



CLASS - 9



**SCHOLARSHIP FOR HIGH ACHIEVERS
AND NEEDY STUDENTS**

SAMPLE QUESTION PAPER

TIME : 2 HOURS

SCIENCE APTITUDE TEST

MAX MARKS : 300

Important Instructions

1. This Question paper contains 4 Parts
Part - I : Mental Ability - 15 Questions | Part - II : Mathematics - 30 Questions | Part - III : Physics & Chemistry - 20 Questions | Part - IV : Biology - 10 Questions
2. Marking Scheme: For each correct answer 4 marks will be awarded and for each wrong answer -1 mark will be deducted. In case of no response zero mark will be awarded
3. There is only one correct answer for each Question.
4. Darken the appropriate circle completely for the correct answer.
5. Use blue/black ballpoint pen only.
6. Fill in all the personal details given in the OMR sheet in the space provided.
7. Rough work is to be done in the space provided for this purpose in the Test Booklet only



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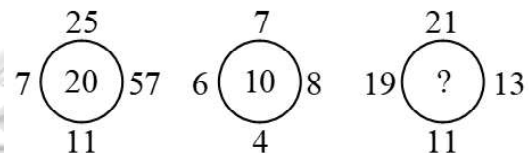
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PART - I : MENTAL ABILITY

1. Four men A, B, C and D and four women W, X, Y and Z are sitting round a table facing each other.
- No two men or women are sitting together.
 - W is to the right of B.
 - Y is facing X and is to the left of A.
 - C is to the right of Z.
- Who are the two persons sitting adjacent to D?
- W and Y
 - X and W
 - X and Z
 - W and Z
2. $S \times T$ means that S is the father of T, $S + T$ means that S is the mother of T, $S - T$ means that S is the sister of T. On the basis of this information, you have to select the option which shows that A is the grandfather of T.
- $A \times S \times B - T$
 - $A \times B + C - T$
 - $A + C - T$
 - $A + B - C \times T$
3. What was the day on 26th January 1950, when first Republic Day of India was celebrated ?
- Monday
 - Tuesday
 - Thursday
 - Friday

4. At what time between 5.30 and 6 will the hands of a clock be at right angle ?
- $43\frac{5}{11}$ minutes past 5
 - $43\frac{7}{11}$ minutes past 5
 - 40 minutes past 5
 - 45 minutes past 5
5. How many times do the hands of a clock coincide in a day ?
- 24
 - 22
 - 21
 - 20
6. In the series 7, 14, 28, ..., what will be the 10th term ?
- 1792
 - 2456
 - 3584
 - 4096
7. In a certain code, 15789 is written as XTZAL and 2346 is written as NPSU. How is 23549 written in that code ?
- NPTUL
 - PNTSL
 - NPTSL
 - NBTSL
8. Find the missing number:-

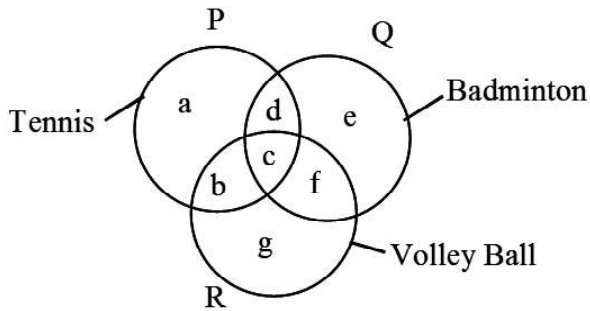


- 16
- 25
- 36
- 49

Space for Rough Work

Directions (Q. 9 to 12) :

The figure given below consists of three intersecting circles which represent sets of students who play Tennis, Badminton and Volley Ball. Each region in the figure is represented by a small letter.



On the basis of the above figure, answer the questions given below.

9. Which letter represents the set of persons who play all the three games ?

(a) b (b) c
(c) f (d) g

10. Which letter represents the set of persons who play Tennis and Volley Ball but no Badminton?

(a) g (b) e
(c) c (d) b

11. Which letter represents the set of persons who play Tennis but neither Badminton nor Volley Ball ?

(a) a (b) b
(c) c (d) d

12. Which letter represents the set of persons who play Tennis and Badminton but not Volley Ball?

(a) b (b) c
(c) d (d) f

13. A man is facing North-West. He turns 90° in the clockwise direction and then 135° in the anticlockwise direction. Which direction is he facing now ?

