two independent states.
- Lord Mountbatten was made the first Governor General of Independent India, whereas Mohammad Ali Jinnah became the first Governor General of Pakistan.
- C. Rajagopalachari became the first and last Indian Governor-General of India. When India became a Republic on 26 January, 1950 Dr. Rajendra Prasad became the first President of our country.

☞ Socio-Religious Movements and Organisation

Year	Place	Name of the Organisation	Founder
1815	Calcutta	Atmiya Sabha	Ram Mohan Roy
1828	Calcutta	Brahmo Samaj	Ram Mohan Roy
1829	Calcutta	Dharma Sabha	Radhakanta Dev
1839	Calcutta	Tattvabodhini Sabha	Debendranath Tagore
1840	Punjab	Nirankaris	Dayal Das, Darbara Singh, Rattan Chand etc.
1844	Surat	Manav Dharma Sabha	Durgaram Manchharam
1849	Bombay	Paramhansa Mandli	Dadoba Pandurung
1857	Punjab	Namdharis	Ram Singh
1861	Agra	Radha Swami Satsang	Tulsi Ram
1866	Calcutta	Brahmo Samaj of India	Keshab Chandra Sen
1866	Deoband	Dar-ul-Ulum	Maulana Hussain Ahmed
1867	Bombay	Prarthna Samaj	Atmaram Pandurung
1875	Bombay	Arya Samaj	Swami Dayanand Saraswati
1875	New York (USA)	Theosophical Society	Madam H.P. Blavatsky and Col. H.S. Olcott
1878	Calcutta	Sadharan Brahmo Samaj	Anand Mohan Bose
1884	Pune (Poona)	Deccan Education Society	G.G. Agarkar
1886	Aligarh	Muhammadan Educational Conference	Syed Ahmad Khan
1887	Bombay	Indian National Conference	M.G. Ranade
1887	Lahore	Deva Samaj	Shivnarayan Agnihotri
1894	Lucknow	Nadwah-ul-Ulama	Maulana Shibli Numani
1897	Belur	Ramakrishna Mission	Swami Vivekananda
1905	Bombay	Servents of Indian Society	Gopal Krishna Gokhale
1909	Pune (Poona)	Poona Seva Sadan	Mrs. Ramabai Ranade and G.K. Devadha
1911	Bombay	Social Service League	N.M. Joshi
1914	Allahabad	Seva Samiti	H.N. Kunzru

☞ Newspapers and Journals

• Bengal Gazette (1780) (India's first newspaper)	James Angustus Hikky
• Kesari	B.G. Tilak
• Maratha	B.G. Tilak
• Sudharak	G.K. Gokhale
• Amrit Bazar Patrika	Shishir Kumar Ghosh and Motilal Ghosh
• Yugantar	Bhupendranath Datta and Birender Kumar Ghosh
• Bombay Chronicle	Firoze Shah Mehta
• New India (Daily)	Annie Besant

☞ Books and Authors

• Causes of the Indian Mutiny	Sir Syed Ahmed Khan
• Ghulam Giri	Jyotiba Phule
• Anandmath	Bankim Chand Chatterjee
• Satyarth Prakash	Swami Dayanand
• Unhappy India	Lala Lajpat Rai
• India Divided	Dr. Rajendra Prasad
• The Discovery of India	J.L. Nehru
• Neel Darpan	Dinbandhu Mitra
• Hind Swaraj	M.K. Gandhi
• What Congress and Gandhi have done to the untouchables	Dr. B.R. Ambedkar

☞ Important Sayings

'Back to Vedas'	Dayanand Saraswati
'Dilli Chalo!'	Subhash Chandra Bose's battle cry of *Azad* Hind Fauj
'Do or Die'	Mahatma Gandhi (while launching Quit India movement in 1942)
'Give me blood and I will give you freedom'	Subhash Chandra Bose (in his address to soldiers of Azad Hind Fauj)
'My ultimate aim is to wipe every tear from every eye'	Jawaharlal Nehru
'Swaraj is my birthright and I will have it'	Bal Gangadhar Tilak
'Inqualab Zindabad'	Bhagat Singh
'Jai Jawan, Jai Kisan'	Lal Bahadur Shastri
'Sarfaroshi ki tamanna Ab Hamare Dil mein Hai'	Ram Prasad Bismill
'Saare Jahan Se Achcha, Hindustan Hamara'	Dr. Mohammed Iqbal
'Hindi, Hindu, Hindustan'	Bhartendu Harishchandra
'Vande Mataram'	Bankim Chandra Chatterjee

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4 Indian Geography

- India extends between 8°4' N and 37°6' N latitudes and between 68°7' E and 97°2' E longitudes.
- India, has a total geographic area of 32,87,263 sq. km. This is only 2.42 per cent of the total geographic area of the world but holds 17.5 per cent of the world's population.
- The 23½° N, which is the Tropic of Cancer, runs across the country. India has a length of 3214 km from north-to-south and 2933 km from east-to-west. It has a land frontier of 15200 km.
- The total length of the coastline of the mainland, Lakshadweep Islands and Andaman and Nicobar Islands is 7,516.6 km.
- India shares its common border with Afghanistan and Pakistan in the north-west, China and Bhutan in the north, and Bangladesh in the east. In the south, Sri Lanka is separated from India by a strait, known as the Palk Strait.
- 82°30' E longitude is considered as the Indian Standard Meridian. The local time of this longitude is taken as the Indian Standard Time (IST). This is 5½ hours ahead of the Greenwich Mean Time.
- India is the second most populous country in the world with a population of 1.21 billion, which is 17.44% of the world.
- India shares longest boundary with Bangladesh (4053 km), followed by China (3380 km), Pakistan (2912 km), Nepal (1690 km), Myanmar (1463 km), Bhutan (605 km) and Afghanistan (88 km).
- In India, the Tropic of Cancer (23.5° N latitude) passes through 8 states (Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram).
- Indian subcontinent is located in the Northern and Eastern hemisphere.
- Andaman and Nicobar Islands in the Bay of Bengal; Lakshadweep, Amindivi and Minicoy in the Arabian Sea.
- Ocean India lies midway between the Far East and Middle East. The trans-Indian Ocean routes connecting the industrially developed countries of Europe in the West and the under developed countries of East Asia pass close by Indian subcontinent is surrounded by Arabian Sea in the South-West and Bay of Bengal in the South-East.
- India is bordered on three sides by water and on one by land, it is also a peninsula.
- There are 28 States, and 7 Union Territories and 1 National Capital Territory (Delhi) in India.

Highest Peaks of India

Highest Peak	Height (in m)	State
Mt. K2	8611	PoK (India)
Kanchenjunga	8598	Sikkim
Nanda Devi	7817	Uttarakhand
Saltoro Kangri	7742	Jammu and Kashmir
Kangto	7090	Arunachal Pradesh
Reo Purgyil	6816	Himachal Pradesh
Saramati	3841	Nagaland
Sandakphu	3636	West Bengal
Khayang	3114	Manipur
Anaimudi	2695	Kerala
Dodda Betta	2636	Tamil Nadu

Important Sanctuaries and National Park

Name	Location	Reserve for
Achanakmar Sanctuary	Bilaspur, Chhattisgarh	Tiger, boar, chital, sambar, bison
Bandhavgarh National Park	Shahdol, Madhya Pradesh	Tiger, panther, chital, nilgai, wild boar
Bandipur Sanctuary	Border of Karnataka and Tamil Nadu	Elephant, tigers, panther, sambar, deer, birds
Banerghatta National Park	Bangalore, Karnataka	Elephant, chital, deer, grey partridges, green pigeon
Bhadra Sanctuary	Chikmagalur, Karnataka	Elephant, chital, panther, sambar, wild boar
Bhimabandh	Monghyr, Bihar	Tiger, leopard, sambar, wild boar, chital, water birds
Bori Sanctuary	Hoshangabad, Madhya Pradesh	Tiger, panther, sambar, chital, wild boar, barking deer
Borivili National Park	Mumbai	Panther, sambar, langur, wild boar, chinkara
Chandraprabha Sanctuary	Near Varanasi, Uttar Pradesh	Famous for Gir lions, chital, sambar
Corbett National Park	Nainital, Uttarakhand	Tiger, leopard, elephant, sambar (named in memory of Jim Corbett)
Dachigam Sanctuary	Dachigam, Kashmir	Kashmiri stag
Dalma Sanctuary	Singhbhum, Jharkhand	Elephant, leopard, wild boar, barking deer
Dandeli Sanctuary	Dharwar, Karnataka	Tiger, panther, elephant, chital, sambar, wild boar
Dudhwa National Park	Lakhimpurkheri, Uttar Pradesh	Tiger, panther, sambar, chital, nilgai, barking deer
Gandhi Sagar Sanctuary	Mandsaur, Madhya Pradesh	Chital, sambar, chinkara, barking deer, wild birds
Garampani Sanctuary	Diphu, Assam	Elephant, leopard, wild buffalo, langur
Ghana Bird Sanctuary	Bharatpur, Rajasthan	Water birds, black-buck, chital, sambar
Gir Forest	Junagarh, Gujarat	India's biggest wildlife sanctuary famous for Gir lions
Gautam Buddha Sanctuary	Gaya, Bihar	Tiger, leopard, sambar, chital, barking deer
Hazaribagh Sanctuary	Hazaribagh, Jharkhand	Tiger, leopard, chital, nilgai, sambar, wild cat
Intangki Sanctuary	Kohima, Nagaland	Elephant, gaur, tiger, panther, barking deer, wild boar
Jaldapara Sanctuary	West Bengal	Rhinoceros
Kawal Sanctuary	Adilabad, Andhra Pradesh	Tiger, panther, gaur, chital, wild boar
Kaziranga National Park	Jorhat, Assam	Horned rhinoceros, gaur, elephant, leopard, wild buffalo
Khangchandzenda National Park	Gangtok, Sikkim	Snow leopard, musk deer, Himalayan boar
Kinnersani Sanctuary	Khamrsan, Andhra Pradesh	Tiger, panther, gaur, chital, sambar, nilgai

Name	Location	Reserve for
Kolleru Pelicanary	Elluru, Andhra Pradesh	Pelicans, painted stroke
Nogerhole National Park	Coorg, Karnataka	Elephant, tiger, panther, sambar, chital
Namdafa Sanctuary	Tirap, Arunachal Pradesh	Elephant, panther, sambar, tiger, chital, king cobra
Nawegaon National Park	Bhandara, Maharashtra	Tiger, panther, sambar, chital, nilgari
Pachmarhi Sanctuary	Hoshangabad, Madhya Pradesh	Tiger, panther, boar, sambar, nilgai, barking deer
Pakhal Sanctuary	Warangal, Telangana	Tiger, panther, sambar chital, nilgai
Parambikulam Sanctuary	Palghat, Kerala	Tiger, leopard, gaur, elephant, nilgai, chital
Pench National Park	Nagpur, Maharashtra	Tiger, panther, gaur, sambar, chital, nilgai
Periyar Sanctuary	Idukki, Kerala	Elephant, tiger, panther, gaur, nilgai, sambar, wild beer
Ranganthittoo Bird Sanctuary	Islands in river Cauvery in Karnataka	Important bird sanctuary
Rhola National Park	Kulu, Himachal Pradesh	Snow-leopard, brown boar, musk deer, snowcock, new pigeon
Sariska Sanctuary	Alwar, Rajasthan	Tiger, panther, sambar, nilgai, chital, chinkara
Sharaswathy Valley Sanctuary	Shimoga, Karnataka	Elephant, tiger, panther, sambar, gaur, chital, wild boar
Shikari Devi Sanctuary	Mandi, Himachal Pradesh	Black boar, musk deer, panther, leopard, partridge
Shivpuri National Park	Shivpuri, Madhya Pradesh	Tiger, panther, sambar, hyena, sloth, boar, nilgai
Similipal Sanctuary	Mayurbhanj, Odisha	Elephant, tiger, leopard, gaur, chital
Someshwara Sanctuary	Canara, Karnataka	Tiger, Panther, Wild Boar, Leopard
Sunderban Tiger Reserve	South 24 parganas, West Bengal	Tiger, deer, wild boar, crocodile, Gangetic dolphin
Sonai Rupa Sanctuary	Tezpur, Assam	Elephant, sambar, wild boar, one-horned rhinoceros
Tadoda National Park	Chandrapur, Maharashtra	Tiger, panther, sambar, nilgai, chinkara, chital
Todwai Sanctuary	Warangal, Telangana	Tiger, panther, sambar, gaur, jungle cat
Tansa Sanctuary	Thane, Maharashtra	Panther, sambar, chital, four-horned antelope
Tungabhadra Sanctuary	Bellary, Karnataka	Panther, chital, sloth boar, four-horned antelope
Valvadore National Park	Bharnagar, Gujarat	Wolf, black buck
Vedanthangal Bird Sanctuary	Tamil Nadu	Important bird sanctuary
Wynad Sanctuary	Cannanore and Kozhikode, Kerala	Elephant, gaur, sambar, chital, wild boar, deer
Wild Ass Sanctuary	Little Rann of Kutch, Gujarat	Wild ass, wolf, nilgai, chinkara

Biosphere Reserve of India

Eleven of the eighteen Biosphere Reserve are a part of the World Network of Biosphere Reserves, based on the UNESCO Man and the Biosphere (MAB) Programme list.

Biosphere Reserves of India in UNESCO List

Name	States	Year
Nilgiri Biosphere Reserve	Tamil Nadu, Kerala, Karnataka	2000
Gulf of Mannar Biosphere Reserve	Tamil Nadu	2001
Sundarbans Biosphere Reserve	West Bengal	2001
Nanda Devi Biosphere Reserve	Uttarakhand	2004
Nokrek Biosphere Reserve	Meghalaya	2009
Pachmarhi Biosphere Reserve	Madhya Pradesh	2009
Simlipal Biosphere Reserve	Odisha	2009
Great Nicobar Biosphere Reserve	Great Nicobar	2013
Achanakmar-Amarkantak Biosphere Reserve	Chhattisgarh, Madhya Pradesh	2012
Agasthyamalai Biosphere Reserve	Kerala and Tamil Nadu	2016
Khangchendzonga National Park	Sikkim	2018

PROJECT TIGER

- It was launched on April 1, 1973 to ensure maintenance of viable population of the tigers in India.
- There are 50 tiger reserves in the country:

Name of Tiger Reserve	State	Name of Tiger Reserve	State
Bandipur	Karnataka	Bori, Satpura, Panchmarhi	Madhya Pradesh
Kanha	Madhya Pradesh	Katarniaghat	Uttar Pradesh
Melghat	Maharashtra	Kaziranga	Assam
Palamau	Jharkhand	Corbett	Uttarakhand
Ranthambhore	Rajasthan	Manas	Assam
Sunderbans	West Bengal	Similipal	Odisha
Periyar	Kerala	Nagarjunasagar	Andhra Pradesh
Sariska	Rajasthan	Dudhwa	Uttar Pradesh
Buxa	West Bengal	Valmiki	Bihar
Indravati	Chhattisgarh	Tadobo-Andhari	Maharashtra
Namdapha	Arunachal Pradesh	Panna	Madhya Pradesh
Kalakad-Mundanthurai	Tamil Nadu	Bhadra	Karnataka
Pench	Madhya Pradesh	Pakhui-Nameri	Arunachal-Assam
Bandhavgarh	Madhya Pradesh	Nagarhole	Karnataka
Dampha	Mizoram	Nameri	Assam
Pench	Maharashtra		

Important Projects and their Beneficiary States

Project	River	Purpose	Beneficiary States
Farakka Project	Ganga, Bhagirathi	Power, irrigation, avoid accumulation of slit to improve navigation	West Bengal
Beas Project	Beas	Irrigation and power	Rajasthan, Haryana, Punjab and Himachal Pradesh
Rajasthan Canal Project	Sutlej, Beas and Ravi	Irrigation	Rajasthan, Punjab and Haryana
Chambal Project	Chambal	Power and irrigation	Madhya Pradesh and Rajasthan
Kakrapara Project	Tapti	Irrigation	Gujarat
Ukai Project	Tapti	Power and irrigation	Gujarat
Ramganga Multipurpose Project	Chisot stream near Kala	Power and irrigation	Uttar Pradesh
Matatilla Project	Betwa	Multipurpose power and irrigation	Uttar Pradesh and Madhya Pradesh
Tehri Dam Project	Bhilangana, Bhagirathi	Hydroelectricity	Uttarakhand
Rihand Scheme	Rihand	Hydroelectricity	Uttar Pradesh
Kundah Project	Kundah	Hydroelectricity and irrigation	Tamil Nadu
Bhakra Nangal Project	Sutlej	Power and irrigation	Punjab, Himachal Pradesh, Haryana and Rajasthan
Damodar Valley	Damodar	Power, Irrigation and flood control	Bihar and West Bengal, shared by Madhya Pradesh
Hirakud	Mahanadi	Power and irrgation	Odisha
Tunghabhadra Project	Tungabhadra	Power and irrigation	Andhra Pradesh and Karnataka
Nagarjuna Sagar Project	Krishna	Power and irrigation	Andhra Pradesh
Gandak River Project	Gandak	Power and irrigation	Bihar, Uttar Pradesh, Nepal (joint venture of India and Nepal)
Kosi Project	Kosi	Flood control, Power and irrigation	Bihar
Tawa Project	Tawa (Narmada)	Irrigation	Madhya Pradesh
Poochampad Project	Godavari	Irrigation	Andhra Pradesh
Malaprabha Project	Malaprabha	Irrigation	Karnataka
Durgapur Barrage	Damodar	Irrigation and navigation	Karnataka, West Bengal and Jharkhand
Mahanadi Delta Project	Mahanadi	Irrigation	Odisha
Iddukki Project	Periyar	Hydroelectricity	Kerala
Koyna Project	Koyna	Hydroelectricity	Maharashtra

