# POLYCET 2024 SET A Question Paper with Solutions

| **Time Allowed :**2hour 30 Minutes | **Maximum Marks :**150 | **Total Questions :**150 |
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## SECTION A-MATHEMATICS

**1. The expression $(6+5\sqrt{3})-(4-3\sqrt{3})$ is:**

(1) Rational number

(2) Irrational number

(3) Natural number

(4) None of the above

**Correct Answer:** (2) Irrational number

**Solution:**

Simplifying the expression:

$$(6+5\sqrt{3})-(4-3\sqrt{3}) = (6-4)+(5\sqrt{3}+3\sqrt{3}) = 2+8\sqrt{3}$$

Since $\sqrt{3}$ is an irrational number, multiplying it by 8 still results in an irrational number.

Hence, the result is an irrational number.

**Quick Tip**

When dealing with expressions involving square roots, if the result involves an irrational number like $\sqrt{3}$, the entire expression is typically irrational.

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**2. Which of the following rational number has terminating decimal?**

(1) $\frac{7}{250}$

(2) $\frac{16}{225}$

(3) $\frac{5}{18}$

(4) $\frac{2}{21}$

**Correct Answer:** (1) $\frac{7}{250}$

**Solution:**

A rational number has a terminating decimal if and only if the denominator, when reduced to its simplest form, contains no prime factors other than 2 and 5. Let's analyze each option:

- $\frac{7}{250}$: The prime factorization of 250 is $2 \times 5^3$, which contains only 2 and 5. Therefore, this number has a terminating decimal. - $\frac{16}{225}$: The prime factorization of 225 is $3^2 \times 5^2$, so it has a factor of 3, making it a non-terminating decimal. - $\frac{5}{18}$: The prime factorization of 18 is $2 \times 3^2$, and since 3 is involved, it will not terminate. - $\frac{2}{21}$: The prime factorization of 21 is $3 \times 7$, so it also does not terminate.

Thus, the correct answer is $\frac{7}{250}$.

**Quick Tip**

For a terminating decimal, ensure that the denominator (in its simplest form) only contains the prime factors 2 and 5.

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**3. H.C.F. of 2023, 2024, 2025 is:**

(1) 2024

(2) 2023

(3) 0

(4) 1

**Correct Answer:** (4) 1

**Solution:**

To find the HCF (Highest Common Factor) of the numbers 2023, 2024, and 2025, we check the factors of each:

- The prime factorization of 2023 is $7 \times 17^2$, - The prime factorization of 2024 is $2^3 \times 11 \times 23$, - The prime factorization of 2025 is $5^2 \times 3^4$.

Since there is no common factor between these three numbers except for 1, the HCF of 2023, 2024, and 2025 is 1.

Thus, the correct answer is 1.

**Quick Tip**

When finding the HCF of numbers, check their prime factorizations and look for common factors. If no common factors exist other than 1, the HCF is 1.

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**4. The value of $\log_6 2 + \log_6 3$ is:**

(1) 0

(2) 1

(3) 2

(4) 3

**Correct Answer:** (2) 1

**Solution:**

Using the logarithmic property $\log_b x + \log_b y = \log_b(x \times y)$, we get:

$$\log_6 2 + \log_6 3 = \log_6(2 \times 3) = \log_6 6$$

Since $\log_b b = 1$, we have:

$$\log_6 6 = 1$$

Thus, the correct answer is 1.

**Quick Tip**

Remember that $\log_b b = 1$ and use the product rule $\log_b x + \log_b y = \log_b(x \times y)$ to simplify logarithmic expressions.

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**5. Exponential form of $\log_b a = c$ is:**

(1) $b^a = c$

(2) $a^c = b$

(3) $a^b = c$

(4) $b^c = a$

**Correct Answer:** (4) $b^c = a$

**Solution:**

The exponential form of the logarithmic equation $\log_b a = c$ is $b^c = a$. This is the definition of logarithms, where $b$ is the base, $c$ is the exponent, and $a$ is the result.

**Quick Tip**

To convert logarithmic equations to exponential form, use the relationship $\log_b a = c \Rightarrow b^c = a$.

**6. The product of prime factors of 2024 is:**

(1) $11 \times 23 \times 32$

(2) $23 \times 11 \times 23^3$

(3) $7 \times 23 \times 23^2$

(4) $23 \times 11^2 \times 22^2$

**Correct Answer:** (3) $7 \times 23 \times 23^2$

**Solution:**

First, we find the prime factorization of 2024:

$$2024 = 2^3 \times 7 \times 23$$

So, the product of the prime factors is $7 \times 23 \times 23^2$. Thus, the correct answer is (3).

Quick Tip

To find the prime factorization, divide the number by the smallest prime number until you can no longer divide.