(a) East (b) West
(c) North (d) South

14. 'Dearth' is related to 'Scarcity' in the same way as 'Substitute' is related to-

(a) Replace (b) Rumour
(c) Destroy (d) Assume

15. Find the odd-one out?

(a) 32 : 15 (b) 86 : 42
(c) 56 : 26 (d) 74 : 36

Space for Rough Work

PART - II : MATHEMATICS

1. A sum becomes twice itself at compound interest in six years. In how many years will the same become sixteen times itself?

(a) 18 (b) 24
(c) 9 (d) 27

2. Find the value of $\sqrt{240 + \sqrt{240 + \sqrt{240 + \dots \infty}}}$.

(a) -15 (b) 16
(c) 15 (d) -16

3. Which of the following is a factor of $x^4 + x^2 + 1$?

(a) $x^2 + x - 1$ (b) $x^2 - x - 1$
(c) $x^2 - x + 1$ (d) $-x^2 - x - 1$

4. If $2^x = 3^y = 4^z$, for some integer values of x , y , and z , then what is the value of $x + y + z$?

(a) 0 (b) 1
(c) $\frac{1}{3}$ (d) $\frac{14}{3}$

5. If the length and the breadth of a rectangle are increased by 20% and 10%, respectively, then find the percentage increase in its area.

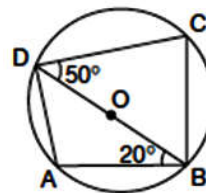
(a) 30% (b) 32%
(c) 35% (d) 31%

6. Find the area of a regular octagon having perimeter of 16 cm. (Correct to two decimal places) Given $\sqrt{2} = 1.41$

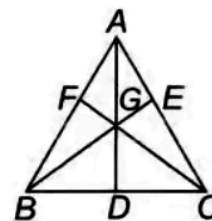
(a) $4(\sqrt{2}+1)\text{cm}^2$ (b) 19.31cm^2
(c) $8(\sqrt{2}+1)\text{cm}^2$ (d) 15.31cm^2

7. In the given figure, ABCD is a quadrilateral inscribed in a circle and BD is a diagonal passing through the centre of the circle 'O'. Find $\angle BOC + \angle AOD$.

(a) 140°
(b) 100°
(c) 120°
(d) 180°

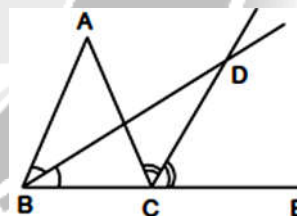


8. In $\triangle ABC$ the medians AD, BE and CF pass through G. If $BG = 6$ units find BE.



(a) 9 unit (b) 6 unit
(c) 3 unit (d) 12 unit

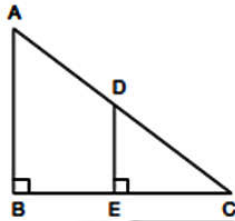
9. In the given figure, ABC is a triangle. BD and CD are internal and external bisectors of $\angle B$ and $\angle C$, respectively. If $\angle BAC = 50^\circ$, then $\angle BDC = \underline{\hspace{1cm}}$.



(a) 25° (b) 50°
(c) 75° (d) 100°

Space for Rough Work

10. If $3a + 5b + 6c = 33$ and $a + 3b + 4c = 19$, then $a + b + c = \underline{\hspace{2cm}}$.
- (a) 7 (b) 14
(c) 21 (d) 13
11. In the given figure, $DE \parallel AB$. If $EC = 12$ cm, $AB = 40$ cm, and $DE = 16$ cm, then $BE = \underline{\hspace{2cm}}$.