Mineral Resources of India

Resources	Place
Coal	West Bengal (Raniganj, Burdwan, Bankura, Purulia, Birbhum, Jalpaigudi, Darjeeling), Jharkhand (Jharia, Giridih, Kharhawadi, Bokaro, Hazaribagh, Karnapura, Rampur, Palamau), Odisha (Rampur, Hindgir, Talcher, Sambal), Madhya Pradesh and Chhattisgarh (Rewa, Pench valley, Umaria, Korba, Sohagpur, Mand river area, Kanha valley, Betul), etc. Power sector is the largest consumer of coal in India followed by steel industry, cement industry, etc.
Manganese	Maharashtra (Nagpur, Bhandara, Ratnagiri), Madhya Pradesh (Balaghat, Chhindawara), Odisha (Keonjhar, Bonai, Kalahandi), Andhra Pradesh (Kadur, Garibadi).
Copper	Madhya Pradesh (Balaghat), Rajasthan (Khetri), Jharkhand (Singhbhum, Masobani, Surda), Karnataka (Chitradurg, Hassan).
Mica	Jharkhand (Hazaribagh, Giridih, Kodarma), Bihar (Gaya, Bhagalpur), Andhra Pradesh (Guntur, Vizag, Kurnool), Rajasthan (Bhilwara, Udaipur, Jaipur).
Petroleum	Assam (Digboi, Naharkatiya, Badarpur, Masinpur and Pallharia), Gujarat (Ankleshwar, Khambat, Kalol), Mumbai High, Bassein (South of Mumbai High), etc. Recently oil has been discovered in Cauvery basin, Krishna and Godavari basin, Khambat basin, etc.
Iron	India possesses Haematite, a very high-grade iron ore. In Madhya Pradesh (Bailadila, Jabalpur), Goa (North Goa), Karnataka (Bababudan hills, Chikmangalur, Hospet), Jharkhand (Singhbhum, Noamundi), Andhra Pradesh, Odisha. India is the fifth largest exporter of iron ore in the world. Japan is the biggest buyer accounting for about 3/4th of India's total exports. Major ports handling iron ore export are Vishakhapatnam, Paradip, Marmagao and Mangalore.
Bauxite	Chief ore for producing aluminium. In Odisha (Kalahandi, Koraput, Sundargarh, Bolangir, Sambalpur), Jharkhand (Lohardaga, Gumla), Madhya Pradesh (Jabalpur, Mandla, Shahdol, Katni, Balaghat), Maharashtra, Andhra Pradesh, Gujarat, Tamil Nadu.
Gold	Karnataka (Kolar, Hutti, Raichur), Andhra Pradesh (Ramgiri and Yeppamanna goldfields in Chittor and Anantapur districts).
Silver, Zinc & Lead	Rajasthan (Zawar mines near Udaipur), Andhra Pradesh (Mysore, Chitradurg), Karnataka (Kolar mines).
Uranium	Jharkhand (Jaduguda), Rajasthan (Ajmer), Andhra Pradesh (Nellore, Nalgonda), Karnataka (Gulbarga).
Thorium	Kerala coast (From Monazite sand), rocks of Aravallis in Rajasthan

Water Transport

The Government has recognised the following National Waterways of India

NW 1	Allahabad to Haldia	1629 km
NW 2	Sadia to Dhubri on Brahmaputra river	819 km
NW 3	Kollam to Kottapuram	186 km
NW 4	Kakinada to Marakkanam along Godavari and Krishna river	1110 km
NW 5	Mangalgarhi to Paradeep and Talcher to Dhamara Mahanadi and Brahmini	1623 km

Important National Highways

NH	Connects
NH 1	New Delhi-Ambala-Jalandhar-Amritsar
NH 2	Delhi-Mathura-Agra-Kanpur-Allahabad-Varanasi-Kolkata
NH 3	Agra-Gwalior-Nasik-Mumbai
NH 4	Thane and Chennai via Pune and Belgaum
NH 5	Kolkata-Chennai
NH 6	Kolkata-Dhule
NH 7	Varanasi-Kanyakumari (2369 km)
NH 8	Delhi-Mumbai (via Jaipur, Baroda and Ahmedabad)
NH 9	Mumbai-Vijayawada
NH 10	Delhi-Fazika
NH 24	Delhi-Lucknow
NH 26	Lucknow-Varanasi
NH 44	Srinagar-Kanyakumari (3745 km) (Longest National highway)

Railway Zones and Headquarters

Railway Zones	Headquarters
Central	Mumbai VT
Eastern	Kolkata
Northern	New Delhi
North Eastern	Gorakhpur
North-East Frontier	Maligaon-Guwahati
Southern	Chennai
South Central	Secunderabad
South Eastern	Kolkata
Metro Railway	Kolkata
Western	Mumbai Churchgate
East Coast	Bhubaneshwar
East Central	Hajipur
North Central	Allahabad
North Western	Jaipur
South Western	Bangalore (Hubli)
West Central	Jabalpur
South East Central	Bilaspur

Major Ports of India

Name	State	River/Strait/Ocean
Kolkata	West Bengal	Hoogly River
Mumbai (Busiest and biggest)	Maharashtra	Arabian Sea
Chennai (Oldest and artificial)	Tamil Nadu	Bay of Bengal
Cochin (Natural harbour)	Kerala	Arabian Sea
Vishakhapatnam (Deepest Port)	Andhra Pradesh	Bay of Bengal
Paradip	Odisha	Bay of Bengal
New Titucorin (Southernmost)	Tamil Nadu	Bay of Bengal
Marmagao	Goa	Arabian Sea
Kandla (Tidal Port)	Gujarat	Arabian Sea
Mangalore (exports Kudremukh iron-ore)	Karnataka	Arabian Sea
J. L. Nehru Port (Fastest Growing)	Maharashtra	Arabian Sea
Ennore (Most modern in private hands)	Tamil Nadu	Bay of Bengal

Forest and Tree Cover of India (2019)

Class		Area (sq. km)	Percentage of Geographical Area
Forest Cover—	Very Dense Forest	99,278	3.02
	Moderately Dense Forest	3,08,472	9.38
	Open Forest	3,04,499	9.26
Total Forest and Tree Cover		**8,07,276**	**24.56**
	Scrub	46,297	1.41
	Non Forest	25,28,923	76.92
Total Geographical Area		**32,87,469**	**100.00**

Major Tribes in India

Tribes	State	Tribes	State
Abors	Assam	Lepchas	Sikkim
Apatamis	Arunachal Pradesh	Lushais	Tripura
Badagas	Nilgiri (TN)	Murias	Bastar region in Chhattisgarh
Baiga	Madhya Pradesh	Mikirs	Assam
Bhils	Mostly in Madhya Pradesh and Rajasthan, also in Gujarat	Mundas	Jharkhand
Bhotias	Garhwal and Kumaon regions in Uttarakhand	Nagas	(Angami, Sema, Ao, Tangkul, Lahora): Nagaland, some parts in Assam and NEFA region
Chenchus	Andhra Pradesh, Odisha	Oarons (also called Kurukh)	Bihar, Odisha
Gaddis	Himachal Pradesh	Onges	Andaman and Nicobar Islands
Garos	Meghalaya	Santhals	Birbhum region in Bengal, Hazaribagh, Ranchi and Palamau in Jharkhand
Gonds	Madhya Pradesh, also in Bihar, Odisha and Andhra Pradesh	Sentinelese	Sentinel Island, Andaman and Nicobar
Jarawas	Little Andamans	Shompens	Andaman and Nicobar
Khas	Jaunsar-Babar area in U.P.	Todas	Nilgiri (Tamil Nadu)
Khasis	Assam, Meghalaya	Uralis	Kerala
Khonds	Odisha	Warlis	Maharashtra
Kol	Madhya Pradesh		
Kotas	Nilgiri (Tamil Nadu)		
Kuki	Manipur		

Mangrove Cover Report 2017

(Area in sq. km)

Sl. No.	States/UTs	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total Mangrove	Change with respect to ISFR 2015
1.	Andhra Pradesh	0	213	191	404	37
2.	Goa	0	20	6	26	0
3.	Gujarat	0	172	968	1140	33
4.	Karnataka	0	2	8	10	7
5.	Kerala	0	5	4	9	0
6.	Maharashtra	0	88	216	304	82
7.	Odisha	82	94	67	243	12
8.	Tamil Nadu	1	25	23	49	2
9.	West Bengal	999	692	423	2114	8
10.	A & N Islands	399	169	49	617	0
11.	Daman & Diu	0	0	3	3	0
12.	Puducherry	0	0	2	2	0
	Total	**1481**	**1480**	**1960**	**4921**	**181**

Forest Cover of India in 2019

States/UTs	Geographical Area	VDF	MDF	OF	Total Forest Area	Percent of Geographical Area
Andhra Pradesh	1,62,968	1,994	13,938	13,205	29,137	17.88
Arunachal Pradesh	83,743	21,095	30,557	15,036	66,688	79.63
Assam	78,438	2,795	10,279	15,253	28,327	36.11
Bihar	94,163	333	3,280	3,693	7,306	7.76
Chhattisgarh	1,35,192	7,068	32,198	16,345	55,611	41.13
Delhi	1,483	6.72	56.42	132.30	195.44	13.18
Goa	3,702	538	576	1,123	2,237	60.43
Gujarat	1,96,244	378	5,092	9,387	14,857	7.57
Haryana	44,212	28	451	1,123	1,602	3.62
Himachal Pradesh	55,673	3,113	7,126	5,195	15,434	27.72
Jammu & Kashmir*	53,258	4,203	7,952	8,967	21,122	39.66
Ladakh	1,69,421	78	660	1,752	2,490	1.47
Jharkhand	79,716	2,603	9,687	11,321	23,611	29.62
Karnataka	1,91,791	4,501	21,048	13,026	38,575	20.11
Kerala	38,852	1,935	9,508	9,701	21,144	54.42
Madhya Pradesh	3,08,252	6,676	34,341	36,465	77,482	25.14
Maharashtra	3,07,713	8,721	20,572	21,485	50,778	16.50
Manipur	22,327	905	6,386	9,556	16,847	75.46
Meghalaya	22,429	489	9,267	7,363	17,119	76.33
Mizoram	21,081	157	5,801	12,048	18,006	85.41
Nagaland	16,579	1,273	4,534	6,679	12,486	75.31
Odisha	1,55,707	6,970	21,552	23,097	51,619	33.15
Punjab	50,362	8	801	1,040	1,849	3.67
Rajasthan	3,42,239	78	4,342	12,210	16,630	4.86
Sikkim	7,096	1,102	1,552	688	3,342	47.10
Tamil Nadu	1,30,060	3,605	11,030	11,729	26,364	20.27
Telangana	1,12,077	1,608	8,787	10,187	20,582	18.36
Tripura	10,486	654	5,236	1,836	7,726	73.68
Uttar Pradesh	2,40,928	2,617	4,080	8,109	14,806	6.15
Uttarakhand	53,483	5,047	12,805	6,451	24,303	45.44
West Bengal	88,752	3,019	4,160	9,723	16,902	19.04
A & N Islands	8,249	5,678	684	381	6,743	81.74
Chandigarh	114	1.36	14.24	6.43	22.03	19.32
Dadra & Nagar Haveli	491	0	80	127	207	42.16
Daman & Diu	111	1.40	5.69	13.40	20.49	18.46
Lakshdweep	30	0	16.09	11.01	27.10	90.33
Puducherry	490	0	17.66	34.75	52.41	10.70
Total	**32,87,469**	**99,278**	**3,08,472**	**3,04,499**	**7,12,249**	**21.67**

** Includes Jammu & Kashmir area outside LoC that is under illegal occupation of Pakistan and China.*

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5 Capital/State

STATES AND UNION TERRITORIES OF INDIA

States of India

	States	*Capital*	*Principal Language(s)*	*Area in (sq. km)*
	1	2	3	4
1.	Andhra Pradesh	Amaravati	Telugu, Urdu	1,60,205
2.	Arunachal Pradesh	Itanagar	Monpa, Miji	83,743
3.	Assam	Dispur	Assamese	78,438
4.	Bihar	Patna	Hindi	94,163
5.	Chhatisgarh	Raipur	Hindi	1,35,191
6.	Goa	Panaji	Konkani, Marathi	3,702
7.	Gujarat	Gandhi Ngr	Gujarati	1,96,024
8.	Haryana	Chandigarh	Hindi	44,212
9.	Himachal Pradesh	Simla	Hindi, Pahari	55,673
10.	Jharkhand	Ranchi	Hindi, Santhali	79,714
11.	Karnataka	Bengaluru	Kannada	1,91,791
12.	Kerala	Thiruva-nanthapuram	Malayalam	38,863
13.	Madhya Pradesh	Bhopal	Hindi	3,08,000
14.	Maharashtra	Mumbai	Marathi	3,07,713
15.	Manipur	Imphal	Manipuri	22,327
16.	Meghalaya	Shillong	Khasi, Garo, English	22,429
17.	Mizoram	Aizawl	Mizo, English	20,987
18.	Nagaland	Kohima	Angami, Ao, Chang	16,579
19.	Odisha	Bhubaneswar	Odiya	1,55,707
20.	Punjab	Chandigarh	Punjabi	50,362

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	1	2	3	4
21.	Rajasthan	Jaipur	Hindi, Rajasthani	3,42,239
22.	Sikkim	Gangtok	Bhutia, Nepali, Lepcha	7,096
23.	Tamil Nadu	Chennai	Tamil	1,30,058
24.	Tripura	Agartala	Bengali, Kakborek	10,491
25.	Uttarakhand	Dehradun*	Hindi, Garhwali	53,483
26.	Uttar Pradesh	Lucknow	Hindi, Urdu	2,40,928
27.	West Bengal	Kolkata	Bengali	88,752
28.	Telangana	Hyderabad	Telugu, Urdu	1,14,840
Union Territories				
1.	Andaman & Nicobar Islands	Port Blair	Hindi, Nicobarese	8,249
2.	Chandigarh	Chandigarh	Hindi, Punjabi	114
3.	Dadra & Nagar Haveli and Daman & Diu	Daman	Gujarati, Hindi	603
4.	Delhi	Delhi	Hindi, Urdu, Punjabi	1,483
5.	Lakshadweep	Kavaratti	Malayalam	32
6.	Puducherry	Puducherry	Tamil	479
7.	Jammu & Kashmir	Srinagar/Jammu	Kashmiri, Dogri, Urdu	2,22,236(1)
8.	Ladakh	Leh	Ladakhi	—

Special Features

States :

(i) Largest population — Uttar Pradesh

(ii) Highest density of population — Bihar

(iii) Lowest density of population — Arunachal Pradesh

(iv) Largest in area — Rajasthan

(v) Highest literacy — Kerala

(vi) Minimum population — Sikkim

(vii) Minimum area — Goa

(viii) First to achieve 100% electrification — Haryana

(ix) Lowest literacy — Bihar

Union Territories :

(i) Largest in population — Delhi

(ii) Minimum population — Lakshadweep

(iii) First to achieve 100% literacy —Lakshadweep

(iv) Highest density of population — Delhi

Census 2011: Since 1881 census operations take place regularly every ten years. According to 2011 census, the total population of India was 1,21,08,54,977 (62.3 crore male and 58.7 crore female).

Some Special Features: (1) Average density of population — 382 per sq km. **(2)** Literacy — Total 73.0% (male — 80.9%; female — 64.6%). **(3)** Kerala has more women than men i.e. 1084 women for every 1000 men.

(1) Includes 78,114 sq km under illegal occupation of Pakistan, 5,180 sq km illegally handed over by Pakistan to China and 37,555 sq km under illegal occupation of China.

Note: The figures are based on Census of India 2011.

* Provisional Capital.

6 General Science

IMPORTANT INVENTIONS

Name of Invention	*Inventor*	*Nationality*	*Year*
Aeroplane	Orville & Wilbur Wright	U.S.A.	1903
Ball-Point Pen	John J. Loud	U.S.A.	1888
Barometer	Evangelista Torricelli	Italy	1644
Bicycle	Kirkpatrick Macmillan	Britain	1839-40
Bifocal Lens	Benjamin Franklin	U.S.A.	1780
Car (Petrol)	Karl Benz	Germany	1888
Celluloid	Alexander Parkes	Britain	1861
Cinema	Nicolas & Jean Lumiere	France	1895
Clock (mechanical)	I-Hsing & Liang Ling-Tsan	China	725
Diesel Engine	Rudolf Diesel	Germany	1895
Dynamo	Hypolite Pixii	France	1832
Electric Lamp	Thomas Alva Edison	U.S.A.	1879
Electric Motor (DC)	Zenobe Gramme	Belgium	1873
Electric Motor (AC)	Nikola Tesla	U.S.A.	1888
Electro-magnet	William Sturgeon	Britain	1824
Electronic Computer	Dr. Alan M. Turing	Britain	1943
Film (moving outlines)	Louis Prince	France	1885
Film (musical sound)	Dr. Le de Forest	U.S.A.	1923
Fountain Pen	Lewis E. Waterman	U.S.A.	1884
Gramophone	Thomas Alva Edison	U.S.A.	1878
Helicopter	Etienne Oehmichen	France	1924
Jet Engine	Sir Frank Whittle	Britain	1937
Laser	Charles H. Townes	U.S.A.	1960
Lift (Mechanical)	Elisha G. Otis	U.S.A.	1852
Locomotive	Richard Trevithick	Britain	1804
Machine Gun	James Puckle	Britain	1718
Microphone	Alexander Graham Bell	U.S.A.	1876
Microscope	Z. Janssen	Netherlands	1590
Motor Cycle	G. Daimler	Germany	1885
Photography (on film)	John Carbutt	U.S.A.	1888
Printing Press	Johann Gutenberg	Germany	c.1455
Razor (safety)	King C. Gillette	U.S.A.	1895
Refrigerator	James Harrison & Alexander Catlin	U.S.A.	1850
Safety Pin	Walter Hunt	U.S.A.	1849
Sewing machine	Barthelemy Thimmonnier	France	1829
Ship (steam)	J.C. Perier	France	1775
Ship (turbine)	Hon. Sir C. Parsons	Britain	1894
Skyscraper	W. Le Baron Jenny	U.S.A.	1882
Slide Rule	William Oughtred	Britain	1621