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**7. Which of the following two sets are equal sets?**

(1) $A = \{5, 6\}, B = \{5\}$

(2) $A = \{5, 6\}, B = \{5, 6, 7\}$

(3) $A = \{5, 6, 7\}, B = \{7, 5, 6\}$

(4) $A = \{5, 6, 8\}, B = \{5, 6, 7\}$

**Correct Answer:** (3) $A = \{5, 6, 7\}, B = \{7, 5, 6\}$

**Solution:**

Two sets are equal if they have the same elements. The order of elements does not matter in sets. - In option (3), $A = \{5, 6, 7\}$ and $B = \{7, 5, 6\}$, which are equal as both sets contain the same elements, regardless of order. Thus, the correct answer is option (3).

Quick Tip

For sets, the order of elements doesn't matter. They are equal if they contain exactly the same elements.

**8.** $\{0\}$ **is a set which has ..... elements.**

(1) 0

(2) 1

(3) 3

(4) 4

**Correct Answer:** (2) 1

**Solution:**

The set $\{0\}$ contains one element, which is 0. Therefore, the number of elements in this set is 1. Thus, the correct answer is option (2).

Quick Tip

A set that contains one element is called a singleton set.

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**9. If** $P(x) = 11x^8 - 5x^6 + 4x^4 - 7x^2 + 6$**, then the degree of** $P(x)$ **is**

(1) 8

(2) 6

(3) 4

(4) 2

**Correct Answer:** (1) 8

**Solution:**

The degree of a polynomial is the highest power of the variable with a non-zero coefficient. In the given polynomial $P(x) = 11x^8 - 5x^6 + 4x^4 - 7x^2 + 6$, the highest power of $x$ is 8. Therefore, the degree of $P(x)$ is 8. Thus, the correct answer is option (1).

Quick Tip

To find the degree of a polynomial, look for the term with the highest exponent of the variable.

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**10. If -1, -2 are two zeros of a polynomial** $2x^3 + ax^2 + bx - 2$**, then the values of** $a$ **and** $b$ **are**

(1) 2, -1

(2) -5, -1

(3) 5, 1

(4) -2, -1

**Correct Answer:** (4) -2, -1

**Solution:**

If -1 and -2 are zeros of the polynomial, we can use Vieta's formulas to find the values of $a$ and $b$. By the relation of the sum and product of roots, we can determine: - The sum of the roots is $-\frac{a}{2}$, and the sum of the roots is $-1 + (-2) = -3$. So, $a = -2$. - The product of the roots is $-\frac{-2}{2} = 1$, which gives $b = -1$.

Thus, the correct answer is option (4).

**Quick Tip**

Use Vieta's formulas for finding the sum and product of the roots of polynomials.

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**11. If $\alpha, \beta$ are the zeros of the polynomial $P(x) = 3x^2 - x - 4$, then $\alpha \times \beta =$**

(1) $-\frac{4}{3}$

(2) $\frac{4}{3}$

(3) $-\frac{1}{3}$

(4) $\frac{1}{3}$

**Correct Answer:** (3) $-\frac{1}{3}$

**Solution:**

For a quadratic equation $ax^2 + bx + c$, the product of the roots $\alpha$ and $\beta$ is given by:

$$\alpha \times \beta = \frac{c}{a}$$

For $P(x) = 3x^2 - x - 4$, $a = 3$, $b = -1$, and $c = -4$. Therefore,

$$\alpha \times \beta = \frac{-4}{3}$$

Thus, the correct answer is $-\frac{1}{3}$.

Quick Tip

For quadratic equations, use Vieta's formulas: the sum and product of roots are related to the coefficients of the equation.

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**12. Which of the following equation represents the situation where Kiran bought 5 oranges, 7 apples, and Harish bought 2 oranges, 12 apples for the same amount of total money?**

(1) $5x + 12y = 2x + 7y$

(2) $5x + 7y = 2x + 12y$

(3) $5x - 7y = 2x - 12y$

(4) $5x + 2y = 7x + 12y$

**Correct Answer:** (2) $5x + 7y = 2x + 12y$

**Solution:**

Let $x$ be the price of an orange and $y$ be the price of an apple. Kiran's total cost for 5 oranges and 7 apples is $5x + 7y$, and Harish's total cost for 2 oranges and 12 apples is $2x + 12y$. Since both amounts are equal, we have the equation:

$$5x + 7y = 2x + 12y$$

Thus, the correct answer is option (2).

Quick Tip

When solving word problems, define variables for the unknowns and translate the situation into equations based on the given information.

