



SCIENCE APTITUDE TEST

CLASS - 9

SOLUTIONS

TEST CODE - 28S

WhatsApp Channel



Result will be Declared on 14th Oct. 2025

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10th CBSE Board Results 2025

SCI -100 | SS -100



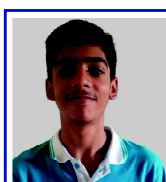
99.00%

Kushagrah



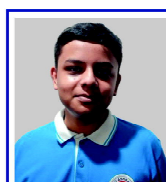
98.80%

Devansh



98.50%

Harshil



98.40%

Jay D.



98.66%

Rudra

MATH -100



97.60%

Aryan



97.60%

Khwahish



97.40%

Naman



97.40%

Rusha



97.40%

Siddhant

MATH -100



96.60%

Diza



96.50%

Kaushar



96.00%

Harleen



96.00%

Rakti



95.75%

Swara

ENG -100



95.60%

Jayani



95.60%

Parlta



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Shaurya



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Krishiv



95.05%

Shruja

And Many More....



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10th GSEB Board Result 2025



 SCI 100 SS 100 99.81% ile Naysa P.	 MATH 100 SCI 100 99.60% ile Pahal B.	 SS 100 99.35% ile Khushi P.	 SCI 100 99.22% ile Chirag R.	 99.14% ile Rutvi S.	 MATH 100 99.00% ile Darsh G.
 98.62% ile Dhanesh B.	 MATH 100 98.31% ile Darshil P.	 98.20% ile Vihaan T.	 98.20% ile Drashti S.	 98.20% ile Aanya K.	 98.20% ile Kshitij N.
 97.99% ile Varada M.	 97.88% ile Saksham U.	 MATH 100 SCI 100 97.76% ile Nivedya J.	 97.64% ile Dhyey P.	 97.50% ile Maharsh B.	 MATH 100 97.40% ile Shubh P.
 97.27% ile Pankti P.	 97.14% ile Devansh A.	 SCI 100 97.02% ile Vihaan P.	 96.76% ile Kathit S.	 96.68% ile Nisarg S.	 96.63% ile Dhwani P.
 96.50% ile Evan C.	 96.36% ile Disha S.	 MATH 100 96.36% ile Samarth T.	 96.22% ile Devanshi P.	 95.93% ile Mahaveer V.	 95.93% ile Abhinav P.

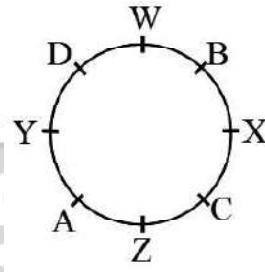
And Many More....

PART - I : MENTAL ABILITY

1.

Sol. (a)

Figure given here represents the exact position of all the eight persons. The sitting arrangement fulfills all the conditions given in the question. We observe from here that D is sitting between W and Y.



Hence our answer is (A).

2.

Sol. (a)

Option (A) represents that A is the grandfather of T

- (i) $B - T = B$ is the sister of T.
- (ii) $S \times B = S$ is the father of B, here
S will be father of T [from information (i)]
- (iii) $A \times S = A$ is the father of S, hence A will be grandfather of B.

3.

Sol. (c)

26th January 1950 means
 (1949 years and 26 days)
 1600 years have 0 odd days
 300 years have 1 odd day
 49 years have
 (12 leap years and 37 ordinary years)
 $(12 \times 366 + 37 \times 365)$ days
 $(4392 + 13505)$ days
 (17897) days = 2556 weeks + 5 days

So, 49 years have 5 odd days

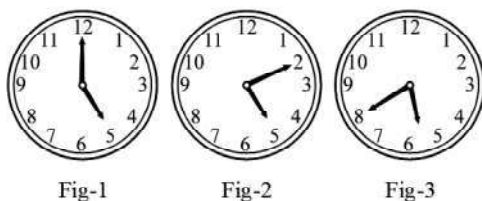
and 26 days have 5 odd days

Total number of odd days = $0 + 1 + 5 + 5 = 11$ days = 4 odd days.

Hence the day on 26th January 1950 was Thursday.

4.