Name of Invention	Inventor	Nationality	Year
Steam Engine (condenser)	James Watt	Britain	1765
Steel Production	Henry Bessemer	Britain	1855
Steel (stainless)	Harry Brearley	Britain	1913
Submarine	David Bushnell	U.S.A.	1776
Tank	Sir Ernest Swinton	Britain	1914
Telegraph	M. Lammond	France	1787
Telegraph Code	Samuel F.B. Morse	U.S.A.	1837
Telephone (perfected)	Alexander Graham Bell	U.S.A.	1876
Television (mechanical)	John Logie Baird	Britain	1926
Television (electronic)	P.T. Farnsworth	U.S.A.	1927
Thermometer	Galileo Galilei	Italy	1593
Transformer	Michael Faraday	Britain	1831
Transistor	Bardeen, Shockley & Brattain	U.S.A.	1948
Washing Machine (elec.)	Hurley Machine Co.	U.S.A.	1907
Zip-Fastener	W.L. Judson	U.S.A.	1891

IMPORTANT DISCOVERIES

Discovery	Discoverer	Nationality	Year
Aluminium	Hans Christian Oerstedt	Denmark	1827
Atomic number	Henry Moseley	England	1913
Atomic structure of matter	John Dalton	England	1803
Chlorine	C.W. Scheele	Sweden	1774
Electromagnetic induction	Michael Faraday	England	1831
Electromagnetic waves	Heinrich Hertz	Germany	1886
Electromagnetism	Hans Christian Oersted	Denmark	1920
Electron	Sir Joseph Thomson	England	1897
General theory of relativity	Albert Einstein	Switzerland	1915
Hydrogen	Henry Cavendish	England	1766
Law of electric conduction	Georg Ohm	Germany	1827
Law of electromagnetism	Andre Ampere	France	1826
Law of falling bodies	Galileo	Italy	1590
Laws of gravitation & motion	Isaac Newton	England	1687
Laws of planetary motion	Johannes Kepler	Germany	1609-10
Magnesium	Sir Humphry Davy	England	1808
Neptune (Planet)	Johann Galle	Germany	1846
Neutron	James Chadwick	England	1932
Nickel	Axel Cronstedt	Sweden	1751
Nitrogen	Daniel Rutherford	England	1772
Oxygen	Joseph Priestly	England	1772
	C.W. Scheele	Sweden	
Ozone	Christian Schonbein	Germany	1839
Pluto (Planet)	Clyde Tombaugh	U.S.A	1930
Plutonium	G.T. Seaborg	U.S.A	1940
Proton	Ernest Rutherford	England	1919
Quantum Theory	Max Planck	Germany	1900
Radioactivity	Antoine Bacquerel	France	1896
Radium	Pierre & Marie Curie	France	1898
Silicon	Jons Berzelius	Sweden	1824
Special theory of relativity	Albert Einstein	Switzerland	1905
Sun as centre of solar system	Copernicus	Poland	1543
Uranium	Martin Klaproth	Germany	1789
Uranus (Planet)	William Herschel	England	1781
X-rays	Wilhelm Roentgen	Germany	1895

Scientific Instruments

Name of Instrument	*Used for*
Altimeter	measuring altitude
Ammeter	measuring strength of an electric current
Anemometer	measuring the velocity of wind
Audiometer	measuring level of hearing
Barometer	measuring atmospheric pressure
Callipers	measuring the internal and external diameters of tubes
Calorimeter	measuring quantity of heat
Compass	finding out direction
Dynamo	converting mechanical energy into electrical energy
Galvanometer	detecting and determining the strength of small electric currents
Hydrometer	measuring specific gravity of a liquid
Hygrometer	measuring the humidity in the atmosphere
Lactometer	measuring the purity of milk
Manometer	measuring the gaseous pressure
Micrometer	measuring minute distances, angles, etc.
Microscope	seeing magnified view of very small objects
Photometer	measuring intensity of light from distant stars
Pyrometer	measuring high temperatures
Radar	detecting and finding the presence and location of moving objects like aircraft, missile, etc.
Radiometer	measuring the emission of radiant energy
Rain Gauge	measuring the amount of rainfall
Seismograph	measuring and recording the intensity and origin of earthquake shocks
Sextant	measuring altitude and angular distances between two objects or heavenly bodies
Spectrometer	measuring the refractive indices
Spherometer	measuring the curvature of spherical objects/surface
Sphygmomanometer	measuring blood pressure
Stethoscope	ascertaining the condition of heart and lungs by listening to their function
Stroboscope	viewing objects that are moving rapidly with a periodic motion as if they were at rest
Tachometer	measuring the rate of revolution or angular speed of a revolving shaft
Telescope	viewing magnified images of distant objects
Thermocouple	measuring the temperature inside furnaces and jet engines
Thermometer	measuring human body temperature
Thermostat	regulating constant temperature
Ultrasonoscope	measuring utrasonic sounds
Viscometer	measuring the viscosity of a fluid
Voltmeter	measuring potential difference between two points.

MAJOR SCIENCE RESEARCH INSTITUTIONS

- National Institute of Oceanography, Panaji (Goa)
- National Science Centre, New Delhi
- Central Salt and Marine Chemical Research Institute, Bhavnagar (Gujarat)
- Central Drug Research Institute, Lucknow (Uttar Pradesh)
- Central Leather Research Institute, Chennai (Tamil Nadu)
- Centre for DNA Fingerprinting and Diagonostics, Hyderabad (Telangana)
- Central Road Research Institute, New Delhi

- National Metallurgical Laboratory, Jamshedpur (Jharkhand)
- Central Institute for Cotton Research, Nagpur (Maharashtra)
- Central Marine Fisheries Research Institute, Kochi (Kerala)
- Central Potato Research Institute, Shimla (Himachal Pradesh)
- Central Rice Research Institute, Cuttack (Odisha)
- Central Tobacco Research Institute, Rajahmundr (Andhra Pradesh)
- Indian Agricultural Research Institute, New Delhi
- Cement Research Institute of India, Ballabhgarh (Haryana)
- Indian Cancer Research Centre, Mumbai (Maharashtra)
- Indian Roads Congress, New Delhi
- Atomic Energy Commission, Mumbai (Maharashtra)
- Bhabha Atomic Research Centre, Trombay, Mumbai (Maharashtra)
- Indian Space Research Organisation, Bengaluru (Karnataka)
- Thumba Equatorial Rocket Launching Station, Thumba, Thiruvananthapuram (Kerala)
- Vikram Sarabhai Space Centre, Thiruvananthapuram (Kerala)

FOOD

- It is a nutritive substance taken by an organism for growth, work, repair and maintaining life processes. It provides energy to do work and maintain body heat, provides materials for the growth of the body, makes necessary materials for reproduction and provides materials for the repair of damaged cells and tissues of our body.
- **Carbohydrates:** For a normal person, 400 to 500 gms of carbohydrates are required daily but for sportspersons, growing children and nursing mothers, it is on higher side.
- **Proteins:** They are complex organic com-pounds made up of carbon, hydrogen, oxygen and nitrogen. The building blocks of Protein are Amino acids and there are large number of amino acids.
- Proteins are essential for the growth of children and teenagers, and for maintenance and making good the wear and tear of the body tissues in adults.
- An adult needs about 1 gm of protein per kg of body weight.
- **Fats:** They are esters of long chain fatty acids and an alcohol called glycerol. Fats also contain atoms of carbon, hydrogen and oxygen.
- The main function of fats in the body is to provide a steady source of energy and for this purpose, they are deposited within the body.
- One gm of fat gives 37 kilojoules of energy which is more than double of that given by carbohydrates.
- Fats, the richest source of energy to our body, can be stored in the body for subsequent use. Fats, soluble in organic solvents and insoluble in water, also supply fat-soluble vitamins to our body.
- **Minerals:** Some of the important minerals needed by our body are — iron, iodine, calcium, phosphorus, sodium, potassium, zinc, copper, magnesium, chloride, fluoride and sulphur.
- We get most of the minerals in combined form from plant sources. Deficiency of these minerals causes many diseases.
- **Energy Requirements:** The energy requirement of a body varies according to age, sex, lifestyle, occupation, climate and special situations like pregnancy and lactation.

Age	Energy requirements
5 years	6000 kJ per day
11 years	9000 kJ per day
18 years	11000 kJ per day
Adult (normal work)	9600 kJ per day
Adult (heavy work)	12000 kJ per day
Adult (very heavy work)	16000 kJ per day

- **Vitamins:** They act as catalysts in certain chemical reactions of metabolism in our body.
- They don't provide energy to our body nor form body tissues.
- More than 15 types of vitamins are known and only 2 vitamins — D and K can be formed in our body.

Vitamin	Necessity	Source
Vitamin A	For maintaining healthy eyesight, normal skin and hair	Cod liver oil, fish, eggs, milk, carrot, leafy vegetables.
Vitamin B_1	For growth, carbohydrate metabolism, functioning of heart, nerves and muscles.	Milk, soya-food, meat, whole cereals, green vegetables.
Vitamin C	For keeping teeth, gums and joints healthy, for increasing resistance of body to infection	Citrus fruits, guava, tomatoes.
Vitamin D	For normal growth of bones and teeth	Milk, eggs, butter, cod liver oil, sun light.
Vitamin E	For normal reproduction, functioning of muscles and protection of liver	Green leafy vegetables, milk, butter, tomato.
Vitamin K	For normal clotting of blood and normal functioning of liver	Green leafy vegetables, soyabean, tomato.

- **Roughage:** Though it does not provide any energy to the body, yet keeps the digestive system in order, by helping in retaining water in the body and preserving constitution.
- The main source of roughage are salads, cabbage, corn cob, porridge, vegetables and fruits with stems.

DISEASES

COMMUNICABLE DISEASES

- They are the diseases which can be transmitted from reservoirs of infection or infected person to the healthy but susceptible persons.
- The disease causing agent or the pathogen can be transmitted directly or indirectly.

DEFICIENCY DISEASES

- These occur due to deficiency of some nutrients in the diet or some hormone due to hypo activity or damage to endocrine glands.

Diet Deficiency	Disease
Protein	Kwashiorkor
Protein-energy malnutrition	Marasmus
Vitamin A	Night-blindness, Xerophthalmia
Vitamin B_1	Beri-Beri
Vitamin B_2	Cheilosis
Vitamin B_5	Pellagra
Vitamin C	Scurvy
Vitamin D	Rickets (in children), (in adult) Osteomalacia
Vitamin K	Hypothrombinemia
Iron	Anaemia
Iodine	Goitre
Fluoride	Dental caries
Calcium and phosphorus	Affects formation of bones and teeth
Hormone Deficiency	**Disease**
Insulin	Diabetes
Thyroxine	Cretinism (child), Goitre
STH	Dwarfism, Gigantism

ALLERGIC DISEASE

- In these diseases, body becomes hypersensitive to some foreign agents, allergens, which cause inflammation when come in contact with the body or enter inside the body.
- Foreign agents can be dust, pollens, certain-foods, serum, certain drugs or fabrics.
- The unfavourable response of the body to allergens is called allergic reaction. Asthma and hay fever are allergic diseases.

BACTERIAL DISEASES

- Bacteria are minute organisms which are known to cause a number of diseases:

Disease	Incubation period	Spread through
Tuberculosis	2-10 weeks	Air-borne, droplet infection
Diptheria	2-6 days	Air-borne droplet infection
Cholera	6 hours to 2-3 days	Contaminated food and water. House flies are the vectors

Disease	Incubation period	Spread through
Leprosy	Upto 5 years	Prolonged and intimate contact
Whopping cough	7-14 days	Droplet infection
Tetanus	3-21 days	Entry of cysts through any wound made by sharp object, dog bite or fall on the road
Typhoid	1-3 weeks	Directed and Contact
Plague	2-6 days	Rats and bed-bugs transmit the germs
Pneumonia	1-3 days	Air-borne

VIRAL DISEASES

Disease	Incubation period	Spread through
Chicken-pox	12-20 days	Direct contact with infected persons or infected objects
Smallpox	12 days	Droplet infection
Poliomyalitis	7-14 days	Direct and oral
Measles	10 days	Droplet infection
Mumps	12-26 days	Droplet infection
Rabies	1-3 months	Bite of rabied animal like dogs, monkeys, cates
Influenza	24-28 hours	Air-borne

DISEASES CAUSED BY PROTOZOA

- Amoebiasis (Amoebic dysentery), Malaria, Kala-azar, Trypanosomiasis and Giardiasis are main diseases caused by Protozoans.
- Malaria is a parasitic infection.

SYSTEM OF HUMAN BODY

DIGESTIVE SYSTEM

- The digestive system consists of alimentary canal and digestive glands. Alimentary canal is about 8-10 meters long tube of varying diameter. Food is taken in through mouth.
- The tongue helps in ingestion, chewing, tasting and swallowing of food and mixing of food and saliva.
- Salivary glands secret saliva which helps in digestion of starch. Gastric glands present in the mucosa of the stomach, provide acidic medium for the food digestion.
- Liver, the largest sized, reddish brown gland of body, secrets bile. Liver is present in the right upper part of the abdomen. The bile secreted by the liver is stored in gall bladder. It helps in the emulsification and digestion of fats.
- Pancreas is the second largest gland in human body and secretes pancreatic juices. Intestine also secret juices.

RESPIRATORY SYSTEM

- Oxygen is needed for the oxidation and expelling of carbon dioxide is necessary to avoid its-accumulation. This process of exchange of gases between the environment and the body, is called respiration.
- In some unicellular organisms like aerobic bacteria, amoeba, hydra, etc. there is direct exchange of gases between the carbon dioxide of the body and oxygen of water.
- There is no blood for transport of gases. However, in larger and complex form of animals, specialised respiratory organs are developed.
- Amphibians respire through skin, fishes through gills and mammals birds and reptiles through lungs.
- A normal adult inspires or expires about 500 ml of gas with each breath and about 72 breathes per minutes.

CIRCULATORY SYSTEM

- Main components of the circulatory system are heart, blood vessels and blood.
- Heart is a thick, muscular, contractile and automatic pumping organ. In birds and mammals, heart is divided into four chambers.
- Arteries are thick walled blood vessels which always carry the blood away from the heart to various body parts.
- Veins are thin walled blood vessels which always carry the blood from various parts generally to the heart.

- In an adult healthy person, the normal rate of heart beat at rest is about 70-72 times per minute.

BLOOD

- It is red, opaque, somewhat sticky and viscous fluid in the body of animals.
- It is slightly alkaline (pH = 7.4), heavier than water (sp gr = 1.05) and five times more viscous than distilled water.
- Blood forms 6 to 10% of the body weight.
- An adult, on average, has about 6.8 litres of blood.
- Blood contains plasma and blood corpuscles with the former occupying 55-60% of the volume.
- Plasma transports food components, metabolic wastes and hormones; keeps constant level of pH of blood, maintains body temperature and helps in blood clotting.
- Erythrocytes or red blood corpuscles (RBCs), leukocytes or white blood corpuscles (WBCs) and blood platelets are other parts of the blood.
- Due to the presence of iron containing pigment haemoglobin, RBCs are red in colour. The RBCs are crucial for ex-change of oxygen and carbon dioxide. WBCs are nucleated and non-pigmented cells. They are larger in size than RBCs but far less in number (1 : 600).
- WBCs play an important role in immune system of the body. Blood platelets cause the coagulation of blood and clot formation to prevent excessive bleeding.
- Human blood is divided into four main Groups—A, B, AB and O.
- The plasma of Group A blood contains an anti-B factor and vice-versa, so that people of Groups A and B cannot accept each other's blood.
- Group AB contains neither anti-A nor anti-B factor and people with this group can receive transfusions from both but can give to neither.
- Group O contains both anti-A and anti-B and can receive blood only from Group O but can donate blood to all Groups. Group O is called universal donor because they can donate to all the Groups.
- Group AB is called universal acceptor because they can accept blood from all Groups.

SKELETON SYSTEM

- The frame or the hard structure of the human body is composed from the bones and the organs of making such frame are called skeleton system.

Bones

- Bone is the hardest tissue of the body and form the largest section of the body weight.
- Bones contain organic as well as inorganic matters. With advancing age, the inorganic matter's share increases, causing the bones to become more brittle.
- Long bones such as humerus and femur are hollow while small bones are solid.

EXCRETORY SYSTEM

- In men, excretory system is formed of one pair of kidneys, one pair of ureters, a urinary bladder and a urethra. Kidney is about 10 cm long, bean shaped, dark-red and slightly flattened structure.
- Sweet glands, oil glands, lungs and liver also act as additional excretory organ.
- In case of kidney failure, a man can treated by hemodialysis or transplan-tation of a kidney from a donor's body.

NERVOUS SYSTEM

- The system which controls and coordinates the body functions, retains memory and receives and sends signals, is called the nervous system.
- The nervous system comprises brain, spinal cord, nerves and nerve fibres.
- Human brain weighs about 1200 to 1400 gm. Main parts of the brain are cerebrum, cerebellum and medulla oblongata.
- Cerebrum controls voluntary function and is site of intelligence, will power, emotions, etc.
- Cerebellum controls involuntary functions like heart beat, respiration, etc.
- Spinal cord is about 45 cm long and about 35 gm in weight. It conducts impulses to and from the brain and controls reflex actions of the body.
- Various cranial (arising from of ending into brain) and spinal nerves (arising from spinal cord) control smell, vision, movements of body parts, taste and hearing.

REPRODUCTION SYSTEM

- In this type of reproduction, there is formation and fusion of sex cells, called gametes.
- Organism develops from the zygote through embryo formation.
- It generally involves two parents — male and female.
- The offsprings are different from the parent as variations appear due to new combinations of genes. So, it plays an important role in evolution.
- All higher plants and animals reproduce sexually.

CHROMOSOMES

- Plants and animals have fixed number of chromosomes per cell.
- Genes are located on chromosomes and are responsible for transfer of characteristics from one cell to the next either in the same organism or from parents to offspring.
- Man has 23 pairs of chromosomes, of which one pair is sex chromosomes.
- Males child inherits X chromosomes from the female parent and Y from the male parent.
- Female child receives a X chromosome each from either of its parents.
- Mendel was the first scientist to explain transmission of units from reproductive cells of the parents to the off-springs.

CLONING

- It is the process of producing genetically identical copies of a biological material, starting from a single cell. The original genes are transplanted and thus one can produce organisms of known and desirable characteristics.

GENETIC ENGINEERING

- It is the method of artificial synthesis of new genes and their subsequent transplantation or methods of correcting the defective genes.
- It has helped in producing plants and animals with specific characters.
- So, crippling hereditary diseases can also be cured like hemophilia etc.