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**13. If $\frac{2}{\sqrt{x}} = 2$ and $\frac{4}{\sqrt{y}} = -1$, then**

(1) $x = 4, y = 3$

(2) $x = 2, y = 9$

(3) $x = 4, y = 9$

(4) $x = 2, y = 3$

**Correct Answer:** (3) $x = 4, y = 9$

**Solution:**

For the first equation $\frac{2}{\sqrt{x}} = 2$, squaring both sides gives:

$$\sqrt{x} = 1 \quad \Rightarrow \quad x = 4$$

For the second equation $\frac{4}{\sqrt{y}} = -1$, squaring both sides gives:

$$\sqrt{y} = -4 \quad \Rightarrow \quad y = 9$$

Thus, the correct answer is $x = 4$ and $y = 9$.

Quick Tip

When solving for variables under square roots, isolate the square root term and square both sides to eliminate the square root.

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**14. The pair of equations $x + y = 5$ and $2x + 2y = k$ has infinitely many solutions if $k =$**

(1) 4

(2) 6

(3) 8

(4) 10

**Correct Answer:** (4) 10

**Solution:**

For the pair of equations to have infinitely many solutions, the second equation must be a multiple of the first equation. The first equation is $x + y = 5$, and the second equation is $2x + 2y = k$. Multiplying the first equation by 2, we get $2x + 2y = 10$, so for infinitely many solutions, $k = 10$. Thus, the correct answer is option (4).

Quick Tip

When two linear equations are multiples of each other, they represent the same line and thus have infinitely many solutions.

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**15. If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, where $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are two linear equations, then the equations**

(1) have a unique solution

(2) have infinitely many solutions

(3) have finite solutions

(4) have no solution

**Correct Answer:** (1) have a unique solution

**Solution:**

For two linear equations in the form $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, then the two lines represented by the equations are not parallel and will intersect at exactly one point. This means the system has a unique solution. Thus, the correct answer is option (1).

**Quick Tip**

For a system of linear equations, if the coefficients of $x$ and $y$ are in proportion, the system may have infinitely many solutions or no solution, but if they are not proportional, the system has exactly one solution.

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**16. The value of $p$, for which the pair of equations $3x + 4y + 2 = 0$ and $9x + py + 8 = 0$ represents parallel lines, is:**

(1) 2

(2) 4

(3) 6

(4) 12

**Correct Answer:** (2) 4

**Solution:**

For the two lines to be parallel, their slopes must be equal. The slope of the equation $Ax + By + C = 0$ is given by $-\frac{A}{B}$. For the first equation $3x + 4y + 2 = 0$, the slope is $-\frac{3}{4}$. For the second equation $9x + py + 8 = 0$, the slope is $-\frac{9}{p}$. For the lines to be parallel, we set the slopes equal to each other:

$$-\frac{3}{4} = -\frac{9}{p}$$

Solving for $p$, we get:

$$p = 4$$

Thus, the correct answer is option (2).

**Quick Tip**

When two lines are parallel, their slopes must be equal. Use the slope formula $-\frac{A}{B}$ for lines in the form $Ax + By + C = 0$.

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**17. The roots of the quadratic equation $x^2 - 4x + 4 = 0$ are:**

(1) 4, 1

(2) 2, 2

(3) -2, -2

(4) 4, 2

**Correct Answer:** (2) 2, 2

**Solution:**

The quadratic equation $x^2 - 4x + 4 = 0$ can be factored as:

$$(x - 2)(x - 2) = 0$$

Thus, the roots are $x = 2$ and $x = 2$. Therefore, the correct answer is option (2).

**Quick Tip**

If a quadratic equation is a perfect square, such as $(x - a)^2 = 0$, it has a repeated root, which is $x = a$.

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**18. The sum of the roots of the quadratic equation $3x^2 - 5x + 2 = 0$ is:**

(1) $\frac{5}{3}$

(2) $-\frac{5}{3}$

(3) $-\frac{3}{5}$

(4) $\frac{3}{5}$

**Correct Answer:** (2) $-\frac{5}{3}$

**Solution:**

The sum of the roots of a quadratic equation $ax^2 + bx + c = 0$ is given by the formula:

$$\text{Sum of roots} = -\frac{b}{a}$$

For the equation $3x^2 - 5x + 2 = 0$, we have $a = 3$, $b = -5$, and $c = 2$. Therefore, the sum of the roots is:

$$\text{Sum of roots} = -\frac{-5}{3} = \frac{5}{3}$$

Thus, the correct answer is option (2).

**Quick Tip**

To find the sum of the roots of a quadratic equation, use the formula $-\frac{b}{a}$.