Sol. (b)



At 5 both the hands are 25 minutes apart and to be at right angle both the hands have to be 15 minutes apart as shown in figure (2) and figure (3). Since we have to take the position of clock between 5.30 and 6 therefore, the positions of hands of clock as per figure (3) is our answer. Now it is clear from figure (1) and figure (3) that minute hand will have to travel $(25 + 15) = 40$ minutes space in order to form a right angle with the hour hand. 55 minutes space is gained in 60 minutes.

Therefore, 40 minutes space will be gained in $\left(\frac{60}{55} \times 40\right)$ minutes or $43\frac{7}{11}$ minutes.

Therefore, the hands are at right angle at $43\frac{7}{11}$ minutes past 5.

So, the correct option is (B).

5

Sol. (b)

From the properties of the clock we know that hands of a clock coincide once in every hour but between 11 o' clock and 1 o' clock they coincide only once. Therefore, the hands of a clock coincide 11 times in every 12 hours. Hence they will coincide (11×2) 22 times in 24 hours. So our answer is (B).

6.

Sol. (c)

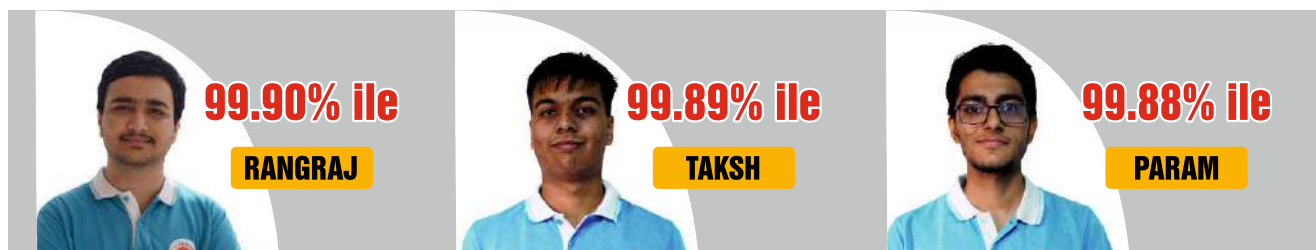
Clearly, $7 \times 2 = 14$, $14 \times 2 = 28$, ... and so on.

So, the given series is a G.P. in which

$a = 7$ and $r = 2$.

10th term = $ar^{(10-1)} = ar^9 = 7 \times 29 = 7 \times 512 = 3584$

27 Students secured above **99% ile** in **JEE Main 2025**



and many more....

7.

Sol. (c)

The numbers are coded as shown :

1 5 7 8 9 2 3 4 6
X T Z A L N P S U

i.e., 2 as N, 3 as P, 5 as T, 4 as S and 9 as L. So, 23549 is coded as NPTSL.

8.

Sol. (a)

Answer is (A) i.e. 16 because

$$2 \times \sqrt{25 + 57 + 11 + 7} = 2\sqrt{100} = 20$$

$$2 \times \sqrt{7 + 8 + 4 + 6} = 2\sqrt{25} = 10$$

$$\text{So, } 2 \times \sqrt{21 + 13 + 19 + 11} = 2\sqrt{64} = 16$$

9.

Sol. (b)

The letter that represents the set of persons who play all three games is C.

In a Venn diagram where three overlapping circles represent different groups, the area where all three circles intersect represents the individuals who are part of all three groups.

10.

Sol. (d) letter represents the set of persons who play Tennis and Volley Ball but no Badminton b.

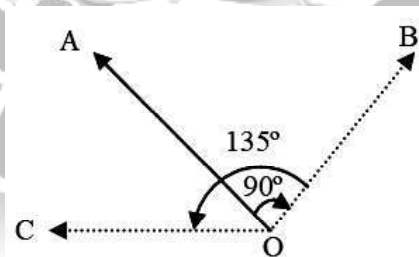
11.

Sol. (a) letter represents the set of persons who play Tennis but neither Bad minton nor Volley Ball a.

12.

Sol. (c) letter represents the set of persons who play Tennis and Badminton but not Volley Ball d.

13.

Sol. (b)

As shown in the figure, the man faces in the direction OA. After moving 90° clockwise, the man faces in the direction OB. On moving to 135° anticlockwise, he faces in the direction OC, which is West.