DNA FINGERPRINTING

- It consists of examining repetitive DNA in the genome for variations in the length of restriction fragments.
- Every individual has his own pattern, so that fingerprinting can match blood to a particular person, and patterns are inherited from parent to child, allowing the method to identify relationships between individuals.

IN-VITRO FERTILIZATION

- When a sperm and an egg are made to fertilize outside a living body (usually a test tube), it is called in-vitro fertilization.
- This process has been used to impregnate several females who could not do so through natural means.

DISEASES AND THE PARTS OF BODY THEY AFFECT

Disease	*Part of body affected*
AIDS	Immune system of body
Arthritis	Inflammation of joints
Asthma	Lungs
Cataract	Eyes
Conjunctivitis	Eyes
Diabetes	Pancreas
Diphtheria	Throat
Glaucoma	Eyes
Eczema	Skin
Goitre	Front of the neck (due to enlargement of thyroid gland)
Gout	Joints of bone
Jaundice	Liver
Meningitis	Brain or spinal cord
Pleurisy	Pleura (inflammation of)
Polio	motor neurons
Pneumonia	Lungs
Pyorrhoea	Sockets of teeth
Tuberculosis	Lungs
Typhoid	Intestine
Malaria	Spleen
Leukaemia	Blood
Rickets	Bones

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7 Health, Hygiene & Sanitation

HEALTH

Health is the level of functional and metabolic efficiency of a living organism. The World Health Organization (WHO-2006) defined human health in its broader sense as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity". Health, or health and well-being, are also includes a supportive environment, personal security, freedom of choice, social relationships, adequate employment and income, access to educational resources, and cultural identity (Diaz et al., 2006; Millennium Assessment 2005).

Over the last decade, health promotion practitioners have increasingly been asked to think about the relationships between humans and the environment in terms of ecosystems (Brown, 1994) and to adopt an 'ecological' approach to health promotion (Kickbusch, 1989) with the environment an integral part of human development (Hancock, 1993a).

SANITATION AND HYGIENE

Maintaining proper sanitation and good hygiene practices are necessary for healthy living.

Sanitation

Sanitation means all measures that promote:

- Proper disposal of human and animal wastes (solid as well as liquid wastes). It also includes disposal of hazardous wastes from hospitals/ industries/other sources.
- Use and proper maintenance of toilets.
- Avoiding of open defecation.

Maintaining proper standards of sanitation are necessary for improving and protecting health and wellbeing of the people.

Sanitation includes steps to ensure access and use of toilets by everyone. It also includes ways to separate human excreta from coming in contact with other individuals. One of the important factors to maintain proper sanitation is to end the practice of 'open defecation'. This may be done by involving individuals and community members to build, maintain and use toilets. Therefore, sanitation is often associated with our surroundings or environment.

HYGIENE

Hygiene is a set of practices performed for the preservation of health. Hygiene is often associated with our body. According to the World Health Organisation (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases."

One of the most effective ways to protect ourselves and others from diseases is to adopt good practices of personal hygiene. These may include:

- taking bath at least once a day.
- washing hands
  - ❑ after using the toilet.
  - ❑ before preparing food or serving food.
  - ❑ before and after eating food.
  - ❑ if someone around you is infected with cold or any other infectious disease.
  - ❑ after handling pets and domestic animals.
- brushing teeth in the morning and before going to bed.

- rinsing mouth after every meal.
- wearing clean clothes.

We will now try to find out how improper hygiene can affect our health negatively. Have you come across a person with a strong unpleasant body smell. You must have experienced this in a crowded places such as bus, train, etc. You may have also felt that your body is smelly sometime.

When we do not take regular bath our body smells because of sweat. This is particularly true in summer. The foul smell is due to the action of bacteria on sweat.

Similarly, washing hands is essential to remove harmful germs, if any, sticking to our hands. These germs may stick to our body during our day to day activities. These germs are so small that we cannot see them. Regular washing of hands helps to remove these germs, some of which could be a source of disease such as common cold and diarrhoea. Wearing washed and clean clothes also protects us from harmful germs.

When we eat, some tiny food particles remain trapped in the mouth in between the teeth. The action of bacteria on them may give rise to bad breath. Bad breath may also be due to diseases of the teeth, gums and mouth. Regular brushing of teeth and rinsing of mouth removes the food particles to a large extent. If bad breath continues, one must visit the dentist.

IMPORTANT SANITATION SCHEMES IN INDIA

The period 1981–1990 was celebrated worldwide as the International Decade of Water and Sanitation. It reflected global concern about sanitation.

In India, sanitation services in urban areas are provided by municipal bodies. In rural areas these services are provided through state government departments and gram panchayats. In rural areas, the Government of India started the Central Rural Sanitation Programme (CRSP) in 1986, followed by the Total Sanitation Campaign (TSC) in 1999, and the Nirmal Bharat Abhiyan in 2012. The objective of all these schemes was to encourage rural households to build and use toilets, so to accelerate sanitation coverage. Households were provided financial incentives for this.

According to the Ministry of Drinking Water and Sanitation (MDWS), Government of India's Baseline Survey 2013, the above efforts resulted in India's sanitation coverage in rural areas to reach close to 40 per cent. This progress however was not satisfactory as most of the efforts focused more on construction of toilets and not enough on ensuring their use. The Swachh Bharat Mission launched by the Government is an effort to address this issue.

Swachh Bharat Mission

On 2nd October 2014, the Prime Minister, Shri Narendra Modi, launched the Swachh Bharat Mission (SBM). The Mission is being implemented both in urban and rural areas, and aims to create an Open Defecation Free India by 2nd October 2019, which is the 150th birth anniversary of Mahatma Gandhi, the Father of the Nation. It also aims at creating cleaner cities, towns and villages across the country.

The *Swachh Bharat Mission* logo consists of Gandhiji's spectacles and the slogan, *Ek Kadam Swachhata Ki Aur*. The *Swachh Bharat Mission* aims to provide toilet facilities to all, and promote their use at all times. Under the programme, the government provides incentives to households to build and use toilets.

Cleanliness of homes and surroundings and public places like schools, hospitals, offices, bus stands, railway stations and markets, etc., are also important components of the Mission. Good hygiene practices like hand washing after defecation and before meals are being promoted. Hand washing facilities in schools are being set up so that children can wash their hands before and after having their mid day meal.

The *Swachh Bharat Mission* has created a lot of excitement and enthusiasm among citizens. Students in particular have come forward and are participating in awareness and cleanliness activities across the country. Government departments, public and private enterprises, civil society, youth organisations and the general public are participating in the activities. Various events are being held in which mass participation in cleanliness activities and its promotion is seen. Many celebrities have also supported and participated in the programme.

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8 Geography of Jammu & Kashmir

LOCATION

Strategically located Jammu and Kashmir UT constitutes the northern most extremity of India.

J&K Situated between 32.15 degree and 37.05 degree north latitude and 72.35 degree and 83.20 degree east longitude. The UT share international border with Pakistan. Indian States/UT that share borders with J&K are Punjab, Himachal Pradesh & Ladakh (UT).

The UT is well connected with rest of the country by air, rail and road. The Indian Airlines and private airlines operate regular flights to Srinagar and Jammu.

The National Highway 1-A connects the capital cities of Srinagar and Jammu with rest of the country. There are daily passenger trains connect-ing Jammu with most of the major cities of the country. The J&K UT consists of 20 districts.

PHYSIOGRAPHY

The territory of the state is divided into seven physiographic zones closely associated with the structural components of the western Himalayas. These include:

Plains: The plains of the Jammu region are characterized by interlocking sandy alluvial fans that have been deposited during the Pleistocene age by the streams flowing from the foothills and by a much dissected pediment (eroded bedrock surface) covered by loams and loess (fine deposits of silt).

Foothills: Rising from 2,002 to 7,002 ft, the foothills form the outer and inner zones.

Lesser Himalayas: Composed of Permo-Carboniferous volcanic rocks of granite, gneisses, quartz and states, the Pir Panjal constitutes the first mountain rampart comprising the westernmost part of the Lesser Himalayas.

Greater Himalayas: This contains ranges reaching more than 20,013 ft (6,100 m) in altitude. These ranges act as a climatic divide and stop the cold wind coming from Central Asia.

Valley of Kashmir: Between the Pir Panjal and the western end of the Great Himalayan ranges lies a deep asymmetrical basin called the Valley of Kashmir.

Upper Indus Valley: The Valley of the Upper Indus river follows the geological strike (structural trend) westwards from the Tibetan border to the point in the Pakistani sector where, it rounds the great mountainous mass of Nanga Parbat to run southwards in deep gorges cut across the strike. In its upper reaches, gravel terraces flank the river, each tributary builds an alluvial fan in the main valley.

Karakoram: The Karakoram region contains some of the world's highest peaks. As the altitude rises very much and majestic peaks appear; K_2 (Godwin Austin) the second highest peak in the world (28,264 ft or 8,611 m) occupies the most important position.

CLIMATE

Climate exerts a profound influences on the inhabitants of any region. Their social, cultural,

economic and other aspects of life are directly or indirectly governed by climate. The climate of the state ragnes from the burning and the scorching heat of the plains of (Jammu Division) to the snow-capped heights of Gulmarg (Kashmir). All these represent the two different climatic zones.

The extreme variants of climate in Jammu & Kashmir are due to its location and topography. The sheltered valley of Kashmir, however, exhibits an exception to its peripheral region.

Broadly, the UT of Jammu & Kashmir comprises two distinct climatic regions: temperate Kashmir valley, and the humid sub-tropical region of Jammu.

The temperature in the region varies spatially. Mean monthly temperature is lowest in January and highest in July, except in Jammu, where highest temperature is experienced in June. Mean monthly temperature in January varies from –17°C at Drass to 14°C at Jammu. Considering the overall distribution of climatic elements, three units become obvious:

1. The windward (Jammu region)
2. The high altitude Kashmir (Himadri, Pir Panjal)
3. The Kashmir valley

The climate of the Valley of Kashmir has its own peculiarities. The seasons are marked with sudden change and the climate can be divided into six seasons of two months each.

Seasons of the Valley

Season	*Period*	*Local Term*
Spring	16th March to 15th May	Sont
Summer	16th May to 15th July	Retkol (Grishm)
Rainy	16th July to 15th September	Waharat
Autumn	16th September to 15th November	Harud
Winter	16th November to 15th January	Wandah
Ice Cold	16th January to 16th March	Shishir

The aforementioned climatic divide does not apply only to Kashmir valley but also to the parts of Jammu which, like Kashmir valley, are subjected to snowfall and a severe winter. There is such heavy snowfall on the way to Ladakh from the valley that it remains cut off by road for about 5-6 months every year.

MOUNTAINS AND THEIR PASSES

Kashmir valley is enclosed by high mountain-chains on all sides, except for certain passes and a narrow gorge at Baramulla. There are Shivalik hills towards the south and very lofty mountains in the north, the peaks of which always remain covered with snow. There are volcanic mountain too in the state. Some of the famous mountains and their passes are:

Karakoram and Kyunlum: Both these mountain ranges lie to the north and north-east of the state and separate it from Russian, Turkistan and Tibet. In the north-west, Hindukush range continues towards Karakoram ranges, where K2 peak, the second highest peak of the world, is situated. Two lofty peaks of Gasherbrum (8,570 m) and Masherbrum (7,827 m) also lie there. People of Ladakh pass through Karakoram pass (5,352 m) and Nubra pass (5,800 m) while going to Chinese Turkistan and Khattan. One can reach Tibet from Ladakh via Kharudangala pass (5,557 m) and Changla pass (5,609 m).

Zaskar: It is about 600 metres above sea level and separates Indus valley from the Valley of Kashmir. It prevents south-west, coastal winds from reaching Kashmir. Ladakh region terminates at Zojila pass (3,529 m), from where begins the Valley of Kahsmir. Poet pass (5,716 m) is also a famous pass in this range.

Nun Kun: It lies between Ladakh and Kashmir border. It is 7,055.1 m above sea level. To its south-east is situated Kulu and to its north-west is situated Kargil tehsil of Ladakh. One has to pass through Bawalocha pass (4,891 m) to reach Leh (Ladakh) from Kulu.

Nanga Parbat: This range spreads in Gilgit. Its height is 8,107.68 m above sea level and is utterly devoid of vegetation. It was conquered by the Italian mountaineers in 1954. This is now under the unlawful possession of Pakistan.

Burzil: It bifurcates Kashmir and Ladakh on which Burzil pass is situated at a height of 3,200 m above sea level.

Amarnath: Amarnath mountain is famous for its holy Amarnath cave, at a height of 5,372 m above sea level. They have to pass Mahagunas pass (1,475 m) on their way to Shri Amarnathji. Gwasharan (5,450 m) is situated in the Lidar valley towards Pahalgam; on it lies the famous glacier Kolahi. Sheshnag mountain also spreads in this valley. It is called Sheshnag as its peaks resemble the heads of seven big snakes.

Toshmaidan: Toshmaidan (4,270 m) and Kajinag (3,700 m) mountains lie in the inner Himalayas. They ramain clad with snow throughout the year, but during summer when the snow melts, the water flows down into the Jhelum river.

Afarwat: This mountain spreads through the Guimarg valley. The famous spring Alpathar lies on its peak, from which, Nullah Nagal comes out and flows down into the Wular lake.

Pir Panjal: This range separates Kashmir valley from the outer Himalayas and it is about 2,621 km in length and 50 km in breadth. Famous Banihal pass (2,832 m) lies in the shape of a tunnel on its peak, it remains covered with snow during winter making it impassable. Now at a height of 2,200 m above sea level a new tunnel, namely 'Jawahar Tunnel' has been constructed. The tunnel is 2,825 m long and it was opened for traffic on 22nd Dec, 1956. On the other end of this range lie Baramulla pass (1,582 m) and Hajipir pass (2,750 m). Hajipir joins Punch and Uri. During 1965 Indo-Pak War, the Indian Army had occupied this pass. Later on, it was handed over to Pakistan.

Shivalk: These hills extend from the north of the outer plains to middle mountains of the state reaching heights varying from 600 m to 1,500 m above sea level.

Volcanic Peak: One Volcanic Peak 'Soyamji' (1,860 m) is situated in North Machhipura (Handwara) and the other 'Kharewa peak' lies in Tehsil Pahalgam, which is now dead or extinct; the former, however, continued eruption of Lava for about thirteen months during 1934, is now in dormant state. There is a temple on this peak and many sulphur springs are found at the foot of the hill. These volcanic mountains are the cause of earthquakes in Kashmir. So far, twelve devastating earthquakes have occurred in Kashmir. Of these, the earthquake of 1885 was the most devastating. Hundreds of houses collapsed, thousands of people died and there were cracks in the earth as a result of this earthquake.

CROPS

Rice: It is the most dominant crop in the entire state. It can be well grown in the hot and moist climate as well. Paddy crop (rice) is usually transplanted in the third week of May, while in the external plains of Jammu it is transplanted in the beginning of July, on the commencement of monsoon. The valley of Kashmir, in the state is famous as the "Rice Bowl". The Tehsil of Ranbir Singhpura (Jammu) is famous for its Basmati Rice. Rice is majorly grown in the districts of Jammu, Anantnag, Baramulla, Kupwara, Srinagar, Pulwama and Kathua.

Wheat: It is the second, major, significant crop in the state. It needs cold and moist weather conditions to grow. It also needs 30 cm to 50 cm of rainfall. It is a "rabi" crop in Jammu and Kashmir. The fields are ploughed, many-a-time, before sowing the seeds. Wheat is mainly produced in Jammu, Kathua, Udhampur and Rajouri.

Maize: It is one of the most important cereal crop in the state. It needs warm and moist weather conditions. It is mainly used as food for the people living in Kandi areas. It is also used as a green fodder. Around 30 per cent of the gross cropped area of the state, in 1983-84 was reserved for the cultivation of Maize. The leading maize producing areas of Jammu Division are Rajouri, Doda, Poonch, Udhampur etc. The important areas in the Kashmir Division are Kupwara, Baramulla and Anantnag etc.

Saffron: It is the significant cash crop of Jammu and Kashmir. The Saffron crop needs very different weather conditions to grow. The conditions of extreme cold and extreme heat is

not supportive for saffron. Moderate weather conditions with light snowing is ideal for saffron cultivation. This crop is extremely expensive to grow. The labour and seeds costs very high. This is harvested in October and early November. In this period, picking of Saffron flowers just after the disappearance of dew is ideal to get pleasant fragrance. These days Saffron cultivation is being done in various Tehsils of five districts in Kashmir Division. It is mainly grown in Pulwama Tehsil with 75 per cent of the total saffron production.

Shortcomings' in Agriculture

1. Shortage of advanced and modern resources.
2. Damage to the textural and chemical properties.
3. Depletion of the fertile layers of the soil through soil erosion.
4. Agricultural marketing is very expensive in the state. It becomes costly because of the distance between the fruit gardens' and the markets. The hyped transportation costs makes the fruits very expensive, in terms of competing with fruits of other states.

FORESTS

The state has 21,122 sq km under forest area constituting about 39.66% of total geographical area of 53,258 sq km.