- (a) 10 cm (b) 15 cm
(c) 18 cm (d) 20 cm
12. The cost of 4 pens, 5 erasers, and 6 pencils is Rs 37. The cost of 3 pens, 2 erasers, and a pencil is Rs19. Find the cost of 3 pens, 3 erasers, and 3 pencils.
- (a) Rs 16 (b) Rs 20
(c) Rs 18 (d) Rs 24
13. The diagonal of a rectangle ABCD is the side of a rhombus AEFC. What is the ratio of the areas of the rectangle and the rhombus?
- (a) 1:4 (b) 2:3
(c) 3:4 (d) 1:2
14. One of the equal sides of an isosceles triangle is 16 cm and its perimeter is 62 cm. What is the area of the triangle (in sq. cm)?
- (a) $15\sqrt{31}$ (b) $32\sqrt{31}$
(c) $16\sqrt{30}$ (d) $15\sqrt{30}$

15. The sum of the radius and height of a solid cylinder is 35 cm. If the total surface area of the solid is 1540 cm^2 then what is the volume of the solid (in cm^3)
- (a) 1078 (b) 2156
(c) 4312 (d) 8624
16. Simplify $(5x + 4y)^2 - (5x - 4y)^2$
- (a) $50x^2 + 32y^2$ (b) $25x^2 + 16y^2$
(c) $40xy$ (d) $80xy$
17. If A gets 50% more than B, then by what percentage does B get less than A?
- (a) 50% (b) $33\frac{1}{3}\%$
(c) $16\frac{2}{3}\%$ (d) 150%
18. A person can row 20 km downstream in 2h and 16 km upstream in 8h. Find the speed of the person in still water (in kmph).
- (a) 12 (b) 8
(c) 6 (d) 4
19. The sum of the digits of a three-digit number is 9. If 99 is added to the number, then the digits will be in the reverse order. The digit in the ten's place is equal to $\frac{2}{7}$ times the sum of the digits in the hundred's place and unit's place. Find the product of the digits in the number.
- (a) 24 (b) 36
(c) 48 (d) 64
20. If the common solution of the equations $4x + 5y = 26$ and $8x + 3y = 17$ is (p, q) then find the value of $p + q$
- (a) $14/5$ (b) $21/4$
(c) $23/4$ (d) $17/3$

Space for Rough Work

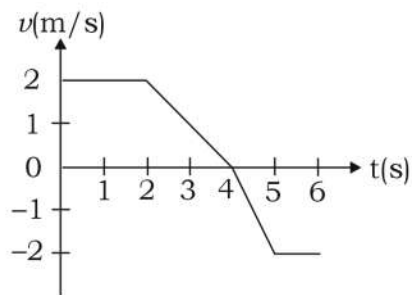
21. The area of a triangle whose sides are 17 cm, 8 cm, and 15 cm is ____.
- (a) 30cm^2 (b) 40cm^2
(c) 50cm^2 (d) 60cm^2
22. If the surface area of a sphere is 5024 cm^2 , then find the radius of the sphere (take $\pi = 3.14$).
- (a) 10 cm (b) 15 cm
(c) 20 cm (d) 25 cm
23. If the total surface area of a cube is 864 cm^2 . Find the volume of the cube (in cm^3)
- (a) 1728 (b) 2744
(c) 512 (d) 216
24. If $x = \sqrt{2} - \sqrt{3}$, then find the value of $x + \frac{1}{x}$.
- (a) $-2\sqrt{3}$ (b) $2\sqrt{3}$
(c) $4\sqrt{2}$ (d) $-4\sqrt{2}$
25. Solve for x: $(\sqrt{81})^{2x+4} = (\sqrt{729})^{2x+2}$
- (a) 1 (b) 3
(c) 4 (d) 6
26. Factorize: $4x^4 + 16$
- (a) $4(x^2 + 2)(x^2 - 2)$
(b) $2(x^2 + 4)(x^2 - 2)$
(c) $4(x^2 + 2x + 2)(x^2 - 2x + 2)$
(d) $4(x^2 - 2x - 2)(x^2 + 2x - 2)$
27. The remainder obtained when $2x^5 - 3x^3 + x^2 - 18$ is divided by $x - 2$ is
- (a) 26 (b) 27
(c) 28 (d) 29
28. If the difference between the mean and median of a data is x, then what will be the difference between the mean and mode of the data?
- (a) $2x$ (b) $3x$
(c) $\frac{x}{2}$ (d) $\frac{x}{3}$
29. If $\frac{1}{3}$ is added to a number, the sum is divided by 2 and $\frac{4}{3}$ is added to the quotient, then the resultant sum is 19. Find the number.
- (a) 24 (b) 35
(c) 45 (d) 27
30. The perpendicular distance of the point $(-7, 8)$ from x-Axis is ____ units.
- (a) 7 (b) -7
(c) 8 (d) -8

