KHOJ-2025
Exam for Young Scientists..!

CLASS 10

ANSWER KEY WITH SOLUTION

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PART - I : MENTAL ABILITY

1.

Sol. **(d)** 150

No red paint means the two adjacent faces having red have to be removed, i.e., 36 + 30 = 66 cubes. Hence, 216 - 66 = 150.   Choice (D)

2.

Sol. **(d)** 44

At least two different colours will mean out of the 56 cubes along all the edges together, we remove 4 cubes (excluding the corner cubes) for each colour, which have same colour on two faces i.e., 12 cubes. Hence, 56 - 12 = 44. Choice (D)

3.

Sol. **(c)** 60

One face red $\Rightarrow$ out of 36 + 30 = 66 cubes (on both the red faces together), we need to remove 6 common cubes which have two faces painted red. Hence, 66 - 6 = 60. Choice (c)

4.

Sol. **(c)** 16

There are 3 common edges giving 6 + 6 + 4 cubes which have green and red i.e., 16. Choice (c)

5.

Sol. **(c)** MUIDATS

Word : PANCREAS

Pattern: Letters in the word are reversed.

Code: SAERCNAP

Similarly, the code for STADIUM is MUIDATS.   Choice (c)

6.

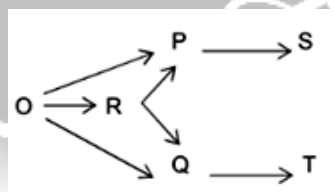**Sol:** **(a)** O cannot supply water to all of them without touching at least one person twice.

O can go directly to P and then to S or O can go directly to Q and then to T.

O $\rightarrow$ P $\rightarrow$ S or O $\rightarrow$ Q $\rightarrow$ T

The diagram can be represented as follows.

O can directly go to R and then to P and Q. O can go to P, then to S, then to T and return via Q and R. So, he cannot supply water to all without touching any of them twice. Hence, choice (A) is TRUE. Choice (A)

7.

Sol: **(d)** 13, 20, 29

5, 12, 13, 7, 14, 17, 9, 16, 19, 11, 18, 23, ___, ___, ____. The given series is a mixture of three different series. Every third number starting with 5 form a series of consecutive odd numbers in increasing order. Every third number starting with 12 form a series of consecutive even numbers. Similarly, every third number starting with 13 form a series of consecutive prime numbers. 5, 7, 9, 11, 13 (odd number series) 12, 14, 16, 18, 20 (even numbers series) 13, 17, 19, 23, 29 (prime numbers series) Hence, the next numbers in the series are 13, 20 and 29. Choice (d)

8.

Sol: **(c)** Anatomy

Books on Chemistry and Botany have exactly two books between them just as books on Maths and Physics have. Mathematics book is neither at the top nor at the bottom. So, the arrangement of Chemistry and Botany books may be as follows.(i) Chemistry - Botany - (or) - Chemistry -- Botany or (ii) Botany - Chemistry - (or) - Botany - Chemistry Maths books are not at any extreme. So, the arrangement may be as follows:

Chemistry Mathematics - Botany Physics or

Physics Chemistry - Mathematics Botany or

Botany Mathematics -Chemistry Physics or

Physics Botany - Mathematics Chemistry.

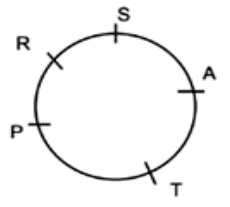**9.**

Sol: **(d)** Payal

In any of these possible arrangements, only the Anatomy book can be in the exact middle. Choice (C)

Let us denote all the names by their first letters. It is given that, T is to the immediate right of P while Q and R sit on either side of S. So the arrangement is as follows.
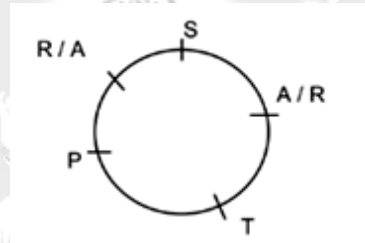
If there is only one person between R and T, the arrangement is as follows

So P must be between R and T because if R and A exchange their positions, then there will be no one between R and T, hence Choice (B)

10.