14.

Sol. (a)

'Scarcity' is synonym of 'Dearth'. In the same way 'Replace' is a word nearest in meaning to the word 'Substitute'. Therefore, our answer is (A).

15.

Sol. (c) Second no. is one less than the half of first number. So, option (C) is out answer.

PART - II : MATHEMATICS

1.

Sol. (b)

A sum becomes doubled itself at compound interest in six years.

Given, $A = 2P$

$$P\left(1 + \frac{r}{100}\right)^n = A \quad \Rightarrow \quad P\left(1 + \frac{r}{100}\right)^6 = 2P$$

$$\Rightarrow \left(1 + \frac{r}{100}\right)^6 = 2 \quad \Rightarrow \left[\left(1 + \frac{r}{100}\right)^6\right]^4 = (2)^4$$

$$\Rightarrow \left(1 + \frac{r}{100}\right)^{24} = 16 \Rightarrow P\left(1 + \frac{r}{100}\right)^{24} = 16P$$

In 24 years, the sum will become sixteen times itself.

2.

Sol. (b)

$$\text{Let } x = \sqrt{240 + \sqrt{240 + \sqrt{240 + \dots \infty}}}$$

$$\Rightarrow x^2 = 240 + \sqrt{240 + \sqrt{240 + \dots \infty}} \quad \Rightarrow x^2 = 240 + x$$

$$\Rightarrow x^2 - x - 240 = 0 \quad \Rightarrow (x - 16)(x + 15) = 0$$

$$\Rightarrow x = 16 \text{ or } x = -15 \text{ not possible} \quad \therefore x = 16$$

3.

$$\text{Sol. (c)} \quad x^4 + x^2 + 1 = (x^2 + 1)^2 - x^2 = (x^2 + x + 1)(x^2 - x + 1)$$

4.

Sol. (a)

$$\text{Given, } 2^x = 3^y = 4^z$$

It is possible when $x = y = z = 0$

$$\therefore x + y + z = 0 + 0 + 0 = 0$$



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5.

Sol. (b)

Let l and b be length and breadth of the rectangle, respectively.

$$\therefore \text{Area of the rectangle} = l \times b$$

Given, length and breadth are increased by 20% and 10%, respectively.

$$\therefore \text{Area of the resultant rectangle} = \left(\frac{120l}{100}\right)\left(\frac{110b}{100}\right)$$

$$\text{Required percentage} = \frac{\left[\left(\frac{120l}{100}\right)\left(\frac{110b}{100}\right) - lb\right]}{lb} \times 100 = \left(\frac{12 \times 11 - 100}{100}\right) \times 100 = (132 - 100)\% = 32\%$$

6.

Sol. (b)

Perimeter of octagon = 16 cm

Formula Used-

The perimeter of regular octagon = 8 x Side

Area of regular octagon = 2 x Side² x $(\sqrt{2} + 1)$

Calculation-

According to the condition -

$$8 \times \text{Side} = 16$$

$$\text{Side} = 2$$

$$\text{Area of octagon} = 2 \times \text{side}^2 \times (\sqrt{2} + 1) \Rightarrow 2 \times 2^2 \times (\sqrt{2} + 1) \Rightarrow 8\sqrt{2} + 8 \Rightarrow 19.31 \text{ cm}^2$$

7.

Sol. (a) 180°

$$\angle BDC = \angle BAC = 50^\circ$$

$$\Rightarrow \angle AOB = 180^\circ - 70^\circ = 110^\circ$$

$$\text{Join OC, } \angle BOC = 2\angle BDC = 2 \times 50^\circ$$

$$\angle BOC = 100^\circ$$

$$\Rightarrow \text{Join OA;}$$

$$\triangle AOD,$$

$$\Rightarrow \angle ADO = \angle OAD = 70^\circ$$

$$\Rightarrow \angle ADO + \angle OAD + \angle AOD = 180^\circ$$

$$\Rightarrow 70^\circ + 70^\circ + \angle AOD = 180^\circ$$

$$\Rightarrow \angle AOD = 180^\circ - 140^\circ$$

$$\Rightarrow \angle AOD = 40^\circ$$

$$\therefore \angle BOC + \angle AOD$$

$$100^\circ + 40^\circ = 140^\circ$$

8.