Space for Rough Work

PART - III : PHYSICS & CHEMISTRY

- The value of acceleration due to gravity (g) on Earth's surface is:
 - Maximum at the equator
 - Maximum at the center of the Earth
 - The same at all locations
 - Maximum at the poles
- When a stone tied to a string is whirled in a circle, the work done on it by the string for one complete revolution is:
 - Positive
 - Negative
 - Zero
 - Infinite
- A car accelerates uniformly from 18 km/h to 72 km/h in 10 seconds. The distance covered by the car in that time is:
 - 100 m
 - 125 m
 - 150 m
 - 200 m
- A cricket ball of mass 150 g is moving with a velocity of 15 m/s. A player catches it and stops it in 0.05 s. The force exerted by the player on the ball is:
 - 22.5 N
 - 22.5 N
 - 45 N
 - 45 N
- A submarine emits a sonar pulse, which returns from an underwater cliff in 2.04 s. If the speed of sound in salt water is 1530 m/s, how far away is the cliff?
 - 765 m
 - 1560.6 m
 - 3121.2 m
 - 6242.4 m

- The velocity-time graph for a particle is shown below. What is the total displacement of the particle in 6 seconds?



- 2 m
 - 3 m
 - 6 m
 - 8 m
- The kinetic energy of an object of mass 'm' moving with a velocity of 5 m/s is 25 J. What will be its kinetic energy when its velocity is doubled?
 - 25 J
 - 50 J
 - 100 J
 - 125 J
 - The gravitational force between two masses is F . If the distance between them is tripled, the new force will be:
 - $F/3$
 - $F/9$
 - $3F$
 - $9F$
 - A ball is thrown vertically upwards. The magnitude of its displacement in the 4th second of motion is equal to the magnitude of its displacement in the 7th second. What was the initial velocity of the ball? (take $g = 10 \text{ m/s}^2$)
 - 40 m/s
 - 50 m/s
 - 55 m/s
 - 70 m/s

Space for Rough Work

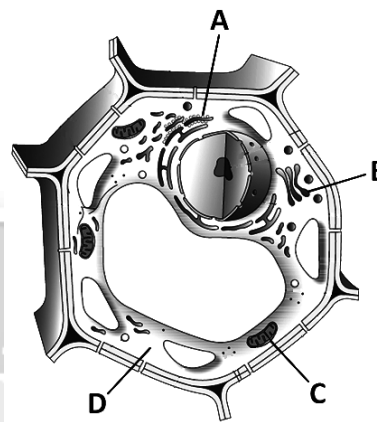
10. A block of wood floats in water with $\frac{2}{5}$ of its volume submerged. When the same block is placed in oil, $\frac{3}{5}$ of its volume is submerged. The ratio of the density of oil to the density of wood is:
- (a) 5 : 3 (b) 4 : 3
(c) 2 : 3 (d) 3 : 4
11. In all the three states of water, (i.e. ice, liquid and vapour) chemical composition of water
- (a) is very different
(b) remains same
(c) Sometimes same and sometimes different
(d) None of the above
12. Which of the following experimental actions would ultimately result in the formation of a mixture rather than a pure substance or a chemical compound?
- I. Pulverizing a marble tile into fine granules.
II. Fragmenting solid ice into smaller crystalline pieces.
III. Introducing metallic sodium into water.
IV. Admixing milk with water.
- (a) I, II and III (b) I, II and IV
(c) III and IV (d) Only IV
13. When 200 J of heat is supplied to a 50 g sample of a solid at its melting point, the solid melts completely without any rise in temperature. What is the latent heat of fusion of the substance?
- (a) 4 kJ/kg (b) 2 kJ/kg
(c) 8 kJ/kg (d) 10 kJ/kg
14. At 80 °C, the solubility of salt X is 60 g in water, while at 25 °C, its solubility decreases to 25 g in water. A chemist dissolves 120 g of salt X in 200 g of water at 80 °C to prepare a hot saturated solution. The solution is then cooled slowly to 25 °C. How much salt will crystallize out on cooling, and what will be the mass by mass percentage concentration of the saturated solution at 25 °C?
- (a) 70 g crystallizes; 20% concentration
(b) 60 g crystallizes; 25% concentration
(c) 50 g crystallizes; 33.3% concentration
(d) 45 g crystallizes; 28.6% concentration
15. A neutral atom of an element has a nucleus whose nuclear charge is 13 times that of a hydrogen nucleus, and whose mass is 27 times the mass of a hydrogen nucleus. When this atom forms its most stable positively charged ion, what is the ratio of the number of electrons to the number of protons in the ion?
- (a) 27 : 13 (b) 10 : 13
(c) 20 : 24 (d) 10 : 14
16. People often place naphthalene balls in cupboards or storage boxes containing clothes and blankets. After a few weeks, these balls vanish completely without leaving any solid residue. Which process is responsible for this disappearance?
- (a) Condensation (b) Sublimation
(c) Evaporation (d) Diffusion