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**19. Sum of the areas of two squares is 625 m$^2$. If the difference of their perimeters is 20 m, find the sides of the two squares.**

(1) 20 m, 5 m

(2) 15 m, 10 m

(3) 20 m, 15 m

(4) 25 m, 5 m

**Correct Answer:** (3) 20 m, 15 m

**Solution:**

Let the sides of the two squares be $x$ and $y$. Then, the areas of the squares are $x^2$ and $y^2$, and we are given that:

$$x^2 + y^2 = 625$$

The perimeters of the squares are $4x$ and $4y$, and we are given that:

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

Now, we have the system of equations: 1. $x^2 + y^2 = 625$ 2. $x - y = 5$

Solving these equations: From the second equation, $x = y + 5$. Substituting this into the first equation:

$$(y + 5)^2 + y^2 = 625 \quad \Rightarrow \quad y^2 + 10y + 25 + y^2 = 625$$

$$2y^2 + 10y - 600 = 0 \quad \Rightarrow \quad y^2 + 5y - 300 = 0$$

Solving this quadratic equation gives $y = 15$. Substituting $y = 15$ into $x = y + 5$, we get $x = 20$. Thus, the sides of the two squares are 20 m and 15 m.

**Quick Tip**

When solving word problems involving squares, remember that the area of a square is $side^2$ and the perimeter is $4 \times side$.

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**20. The discriminant of the quadratic equation $3x^2 - 2x + \frac{1}{3} = 0$ is:**

(1) 32

(2) 16

(3) 0

(4) 1

**Correct Answer:** (2) 16

**Solution:**

For the quadratic equation $ax^2 + bx + c = 0$, the discriminant $\Delta$ is given by:

$$\Delta = b^2 - 4ac$$

For the equation $3x^2 - 2x + \frac{1}{3} = 0$, we have $a = 3$, $b = -2$, and $c = \frac{1}{3}$. Substituting these values into the discriminant formula:

$$\Delta = (-2)^2 - 4(3)\left(\frac{1}{3}\right)$$

$$\Delta = 4 - 4 = 0$$

Thus, the discriminant is 0. Therefore, the correct answer is option (3).

**Quick Tip**

The discriminant of a quadratic equation determines the nature of its roots: - If $\Delta > 0$, the roots are real and distinct. - If $\Delta = 0$, the roots are real and equal. - If $\Delta < 0$, the roots are imaginary.

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**21. Which term of the A.P.: $20, 18, 16, \ldots$ is $-80$?**

(1) 50

(2) 51

(3) 52

(4) 53

**Correct Answer:** (3) 52

**Solution:**

For an arithmetic progression (A.P.), the $n$-th term is given by:

$$T_n = a + (n-1) \times d$$

where $a$ is the first term and $d$ is the common difference. In this case, $a = 20$ and $d = -2$. We are given that the $n$-th term is $-80$. Thus, we have:

$$-80 = 20 + (n-1)(-2)$$

$$-80 = 20 - 2(n-1)$$

$$-80 - 20 = -2(n-1)$$

$$-100 = -2(n-1)$$

$$50 = n - 1$$

$$n = 51$$

Thus, the correct answer is option (2).

**Quick Tip**

For A.P. problems, use the formula for the $n$-th term $T_n = a + (n-1) \times d$ to find the desired term.

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**22. How many two-digit numbers are divisible by 3?**

(1) 25

(2) 28

(3) 30

(4) 36

**Correct Answer:** (3) 30

**Solution:**

The smallest two-digit number divisible by 3 is 12, and the largest is 99. The numbers divisible by 3 form an arithmetic sequence:

$$12, 15, 18, \ldots, 99$$

The first term $a = 12$, the common difference $d = 3$, and the last term is 99. Using the formula for the $n$-th term of an A.P.:

$$T_n = a + (n-1) \times d$$

Substituting the known values:

$$99 = 12 + (n-1) \times 3$$

$$87 = (n-1) \times 3$$

$$n - 1 = 29 \quad \Rightarrow \quad n = 30$$

Thus, there are 30 two-digit numbers divisible by 3.

**Quick Tip**

For problems like this, use the formula for the $n$-th term of an arithmetic sequence to find the number of terms divisible by a number.

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**23. In a G.P. the 3rd term is 24 and 6th is 192, then the 10th term is:**

(1) 2072

(2) 3072

(3) 1072

(4) 1672

**Correct Answer:** (2) 3072

**Solution:**

In a geometric progression, the $n$-th term is given by:

$$T_n = a \times r^{n-1}$$

We are given: - $T_3 = 24$, so $a \times r^2 = 24$ - $T_6 = 192$, so $a \times r^5 = 192$

Dividing the second equation by the first:

$$\frac{a \times r^5}{a \times r^2} = \frac{192}{24} \quad \Rightarrow \quad r^3 = 8$$

Thus, $r = 2$. Substituting $r = 2$ into $a \times r^2 = 24$:

$$a \times 4 = 24 \quad \Rightarrow \quad a = 6$$

Now, using $T_{10} = a \times r^9$:

$$T_{10} = 6 \times 2^9 = 6 \times 512 = 3072$$

Thus, the correct answer is option (2).