District-wise Forest cover of Jammu & Kashmir in 2019 (in sq. km)

District	Shape File Area	Very Dense Forest	Mod. Dense Forest	Open Forest	Total	% of Shape File Area
Anantnag	2,727	126.55	455.28	492.36	1,074.19	39.39
Badgam	1,250	100.85	76.04	164.95	341.84	27.35
Bandipura	2,676	270.85	177.16	194.83	642.84	24.02
Baramulla	2,062	287.57	211.90	370.79	870.26	42.20
Doda	2,411	327.98	703.50	454.45	1,485.93	61.63
Ganderbal	1,620	129.36	179.13	186.01	494.50	30.52
Jammu	2,407	0.00	241.41	526.22	767.63	31.89
Kathua	2,512	108.16	607.96	615.32	1,331.44	53.00
Kishtwar	8,179	235.96	716.41	832.68	1,785.05	21.82
Kulgam	1,265	84.92	99.00	206.32	390.24	30.85
Kupwara	2,744	783.42	408.34	273.19	1,464.95	53.39
Mirpur	3,759	0.00	484.66	753.13	1,237.79	32.93
Muzaffarabad	4,663	873.97	441.86	293.20	1,609.03	34.51
Pulwama	896	15.70	117.72	240.72	374.14	41.76
Punch	4,244	332.28	1,121.33	654.10	2,107.71	49.66
Rajauri	2,635	42.04	424.48	838.78	1,305.30	49.54
Ramban	1,288	70.55	287.17	308.52	666.24	51.73
Reasi	1,932	234.54	393.58	470.29	1,098.41	56.85
Samba	921	0.00	124.26	207.53	331.79	36.02
Shupiyan	505	62.50	37.22	224.33	324.05	64.17
Srinagar	282	0.24	20.03	24.97	45.24	16.04
Udhampur	2,280	115.42	624.03	634.57	1,374.02	60.26
Grand Total	**53,258**	**4,202.86**	**7,952.47**	**8,967.26**	**21,122.59**	**39.66**

FRUITS

Apple

Amri (Ambri Kashmiri): Lawrence describes it as "the most popular apple in Kashmir ..... a sweet fruit ripening in October and keeping its condition for a long time and finding favour with the natives of India for its sweetness and its handsome appearance". Ambri is indigenous to Kashmir and continues to enjoy superiority by virtue of its crisp, sweet flesh and excellent aroma. The fruit is blushed red, striped, medium-sized and oblong to conical in shape with longer storage life. The fruit matures in the last week of September to first week of October. It is an excellent dessert variety.

American trel (American Apirogue) : This variety has crisp juicy, greenish white and sweet flesh and is usually medium-sized, as a result of which it has become very popular with consumers. Oblate-shaped, blushed and patchy red with a smooth surface, it matures in the last week of September. A good dessert variety.

Delicious (Red Delicious): A world-renowned variety. It is one of the most widely grown apples. The fruit is tapering in shape with characteristic five lobes at the apex. Skin is smooth, striped and blushed red. Flesh is fine grained, greenish white, sweet, very juicy and crisp with good aroma. Size is medium to large and it matures by the end of September. A good dessert variety.

Maharaji (White Dotted Red): A large-sized apple with bright red colour on a green base with conspicuous dots. Flesh is crisp, very juicy, acidic and aromatic. The variety sweetens in storage and in an excellent keeper. The fruit matures in late October. It is also a cooking and dessert variety.

Hazaratbali (Benoni): A medium-sized apple with rounds to slightly conical in shape and red to striped skin; white juicy and sweet flesh. It is the earliest variety of apple available from the valley, maturing in mid-July.

Kesri (Cox's Orange Pippin): An old English medium-sized apple; it is round to conical in shape with skin orange red deepening to bright red. The flesh is yellow, firm, crisp, tender and very juicy. A dessert apple with good aroma and sub-acidic taste. The fruit matures in mid August.

Pear

Nakh Kashmiri (Chinese Sandy Pear): This variety gets its name from grained flesh. A conical shaped, small to medium sized variety with crisp, white and juicy flesh. The skin is thick and green in colour that turns yellow on ripening. Carries well in storage and is an excellent dessert variety.

Williams: A widely known English variety. The fruit is large-sized and symmetrical. Skin is yellow with faint blush. The flesh is fine, grained, juicy and sweet. The fruit matures in mid-July. A good dessert variety and the choice of canners.

Cherry

Gilas Double (Bigarreau Napoleon): This variety is large-sized anti attractive with cream-red colour. The flesh is firm and juicy but slightly acidic. A good keeper; excellent for canning, and dessert purposes.

GilasAwal Number (Guigne Pourpera Pecoce): Medium-sized, light red coloured and quite fleshy. The flesh is juicy and sweet with acidic tinge. First to come in the market in May. A good dessert variety.

Gilas Misri (Bigarreau Noir Grossa): Large sized and red coloured; its skin is firm and flesh is sweet and juicy. A good dessert variety.

Walnut

Kashmir walnuts are popular within the country as well as in foreign markets; a source of substantial foreign exchange. On the basis of shell thickness these are grouped as “Burzil”. “Kagzi” and “Wont”; corresponding to “Paper-shelled”. Walnut Kernels are used in confectionery, as dessert and for extraction of oil.

Almond

Kashmir almonds are known for their superiority of taste and are very popular with the consumers. Like walnuts these are also grouped on the basis of shell thickness as "Papery", "Thin-shelled", and "Thick-shelled". Considered as highly nourishing and of great medicinal value, its kernels are used in confectionery as well as dessert. Its trees are the first blooming fruit trees and an enchanting sight that lends glamour to the spring in Kashmir.

Peaches

Quetta: Fruit medium to above medium, pointed, halves acuminate. Skin thick, downy, Yellow base with scattered red patches. Flesh firm, creamy yellow, moderately juicy, sweet with acidic blend when fully ripe. Free stone. The fruit is ready for harvest in 3rd week of August.

Apricot

Gilgati Sweet: Fruit medium, from oblong to rather ovate, slightly irregular in shape. Cavity rather deep to medium in depth, regular and acute. Skin yellow when fresh (brown yellow when dried) sweet, moderately flavoured, stone free kernel sweet. Ready for picking in the last week of June.

Strawberry

Strawberry is earliest fruit available in Srinagar market during April. Sub-tropical areas in Jammu have potential to grow the crop under irrigated condition. It is valued for easy propagation, early maturity, high yield with 5 to 9 per cent sugar. Plants start bearing in second year. Over 2000 varieties of garden strawberry are known with large fruit, weighing 30-70 grams.

Plums

Santa Rosa: Fruit medium, roundish, regular, skin smooth and thin flesh deep red, juicy, sweet and soft full of aroma, stone cling type.

FLORICULTURE

Floriculture sector has been identified as the most focussed segment of horticulture. There is much more income to farmers from flower cultivation due to growing demand for flowers in domestic and foreign markets. To promote this segment floriculture nurseries have been developed where ornamental and medicinal plants are produced, besides the seed multiplication programmes of flower seeds. One of the landmark achievement of floriculture department has been the establishment of Tulip Garden first of its kind of Siraj Bagh Srinagar. Situated on the foothills of the mighty Zabarwan mountains the garden has the distinction of being Asia's largest Tulip garden. The garden remains in full bloom for one month (last week of March to last week of April). The garden witness highest inflow of tourists which includes film making companies for shooting song sequences in this beautiful garden.

FLOWERS

Flower Kerria Japonica: Deciduous, arching, graceful shrub butter cup like, golden yellow flowers are borne along green shoots. From mid to late spring, foliage is bright green.

Flower Visteria: Deciduous, woody-stemmed, twining climber leaflets, scented, pea like violet flowers are carried in Drooping recemes blooms in early spring.

Flower Tulip: Tulips are excellent in the rock Gardens informal bedding, as elegant cut flowers and for containers. A large variety of the hybrids are now available. Flowers mid spring, propagation by bulbs.

Flower Magnolia Liliflora: Deciduous shrub with open habit oval to pear shaped, dark green leaves, large deep purple, flowers, creamy white flushed purple inside.

Flower Chaen-Omelee Speciose: Well branched, spreading shrub dark green glossy leaves and bowl shaped flower about 5 cm across from mid winter to mid spring small to medium, propagation by cutting seeds and layering.

TRANSPORT AND COMMUNICATION

Transport

In the landlocked state like Jammu and Kashmir, road transport is an indispensable means of communication for the regular distribution of essential and other commodities. The government

has given the highest priority to the construction and maintenance of roads.

Railways

The railway line between Jammu and Udhampur, started in 1981-82, was completed by 1997-98. ₹ 142 crores, with an addition of another ₹ 50 crores have been spent on completing it. This railway line has been further extended up to Srinagar at an additional cost of ₹ 1,900 crores.

Anantnag-Qazigund Rail Line Cleared

The Then Prime Minister Manmohan Singh inaugurated the Anantnag-Qazigund section of the railway line in Srinagar in October 2009. With the inauguration of the 18.359 km rail link between Anantnag and Qazigund, the 119 km railway line from Qazigund to Baramulla has become operative. The project has been completed at an expenditure of about ₹ 3,250 crore.

Roads

The UT is connected to the rest of the country through just one highway (NH 1A), 400 kms stretch (approx) maintained by Border Roads Organization (BRO) of India. As Railway network of the UT is in infancy stage, this has rendered the UT totally dependent on road connectivity which provides links to the remote areas of the UT. Out of 9933 habitations only 2735 habitations are yet to be connected. A total length of 26711 kms of road is being maintained by PWD.

Flagship Programme—PMGSY

The Pradhan Mantri Gram Sadak Yojana (PMGSY) is a flagship programme which was launched in December, 2000 in the country and also extended to J&K UT in the same year. The objective of the PMGSY programme is to provide connectivity by way of all weather roads to the unconnected habitations in rural areas. Under Bharat Nirman Programme, it is envisaged to provide road connectivity to all the unconnected habitations in the country having population more than 1000 souls as per census 2001 whereas in hilly states and desert areas the target is to provide connectivity with population size of 500 souls and above.

Presently, 2038 schemes at an estimated cost of ₹ 5486.14 crore have been sanctioned under this programme in nine phases, against which an amount of ₹ 2462.94 crore stands released by GOI ending November, 2013 against which ₹ 2382.86 crore stands utilized. So far 891 schemes have been completed. A total road length of 4968 kms have also been completed till date.

Main Roads

1. **Srinagar—Shopian Road:** 95 kms long. Sopore connected with Teethwal through Handwara, Trehgem and Chowhibal.
2. **Jhelum Valley Road:** 133 kms long road. It connects Srinagar with Baramulla and Uri. It is a National Highway.
3. **Dhar—Udhampur Road:** A defence Road is connecting Dhar with Udhampur.
4. **Jammu—Pathankot Road:** It is the National highway, 108 kms long. It links the UT with rest of the country.
5. **Banihal Cart Road:** 300 kms long, connectivity for Jammu and Kashmir. Connectivities of the road connect other areas among themselves.
6. **Jammu—Poonch Road:** 230 kms long Important from Defence point of view.
7. **Srinagar—Shopian Road:** It is 53 kms long and branches off from Pampore.
8. **Srinagar—Baltal Road:** 118 kms long, passes through Ganderbal and crosses through Sindh Nullah.
9. **Srinagar—Wayil Road:** Road passes through Achhabal, Kokarnag and is 85 kms long.
10. **Batote, Doda, Bhadherwah and Kishtwar Road:** Doda and Kishtwar connected Doda is 45 kms from Batote, Bhadherwah 53 kms and away from Doda.
11. **Srinagar—Pahalgam Road:** 98 kms long, passes through Anantnag and Mattan from Pahalgam. It leads to Amarnath cave.
12. **Srinagar—Bandipur Road:** 56 km long leads to Bandipur from Srinagar. It passes through Sumbal, Mansar lake, Safapur and Ajas. From Bandipur, there is a 33 kms long road to Sopore and one to Gurez.

13. **Srinagar Gulmarg Road:** It is 29 kms long, connectivity between Srinagar and Tangmarg and Gulmarg, a tourist place.

Aviation

There are two major airports in the UT providing aerial transport among two regions of the UT and the Country. Out of the two Srinagar airport has been upgraded as international airport named as Sheikh-ul-Alam Airport, while as the facilities at Jammu airport is also being upgraded. Commissioning of Sheikh-ul-Alam International Airport at Srinagar has opened the new vistas for enhancing connectivity at International level which will inturn facilitate international tourism, promote international trade especially export which will provide a big push to the economy and generate avenues of better employment.

Communication

Communication facilities have considerably expanded with the opening of new telephone exchanges, extension of existing lines and the establishment of direct-dialing services between Srinagar and Jammu, Srinagar and Delhi and between Srinagar, Anantnag and Baramulla. This service has been extended upto Mumbai and other important towns in the country. The much awaited mobile telephony was launched in Jammu & Kashmir by BSNL in August 2003. A new radio transmitter of much greater power has since been installed in Jammu, and the Srinagar station has been further strengthened. The TV station in Srinagar, catering to a population of more than 20 lakhs, has become very popular. Similar is the case with the Jammu TV station.

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9 Culture of Jammu & Kashmir

Jammu and Kashmir has the distinction of having multifaceted, variegated and unique cultural blend, making it distinct from the rest of the country, not only from the different cultural forms and heritage, but from geographical, demographically, ethical, social entities, forming a distinct spectrum of diversity and diversions into Kashmir and Jammu, all professing diverse religion, language and culture, but continuously intermingling, making it vibrant specimens of Indian Unity amidst diversity. Its different cultural forms like art and architecture, fair and festivals, rites and rituals, seer and sagas, language and mountains, embedded in ageless period of history, speak volumes of unity and diversity with unparalleled cultural cohesion and cultural service.

While the Kashmir has been the highest learning centre of Sanskrit and Persian where early Indo-Aryanic civilization has originated and flourshed, it has also been embracing point of advent of Islam bringing its fold finest traditions of Persian civilization, tolerance, brotherhood and sacrifice.

Some of the popular performing traditions of J&K are as fallows:

JAMMU REGION

(a) **Kud:** It is basically a ritual dance performed in honour of Lok Devatas. This dance style is performed mostly during nights.

(b) **Heren:** It is a traditional theatre form performed during Lohri festival by 10-15 members. This style is mostly performed in hilly regions of Jammu.

(c) **Fumenie and Jagarana:** This dance style is performed by the ladies on the eve of groom's departure to in-laws house. Both the songs are sung by a group of females comprising 15-20 members. This traditional dance form depicts the feelings and emotions of women folk.

(d) **Bakh/Gwatri/Kark/Masade:** It is a chorous narrative singing sung by a group of 10 singers without the accompaniment of any musical instruments.

(e) **Gwatri:** It is a singing/ dance combined tradition in which the singers narrate some text which is enacted by the Gwatari dancers.

(f) **Karak:** It is a tale ballet singing form sung by a community called 'Jogies'.

(g) **Benthe:** This is chorous singing tradition performed specific community of tribal called Gujjar and Bakerwal. Dance is performed by 5-7 members.

KASHMIR REGION

(a) **Bhand Pather:** It is a traditional folk theatre style combination of play and dance in a satirical style where social traditions, evils are depicted and performed in various social and cultural functions.

(b) **Chakri:** It is most popular form of Kashmiri folk music. It has some resemblance with chakra of mountainous regions of Uttar Pradesh.

(c) **Sufiana Music:** Sofians musiqui came to Kashmir from Iran in the 15th century. Over the years it has established itself as the classical music form of Kashmir and has incorporated a number of Indian Ragas in its body. Hafiz Nagma in fact, used to be part of sofiana music.

OTHER POPULAR PERFORMING TRADITIONS OF J&K

Rouf: This dance is almost steeped in antiquity. Rouf is always performed in the accompaniment of pleasant pathetic song.

Hafiz Nagma: Hafiz Nagma is based on the classical music of Kashmir the Sofiyiana Kalam. The Sufiyana Kalam has its own ragas known as Muquam. The prominent instrument used in Hafiz Nagma is called Santoor-a hundred stringed instrument played with sticks. The dance use in this tradition is known as 'Hafiza'.

Song of Habba Khatoon: Habba Khatoon was the renowned princess of Kashmir. Her feelings during her separation from the Yousuf King is depicted in this song. The song is based on the folk renderings of Kashmiri Music.

Jagarna: This marriage song cum-dance form has the elements of theatre. While the menfolk of the bridegroom's house have gone with the Barat, women folk are left alone in the house.

Surma: This song in Dogri, set to dance reveals the anguish of a newly married girl whose husband is away in the Army. The ever increasing yearning of reunion is depicted through this song-dance.

Bakhan: This folk song is a widely prevalent form of mass entertainment in this region. The haunting Melody of Pahari songs add to the beauty and joy of daily life. There are certain songs which are independent of Instruments. "Bakhan" is such a best example. "Bakhan" are in verse.

Geetru: A dance-song of Dogra Pahari region of Jammu being performed at the occasion of feasts, festivals and marriages by the rural folk parties of this region.

ART AND CRAFT

The two regions of the State-Jammu and Kashmir, specialise in different arts and crafts. The two regions are:

1. **Jammu:** Basholi paintings, Calico painting and Phoolkari.
2. **Kashmir:** Carpets, Kashmiri Shawls, Wood carving, Papiermarche, Chainstitch, Crewel, Namda.

SOME WELL-KNOWN DESIGNERS OF CARPETS

1. **Mohtashan Kashan:** A well known Persian designer.
2. **Syrk Turkman:** An antique Syrk rug named after the tribe who first wove it.
3. **Kashmir Qum:** Persian in Origin.
4. **Turkman Princes Bukhara:** Based on Candle stand holder pattern.
5. **Kashmir Moghul:** A bold geosmetric and floral effect.
6. **Kashmir Kashan:** depicting the tree of life.

WOOD WORK

Khatumband and Zali Pinjra : traditional wood crafts of Kashmir.

CUISINE

KASHMIRI DISHES

Kashmiri cuisine, comprising mostly of non-vegetarian dishes, is characterised by three different styles of cooking-the Kashmiri Pandit, the Muslims and the Rajput styles. Traditional Kashmiri cooking is called 'Wazhawan' and is rich and aromatic with a wonderful flavour. Rice is the staple food and lamb, goat's meat and chicken form the basis of many famous dishes. Spices and condiments play a very important role in the Kashmiri delights. Asafoetida, aniseed, dry garlic, cloves and cinnamon are added for extra flavoring. Kashmiri Hindus use fenugreek, ginger and aniseed in their food, while Muslims use garlic, Kashmiri chillies, cloves and cinnamon. One of the distinct features of Kashmiri cuisine is the generous use of curds in the gravies, giving the dishes a creamy consistency. Some known dishes of Kashmir are yakhni, (Kashmiri Mutton Curry) tabaq naat, dum aloo, (boiled patatoes with heavy amounts of spice) rogan josh (lamp cooked in heavy spices), gaustaba (Meat balls in Curd), Zaamdod (Curd), Rista (Pounded mutton balls, smaller in size than goshtaba and Cooked in heavy spices) and of course the signature rice which is particular to Asian cultures. The dishes are cooked in mustard oil and water, with the addition of red and green chilies.

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10 History of Jammu & Kashmir

Kashmir is perhaps, to possess an authentic account of its history from the very earliest period. This past account of the valley, its culture and traditions, rise and fall of various Kingdoms, victory and defeats of the people have been noted carefully, yet critically by the sons of its soil. True it is, that the Kashmiriat literature is very rich in information about Kashmir.