Sol. (a)

Relate the segments using the ratio Since $BG:GE=2:1$,

it can be written that $GE = \frac{1}{2}BG$.

Substitute and calculate: Substitute the expression for GE into the equation for

$$BE = BG + GE = \frac{3}{2}BG.$$

Given that $BG=6$ units, the length of BE can be calculated as $BE = \frac{3}{2}$ times $6 = 9$ units.

9.

Sol. (a)

Given, $\angle BAC = 50^\circ$

Let $\angle ABC = 2x$ and $\angle ACE = 2y$

Therefore $\angle DBC = x$, $\angle ACD = y$ and $\angle ACB = 180^\circ - 2y^\circ$

In $\triangle ABC$

$$\angle ABC + \angle BCA + \angle CAB = 180^\circ$$

$$2x + (180^\circ - 2y) + 50^\circ = 180^\circ$$

$$2x - 2y = -50 \Rightarrow y - x = 25$$

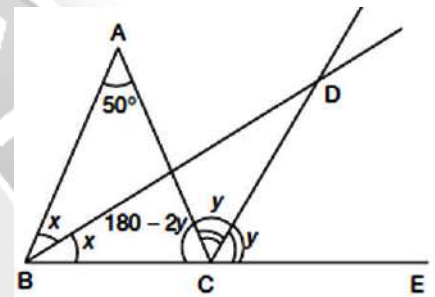
In $\triangle BCD$

$$\angle BDC + \angle DCB + \angle CBD = 180^\circ$$

$$\angle BDC + (180 - y) + x = 180^\circ$$

$$\angle BDC = y - x$$

$$\angle BDC = 25^\circ$$



10.

Sol. (a)

Given, $3a + 5b + 6c = 33$

$a + 3b + 4c = 19$

$$\text{Eq.(1)-Eq.(2)} \quad \Rightarrow 3a + 5b + 6c = 33$$

$$a + 3b + 4c = 19$$

$$\begin{array}{r} a + 3b + 4c = 19 \\ - \quad - \quad - \quad - \\ \hline 2a + 2b + 2c = 14 \end{array}$$

$$a + b + c = 7$$

11.

Sol. (c) $DE \parallel AB \dots$

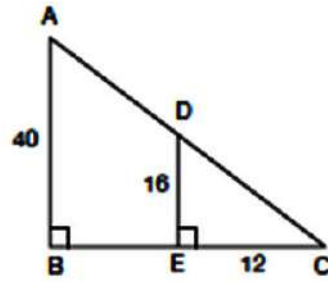
$$\angle ABC = \angle DEC = 90^\circ$$

$$\therefore \triangle ABC \sim \triangle DEC$$

$$\frac{AB}{BC} = \frac{DE}{EC}$$

$$\Rightarrow \frac{40}{BE+12} = \frac{16}{12} \quad \Rightarrow BE+12 = \frac{14 \times 12}{16} \quad \Rightarrow BE+12 = 30 \quad \Rightarrow BE = 18 \text{ cm}$$

Hence, the correct option is (c)



12.

Sol. (d)

Let the pens, erasers, and pencils be denoted by x, y, and z, respectively.

Given

$$4x + 5y + 6z = 37$$

$$3x + 2y + z = 19$$

$$7x + 7y + 7z = 56$$

$$x + y + z = 8$$

$$\therefore \text{The cost of 3 pens, 3 erasers, and 3 pencils is } = 3 \times 8 = 24$$

13.

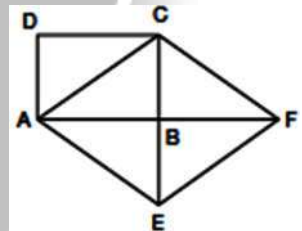
Sol. (d)

$$\text{Area of } ABC = \text{Area of } AEB = \text{Area of } ADC$$

$$\Rightarrow \text{Area of } ABCD = \text{Area of } AEBC$$

$$\Rightarrow \text{Area of the rectangle } ABCD = \frac{1}{2} \text{Area of the rhombus } AEFC$$

$$\therefore \text{Required ratio is } 1:2$$



14.