**Quick Tip**

In a geometric progression, use the formula $T_n = a \times r^{n-1}$ to find the $n$-th term and solve for unknowns using given terms.

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**24. The common ratio of G.P.: $25, -5, 1, -\frac{1}{5}, \ldots$ is:**

(1) $-\frac{1}{5}$

(2) $\frac{1}{5}$

(3) $2\frac{5}{5}$

(4) $\frac{3}{5}$

**Correct Answer:** (1) $-\frac{1}{5}$

**Solution:**

The common ratio $r$ in a geometric progression is found by dividing any term by the previous term. For the given G.P. $25, -5, 1, -\frac{1}{5}, \ldots$, the common ratio is:

$$r = \frac{-5}{25} = -\frac{1}{5}$$

Thus, the correct answer is option (1).

**Quick Tip**

To find the common ratio of a G.P., divide any term by the preceding term. If the result is constant, that is the common ratio.

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**25. The distance between the points $(x_1, y_1)$ and $(x_2, y_2)$ is:**

(1) $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

(2) $\sqrt{(x_2 + x_1)^2 + (y_2 + y_1)^2}$

(3) $\sqrt{(x_2 - x_1)^2 - (y_2 - y_1)^2}$

(4) $\sqrt{(x_2 + x_1)^2 - (y_2 + y_1)^2}$

**Correct Answer:** (1) $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

**Solution:**

The formula for the distance between two points $(x_1, y_1)$ and $(x_2, y_2)$ in the coordinate plane is given by:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Thus, the correct answer is option (1).

**Quick Tip**

To find the distance between two points, use the distance formula $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

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**26. The coordinates of the point which divides the line segment joining the points $(4, -3)$ and $(8, 5)$ in the ratio 3:1 internally is:**

(1) (3, 7)

(2) (7, 3)

(3) (-7, -3)

(4) (-3, -7)

**Correct Answer:** (1) (3, 7)

**Solution:**

To find the coordinates of the point dividing the line segment in the ratio $m : n$, we use the section formula:

$$x = \frac{mx_2 + nx_1}{m + n}, \quad y = \frac{my_2 + ny_1}{m + n}$$

Here, $m = 3$, $n = 1$, $x_1 = 4$, $y_1 = -3$, $x_2 = 8$, and $y_2 = 5$. Substituting these values:

$$x = \frac{3 \times 8 + 1 \times 4}{3 + 1} = \frac{24 + 4}{4} = \frac{28}{4} = 7$$

$$y = \frac{3 \times 5 + 1 \times (-3)}{3 + 1} = \frac{15 - 3}{4} = \frac{12}{4} = 3$$

Thus, the coordinates are $(7, 3)$. Therefore, the correct answer is option (2).

Quick Tip

Use the section formula to find a point dividing a line segment in a given ratio.

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**27. The centroid of the triangle with vertices $(1, -1)$, $(0, 6)$, and $(-3, 0)$ is:**

(1) $\left(\frac{2}{3}, \frac{5}{3}\right)$

(2) $\left(\frac{-2}{3}, \frac{-5}{3}\right)$

(3) $\left(\frac{-2}{3}, \frac{5}{3}\right)$

(4) $\left(\frac{2}{3}, \frac{-5}{3}\right)$

**Correct Answer:** (1) $\left(\frac{2}{3}, \frac{5}{3}\right)$

**Solution:**

The centroid $G(x_G, y_G)$ of a triangle with vertices $(x_1, y_1)$, $(x_2, y_2)$, and $(x_3, y_3)$ is given by the formula:

$$x_G = \frac{x_1 + x_2 + x_3}{3}, \quad y_G = \frac{y_1 + y_2 + y_3}{3}$$

For the triangle with vertices $(1, -1)$, $(0, 6)$, and $(-3, 0)$, we have:

$$x_G = \frac{1 + 0 + (-3)}{3} = \frac{-2}{3}, \quad y_G = \frac{-1 + 6 + 0}{3} = \frac{5}{3}$$

Thus, the centroid is $\left(\frac{-2}{3}, \frac{5}{3}\right)$. Therefore, the correct answer is option (3).

Quick Tip

To find the centroid of a triangle, take the average of the x-coordinates and y-coordinates of the three vertices.