The beauty and the salubrious climate of the valley was known even from the ancient times. The mythological traditions supported fully by the research of geologists confirm that the valley originally was a huge lake called "Satisar", (the land of goddess Sati, consort of Lord Shiva) and its waters were blocked near Baramulla (ancient Varahmulla). In the words of Sir Francis Young Husband, "The huge lake must have been twice the length and three times the width of the lake of Geneva, completely encircled by snowy mountains as high, and higher than Mount Blank, while in the immediately following glacial period, mighty glaciers came wending down to the Sindh, Lidder, and other valleys even to the edge of water."

Kashmir's greatest historian Kalhan writes about his native land "It is a country where the sun shines mildly, being the place created by Rishi Kashyap, for his glory - big and lofty houses, learning, Saffron, icy cool water and grapes rare in Heaven are plentiful here - Kailash is the best place in the three worlds (Tn-bk), Himalayas the best place in Kailash, and Kashmir the best place in Himalayas". Our immortal Sanskrit poet Kalidas writes about the valley;

"The place is more beautiful than the heaven and is the benefactor of supreme bliss and happiness. It seems to me that I am taking a bath in the lake of nectar here."

Sir Walter Lawrence writes "The valley is an emerald set in pearls; a land of lakes, clear streams, green turf, magnificent trees and mighty mountains where the air is cool, and the water sweet, where men are strong, and women vie with the soil in fruitfulness. "He further writes that the valley contains everything which should make life enjoyable. There is sport varied and excellent; there is scenery for the artist and the layman, mountain for the mountaineer, flower for the Botanist, a vast field for the Geologist and magnificent ruins for the archaeologist.

PRE-HISTORIC TIMES

According to the oldest extant book on Kashmir, "Nilmat Puran", in the Satisar lived a demon called Jalod Bowa, who tortured and devoured the people, who lived near mountain slopes. Hearing the suffering of the people, a great saint of our country, Kashyap by name, came to the rescue of the people here. After performing penance for a long time, the saint was blessed, and he was able to cut the mountain near Barahmulla, which had blocked the water of the lake from flowing into the plains below. The lake was drained, the land appeared, and the demon was killed. The saint encouraged people from India to settle in the valley. The people named the valley as Kashyap-Mar and Kashyap-Pura. The name Kashmir also implies land desicated from water: "ka" (the water) and shimeera (to desicate). The ancient Greeks called it "Kasperia" and the Chinese pilgrim Hien-Tsang who visited the valley around 631 A.D. called it KaShi-Mi-Lo". In modern times the people of Kashmir have shortened it into "Kasheer" in their tongue.

Regarding pre historic times Dr Sunil Chandra Ray writes Pre-historic explorations have discovered the occurence of quatemary Glacial cycles in the valley. The chief Geological formation of the ice-age here are the lacustrine deposits called the "Karewas", which overlay the terminal moraines of the first Glaciation and are comprised of two groups, Lower and Upper, differentiated by the moraines of the second Glaciation. The fossil remains of Elphas-hysudrious obtained in the lower 'Karewas' point to lower "Pleistocene age", writes De Teera. The neolithic culture is indicated by the discovery of ground and polished stone axes, hoes, pestle, and bone implements at the well-known megalithic site of Burazahoma, ten miles east of, Srinagar. Burazahoma is famous as one of the only two megalithic sites in the extreme north-west of Indian sub-continent. We do not exactly know the Cultural horizon of the Burazahoma megalithic, nor the Purpose for which they were erected, but the indications are, they were put in places towards the end of the neolithic period at that site, between 400 to 300 B. C."

In 1960, Archaeological Department of the Govt. of India began systematic excavation at this site. Near about the siltbed, pits have been discovered in sections, indicating a settlement of early Pit dwellers whose date has tentatively been fixed at 3000 BC .This is perhaps the only known find of such a settlement in India. It is possible that more valuable data would be found, when extensive surface diggings are completed.

HINDU PERIOD

Kalhana in his book Rajatarangini stated that the history of Kashmir started just before the great Mahabharat war. According to him the first king who ruled over Kashmir is Gonanda, his reign is placed as 653 Kaliera, the traditional date of coronation of King Yudhistira, the eldest brother of the Pandvas, Gonanda was killed in a battle along with his son and at the time of the commencement of the Mahabharat war, Gonanda II was ruling over Kashmir.

Ashoka founded the old city of Srinagar known now as "Pandrethan". At Vijeshwari (modern Bijbehra), he built a Shiva Temple, thus winning the heart of the local population, who were mostly worshippers of Lord Shiva making a gift of the valley to Sangha.

According to local tradition, like Lord Shri Krishna, Lord Buddha is also supposed to have visited Kashmir. After the death of Ashoka, his son Jaluka ascended the throne of Kashmir, and the latter was succeeded by his son King Damodar II, Jaluka was a great king who cleared the valley of oppressing 'Malechas'.

The scholars also, accept the theory that the valley for over two hundred years was ruled by Indo-Greek Kings before the start of "Turushka" (Kushan) rule in the state. Cunningham records a large fund of silver coins of Azes (and Azilies) (coins of Indo-Scythians) on the banks of Vitasta (river Jhelum) in the hills between Varahmulla and Jhelum.

The contact with the Greeks is responsible for the beautiful architectural and sculptural style of old Kashmir temples, and the coinage of later Kashmir Kings has also been influenced by this contact. The three kings mentioned by Kalhan are Huska, Juska, and Kanishka, each of them is credited with the foundation of a town, christened after their respective names: Hushkapura, Jushkapura and Kanishkapura. The Kushan Kings also built many temples and Vihars. Kanishka held the third great council of the Buddhist church at "Kundalvan".

Hien Tsang has given the proceedings of this Council. Nearly 500 Buddhist and Hindu scholars attended this conference, and a learned Kashmir Brahmin Vasumitra presided over its session. Some of the great Buddhist Scholars, who took active part in this council, were Ashvagosha, Nagarjuna, Vasubandu Sangamitra and Jinamitra.

Hiuen-Tsang praises the intellectual caliber of the Kashmir scholars, and considered them as incomparable. The entire proceedings of the conference were inscribed on copper plates in Sanskrit, enclosed in stone boxes, deposited in a Vihar. Like famous Gilgit manuscripts, it is possible that these copper plates may be unearthed in near future, and we would learn much about the rich cultural history of the valley.

In 950, Khemgupta ascended the throne of Kashmir, a man of mediocre ability who married princess Didda, daughter of the ruler of Lohara (Poonch) and granddaughter of the Sahi King of Kabul. In 980 A.D. Didda ascended the throne after the death of her husband. Before her, two other queens had ruled Kashmir namely Yashovati and Sugandha. Didda was a very unscrupulous and willful lady and led a very immoral life. But inspite of these drawbacks, she was an able ruler, who firmly ruled the valley. She died in 1003 A.D. and left the throne of Kashmir to her family in undisputed succession, as her children had died young, she transmitted the crown to Sangramraj, son of her brother Udairaj, the ruler of Lohara (Poonch). It was during her time that Mahmud Gaznavi twice tried to capture the valley but the fort at Lohara, remarkable for its height and strength proved impregnable. The Sultan was obliged to abandon the conquest.

From 1089 - 1101 AD, King Harsha and from 1155-1339, the Kashmir rulers remained busy with intrigues, debauchery, and mutual quarrels. The last Hindu ruler of Kashmir was Udayan Dev. Before his death, he embraced Islam. His death in 1339 paved the way for the establishment of Muslim rule in Kashmir.

MUSLIM PERIOD

After the death of Queen Kota, Shah Mir ascended the throne under the name of Sultan Shamas-ud-din, and his dynasty ruled the state for 222 years. This period is one of the most important in the annals of Kashmir, in as much as Islam was firmly established here. The Shah-Miri dynasty has given us only two rulers, who are worthy of mention. One is Sultan Shihab-ud-din, and the second is the great Sultan Zain-ul-Abidin. The former ascended the throne in 1354, and continued to rule till 1371. He was full of energy, and vigour and he was able to establish his sway over the neighboring countries. His army mainly consisted of Damras, Lavans and the hill tribes of Poonch, Rajapuri and Kishtwar. The important commanders who served under him were both Hindus and Muslims, such as Chandra-Damra, Laula Daniara, Shura, Syed Hassan and Abdul Raina. His two important Hindu ministers were Kota Bhat and Udyashri. At the begining of his reign, he led an army to Sindh and defeated its ruler. While returning he defeated Afgans near Peshawar and then he conquered Kabul, Gazni, Qandhar, Pakhali, Swat and Multan. He invaded Badakshan, and then marched towards Dardistan and Gilgit, which he easily conquered. Then he marched towards Bulochistan and Ladhak. The ruler of Kashgar (central Asia) came with a huge army and Shihab-ud-din whose army was numerically inferior, inflicted a crushing defeat and the Kashgar army was almost wiped out. This led to the annexation of Laddhak and Bultistan, which were claimed by the Kashgar ruler. It is also said that the ruler of Kashmir marched towards Delhi, and on the way conquered Kangra, and then the army of Ferozashah Tughlaq opposed him on the banks of Sutluj. Since the battle between the rulers of the Delhi and Kashmir was indecisive, peace was concluded, and it was agreed that all the territory from Sirhind to Kashmir belonged to the Kashmir ruler. Shihab-ud-din was not only a great conqueror but also an able administrator, and he governed his kingdom with firmness and justice. He was tolerant ruler and treated his Hindu subjects generously.

It is reported that owing to prolonged campaigns he needed money, and his ministers asked him to loot the temples, but he stoutly opposed the proposal, and to quote Jonaraj, he is reported to have said in anger: “Past generation have set-up images to obtain fame, and earn merit, and you propose to demolish them. Some have obtained renown by setting up images of gods, others by worshipping them, some by maintaining them, and you propose demolishing them How great is the enormity of such a deed”. The king founded a new town which he called Shihab-ud-din pora, known now as Shadipur(now near sumbal in District Bandipora). He is also said to have erected many mosques and monasteries. Shihab-ud-din can rightly be called the Lalitaditya of medieval Kashmir. During his time Kashmir armies marched to distant lands, and our victorious banners were unfurled on many forts of foreign countries. Thus this great ruler raised Kashmir to great eminence, and power.

The next ruler was Sultan Qutab-ud-din, and in whose time the important event and worth mentioning revolution is the arrival of Iranian sufi saint Mir Sayyed Ali Hamdani, who was the most remarkable personality of the then muslim world. At the time of his third visit he got with himself 700 Syyeds from Hamdan, who were being out to torture by Timur, ruler of Persia. Iranian saint, Mir Syyed Ali Hamadani is known as the founder of Islam in Kashmir. These syyeds established their centres of missonery activities in different parts of the valley. In 1389, Qutab-ud-din died, and he was succeeded by his eldest son Sultan-Sikandar. Shahi-Khan or Sultan Zain-ul-Abidin ascended the throne in 1420 A. D. and ruled upto 1470 A. D. nearly for half a century. His accession to the throne, proved to be the return of a bright and warm day after a cold and a chilly night.

Zain-ul Abidin organized a huge army, and with its help he reconquered the Punjab, Western Tibet, Ladhak and Balti region, Kulu and Ohind (Hazara). The Sultan also maintained cordial and friendly relations with rulers of other countries. The Sheriff of Macca and the Kings of Juan and Egypt sent him presents. The Maharaja of Gwalior, hearing that the Sultan was interested in Music, sent him valuable works on Indian music. There was also an exchange of embassies and gifts between the great Sultan and the rulers of Sindh, Bengal, Tibet, Gujarat, Malwa and Delhi. The Sultan improved the tone of administration which had rudely been shaken. He appointed talented persons in high administrative posts, irrespective of caste or creed. The Sultan had a high sense of justice and no one who committed a crime was spared, however close he was to throne. Many grandees who were favourites of the king, were severly punished when found guilty. The king took keen interest in agriculture and like Lalitaditya and Avantivarman, many canals were dug out in all parts of the Kingdom. Jonraj and Shriva have given details of these canals in their valuable books. Owing to these irrigation works, the draining of marshes and reclamation of large areas for cultivation, Kashmir became self-sufficient in food, and rice was cheap.

In 1470 A. D. the Sultan died and for a long time his death was mourned by the people. Sultan Zain-ul-Abidin's death sounded the death knell of Shah-Miri dynasty. It met the same fate that the Lohara dynasty had met after the death of Jaisimha in 1156. The only important event that took place before the establishment of Chak dynasty was the invasion of Mirza Haider Dughlat who attacked Kashmir from Zogila pass in 1533. Soon he was able to establish his ascendancy in the valley. The Moghul, like Dulchu earlier, killed, looted and plundered the people, and made women and children their slaves. The Sultan of Kashmir, Nazuk Shah, became almost a puppet in his hands. Moghuls were appointed on high posts everywhere, and the Jagirs of Kashmir Noblemen were confiscated. For more than a decade Mirza was the virtual ruler of the valley and he gave peace and orderly Government to the country. He encouraged Kashmir Art and Crafts, and trade and commerce once again thrived in the valley. The last Kashmiri ruler, Sultan Habib Shah, a weakling was deposed by his commander, and nobles raised on throne Gazi Chak, a prominent military General of the time. He was the direct descendant of Lankar Chak who had come to Kashmir towards the close of Hindu rule. The Chak rule began in Kashmir in 1561 and lasted till 1587, when Akbar, the great Moghul Emperor conquered Kashmir.

MUGHAL PERIOD

During the period of Mughal rule from 1587 to 1752, the people enjoyed peace and order. Akbar built a new town near Hariparbat and called it Nagar-Magar and built the massive wall around the hill. The Mughal rulers never came alone, but were always accompanied by hundreds of Nobles, Amirs and Umras, Princes and Army Generals. Jahangir came virtually, under the spell of the scenic beauty of the place, and wherever he found a hill coming down gently to a spring or a grove of majestic Chinar trees or a beautiful lake, he utilized the place for planting a pleasure garden.

Shalimar and Nishat gardens on the banks of Dal Lake, would keep Jahangir's love for natural beauty ever fresh in our memory. Table shows important Mughal gardens from J&K.

Mughal Gardens in J&K

Name of Gardens	Name of the ruler who built it
Shalimar	Jehangir for his beloved wife Noorjahan
Chashmashahi	Shahjahan
Nishat	Jehangir
Harwan	Asif Khan
Pari Mahar	Shahjehan

Important gardens are Shalimar, Harwan and Nishat. All gardens are facing Dal Lake. Aurangazeb visited Kashmir only once in 1665. Because of instability, lack of unity and discriminations of Mughul kings lead to Afghan invasion in 1752. In Kashmir most of the gardens are built by Mughal rulers.

AFGHAN RULE

The rulers of Kabul were great despots, and they ruled all the parts of their kingdom ruthlessly with an iron hand. The cornerstone of their policy was terror. As many as twenty eight Durrani Subedars governed Kashmir during these sixty seven years. Most of the well to do people of the valley were summoned by the Abid Ali Governor Abdullah Khan to his palace, and ordered to surrender all their wealth on pain of death. Their houses were completely sacked, and many people were put to sword. There was complete gloom and despair on every side.

All the prosperity of the valley was gone, and the people could not even move on the streets, for fear of being robbed of even their scanty clothing. Each and everyday for a Kashmiri was a day of struggle and uncertainty. In 1819 the State was added to the Sikh Kingdom of Punjab. The Sikh rule over Kashmir lasted only for a brief span of time, during which the rulers at Lahore were far too pre-occupied at home to pay any attention to the affairs of this outlying province of theirs.

The misery of the people increased due to natural calamities as well, such as premature snow falls, which would destroy a ripe rice crop leading to famines. These famines were followed by diseases like cholera and plague resulting in a heavy loss of life. Thousands of people migrated to India during these hard days, and no wonder the population of the valley came down to two lakhs from nine lakhs.

SIKH RULE

At last the reign of terror broke the patience of the peace loving people, and a deputation of Kashmiris led by Pandit Birbal Dhar, and his son Pandit Rajakak Dhar, left for Lahore and fervently requested Maharaja Ranjit Singh to conquer Kashmir. Three prominent Muslims helped Pandit Birbal Dhar in his escape from the valley. They were Abdul Qadoos Gojwari, Mallick Zulfiqar and Malik Kamgar. In 1819, 30,000 soliders of Maharaja Ranjit Singh attacked Kashmir, defeated the Pathans, and the state became a part of Ranjit Singh's empire. On receipt of the news, Maharaja Ranjit Singh bestowed honours in Dhar family and Lahore was illuminated for three days, Sikh rule lasted for only 27 years and during this period 10 Governors administersd the country one after another, out of whom the last two were Muslims. In the beginning Sikh rule also proved to be oppressive. "It must have been an intense relief", writes Lawrence, "to all classes in Kashmir to see the downfall of the evil rule of Pathan, and to none was the relief greater than to the peasants who had been cruely fleeced by the rapacious sardars of Kabul. I do not mean to suggest that the Sikh rule was benign or good, but it was at any rate better than that of the Pathans". The Sikh rule over Kashmir lasted only for a brief span of time, during which the rulers at Lahore were far too pre-occupied at home to pay any attention to the affairs of this outlying province of theirs. The misery of the people increased due to natural calamities as well, such as premature snow falls, which would destroy a ripe rice crop leading to famines. These famines were followed by diseases like cholera and plague, resulting in a heavy loss of life. Thousands of people migrated to India during these hard days, and no wonder the population of the valley came down to two lakhs from 8 lakhs.

Mr. Ranel Tayler who visited Kashmir in 1846 writes about Kashmir, "The town presents a very miserable apperance. The houses made of wood are tumbling in every direction. The streets are filthy

for want of drainage, none of the bazars looked wellfilled and prospseous and altogether my ride made me very unhappy". Moorcraft who visited the valley in 1835 writes, "Everywhere the people were in most abject condition, not one sixteenth of the cultivable land is under cultivation, and the inhabitants are starving. They were in a condition of extreme weakness Villages were half deserted and those who lived there were the semblance of extreme sickness. Villages were filthy and swarming with beggars. The rural folk on the whole were half naked and miserably emaciated and presented a ghostly picture of poverty and starvation". Such was the general condition of the state when Maharaja Ranjit Singh died in 1830. His death was a signal for the mutiny of Sikh Army which become uncontrollable, and plunge entire Punjab into confusion and chaos.