Sol: **(d)** 8

The hands of clock coincide once every hour hence from 10 to 7 i.e in 9hrs it must coincide 9 time. But between 11 to 1 only one time at 12 o clock therefore 8times   Choice (d)

11.

Sol: **(b)** Tuesday

5th June 2001 ? (2000) years + 1st January to 5th June 2001.We know that 2000 years have zero odd days. The number of odd days from 1st January to 5th June 2001. Month : Jan + Feb + Mar + Apr + May + June Odd day : 3 + 0 + 3 + 2 + 3 + 5 = 16 odd days or 16/7 or 2 odd day. Hence, 5th June 2001 was a Tuesday.   Choice (b)

12.

Sol: **(b)** Father

Raju's father's mother's daughter is Raju's father's sister. Raju's father's sister's only brother is Raju's father. Hence the person is Raju's father. Choice (B)
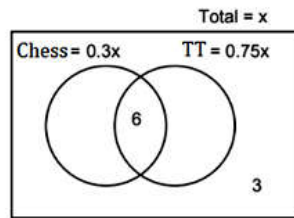
If x is the total number of students in the class, Number of students participating in Chess and TT is 0.3x and 0.75x respectively. Then, {0.3x + 0.75x - 6} + 3 = x ⇒ 0.05x = 3 ⇒ x = 60.

13.

Sol: (c)   60

Total number of students = x = 60. Choice (c)

14.

Sol. **(d)** 20%

Percentage of students who want to participate only in Chess = 30% ?(6/60) × 100 = 20%. Choice (d)

15.

Sol. **(a)** 85 %

Only in one programme = Only in Chess + TT - Both

Only in one programme = 20% only in Chess + 75% in TT - 10% in both = 85%.

PART - II : MATHEMATICS

1.

Sol.   **(c)**   27

Let cost of 1 mango = x   ⇒ 1 Apple   = y   ⇒ 10x + 9y = 104

⇒   27x + 25y= 285   ⇒ x = 5, y = 6

Cost of 3 mango + 2 apple   ⇒ = 3 × 5 + 2 × 6 = 27

2.

Sol.   **(d)**   Any value except 3 and -6

For unique Solution ⇒ $\dfrac{3}{k} \neq \dfrac{k+3}{6} \Rightarrow k \neq 3, k \neq -6$

3.

Sol.   **(c)**   2,200

just write the data as given:

a + b + c + d = 9000   ⇒   a + c + d = 4b   ⇒   b + d = 4/5 (a + c)

The first says that   ⇒   a + c + d = 9000 - b

using the second, that means that 9000 - b = 4b   ⇒   b = 1800

So,   now we have   a + c + d = 7200   ⇒   1800 + d = 4/5 (a + c)

Now we know that

a + d = 7200 - d,

so ,

⇒   1800 + d = 4/5 (7200 - d)   ⇒   1800 + d = 5760 - 4/5 d

9/5 d = 3960   ⇒   d = 2200

4.

Sol. **(c)** 16, 17, 18 $\Rightarrow$ $16^2 + 17^2 + 18^2 = 869$

5.

Sol. **(a)** 25

$\alpha \cdot \beta = 3(\alpha + \beta)$ $\Rightarrow$ $2(2R - 2) = 3(R - 7)$

$4R - 4 = 3R + 21$ $\Rightarrow$ R = 25

6.

Sol. **(a)** $5/24 \Rightarrow \dfrac{1}{\alpha} - \dfrac{1}{\beta} = \dfrac{\beta - \alpha}{\alpha\beta} = \dfrac{5}{24} \left[(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta \right]$

7.

Sol. **(d)** 4/7

$2^m x^2 + 8x + 64^m = 0$ $\Rightarrow$ For real and equal roots

$\Rightarrow$ $b^2 - 4ac = 0$ $\Rightarrow$ $8^2 - 4.2^m \cdot 64^m = 0$ $\Rightarrow$ $m = \dfrac{4}{7}$

8.

Sol. **(c)** 45

a = d

$a_3 = 9$

$\therefore a + 2d = 9$

$\therefore a = d = 3$

a_{15} = a + 14d = 45

9.