Space for Rough Work

17. What is a sol?
- A solid dispersed in a liquid
 - A liquid dispersed in a gas
 - A gas dispersed in a liquid
 - A gas dispersed in a solid
18. What is the correct chemical formula of ammonium sulfate, a commonly used fertilizer?
- NH_4SO_4
 - NH_4SO_2
 - $(\text{NH}_4)_2\text{SO}_4$
 - NH_2SO_4
19. The atomic number of an element is equal to _____
- Number of neutrons
 - Number of electrons
 - Number of protons
 - Number of neutrons + number of protons
20. A sample of mercury sulphide weighs 2326 g and is 50% pure, the rest being inert impurities. If the molar masses of Hg and S are 200.6 g/mol and 32 g/mol respectively, how many grams of mercury can be extracted from the sample?
- 1200 g
 - 1163 g
 - 863 g
 - 1003 g

PART - IV : BIOLOGY

1. Mark the correct option with respect to organelle and its function, labelled as A, B, C and D.



- A - Major site for synthesis of food
 - B- Performs the function of packaging materials to be delivered to only intracellular targets.
 - C- Sites of aerobic respiration
 - D-Liquid part of cell known as protoplasm
2. Mark the correct set of option
- Tracheids & xylem parenchyma
 - Tracheids & phloem Parenchyma
 - Vessel & phloem Parenchyma
 - Sieve tube & xylem Parenchyma

Space for Rough Work

3. **A** : Mitochondria are called semiautonomous organelle
R : They release energy in the form of ATP during cellular respiration.
 (a) A true, R true and R explains A
 (b) A true, R true but R is not correct explanation of A
 (c) A true, R false
 (d) A false, R true
4. Choose the incorrect statement:
 (a) Chemical fertilisers improve soil fertility without side effects
 (b) Manures are eco-friendly
 (c) Irrigation is essential for crop growth
 (d) Crop rotation prevents soil depletion
5. Which of the following are correct?
 1) Rhizobium fixes nitrogen.
 2) Yeast produces alcohol.
 3) Malaria is caused by a virus.
 4) Lactobacillus curdles milk.
 (a) 1,2,4 (b) 1,3,4
 (c) 2,3,4 (d) 1,2,3
6. How does large-scale deforestation affect the local climate of an area?
 (a) Increases oxygen concentration
 (b) Causes soil to become porous
 (c) Decreases global temperature
 (d) Makes the area drier and hotter
7. Which of the following is absent in prokaryotes?
 (a) Nucleoid
 (b) Membrane-bound nucleus
 (c) Ribosomes
 (d) Plasma membrane
8. Adolescence is the period between:
 (a) Infancy and childhood
 (b) Childhood and adulthood
 (c) Adulthood and old age
 (d) Birth and infancy
9. In Hydra, new individuals develop as outgrowths. This process is called:
 (a) Fragmentation (b) Regeneration
 (c) Budding (d) Binary fission
10. Which is the characteristics of cardiac muscles?
 (a) Unstriated (b) Voluntary
 (c) Involuntary (d) Fatigue quickly

Space for Rough Work