Sol. (a)

$$\text{Base of the triangle} = 62 - 2 \times 16 = 30$$

$$\text{Length of equal sides } a = 16 \text{ cm and } b = 30 \text{ cm}$$

$$A = \frac{b}{4} \sqrt{4a^2 - b^2}$$

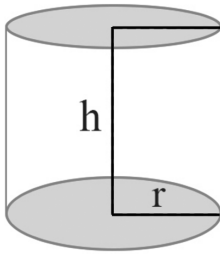
$$\therefore \text{Area of the triangle} = \frac{30}{4} \sqrt{4 \times 256 - 900} = \frac{30}{4} \sqrt{124} = 15\sqrt{3} \text{ sq. units}$$

65 Students secured admissions to **IITs** in 2024.



and many more....

15.

Sol. (c)

Let r and h be the radius and the height of the cylinder, respectively.

$$\text{TSA of the cylinder} = 2\pi r(h + r)$$

$$\text{Given: } r + h = 35\text{cm}$$

$$\text{Total surface area} = 2\pi r(h + r) = 1540\text{cm}^2 \Rightarrow 2 \times \frac{22}{7} \times r(35) = 1540 \Rightarrow r \times \frac{1540 \times 7}{35 \times 22 \times 2} = 7\text{cm}$$

$$\therefore \text{Height (h)} = 28\text{ cm} \quad \text{Volume of the cylinder} = \pi r^2 h$$

$$= \frac{22}{7} \times 7^2 \times 28 = 4312\text{cm}^2$$

16.

Sol. (d)

$$\text{We know that } (a + b)^2 - (a - b)^2 = 4ab$$

$$(5x + 4y)^2 - (5x - 4y)^2 = 4(5x)(4y) = 80xy$$

17.

Sol. (b)

Share of A	Share of B
150	100

$$\text{Required percentage} = \left(\frac{150 - 100}{150} \right) \times 100\% = 33\frac{1}{3}\%$$

18.

Sol. (c)

Let the speed of the man in still water be x kmph and speed of the stream be y kmph.

$$\frac{20}{x + y} = 2, \frac{16}{x - y} = 8$$

$$\Rightarrow x + y = 10 \quad (1)$$

$$x - y = 2 \quad (2)$$

$$\text{Eq. (1) + Eq. (2)} \Rightarrow 2x = 12 \Rightarrow x = 6$$

19.

Sol. (a)Let x , y , and z be the 100s, 10s, and units digits of a three-digit numbers.

$$x + y + z = 9 \quad (1)$$

$$100x + 10y + z + 99 = 100z + 10y + x$$

$$\Rightarrow 99z - 99x = 99$$

$$z - x = 1 \quad (2)$$

$$\text{Also } y = \frac{2}{7}(x + z)$$

$$7y = 2x + 2z \quad (3)$$

From Eq. (1),

$$x + z = 9 - y \Rightarrow 2x + 2z = 18 - 2y$$

$$7y = 18 - 2y$$

$$9y = 18 \Rightarrow y = 2$$

From Eq. (3), $2x + 2z = 7(2)$

$$x + z = 7 \quad (4)$$

From Eq. (2) and Eq. (4), $z - x + x + z = 1 + 7$

$$2z = 8$$

$$z = 4$$

$$\Rightarrow x = 3$$

.. The numbers 3, 2, and 4 product of the digits = $3 \times 2 \times 4 = 24$

20.

Sol. (b)

$$4x + 5y = 26 \quad (1)$$

$$8x + 3y = 17 \quad (2)$$

$$\text{Eq. (1)} \times 2 - \text{Eq. (2)}$$

$$8x + 10y = 52$$

$$8x + 3y = 17$$

$$\underline{(-) \quad (-) \quad (-)}$$

$$7y = 35$$

$$y = 5 \Rightarrow x = \frac{1}{4}$$

$$(p, q) = \left(\frac{1}{4}, 5 \right) \therefore p + q = \frac{21}{4}$$

21.