Sol. **(c)** 780

a = 3 , l = 101, d = 7

a + (n - 1)d = 101

3 + (n - 1) 7 = 101

n = 15

$S_n = \dfrac{15}{2}[3 + 101] = 780$

10.

Sol. **(b)** $x = \sqrt[3]{49} + \sqrt[3]{42} + \sqrt[3]{36}$

Let $a = 7^{\frac{1}{3}}$ $b = 6^{\frac{1}{3}}$

$x = a^2 + ab + b^2$

$x(a - b) = a^3 - b^3 = 1$ $x = \dfrac{1}{a - b}$

$x - \dfrac{1}{x^2} = \dfrac{x^3 - 1}{x^2} = \dfrac{\dfrac{1}{(a-b)^3} - 1}{\dfrac{1}{(a-b)^2}} = \dfrac{1 - (a-b^3)}{(a-b)} = \dfrac{1 - \left[a^3 - b^3 - 3ab(a-b) \right]}{(a-b)}$

$= \dfrac{1 - \left[1 - 3ab(a-b) \right]}{a - b} = 3ab = 3 \times \sqrt[3]{42}$

11.

Sol. (b)   1452

$\text{G C D (p, q)} = 2^2 \times 3 \times 11^2 = 1452$

12.   (a)

$$2\sqrt{3 + \sqrt{5 - \sqrt{13 + \sqrt{48}}}} \ = \ 2\sqrt{3 + \sqrt{5 - \sqrt{13 + 4\sqrt{3}}}} \ = \ 2\sqrt{3 + \sqrt{5 - \left(2\sqrt{3} + 1\right)}}$$

$$= 2\sqrt{3 + \sqrt{4 - 2\sqrt{3}}} \ = \ 2\sqrt{3 + \sqrt{3} - 1} \ = \ = 2\sqrt{2 + \sqrt{3}} \ = 2 \times \frac{1}{\sqrt{2}} \sqrt{4 + 2\sqrt{3}}$$

$$= \sqrt{2}\left(\sqrt{3} + \sqrt{1}\right) = \sqrt{6} + \sqrt{2}$$

$$= \sqrt{6} + \sqrt{2} = \sqrt{a} + \sqrt{b}$$

$$= a + b = 6 + 2 = 8$$

13.

Sol.   **Bonus**

14.

Sol. (d)   21

$PQ \times PR = PS \times PT$

$4 \times 4 = 3 \times PT$

$PT = 24$ $\therefore ST = 24 - 3 = 21$

15.

Sol. **(a)**   1.8 units

$\Delta ABC \sim \Delta ADB$

$\dfrac{AB}{AD} = \dfrac{AC}{AB}$ $\Rightarrow$ $\dfrac{3}{AD} = \dfrac{5}{3}$ $\Rightarrow$ $AD = 1.8$ units

16.

Sol. (a)   8 cm

$PQ^2 = QA \times QB$

$12 \times 12 = (10 \times \text{ x}) \times \text{x}$

$x^2 + 10x - 144 = 0$

$x^2 + 18x - 8x - 144 = 0$

$(x + 18)(x - 8) = 0$

$x = 8$ $\therefore QB = 8\text{cm}$

17.

Sol. (d)   (29/2, 0)

$(x - 2)^2 + (4 - 0)^2 = (x - 6)^2 + (10 - 0)^2$

$$\frac{x^2 - 4x}{8x} + 4 + 16 = x^2 - 12x + 36 + 100$$

$$8x = 116$$

$$x = \frac{116}{8} = \frac{29}{2} \qquad\qquad \text{Ans: } \left(\frac{29}{2}, 0\right)$$

18.

Sol. (a)   (-9, 5)

$$\left[\frac{x - 3}{2}, \frac{y + 9}{2}\right] = \left[\frac{-7 + (-5)}{2}, \frac{8 + 6}{2}\right]$$

x-3=-13   x + 9 = 14

x = -9   y = 5   Ans : (-9, 5)

19.

Sol. (b)   23

New median = 23

20.