DOGRA PERIOD

Dogras are from Indo-Aryan ethnic group in south Asia. Dogras believed to be suryavanshi Rajputs of chattri origin. They are migrated from Rajputana many centuries ago. They live predominantly in the J&K, Punjab, Himachal Pradesh and North East Pakistan. They speak their own language called Dogri. Most of the Dogras are Hindus, some are Muslims and some are Sikhs. From 1846 to 1949, four Dogra kingdoms are ruled in J&K. The Kashmir accession was started at the time of Maharaja Harising. Table gives names of Dogra rulers of J&K.

List of Dogra Rulers

Gulab Singh	1846 - 1857
Ranbir Singh	1857 - 1885
Partab Singh	1885 - 1925
Hari Singh	1925 - 1949

The two Anglo-Sikh Wars led to the final extinction of Sikh sovereignty in the Punjab and by virtue of the treaties of Lahore and Amritsar the British who had by now become undisputed master of India. The greatest service of the first Dogra ruler is the foundation that he laid for the modern Jammu and Kashmir State. The Maharaja died in 1857 after a rule of 11 years, during which period he laid the foundation of a sound system of administration. He was succeeded by Maharaja Ranbir Singh who ruled from 1857 to 1885.

In 1885 Maharaja Sir Pratap Singh ascended the throne and he ruled for a period of 40 years. The real modernization of the state and several progressive reforms were carried out by him. Sir Walter Lawrence brought the first assessment of land revenue system in the state on scientific lines. The two mountain roads, Jhelum valley road and Banihal Cart were built by linking the state with the rest of India.

A scheme for drainage of the valley reclaiming waste-land and preventing floods by digging flood channels was put into operation. Construction of water reservoir at Harwan and establishment of electric generating plant at Mohra was also undertaken during this period. Two colleges in the state besides large number of education institutions were also established by the order of the Maharaja.

The administrative machinery was completely overhauled. There was development in the means of communication and telegraphs. Telephones and post offices were opened in many places. After the death of Maharaja Pratap Singh his nephew Maharaja Sir Hari Singh ascended the throne in 1925. He continued to govern the state till 1949. Hari Singh was the last ruler of Kashmir. When India got freedom in 1947 the land was divided into two parts- India and Pakistan.

By this time most of the princely states of India were united to form the Indian Union. Kashmir, an independent state under Raja Hari Singh, decided to join India due to great similarity in culture and social aspects. The instrument of accession was signed between Lord Mountbatten and Raja Harisingh in terms of defense, external affairs and rehabilitation of refugees.

The most important thing that had far reaching consequences in the future of the state was the birth of political parties and the growth of political consciousness in the state during this period. But more important was the liberation of the country from the British Yoke in 1947 that ended all the traces of foreign domination, absolutism and autocracy in our country.

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Multiple Choice Questions

1. Who constructed Chashma Shahi and Pari Mahal in the Valley?
A. Shahjahan B. Jehangir
C. Akbar D. Qasim Khan

2. Who was called the "Lalitaditya of medieval Kashmir'?
A. Sultan Shihab-ud-din
B. Sultan Ala-ud-din
C. Sultan Sikander
D. Sultan Qutb-ud-din

3. Who was the first King to prohibit the slaughter of animals?
A. Lalitaditya B. Jaya Simha
C. Damodra II D. Meghavahana

4. Who built Shankaracharya temple?
A. Gopaditya B. Gonanda I
C. Harsha D. Sussala

5. The first Muslim King who built the very first mosque in Kashmir was:
A. Rinchana B. Shams-ud-din
C. Ala–ud–din D. Qutub–ud–din

6. The famous tomb of Sheikh Noor-ud-din Noorani is situated in which district?
A. Kishtwar B. Budgam
C. Baramulla D. Bandipora

7. Between whom treaty of Amritsar was signed?
A. British Govt. and Gulab Singh
B. British Govt. and Hari Singh
C. British Govt. and Karan Singh
D. British Govt. and Ranbir Singh

8. When was the treaty of Amritsar signed?
A. March 15, 1843 B. March 16, 1846
C. March 16, 1847 D. March 20, 1850

9. Which Mughal ruler paid much tribute to the beauty of Kashmir?
A. Akbar B. Jahangir
C. Shahjahan D. Aurangzeb

10. What was Islamic name given to Rinchen who embraced Islam?
A. Shah Mir B. Sadr-ud-din
C. Qutub-ud-din D. Yusuf Khan

11. Dogri script was introduced by which ruler?
A. Raja Maldev B. Raja Shakti Karan
C. Raja Bahu Lochan D. Jambu Lochan

12. Sher-e-Kashmir Institute of Medical Sciences is situated in:
A. Jammu B. Srinagar
C. Awantipura D. None of these

13. Most important source of irrigation in Jammu & Kashmir is:
A. Tanks B. Canals
C. Wells D. None of these

14. Pampore is famous for:
A. Saffron B. Tabacco
C. Pulses D. None of these

15. During whose reign 'Persian' became the language of court?
A. Sultan Zain-ul-Abdin
B. Sultan Ala-ud-din
C. Shahmir
D. Shiva Somak

16. Who imposed 'Grahkrtya' and 'Begar'?
A. Shankara Varman B. Shah Mir
C. Raja Maldev D. Raja Shakti Karan

17. The founder of Lohara dynasty was:
A. Hariraja B. Avanta
C. Kalasa D. Sangramaraja

18. Kalhana, a famous historian of Kashmir was lived during the reign of:
A. Jayasimha B. Ramadeva
C. Suhadeva D. Bhikshachara

19. Lalitaditya was the ruler of which dynasty?
A. Karkota B. Utpala
C. Lohara D. Gupta

20. Mir Syed Ali Hamdani make his first visit in Kashmir during the reign of:
A. Sultan Shahab-ud-din
B. Shah Mir Kazi Chak

C. Sultan Sikandar
D. Zain–ul–Abdin

21. Who was the founder of Gupta dynasty?
A. Abhimanyu Gupta B. Sugandha
C. Parva Gupta D. Jayapida

22. During the reign of which King Chinese traveller Hiuen Tsang visited Kashmir?
A. Lalitaditya B. Damodar I
C. Durlabha Vardhana D. Jaluka

23. The founder of old city of Srinagar called as Pandrethan was:
A. Kaniska B. Ashoka
C. Gonanda II D. Parvarsend

24. During the rule of which King Muhammed of Ghazni attacked on Kashmir?
A. Raja Jasdev B. Didda
C. Nandi Gupta D. Raja Ajaib Dev

25. The founder of Jammu City was:
A. Raja Maldev B. Maha Lochan
C. Raja Jasdev D. Jambu Lochan

26. In which year Maharaja Ranjit Singh invaded Kashmir?
A. 1810 A.D. B. 1814 or 1815 A.D.
C. 1820 A.D. D. 1825 A.D.

27. Who was the first Muslim Sultan of Kashmir?
A. Shah Mirza B. Zain-ul-Abdin
C. Ghazi Chak D. Yousuf Shah

28. Who introduced Buddhism in Kashmir?
A. Damodra B. Mihirkula
C. Rinchana D. Ashoka

29. Who was the first King in the history of Kashmir, whose name was mentioned by Kalhana?
A. Balbhadra B. Krishna
C. Gonanda D. Damodra

30. Jammu & Kashmir Minerals Limited was incorporated in:
A. 1970 B. 1960
C. 1955 D. None of these

31. Jhelum river originates from:
A. Dal lake B. Verinag
C. Wular lake D. None of these

32. Poat Pass is situated on:
A. Num Kum range B. Nanga Parbat range
C. Zaskar range D. None of these

33. K_2 peak (Godwin Austin) is situated in:
A. Karakoram range
B. Zaskar range
C. Nanga Parbat range
D. None of these

34. Which of the following districts has the largest area?
A. Anantnag B. Kathua
C. Leh D. None of these

35. What is the name of a typical folk dance of rural Jammu region, which means blowing and the dances open and close their fingers?
A. Rouf B. Phummian
C. Hakit D. Dambali

36. The winner of Sahitya Academy award for Kashmiri for the first time was:
A. Zinda Kaul B. Lal Mal
C. Gulal Shah D. Wazir Mal

37. Who is the writer of book 'Flower of Nishat Bagh'?
A. Mahjoor B. Abdur Sattar
C. Parmanand D. Zinda Koul

38. Who is the writer of romantic poems Shvin Khusro, Laila Majnu and Yusuf Zulekha?
A. Zinda Kaul B. Mahmud Gami
C. Parmanand D. Rasool Mir

39. Who is the author of the book 'The History of Struggle' for freedom in Kashmir?
A. Shrivats Vikal
B. Ranbir
C. Mulla Ahmad
D. Pt. Prem Nath Bazaz

40. The writer of novel 'Phull Bina Dali'' was:
A. Shrivats Vikal B. Rasool Mir
C. Parmanand D. Zinda Kaul

41. The poet who is known as father of Kashmiri Ghazals :
A. Abdur Sattar B. Parmanand
C. Zinda Koul D. Rasool Mir

42. Who was the writer of 'Kavya Lamkara'?
A. Vamana B. Bhamaha
C. Matri Gupta D. Ananda Vardhana

43. Who wrote famous composition 'Shikayat'?
A. Yusuf Shah Chak
B. Sultan Haider Ali

C. Mulla Ahmad
D. Sultan Zain-ul-Abdin

44. The female monk in Ladakh's language is called:
A. Momo B. Chomo
C. Gomo D. Lomo

45. The prominent instrument used in Hafiz-Nagma is called:
A. Santoor B. Harmoniam
C. Tabla D. Sitar

46. In which century Sufiana music came to Kashmir from Iran?
A. 12^{th} century B. 13^{th} century
C. 14^{th} century D. 15^{th} century

47. Who had started construction of famous Raghunath Temple Complex?
A. Gulab Singh B. Ranbir Singh
C. Pratap Singh D. Hari Singh

48. Who is called the first muslim saint of Kashmir?
A. Nuru-din-Noorani B. Baba Ghulam Shah
C. Jalal-ud-din-Rumi D. Pir Baba

49. Who introduced famous musical instrument 'Rabab'?
A. Zain-ul-Abdin B. Haider Ali
C. Yusuf Shah D. Hussain Shah

50. Which is the original script of the Dogri language?
A. Sanskrit (Naga) B. Apbhramsa
C. Persian D. Takri

51. What is the name of dance which is performed by Kashmiri Pandit women around the bridal rangoli during marriage?
A. Chakkri B. Rouf
C. Dambli D. Weug Nachun

52. Where is Sri Ashtadashbhuja Devi (Eighteen Arms) temple located?
A. Ramsu B. Sarthal (Doda)
C. Jammu D. Sarthal (Bani)

53. Which is the largest tributary of river Jhelum?
A. Sindh B. Eri
C. Liddar D. Pohru

54. Which type of coal is found is Riasi?
A. Bituminus B. Peat
C. Lignite D. Anthracite

55. Who is known as 'Little Tibet'?
A. Kargil B. Samba
C. Ladakh D. Riasi

56. Which lake of Kashmir is largest freshwater lake?
A. Wular Lake B. Dal Lake
C. Mansar Lake D. Pongkong Lake

57. Which among the following is known as 'Rice Bowl of Kashmir'?
A. Ganderbal B. Kulgam
C. Bandipora D. Shopian

58. Which of the following Lakes is not belonging to Ladakh region?
A. Tso Moriri B. Rupshu
C. Mansar D. None of these

59. Suru, Nubru and Hemis are the famous tourists resorts in:
A. Doda B. Srinagar
C. Ladakh D. Poonch

60. Rashmi, Vishav and Rambiar are the tributaries of which river?
A. Kishanganga B. Jhelum
C. Chenab D. Ravi

61. 'Himadri' is another name of:
A. Outer plains B. Shiwaliks
C. Greater Himalayas D. Middle Himalayas

62. 'Aksai Chin' is a dissected:
A. Deep Gorge
B. Intermontane Plateau
C. Intermontane Valley
D. Intermontane Strike Valley

63. Srinagar is connected with Jammu by which National Highway?
A. NH-1A B. NH-2A
C. NH-1B D. NH-2B

64. Deodar, Chir, Kail, Fir etc. are the species of which forests?
A. Scrub Forests
B. Sub-Tropical Forests
C. Coniferous Forests
D. Temperate Forests

65. 'Mata Vaishno Devi' Shrine is located in which district?
A. Jammu B. Poonch
C. Reasi D. Doda

66. Shrine of Amarnath is in which district of J&K?
A. Badgam B. Anantnag
C. Doda D. Baramula

67. What is the annual rainfall in Jammu?
A. 975 mm B. 1115.9 mm
C. 1506 mm D. 2000 mm

68. Which is called the Gateway of J&K?
A. Akhnoor B. Uri
C. Jasrota D. Lakhanpur

69. The famous Ski resort in J&K is at:
A. Zaskar B. Gulmarg
C. Pahalgam D. Sona Marg

70. The J&K state is divided into how many geographical Zones?
A. Four B. Five
C. Six D. Seven

71. Which among the following is/are situated near/around Dal Lake?
A. Naseem Bagh B. Nishat Bagh
C. Shalimar Bagh D. All of the above

72. The power of Governor of a State to promulgate ordinance is given in the Constitution of India in:
A. Article 123 B. Article 212
C. Article 213 D. Article 356

73. Thein Dam is built across:
A. Beas B. Ravi
C. Ujh D. Basantar

74. The latitudinal and longitudinal extent of J&K is:
A. 32°16′ N to 37°5′ N and 70°40′ E to 90°30′E
B. 32°17′ N to 36°6′ N and 70°40′ E to 82°30′E
C. 32°17′ N to 37°5′ N and 72°40′ E to 80°30′E
D. 32°15′ N to 38°7′ N and 73°20′ E to 75°32′E

75. How much area China has illegally occupied?
A. 79,130 sq. km B. 37,555 sq. km
C. 5,960 sq. km D. 21,260 sq. km

76. In which year the Sustainable Development Goals came into effect?
A. 2016 B. 2017
C. 2018 D. 2019

77. The establishment of the first silk factory was in 1897 by:
A. Maharaja Pratap Singh
B. Maharaja Ranjit Singh
C. Maharaja Gulab Singh
D. Maharaja Ranbir Singh

78. The introduction of the New J&K Industrial Policy was in the year of:
A. 2013 B. 2014
C. 2015 D. 2016

79. The projection of Kashmir as 'Golfers Paradise' is due to:
A. Tourism B. Scenic beauty
C. Writer Spots D. Cultural Heritage

80. The creation of 'Geology and Mining' Department in Jammu was in:
A. 1969-70 B. 1959-60
C. 1979-80 D. 1989-90

81. When was Integrated Rural Development Programme launched in J&K?
A. August 5, 1975 B. Sept. 5, 1978
C. July 15, 1982 D. Oct. 2, 1980

82. The capicity of Bagalihar hydro electric power project is:
A. 300 MW B. 400 MW
C. 450 MW D. 500 MW

83. What is Igophy that was introduced in Ladakh?
A. New irrigation scheme
B. Tribal development programme
C. Self employment generation scheme
D. Infrastructural development programme

84. In which year, the National Family Planning Programme was started?
A. 1955-56 B. 1960-61
C. 1957-58 D. 1965-66

85. J&K launched the first five year plan in the year of:
A. 1951 B. 1955
C. 1961 D. 1956

86. On which date 'Law Day' is celebrated in India?
A. 26th November B. 28th October
C. 2nd October D. 15th August

87. 'Right to Education' is a Fundamental Right under:
A. Article 14 B. Article 19
B. Article 22 D. Article 21-A

88. Which Article of the Constitution provides for the formation of new States?
A. Article 3 B. Article 2
C. Article 13 D. Article 39

89. Which of the following writs is NOT specifically provided in the constitution of India?
A. Mandamus B. Quo Warranto
C. Injunction D. Prohibition

90. Constitutional safeguards to civil servants are ensured by:
A. Article 310 B. Article 311
C. Article 312 D. Article 315

91. Under ..... of the constitution Public Accounts and Audit Reports is to be laid before both the Houses of Parliament.
A. Article 151 B. Article 153
C. Article 154 D. Article 158

92. Articles ..... of the Indian Constitution explain the position and functions of the Comptroller and Auditor-General of India.
A. 148 to 149 B. 156 to 160
C. 159 to 165 D. 185 to 193

93. Under the Comptroller and Auditor-General of India there is in each state:
A. Audit Chief General
B. Accountant General
C. Comptroller Accountant
D. Chief of the state Accounts

94. Which Article of the Indian Constitution provides for the setting up of the Consolidated Fund?
A. Article 266(1) B. Article 278(1)
C. Article 283(1) D. Article 301(1)

95. Seventy-Third Amendment Act is extremely important for political empowerment of:
A. Women B. Scheduled Castes
C. Scheduled Tribes D. All of these

96. The newly-created district Bandipora is situated in the north shore of:
A. Tsomoriri Lake B. Nagin Lake
C. Wular Lake D. Dal Lake

97. How many members are in J&K Legislative Assembly?
A. 75 B. 83
C. 95 D. 100

98. In J&K Panchayat Adalat enjoy:
A. Criminal Jurisdiction
B. Civil Jurisdiction
C. Both A and B
D. None of these

99. How many seats are in J&K for Lok Sabha?
A. 4 B. 5
C. 8 D. 10

100. Which district was carved out from Baramulla in the 1979?
A. Kupwara B. Bandipora
C. Pulwama D. Ganderbal

101. Name the instrument with the help of which a sailor in a submarine can see the objects on the surface of the sea.
A. Telescope B. Periscope
C. Gycroscope D. Stereoscope

102. 'HEMOPHILLIA' is the disease of .....
A. liver B. blood
C. brain D. bones

103. Vitamin A is abundantly found in .....
A. Brinjal B. Tomato
C. Carrot D. Cabbage

104. ..... is not soluble in water.
A. Vitamin A B. Vitamin B
C. Vitamin C D. None of these