Sol. (d)

$$8^2 + 15^2 = 17^2$$

 \therefore Then the triangle is right-angled triangle.

$$\text{Required area} = \frac{1}{2} \times 15 \times 8 = 60 \text{ cm}^2$$

Total Selections In IIT ASHRAM Till Date**1103**

in JEE Advanced

5386

in JEE Main

557

in NEET

22.

Sol. (c)Let r be the radius of the sphere.Surface area of the sphere $= 4\pi r^2$

$$4\pi r^2 = 5024 \quad \Rightarrow \quad r^2 = \frac{5024}{4 \times 3.14} \quad \Rightarrow \quad r^2 = 400 \quad \Rightarrow \quad r = 20\text{cm}$$

23.

Sol. (a)Given $6s^2 = 864\text{cm}^2$

$$\Rightarrow s^2 = 144\text{ cm}^2 \quad \Rightarrow \quad s = 12\text{cm}$$

Volume $= s^3 = 1728\text{ cm}^3$

24.

Sol. (a)Given, $x = \sqrt{2} - \sqrt{3}$

$$\Rightarrow \frac{1}{x} = \frac{1}{\sqrt{2} - \sqrt{3}} \times \frac{\sqrt{2} + \sqrt{3}}{\sqrt{2} + \sqrt{3}} = \frac{\sqrt{2} + \sqrt{3}}{2 - 3} = -\sqrt{2} - \sqrt{3}$$

$$\Rightarrow x + \frac{1}{x} = \sqrt{2} - \sqrt{3} + (-\sqrt{2} - \sqrt{3}) = \sqrt{2} - \sqrt{3} - \sqrt{2} - \sqrt{3} = -2\sqrt{3}$$

25.

Sol. (a)

$$3^{4(2x+4)/2} = 3^{6(2x+2)/2}$$

$$\Rightarrow 8x + 16 = 12x + 12 \Rightarrow 4x = 4 \Rightarrow x = 1$$

26.

Sol. (c)

$$4x^4 + 16 = (2x^2)^2 + 4^2 \quad \Rightarrow \quad (2x^2)^2 + 2(2x^2)4 + 4^2 - 2(2x^2)4$$

$$\Rightarrow (2x^2)^2 + 16x^2 + 4^2 - 16x^2 \quad \Rightarrow \quad (2x^2 + 4)^2 - (4x)^2$$

$$\Rightarrow (2x^2 + 4x + 4)(2x^2 - 4x + 4) \quad \Rightarrow \quad 4(x^2 + 2x + 2)(x^2 - 2x + 2)$$

27.

Sol. (a)Let $f(x) = 2x^5 - 3x^3 + x^2 - 18$ and divisor $= x - 2$ Remainder $= f(2)$

$$\Rightarrow 2(2)^5 - 3(2)^3 + (2)^2 - 18$$

$$\Rightarrow 64 - 24 + 4 - 18 = 68 - 42 = 26$$

Hence, the correct option is (a)

28.

Sol. (b)

$$\text{Mode} = 3 \text{ median} - 2 \text{ mean}$$

$$\text{Mode-mean} = 3 \text{ median} - 3 \text{ mean}$$

$$\therefore \text{Mode} - \text{Mean} = 3(\text{Median} - \text{mean})$$

$$\text{Mode-mean} = 3x$$

$$(\text{Since median} - \text{mean} = x)$$

Hence, the correct option is (b).

29.

Sol. (b)

Let x be the number.

$$\begin{aligned} \Rightarrow \frac{x + \frac{1}{3}}{2} + \frac{4}{3} &= 19 & \Rightarrow \frac{3x+1}{6} = 19 - \frac{4}{3} & \Rightarrow \frac{3x+1}{6} = \frac{57-4}{3} \\ \Rightarrow \frac{3x+1}{2} &= 53 & \Rightarrow 3x+1 &= 106 \Rightarrow 3x = 105 & \Rightarrow x = 35 \end{aligned}$$

30.

Sol. (c)

The given point is $(-7, 8)$. The y-coordinate of this point is 8. The perpendicular distance from the x-axis is found by taking the absolute value of the y-coordinate, which is $|-8| = 8$.

PART - III : PHYSICS & CHEMISTRY

1.