Sol. (c)   148

104, 112, ... 200

200 = 104 + (n - 1)8

                n = 13

$$\text{Mean} = \frac{104 + 112 + ...200}{13} = \frac{\frac{13}{2}(104 + 200)}{\frac{13}{1}} = 152$$

21.

Sol. (a)   6

A can be 1, 5, 6

22.

Sol. (b)   194400

Let LCM = L , HCF = H

L + H = 1260

L - H = 900

(On solving)

$\therefore$ L = 1080 $\Rightarrow$ H = 180

$\therefore$ Product of no = L $\times$ H =194400

23.

Sol. (b)   The minimum value is $\frac{11}{4}$

$$x^2 - 3x + 5$$

$$a > 0$$

$\therefore$ Minimum value = Vertex $= \left(\frac{-b}{2a}, \frac{-D}{4a}\right)$ $\Rightarrow$ $\frac{-D}{4a} = \frac{-\left[(-3)^2 - 4(1)(5)\right]}{4 \times 1} = \frac{11}{4}$

24.

Sol. (c)   10

Let present age of son be x

Then, Present age of father = 6 x (Acc. To Question)

30 yrs hence ,

Father's age = 6x + 30

Son's age = x + 30

According to Question , 6x + 30 = 2 (x + 30) - 10

By solving the equation , we get x = 5

Present age of son = 5 yrs

Present age of father = 6 × 5 = 30 yrs

Half of the father's age = 30/2 = 15 yrs

This means after 15 – 5 = 10 yrs the son's age will be half of the father's present age .

25.

Sol.   **(a)** $-9\sqrt{3}, 5$ $\Rightarrow$ $a = \sqrt{3}, b = 27, C = 5\sqrt{3}$

$\alpha + \beta = \dfrac{-b}{a}$ $\Rightarrow$ $\alpha + \beta = \dfrac{-27}{\sqrt{3}} = -9\sqrt{3}$

$\alpha\beta = \dfrac{c}{a}$ $\Rightarrow$ $= \dfrac{5\sqrt{3}}{\sqrt{3}} = 5$ Option (a) is correct

26.

Sol.   **(a)**   6

Let $x = \sqrt{30 + \sqrt{30 + \sqrt{30 + ...\infty}}}$

$x = \sqrt{30 + x}$

$x^2 - x - 30 = 0$

$(x - 6)(x + 5) = 0$

$x = +6$

$x = -5$ [Not acceptable]   **Choice (a)**

27.

Sol.   **(d)** K^4 $\Rightarrow$ $\sin^4\theta - \cos^4\theta = K^4$ $\Rightarrow$ $(\sin^2\theta - \cos^2\theta) = K^4$

28.

Sol.   **(a)** $\sec^2\theta + \tan\theta = \dfrac{(\tan\theta - 1)(\tan^2\theta + 1 + \tan\theta)}{(\tan\theta - 1)} = \sec^2 + \tan\theta$

29.

Sol.   **(b)**   8

$Z = 3M - 2\bar{x}$

Subtrat $\bar{x}$ both sides

$Z - \bar{x} = 3(M - \bar{x})$ $\Rightarrow$ $12 = 3(M - \bar{x})$

$M - \overline{x} = 4$

Again $Z = 3M - 2\overline{x}$ $\Rightarrow$ $Z - M = 2(M - \overline{x})$ $\Rightarrow$ $Z - M = 2(4) = 8$

30.

Sol. (b) $\dfrac{1}{7}$

Non leap year has

52 weeks and 1 day

∴ Last 1 day will add up

Extra day either S, M, T, W, Th, F, Sat

∴ $\text{Pr obability} = \dfrac{1}{7}$ [only 1 favourable out of 7]

31.

Sol. (c) 2

Rule LCM (A, B, C)K- Commen difference between Divison & Remaindar

LCM (3, 4, 5, 6, 7) K - 2

420 K - 2

For K = 1, 2 When get 3 digit number   Hence Ans 2 (choice C)

32.