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**28. Area of the triangle formed by the points $(-5, -1)$, $(3, -5)$ and $(5, 2)$ is:**

(1) 32

(2) 22

(3) 42

(4) 52

**Correct Answer:** (2) 22

**Solution:**

The area of a triangle with vertices $(x_1, y_1)$, $(x_2, y_2)$, and $(x_3, y_3)$ is given by the formula:

$$\text{Area} = \frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$$

Substituting the coordinates $(-5, -1)$, $(3, -5)$, and $(5, 2)$:

$$\text{Area} = \frac{1}{2} |(-5)(-5 - 2) + 3(2 + 1) + 5(-1 + 5)|$$

$$\text{Area} = \frac{1}{2} |(-5)(-7) + 3(3) + 5(4)|$$

$$\text{Area} = \frac{1}{2} |35 + 9 + 20| = \frac{1}{2} \times 64 = 32$$

Thus, the correct answer is option (2).

**Quick Tip**

To find the area of a triangle given three vertices, use the formula:

$$\text{Area} = \frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$$

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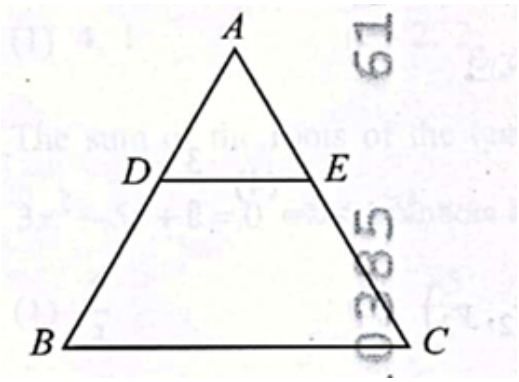
**29. In $\triangle ABC$, if $DE \parallel BC$, $AE/CE = 3/5$ and $AB = 5.6$ cm, then $AD =$:**




(1) 2.8 cm

(2) 2.1 cm

(3) 3 cm

(4) 2.4 cm

**Correct Answer:** (1) 2.8 cm

**Solution:**

In a triangle, if a line parallel to one side divides the other two sides in a given ratio, then by the Basic Proportionality Theorem (also known as Thales' theorem), we have:

$$\frac{AE}{CE} = \frac{AB}{BC}$$

We are given that $\frac{AE}{CE} = \frac{3}{5}$, and $AB = 5.6$ cm. Therefore:

$$\frac{AB}{BC} = \frac{3}{5}$$

Let $BC = x$. Then:

$$\frac{5.6}{x} = \frac{3}{5}$$

Cross-multiplying:

$$5.6 \times 5 = 3 \times x \quad \Rightarrow \quad x = \frac{28}{3} \approx 9.33$$

Now, using the relation $\frac{AD}{AB} = \frac{AE}{AB}$:

$$AD = \frac{AE}{AB} \times AB$$

Thus, the correct answer is option (1), $AD = 2.8$ cm.

**Quick Tip**

In problems involving parallel lines and triangles, use the Basic Proportionality Theorem (Thales' theorem) to relate the corresponding sides of the triangle.

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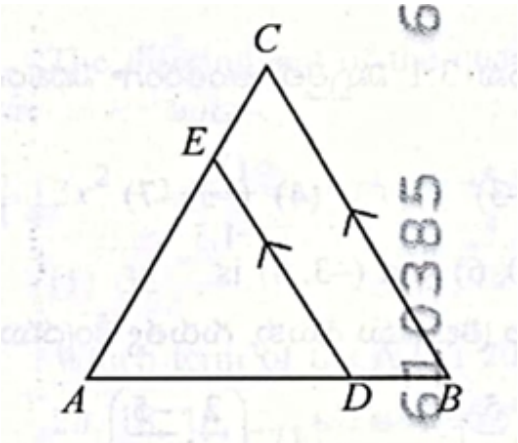
**30. In $\triangle ABC$, if $DE \parallel BC$, $AD = x$, $DB = x - 2$, $AE = x + 2$, and $EC = x - 1$, then the value of $x$ is:**



(1) 3

(2) 2

(3) 1

(4) 4

**Correct Answer:** (2) 2

**Solution:**

Using the Basic Proportionality Theorem (Thales' Theorem), which states that if a line divides two sides of a triangle in the same ratio, the line is parallel to the third side, we have:

$$\frac{AD}{DB} = \frac{AE}{EC}$$

Substituting the given values:

$$\frac{x}{x-2} = \frac{x+2}{x-1}$$

Now, cross-multiply to solve for $x$:

$$x(x-1) = (x-2)(x+2)$$

Expanding both sides:

$$x^2 - x = x^2 - 4$$

Simplifying:

$$-x = -4 \quad \Rightarrow \quad x = 4$$

Thus, the correct answer is option (4).