105. The blood vessels with the smallest diameter are called .....
A. capillaries B. arterioles
C. venules D. lymphatics

106. Out of the following ..... has the greatest elasticity.
A. steel B. rubber
C. aluminium D. annealed copper

107. Cooking gas is a mixture of which of the following two gases?
A. Carbon Dioxide and Oxygen
B. Butane and Propane
C. Carbon Monoxide and Carbon Dioxide
D. Methane and Ethylene

108. The substance most commonly used as a food preservative is:
A. sodium carbonate B. tartaric acid
C. acetic acid D. benzoic acid

109. Normally, the substances that fight against diseases in human systems are known as:
A. dioxyribonucleic acids
B. carbohydrates
C. enzymes
D. antibodies

110. The SI unit of temperature is .....
A. Kelvin B. Celsius
C. Fahrenheit D. None of the above

111. One of the common fungal diseases of man is :
A. plague B. ringworm
C. cholera D. typhoid

112. Omar Abdullah belongs to which party?
A. PDP
B. J&K PPP
C. National Conference
D. None of these

113. Jenner introduced the method of making people immune to :
A. small pox B. rabies
C. cholera D. polio

114. The largest cell in the human body is :
A. Nerve cell B. Live cell
C. Muscle cell D. Kidney cell

115. What is the device that steps up or steps down the voltage?
A. Dynamo B. Conductor
C. Inductor D. Transformer

116. The protein deficiency disease is known as :
A. Kwashiorker B. Cirrhosis
C. Eczema D. Clycoses

117. Iron deficiency causes :
A. rickets B. anaemia
C. cirrhosis D. goitre

118. Blood group of an individual is controlled by :
A. Haemoglobin B. Shape of RBC
C. Shape of WBC D. Genes

119. In a normal man the amount of blood pumped out by the heart per minute is about :
A. 1 litre B. 3 litres
C. 4 litres D. 5 litres

120. Red/green colour blindness in man is known as :
A. Protanopia
B. Deutetanopia
C. Both A and B above
D. Marfan's syndrome

121. The blue colour of the water in the sea is due to :
A. Reflection of the blue light by the impurities in sea water
B. Reflection of the blue sky by sea water and scattering of blue light by water molecules
C. Absorption of other colours by water molecules
D. None of the above

122. The image formed on the retina of the eye is:
A. upright and real
B. larger than the object
C. small and inverted
D. enlarged and real

123. Make in India Scheme was launched in:
A. 2013 B. 2014
C. 2015 D. none of these

124. Oil rises up the wick in a lamp :
A. because oil is volatile
B. due to the capillary action phenomenon
C. due to the surface tension phenomenon
D. because oil is very light

125. The 'stones' formed in human kidney consist mostly of :
A. calcium oxalate
B. sodium acetate
C. magnesium sulphate
D. calcium

126. Bharat Nirman Scheme was launched in:
A. 2005 B. 2006
C. 2007 D. 2008

127. Which part of an eye is transplanted?
A. Cornea B. Retina
C. Iris D. Sciera

128. The Universal donor group of blood is:
A. O B. A
C. B D. AB

129. The green colour of the leaf is due to :
A. Presence of Chloroplast
B. Presence of Chromium
C. Presence of Nicoplast
D. Presence of excess of oxygen

130. Swachh Bharat Abhiyan was launched in:
A. 2014 B. 2015
C. 2016 D. 2017

131. Which crop was the earliest to be cultivated by the people of Indus Valley?
A. Wheat B. Rice
C. Cotton D. Rye

132. The Harappan Civilisation was chiefly concentrated in:
A. Punjab, Rajasthan and Gujarat
B. Sindh, Punjab and Rajasthan
C. Haryana, Rajasthan and Tamil Nadu
D. Punjab, Rajasthan and Assam

133. Pre-Harappan settlement was discovered in 1981 at the foot of the Bolan pass on the Bolan river at one of the following places. Identify it;
A. Mansa B. Manda
C. Mehergarh D. Alamgirpur

134. One thing is common among the following between the Indus and Mesopotamian civilisation. Identify:
A. Larger urban complex
B. Seals rolled on clay tablets
C. Ornamental architecture
D. Use of potter's wheel

135. The Indus valley belonged to:
A. Mediterranean race
B. Proto-Astraloid race
C. Tibetan Mongoloid race
D. Alpine race

136. The important public place discovered at Mohenjo-daro was:
A. the great bath
B. the great granary
C. the great cemetery
D. the acropolis

137. Indus script is:
A. bonstrophedon B. indeographic
C. cuneiform D. logographic

138. Indus seals:
A. were purely secular in character
B. were used as means of exchange by Harappans
C. reveal their religions character
D. were exported in big numbers

139. Who among the following was the first to suggest the similarity between Sanskrit language of Aryans, Greeks and Latin?
A. Sir Williams Jones
B. Monier Williams
C. Max Muller
D. None of the above

140. Which was not the cause of Aryans Victory over the Dasas or Dasyus?
A. Use of chariots in war
B. Use of horses in war
C. Use of metal armours and helmets
D. Use of elephant in war

141. The important characteristics of the vedic religion were:
1. Goddes like 'prithvi', 'Aditi' and 'Usha'
2. Goddes are co-equal to their male-partners
3. Predominance of male dieties.
4. Worship of nature.

Codes:
A. only 3 and 4 B. only 2 and 4
C. only 1 and 4 D. only 1 and 3

142. Which of the following statement is not correct regarding Indra?
A. He was the god exclusively associated with sacrifices.
B. He was know as 'Purandara' or breaken of forts
C. He killed the evil dragon 'Virata'
D. He was the god of Thunder.

143. Which of the following region was called "Arya varta"?
A. From Yamuna upto West Bengal
B. Punjab and Delhi Region
C. The whole of northern India
D. The region beyond Vindhya mountain

144. In India Varna law enjoyed:
A. Legal Sanction only
B. Religions Sanction only
C. Economic Sanction only
D. The Sanction of both the state and religion.

145. Which statement an asceticism is correct?
A. The Atharva Veda after refers to ascetics as Vratyas
B. By the time of the Upanishads, asceticism was widespread
C. Vratya was a priest of non-vedic fertility cult which involved ritual dancing and flagellation
D. All of the above.

146. The speculation of the upanishads centre around one word of the Rig veda which one is that?
A. Parjapati B. Varuna
C. Brahman D. Indra

147. Which among the following is not be called Vedanga?
A. Siksha B. Vyakarna
C. Jyotisha D. Manu Smriti

148. Identify the correct sequence among the following units of political organization.
A. kula, vis, grama, jana
B. jana, vis, grama, kula
C. vis, kula, jana, grama
D. grama, jana, kula, vis

149. Which of the following are the Brahmans appended to the Rig veda?
A. Aitareya Brahmana and Kausitiki Brahmana
B. Gopatha Brahmana
C. Satapatha Brahmana
D. None of these

150. The term "Niyoga" means
A. Marriage of a childless widow with the brother or blood relation of her deceased husband for the sake of progeny.
B. To produce off spring by illegal means.
C. To remain unmarried through out the life.
D. None of the above.

151. Mahayana Buddhism originated in:
A. Andhra Pradesh, 1st Century B.C.
B. Bihar, 1st Century A.D.
C. Kashmir, 3rd Century B.C.
D. Bengal, 2nd Century A.D.

152. Where has the Rummindei Pillar been erected?
A. The birth place of the Budha
B. The place where he preached his sermon first
C. The place where the Budha died
D. The place where he attained enlightenment

153. Early Schism in Buddhism divided the Buddhist order into:
A. Sthavirvadins and Mahasanghikas
B. Mahasanghikas Sunyavadins
C. Sunyavadins and Sarvastivadins
D. Sthavirvadins and Sarvastivadins

154. The Bhabru Edict records Ashoka's faith in:
A. Tisaranam
B. Toleration
C. Dharmavijya
D. Solicitude for the Welfare of the people

155. Which one of the following statement on the social life in the Sangam era is not correct?
A. The widows had to cut off their hair, discard all ornaments and eat only the plainest food.
B. Civil and military offices were held by the rich peasants called velalas.
C. Caste distinction existed.
D. Tolkappiar calls the commercial community as vaisigas.

156. Which one of the following statement on Sangam literature is not correct?
A. It enables us to trace a connected political history of Tamil Kingdom.
B. It sheds light on socio-religious aspects of Tamil-Kingdom.
C. It sheds light on trade relations with "Yavanas".
D. It sheds light on the pronounced fusion that had occurred between the Sanskrit and the Tamil culture.

157. Which was the most important city under Chandragupta Maurya?
A. Pataliputra B. Kausambi
C. Ujjain D. Taxila

158. Megasthenes refers to the rule of Heracles (Vasudeva Krishna's) daughter who was assigned villages to rule in Southern region, and who was probably the founder of Pandya kingdom. Identify her:
A. Pandia B. Panlavi
C. Maitri D. Pandara

159. The term 'ahara' as an administrative united appears in:

A. Arthasastra
B. Ashokan inscriptions
C. Rig Veda
D. Epics

160. What was the name of the Chola king who performed Aswamedha sacrifice?
A. Rajendra I B. Karikala
C. Parantaka D. Rajadhiraja I

161. Corbett National Park is situated in:
A. Gujarat B. Uttarakhand
C. Madhya Pradesh D. Assam

162. India tops in the production of:
A. Copper B. Jute
C. Iron ore D. Coal

163. To check the expansion of Thar desert which of the following measures should be used?
A. Afforestation
B. Construction of canals
C. Construction of dams
D. Artificial rain

164. Manganese is found in:
A. Punjab B. Jammu
C. Madhya Pradesh D. All of the above

165. Indian rhinos are found in:
A. Kaziranga Game Sanctuary
B. Corbett National Park
C. Kanha National Park
D. Gir Forest

166. In India rain forests are mainly found in:
A. Deccan region B. Malabar region
C. North-east India D. None of these

167. Natural Sanctuary of Flamingos is situated in:
A. Kaziranga B. Pullicat, Nellore
C. Hyderabad D. Bharatpur

168. Arrange the following states in the descending order according to the production of sugarcane:
I. Uttar Pradesh II. Maharashtra
III. Tamil Nadu IV. Karnataka
A. II, I, III, IV B. I, II, III, IV
C. I, II, IV, III D. None of these

169. Nagarjunasagar Project is situated on the river:
A. Cauvery B. Krishna
C. Godavari D. Tungabhadra

170. Petroleum was first struck in:
A. Ankleshwar B. Mumbai
C. Digboi D. Koyale

171. Which of the following is a Kharif crop?
A. Gram B. Barley
C. Wheat D. Rice

172. The characteristic Feature of peninsular rivers in India is:
A. They are better used for irrigation
B. They are more suitable for hydel projects
C. Flow of water is less regular as compared to Himalayan rivers
D. They receive water from the melting snows in summer

173. Which of the following slogans has been adopted under the social forestry programme?
A. A tree for each person
B. A tree for each family
C. A tree for each house
D. A tree for each child

174. Match the two-columns

(a) Bhilai	1. Aluminium
(b) Renukoot	2. Steel
(c) Bangalore	3. Machine tools
(d) Ahmedabad	4. Textiles
	5. Zinc Smelting

A. (a)-2, (b)-1, (c)-3, (d)-4
B. (a)-2, (b)-4, (c)-3, (d)-5
C. (a)-2, (b)-5, (c)-3, (d)-5
D. None of these

175. India exports which of the following minerals most?
A. Zinc B. Copper
C. Petroleum D. Iron ore

176. The magnetic compass does not indicate direction properly in some part of the world. This may be due to:
A. Presence of large amounts of underground iron deposits
B. Sedimentary rocks nearby
C. Some fault in it
D. Disturbances in the ionosphere of the earth

177. The planet which is called twin sister of Earth is:
A. Venus B. Mercury
C. Mars D. Jupiter

178. Which of the following is not a lagoon?
A. Sambhar B. Chilka
C. Pullicat D. None of these

179. The countries having natural frontiers with India are:
A. China, Myanmar and Nepal
B. Afghanistan, Nepal and Myanmar
C. China, Myanmar and Afghanistan
D. China, Russia and Bangladesh

180. The area of the Indian Union is:
A. 32,87,263 sq. km. B. 55,26,892 sq. km.
C. 32,00,000 sq. km. D. 35,00,000 sq. km.

181. Which one of the following longitudes determines the Indian Standard Time?
A. 85.5° E B. 86.5° E
C. 84.5° E D. 82.5° E

182. India is situated between:
A. 8°4′ N to 37°6′ N. latitudes and 60°7′ E to 98°25′ longitudes
B. 8° N to 37° N. latitudes and 68° E to 97° E longitudes
C. 8° N to 38° N. latitudes and 60° E to 90° E longitudes
D. 9° N to 36° N. latitudes and 64° E to 100° E longitudes

183. The length of the Himalayas between Indus Gorge and Brahmaputra Gorge is:
A. 3000 km B. 2200 km
C. 8000 km D. 2500 km

184. The longest railway platform in India is at:
A. Howrah B. New Delhi
C. Gorakhpur D. Mughalsarai

185. The lengths of Indian coast line and land frontiers are respectively:
A. 5700 km and 15000 km
B. 7500 km and 15200 km
C. 6000 km and 15000 km
D. 5500 km and 15200 km

186. The climate of India is:
A. subtropical climate
B. tropical climate
C. monsoon type climate
D. savanna type climate

187. India is connected with Europe through:
A. Suez Canal route B. Red Sea
C. Mediterranean Sea D. Persian Gulf

188. The north-south extent of India is:
A. 3200 km B. 3050 km
C. 2900 km D. 3000 km

189. The largest irrigation canal in India is the:
A. Indira Gandhi Canal
B. Yamuna Canal (West)
C. Upper Ganga Canal
D. Lower Ganga Canal

190. The normal sea route from Black Sea to Mumbai passes through the:
A. Kiel Canal
B. Cape of Good Hope
C. Suez Canal
D. Panama Canal

191. 'Paryushan Parv' is Celebrated by—
A. Baudhs B. Hindhus
C. Jains D. Sikhs

192. Ranga Swami Cup is awarded in—
A. Hockey B. Football
C. Cricket D. Volleyball

193. The weight of a Basketball is—
A. 400-500 ounce B. 500-600 gm
C. 567-650 ounce D. 567-650 gm

194. The length and width of a volleyball court is—
A. 17 × 9 metre B. 18 × 9 metre
C. 19 × 10 metre D. 20 × 10 metre

195. Name the first Indian woman who won the Gold Medal in Asian games—
A. P.T. Usha B. Sunita Rani
C. Shayni Abrahim D. Kamaljit Sandhu

196. Which of the following game's playground has 'bonus line'?
A. Basketball B. Hockey
C. Kabaddi D. Volleyball

197. Davis Cup is associated with—
A. Hockey B. Volleyball
C. Baseball D. Lawn Tennis

198. In test cricket, how many bouncers can be bowled in one over?
A. 1 B. 2
C. 3 D. 4

199. Olympia city is situated in which country of the world?
A. Greece B. Germany
C. Italy D. China

200. 'Set Shot' is related to—
A. Snooker B. Squash
C. Basketball D. Golf

ANSWERS

1	2	3	4	5	6	7	8	9	10
A	A	D	A	A	B	A	B	B	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	B	B	A	A	A	D	A	A	A
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
C	C	B	B	D	B	A	D	C	B
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
B	C	A	C	B	A	A	B	D	A
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
D	B	D	B	A	D	A	A	A	D
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
D	B	A	D	C	A	B	D	C	B
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
C	B	A	D	C	B	B	D	B	D
71	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
D	C	B	C	B	A	C	D	C	D
81	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**
D	C	A	C	A	A	D	A	C	B
91	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
A	A	B	A	D	C	B	C	B	A
101	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**
B	B	C	A	A	A	B	D	D	A
111	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
B	C	A	A	D	A	B	D	D	A
121	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**
B	B	B	B	A	A	A	A	A	A
131	**132**	**133**	**134**	**135**	**136**	**137**	**138**	**139**	**140**
C	A	C	D	A	A	D	B	A	D
141	**142**	**143**	**144**	**145**	**146**	**147**	**148**	**149**	**150**
A	A	B	D	D	C	D	B	A	A
151	**152**	**153**	**154**	**155**	**156**	**157**	**158**	**159**	**160**
A	A	A	A	D	A	A	A	B	D
161	**162**	**163**	**164**	**165**	**166**	**167**	**168**	**169**	**170**
B	B	A	C	A	C	B	C	B	C
171	**172**	**173**	**174**	**175**	**176**	**177**	**178**	**179**	**180**
D	C	D	A	D	A	A	A	A	A
181	**182**	**183**	**184**	**185**	**186**	**187**	**188**	**189**	**190**
D	B	D	C	B	C	A	A	A	C
191	**192**	**193**	**194**	**195**	**196**	**197**	**198**	**199**	**200**
C	A	D	B	D	C	D	B	A	C

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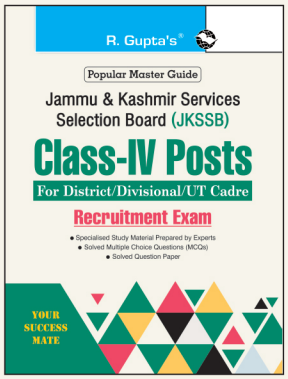

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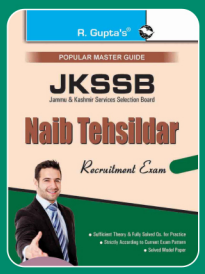

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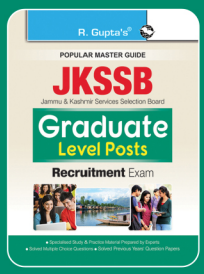

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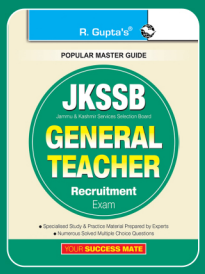

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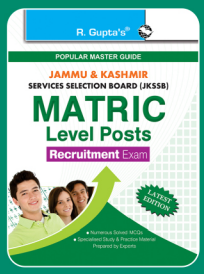

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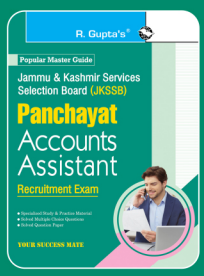

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HSN Code: 49011010
ISBN 978-93-89480-70-2
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Website: www.rameshpublishinghouse.com