Sol. (b) 5

$$x^4 + \left(2 - \sqrt{3}\right)x^2 + 2 + \sqrt{3} = K(x - \alpha_1)(x - \alpha_2)(x - \alpha_3)(x - \alpha_1)$$

Clearly K = 1 On comparing coefficint

Put x = 1

$$1 + 2 - \sqrt{3} + 2 + \sqrt{3} = (1 - \alpha_1)(1 - \alpha_2)(1 - \alpha_3)(1 - \alpha_4)$$

$$5 = (1 - \alpha_1)(1 - \alpha_2)(1 - \alpha_3)(1 - \alpha_4)$$

33.

Sol. (a) ± 3

$2 \sin\theta + 3 \cos\theta = 2$

$3 \sin\theta - 2 \cos\theta = K$ (let)

On Squaring and adding

$$4 \sin^2\theta + 9 \cos^2\theta + 12 \sin\theta.\cos\theta + 9 \sin^2\theta + 4 \cos^2\theta - 12 \sin\theta - \cos\theta = 4 + K^2$$

$13 [\sin^2\theta + \cos^2\theta] = 4 + K^2$

$13 - 4 = K^2$

$K = \pm 3$ (choice = a)

34.

Sol. (b) 30

R + W = 100

3 R - W = 180   On solving 4R = 280, R = 70, and W = 30

35.

Sol. (a)   190

1st player will play with other 19 player

2nd player will play with other 18 player $\therefore$ 19 +18 +17 ....1 $= \dfrac{19 \times 20}{2} = 190$

36.

Sol. (d) $\dfrac{2n+1}{3}$

Using $\overline{X} = \dfrac{\sum x_i f_i}{\sum f_i}$

$\overline{X} = \dfrac{n + 4n + 9n + 16n.........n^2 x}{n + 2n + 3n......nx} = \dfrac{1^2 n + 2^2 n + 3^2 n.....n^2 n}{n + 2n + 3n......nn} = \dfrac{\dfrac{n(n+1)(2n+1)}{6} \times n}{\dfrac{n(n+1)}{2}.n} = \dfrac{2n+1}{3}$

37.

Sol. (c)   2

$\sin\theta + \text{cosec}\theta = 2,$

$\sin\theta + \dfrac{1}{\sin\theta} = 2$

Sum of any positive number and it reciproal is always move than 2 and its 2 when both are equal

$\sin\theta + \dfrac{1}{\sin\theta} = \sin^2\theta = 1$

$\sin\theta = 1$

$\theta = 90^0$

$\sin^{2016}\theta + \text{co sec}^{2016}\theta \qquad \Rightarrow \quad 1 + 1 = 2$

38.

Sol. (a)   parallel

39.

Sol. (b)   7

Given, a and b belongs to the set {1,2,3,4}

Now, determinant of equation $ax^2 + bx + 1 = 0$ should be positive for its roots to be real i.e,

$b^2 -4ac \geq 0 \rightarrow b^2 \geq 4a$

Let's take

a = 1, then $b^2 \geq 4$ which gives values of b as {2,3,4}

a = 2, then $b^2 \geq 8$ which gives values of b as {3,4}

a = 3, then $b^2 \geq 12$ which gives values of b as {4}

a=4, then $b^2 \geq 16$ which gives values of b as {4}

Therefore total of 7 equations can be formed with those two variables.

40.

Sol. **(c)** $7 : 3$

Using BPT in ΔBAC and ΔBPC

$$\frac{AP}{PB} = \frac{CQ}{QB}$$

And $\dfrac{PD}{DB} = \dfrac{CQ}{QB}$ $\qquad\qquad \therefore \dfrac{AP}{PB} = \dfrac{CQ}{QB} = \dfrac{PD}{DB} = \dfrac{4}{3}$

Divided PB in $4 : 3$ ratio

$PD = \dfrac{4}{7} \times 3n = \dfrac{12n}{7}$ $\qquad\qquad \therefore \dfrac{AD}{PD} = \dfrac{4n}{12n/7} = \dfrac{7}{3}$

PART - III : PHYSICS & CHEMISTRY

1.

Sol. **(a)** 3:40 as when the clock shows 8:20 the hours hand will not be on 8 it will be little more than 8. So when seen from mirror it will be little less than 4 i.e it will be 3 and minutes hand on 20 min when seen through mirror points on 40 min.