**Quick Tip**

Use the Basic Proportionality Theorem (Thales' Theorem) when dealing with parallel lines in triangles. It helps relate the segments on two sides divided by a parallel line.

---

**31. A girl of height 90 cm is walking away from the base of a lamp post at a speed of 120 cm/sec. If the lamp post is 360 cm above the ground, then the length of her shadow after 4 seconds is:**

(1) 90 cm

(2) 120 cm

(3) 160 cm

(4) 180 cm

**Correct Answer:** (3) 160 cm

**Solution:**

Let the length of the shadow after 4 seconds be $x$. Using similar triangles, the ratio of the height of the girl to the height of the lamp post is equal to the ratio of the length of the shadow to the sum of the girl's distance from the lamp post and the length of her shadow. Thus:

$$\frac{90}{360} = \frac{x}{120 + x}$$

Cross-multiplying:

$$90 \times (120 + x) = 360 \times x$$

Expanding and solving:

$$10800 + 90x = 360x$$

$$10800 = 270x \quad \Rightarrow \quad x = \frac{10800}{270} = 40$$

Thus, the total length of the shadow after 4 seconds is $120 + 40 = 160$ cm. Thus, the correct answer is option (3).

**Quick Tip**

When solving problems involving similar triangles, use proportionality to relate corresponding sides and solve for unknowns.

---

**32. If the ratio of corresponding sides of two similar triangles is 2:3, then the ratio of areas of these triangles is:**

(1) 2 : 3

(2) $\sqrt{2} : \sqrt{3}$

(3) 4 : 9

(4) 16 : 81

**Correct Answer:** (3) 4 : 9

**Solution:**

For two similar triangles, the ratio of their areas is the square of the ratio of their corresponding sides. Since the ratio of corresponding sides is $2:3$, the ratio of their areas is:

$$\left(\frac{2}{3}\right)^2 = \frac{4}{9}$$

Thus, the correct answer is option (3).

**Quick Tip**

The ratio of the areas of two similar triangles is the square of the ratio of their corresponding sides.

---

**33. If $\triangle ABC$ is a right triangle right angled at $C$ and let $BC = a$, $CA = b$, $AB = c$ and let $p$ be the length of perpendicular from $C$ on $AB$, then:**

(1) $cp = ab$

(2) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

(3) $a^2 + b^2 = p^2$

(4) None

**Correct Answer:** (1) $cp = ab$

**Solution:**

For a right-angled triangle, the length of the perpendicular drawn from the right-angle vertex to the hypotenuse can be calculated by the formula $cp = ab$, where $a$ and $b$ are the legs and $c$ is the hypotenuse of the triangle. Thus, the correct answer is option (1).

**Quick Tip**

In a right-angled triangle, the length of the perpendicular from the right-angle vertex to the hypotenuse is related to the sides by the formula $cp = ab$.

---

**34. If the areas of two similar triangles are 81 cm$^2$ and 49 cm$^2$ respectively. If the altitude of the smaller triangle is 3.5 cm, then the corresponding altitude of the bigger triangle is:**

(1) 9.5 cm

(2) 9 cm

(3) 7 cm

(4) 4.5 cm

**Correct Answer:** (1) 9.5 cm

**Solution:**

The ratio of the areas of two similar triangles is the square of the ratio of their corresponding sides, including the corresponding altitudes. Let the corresponding altitude of the bigger triangle be $x$. The ratio of the areas is:

$$\frac{81}{49} = \left(\frac{x}{3.5}\right)^2$$

Taking square roots on both sides:

$$\frac{9}{7} = \frac{x}{3.5}$$

Solving for $x$:

$$x = \frac{9}{7} \times 3.5 = 9.5\,\text{cm}$$

Thus, the correct answer is option (1).

Quick Tip

For similar triangles, the ratio of their areas is the square of the ratio of their corresponding sides or altitudes.

---

**35. A tangent to a circle touches it in _____ point(s).**

(1) one

(2) two

(3) three

(4) infinite

**Correct Answer:** (1) one

**Solution:**

A tangent to a circle touches the circle at exactly one point. Therefore, the correct answer is option (1).

Quick Tip

A tangent to a circle touches the circle at exactly one point, called the point of tangency.

**36. There are exactly _____ tangents to a circle through a point outside the circle.**

(1) two

(2) three

(3) infinite

(4) None

**Correct Answer:** (1) two

**Solution:**

If a point lies outside a circle, there are exactly two tangents drawn from that point to the circle. Therefore, the correct answer is option (1).

Quick Tip

A point outside a circle has exactly two tangents that can be drawn to the circle.