Sol. (d)

Maximum at the poles - Earth is an oblate spheroid, flattened at the poles. Since $g \propto 1/r^2$, the smaller radius at the poles results in a higher value of g .

2.

Sol. (c)

Zero - In circular motion, the centripetal force is always perpendicular to the direction of displacement. Since $\text{Work} = F d \cos \theta$ and $\cos(90^\circ) = 0$, the work done is zero.

3.

Sol. (b) 125 m - converting velocities to m/s

$$u = 18 \times \frac{5}{18} = 5 \text{ m/s}; \quad v = 72 \times \frac{5}{18} = 20 \text{ m/s}.$$

$$\text{from equation of motion: } s = \left(\frac{u+v}{2} \right) t = \left(\frac{5+20}{2} \right) \times 10 = 12.5 \times 10 = 125 \text{ m}$$

4.

Sol. (d) -45 N

$$\begin{aligned} \text{Using Newton's second law in terms of momentum: } F &= \frac{\Delta p}{t} = \frac{m \times (v - u)}{t} = \\ &= \frac{0.150 \text{ kg} \times (0 - 15 \text{ m/s})}{0.05 \text{ s}} = \frac{-2.25}{0.25} = -45 \text{ N} \end{aligned}$$

5.

Sol. (b) 1560.6 m

The time for the signal to travel one way is $t = 2.04/2 = 1.02 \text{ s}$.

Distance = Speed \times Time = $1530 \text{ m/s} \times 1.02 \text{ s} = 1560.6 \text{ m}$.

6.

Sol. (b) 3 m

Displacement is the area under the v-t graph.

Area 1 (0-2s, rectangle) = $2 \times 2 = 4 \text{ m}$.

$$\text{Area 2 (2-4s, triangle)} = \frac{1}{2} \times 2 \times 2 = 2 \text{ m}.$$

$$\text{Area 3 (4-5s, triangle)} = \frac{1}{2} \times 1 \times (-2) = -1 \text{ m}.$$

$$\text{Area 4 (5-6s, rectangle)} = 1 \times (-2) = -2 \text{ m}.$$

$$\text{Total Displacement} = 4 + 2 - 1 - 2 = 3 \text{ m}.$$

7.

Sol. (c) 100 J

Kinetic Energy $KE = \frac{1}{2}mv^2$. Since $KE \propto v^2$, if velocity is doubled, KE becomes $2^2 = 4$ times.

New KE = $4 \times 25 \text{ J} = 100 \text{ J}$.

8.

Sol. (b) $F/9$

Gravitational force follows the inverse square law, $F \propto 1/r^2$. If distance r becomes $3r$, the new force $F' \propto 1/(3r)^2 = 1/(9r^2)$, so $F' = F/9$.

9.

Sol. (b) 50 m/s

For vertical motion, the speed at a time t before reaching the peak is the same as the speed at time t after the peak. This problem's symmetry implies the velocity at $t = 3\text{ s}$ is equal and opposite to the velocity at $t = 7\text{ s}$.

$$\begin{aligned} v(t=3) &= -v(t=7) & \Rightarrow u - g(3) &= -(u - g(7)) \\ \Rightarrow u - 3g &= -u + 7g & \Rightarrow 2u &= 10g & \Rightarrow u &= 5g = 5(10) = 50 \text{ m/s.} \end{aligned}$$

10.

Sol. (a) 5:3

By the principle of floatation, Weight of block = Weight of fluid displaced.

Let V be the block's volume, ρ_w be wood density, ρ_{water} be water density, and ρ_{oil} be oil density.

$$\text{In oil : } \rho_w g = \left(\frac{3}{5}V\right) \rho_{\text{oil}} g \Rightarrow \rho_w = \frac{3}{5} \rho_{\text{oil}}.$$

$$\rho_{\text{oil}} = \frac{5}{3} \rho_w. \text{ Therefore, the ratio } \rho_{\text{oil}} : \rho_w \text{ is } 5:3.$$

11.

Sol. (b) remains same

The chemical composition of water remains the same in all three states which is H_2O .

12.