So 3:40 is the correct answer.

2.

Sol. **(b)** The image formed by the mirror is at same distance behind the mirror as object is in front of it, now

If distance of object from mirror = 0.5m

Then distance of image from mirror = 0.5m

So, distance between object and mirror = 0.5m + 0.5m = 1m

3.

Sol. **(b)** The light reflected by a plane mirror may form a real image if the rays incident on the mirror are converging.

4.

Sol. **(b)** Take $f = 30$ cm, $m = \dfrac{1}{4}$

as $m = \dfrac{-v}{u}$, $\dfrac{-v}{u} = \dfrac{1}{4}$

$v = -u/4$

Using mirror formula

$1/v + 1/u = 1/f$

$-4/u + 1/u = 1/30$

$-3/u = 1/30$

$u = -90$ cm

5.

Sol. **(d)**

6.

Sol. **(a)** Diagram shows hypermetropia. This defect arises either because the focal length of the eye lens is too long or the eyeball has become too small.

7.

Sol. (b) Equal to the force exerted by Y on X.

As per Newton's third law "To every action there is an equal and opposite reaction."

8.

Sol. **(d)** Yellow, orange and red have greater wavelengths than that of the green colour. They bend less than the green colour and hence angle of incidence for them on face xz is less than their critical angles.

9.

Sol. **(c)** R = 5/4 ohm

Now $l' = 3l$, $A' = A/3$

$$R' = \frac{\delta l'}{A'} = \frac{\delta(3l)}{A/3} = \frac{9\delta l}{A} = 9R$$

There for R' = 45/4 ohm   hence, R:R' = 1:9

10.

Sol. **(b)** Average speed = (total distance covered) / (total time taken)

let the total distance = 3x

time taken to cover first one third distance $t_1 = \dfrac{x}{v_1}$

time taken to cover second one third distance $t_2 = \dfrac{x}{v_2}$

time taker to cover third one third distance $t_3 = \dfrac{x}{v_3}$

$$\text{Average speed} = \frac{x + x + x}{\dfrac{x}{v_1} + \dfrac{x}{v_2} + \dfrac{x}{v_3}} = \frac{3x}{x\left(\dfrac{v_3 v_2 + v_1 v_3 + v_1 v_2}{v_1 v_2 v_3}\right)}$$

$$\text{Average speed} = \frac{3\ v_1 v_2 v_3}{v_1 v_3 + v_2 v_3 + v_1 v_3}$$

11.

Sol. **(b)** As prism always bends the light towards the base and during dispersion violet colour will bend more than red. So in second figure violet is the first colour from top and blue is the third colour from the top.

12.

Sol. **(d)** Use a = (v-u)/t

for option D, u = 0, v = 40 m/s, t = 20s

a = (40-0) / 20 = 2 m/s²

13.

Sol. **(d)**

14.

Sol. **(c)** As acceleration due to gravity (g = 9.8 m/s^2) will be same for both balls.

15.

Sol. **(b)** Due to electromagnetic induction iron rods gets magnetized and develop opposite poles on the two ends of the rods. These ends then attract each other.

16.

Sol. **(d)** Cl_2O

Chlorine show positive oxidation state with oxygen and its oxidation state is + 1 in Cl_2O

17.

Sol. **(b)** HCI and Na_2CO_3

18.

Sol. (a) Tin and lead

Solder is an alloy of tin and lead.

19.

Sol. (c) Sulphide ores

20.

Sol. (a) 273 K

Triple point of water is 273K

21.

Sol. (d) 4 litre

$$n_1 = \frac{7}{28} = \frac{1}{4} = 0.25$$

$$n_2 = \frac{21}{28} = \frac{3}{4} = 0.75$$

$v_1 = v$, $v_2 = 12$ lit

$pv = nRT$

But p and T are same so

$$\Rightarrow \quad \left[\frac{n_1}{v_1} = \frac{n_2}{v_2} \right] \qquad \Rightarrow \quad \frac{0.25}{v_1} = \frac{0.75}{12} \qquad \Rightarrow \qquad V_1 = 4 \text{ lit}$$

22.

Sol. **(c)** 33.49

$$w/v\% = \frac{34.7 \times 1.3 \times 100}{134.7} = 33.49$$

$$\left(d = \frac{M}{v} \text{ and } v = \frac{M}{d} = \frac{134.7}{1.3} \right)$$

23.

Sol. **(d)** X = Copper sulphate Y = Milk

Light is passed through the solution of $CuSO_4$ and solution of milk so, the light only scattered in milk, because milk is a colloidal solution, and path of light is invisible in $CuSO_4$ solution because it is true solution.

24.

Sol. **(c)** $9.1 \times 10^{-31} kg$

Then mass of electron is $9.1 \times 10^{-31} kg$

25.

Sol. **(c)** $1 g H_2$

Maximum number of molecules in "$1 g H_2$"

Number of molecules = $mole \times 6.022 \times 10^{23} = \frac{1}{2} \times 6.022 \times 10^{23} \left(\left(n = \frac{w}{m} \right) = \frac{1}{2} \right)$

3.01×10^{23} molecules

26.

Sol. **(a)** **PH = 9.3**

$pOH = -\log\left[OH^- \right]$

$pOH = -\log\left(2 \times 10^{-5} \right)$

$pOH = 5 - \log 2.0 \,(\log\ 2.0 = 0.3010)$

$pOH = 5 - 0.3010$

$pOH = 4.699$

$P^H + P^{OH} = 14$

$P^H = 14 - P^{OH}$

$P^H = 14 - 4.699$

PH = 9.3

27.

Sol. **(a)** $MCrO_4$

Formula of metal chromate in $MCrO_4$

28.

Sol. **(b)** $1/12^{th}$ of mass of carbon (C –12)

One 'u' is equal to $1/12^{th}$ of mass of carbon

(C –12)

29.

Sol. (c) Isotopes have the same nucleon number.

Isotopes have the same nucleon number it is wrong for isotope because for isotopes Neutrons number are differents.

30.

Sol. **(a)** P= 17, e = 18, n = 20, A = 37

PART - IV : BIOLOGY

1.
Sol. **(c)** Detoxification and metabolism

The liver plays a vital role in detoxifying the blood and metabolizing various substances.

2.
Sol. **(c)** Pepsin

Pepsin is the enzyme responsible for protein digestion in the stomach.

3.
Sol. **(d)** Cerebrum

The cerebrum is responsible for voluntary actions and conscious thoughts.

4.
Sol. **(b)** Transmit impulses from sense organs to the brain

Sensory neurons carry information from sensory receptors to the brain for processing.

5.
Sol. **(b)** Meiosis

Meiosis is the specialized cell division for gamete formation with halving of chromosome number.

6.
Sol. **(c)** It helps in adaptation to changing environments

Genetic diversity is crucial for adaptation and survival in evolving environments.

7.
Sol. **(b)** Mitosis

Mitosis is the process of cell division for growth and tissue repair in multicellular organisms.

8.
Sol. **(d)** Dermal tissue

Dermal tissue in plants acts as a protective outer covering.

9.
Sol. **(b)** Storage of fat

Adipose tissue is specialized for fat storage in animals.

10.
Sol. (b) 140/90 mmHg

In high blood Pressure condition Systolic BP rise from 120 to 140 mmHg & diastolic BP rise from 80 to 90 mmHg.

11.
Sol. **(a)** Animal need more energy for work to do like locomotion, so rate of respiration is higher in animals than in plants.

12.
Sol. (a) Control and coordination of body functions

The nervous system is responsible for regulating and coordinating various body functions.

13.
Sol. (d) Medulla oblongata

The medulla oblongata controls essential involuntary functions like breathing and heartbeat.

14.

Sol. (b) Asexual reproduction results in genetically identical offspring, while sexual reproduction results in genetically diverse offspring.

Asexual reproduction produces offspring with the same genetic makeup, while sexual reproduction combines genetic material from two parents, leading to diversity.

15.

Sol. (b) Stamen

The stamen is the male reproductive organ in a flower, consisting of anther and filament.