Sol. (d) Only IV

Crushing marble or breaking ice only changes their size but the substance remains the same, so no mixture forms. Adding sodium to water causes a chemical reaction and produces new compounds, not a mixture. Only mixing milk with water gives a true mixture.

13.

Sol. (a) 4 kJ/kg

A 50 g sample means 0.05 kg of the substance. When 200 J of heat is used only for melting, this energy per kilogram becomes 4000 J, which is equal to 4 kJ. Hence, the latent heat of fusion of the substance is 4 kJ/kg.

14.

Sol. (a) 70 g crystallizes; 20% concentration

At 80 °C, 200 g of water dissolves 120 g salt, so the solution is saturated.

At 25 °C, the same water can dissolve only 50 g salt.

So, $120 - 50 = 70$ g of salt crystallizes out.The final solution has 50 g salt in 250 g solution \rightarrow 20% concentration.

15.

Sol. (b) 10 : 13

The atom has 13 protons (nuclear charge = 13) and mass 27, so it is aluminium. In neutral state it has 13 electrons, but in its stable ion Al^{3+} it loses 3, leaving 10 electrons. Hence the ratio of electrons to protons is 10 : 13.

16.

Sol. (b) Sublimation

The naphthalene balls disappear because they change directly from solid to gas without becoming liquid. This process is called sublimation.

17.

Sol. (a) A solid dispersed in a liquid

A sol is a type of colloidal solution in which solid particles are dispersed in a liquid medium.

18.

Sol. (c) $(\text{NH}_4)_2\text{SO}_4$

Ammonium has a charge of +1 (NH_4^+) and sulfate has a charge of -2 (SO_4^{2-}). To balance the charges, we need 2 ammonium ions for 1 sulfate ion. So the formula is $(\text{NH}_4)_2\text{SO}_4$.

19.

Sol. (c) Number of protons

Atomic number = number of protons in the nucleus

20.

Sol. (d) 1003 g

The sample contains 50% pure mercury sulphide (HgS),

so pure HgS = 1163 g. 232.6 g of HgS contains 200.6 g of Hg and 32g of S.

so scaling by 5 gives Hg = $200.6 \times 5 = 1003$ g.

PART - IV : BIOLOGY

1.

Sol. (c) A is RER, involved into protein synthesis. B is Golgi body, delivered materials intracellular as well as extracellular.

C is mitochondrion, known as powerhouse of the cell which produce ATP through cellular respiration D is jelly like semi liquid cytoplasm.

2.

Sol. (a) Tracheids and Xylem Parenchyma, both are elements of xylem tissue.

Xylem elements - Tracheids, vessels, xylem parenchyma, xylem fibres

Phloem elements - Sieve tube cells, sieve cells, albumen cells, companion cells phloem parenchyma, phloem fibres

3.

Sol. (b) R does not explain A, Mitochondria are called semiautonomous is due to their ability to self replicate and carry out protein synthesis, not because they produce ATP.

4.

Sol. (a) Excess fertilizers cause pollution and reduce soil fertility.

5.

Sol. (a) Malaria is caused by Plasmodium protozoan, not by virus.

6.

Sol. (d) Makes the area drier and hotter

Forests maintain the water cycle through transpiration.

Cutting trees reduces transpiration → less cloud formation → less rainfall.

Direct sunlight heats the bare soil → soil becomes dry and temperature rises.

Therefore, deforestation makes the area hotter and drier, not cooler or more fertile.

7.

Sol. (b) Membrane-bound nucleus

Prokaryotes (bacteria, archaea) lack a true, membrane-bound nucleus.

Instead, their DNA is located in a region called the nucleoid, which is not surrounded by a membrane.

They do have ribosomes (70S type) for protein synthesis, and a plasma membrane for cellular processes.

Therefore, the correct answer is b) Membrane-bound nucleus.

8.

Sol. (b) Childhood and adulthood

Adolescence is the transitional stage (around 11-19 years) between childhood and adulthood.

It is marked by physical, mental, and emotional changes.

9.

Sol. (c) Budding

Hydra reproduces asexually by budding, where a small bud develops on the parent body, grows, and then detaches to form a new Hydra.

10.

Sol. (c) Cardiac muscles are striated, involuntary and never fatigue.