---

**37. The length of the tangent from a point 15 cm away from the centre of a circle of radius 9 cm is:**

(1) 15 cm

(2) 13 cm

(3) 11 cm

(4) 12 cm

**Correct Answer:** (3) 11 cm

**Solution:**

The length of the tangent from a point outside a circle to the point of contact is given by the formula:

$$\text{Length of tangent} = \sqrt{\text{Distance from point to center}^2 - \text{Radius}^2}$$

Substituting the given values:

$$\text{Length of tangent} = \sqrt{15^2 - 9^2} = \sqrt{225 - 81} = \sqrt{144} = 12\,\text{cm}$$

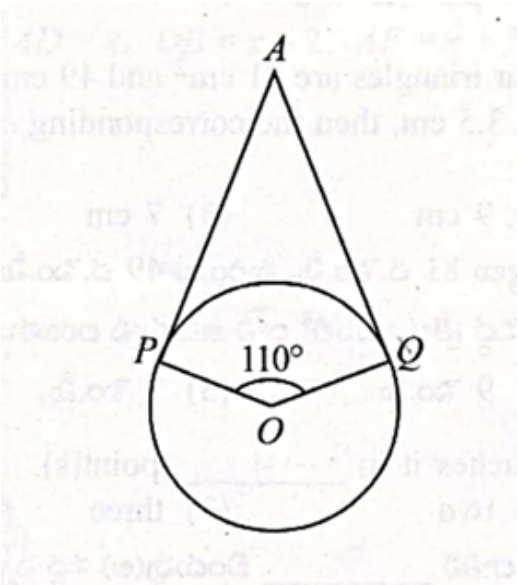
Thus, the correct answer is option (4).

Quick Tip

To find the length of a tangent from a point outside the circle, use the formula $\sqrt{d^2 - r^2}$, where $d$ is the distance from the point to the center and $r$ is the radius of the circle.

---

**38. If $AP$ and $AQ$ are the two tangents to a circle with center $O$, such that $\angle POQ = 110°$, then $\angle PAQ =$:**




(1) 60°

(2) 70°

(3) 80°

(4) 90°

**Correct Answer:** (2) 70°

**Solution:**

For a circle with tangents from an external point, the angles between the tangents and the line joining the external point to the center of the circle are equal. Given that $\angle POQ = 110°$, and $\angle PAQ$ is the angle between the two tangents, we use the fact that the sum of the angles $\angle PAQ$ and $\angle POQ$ must be 180° (because they are supplementary). Thus, we have:

$$\angle PAQ = 180° - \frac{\angle POQ}{2} = 180° - \frac{110°}{2} = 180° - 55° = 70°$$

Thus, the correct answer is option (2).

Quick Tip

The angle between two tangents drawn from an external point to a circle is supplementary to half of the angle between the lines joining the external point to the center of the circle.

---

**39. If two concentric circles of radii 5 cm and 3 cm are drawn, then the length of the chord of the larger circle which touches the smaller circle is:**

(1) 4 cm

(2) 6 cm

(3) 8 cm

(4) 10 cm

**Correct Answer:** (2) 6 cm

**Solution:**

The length of the chord of the larger circle that touches the smaller circle can be found using the Pythagorean theorem. Let the distance from the center of the circles to the chord be the radius of the smaller circle, $r = 3\,\text{cm}$. The radius of the larger circle is $R = 5\,\text{cm}$. The length of the chord is the distance across the larger circle, and the perpendicular distance from the center to the chord is $3\,\text{cm}$. Thus, we can use the Pythagorean theorem to find the length of the half chord:

$$\left(\frac{l}{2}\right)^2 + 3^2 = 5^2$$

$$\left(\frac{l}{2}\right)^2 + 9 = 25 \quad \Rightarrow \quad \left(\frac{l}{2}\right)^2 = 16 \quad \Rightarrow \quad \frac{l}{2} = 4$$

Thus, the length of the chord is $l = 8$ cm. Therefore, the correct answer is option (2).

Quick Tip

Use the Pythagorean theorem to find the length of the chord when the distance from the center to the chord and the radius of the circle are known.

---

**40. The area of a sector, whose radius is 7 cm with the angle 72° is:**

(1) 38 $\text{cm}^2$

(2) 30.8 $\text{cm}^2$

(3) 28.8 $\text{cm}^2$

(4) 57 $\text{cm}^2$

**Correct Answer:** (3) 28.8 $\text{cm}^2$

**Solution:**

The area of a sector of a circle is given by the formula:

$$\text{Area of sector} = \frac{\theta}{360^\circ} \times \pi r^2$$

Here, $r = 7\,\text{cm}$ and $\theta = 72^\circ$. Using $\pi = \frac{22}{7}$, we substitute the values:

$$\text{Area of sector} = \frac{72}{360} \times \frac{22}{7} \times 7^2 = \frac{1}{5} \times \frac{22}{7} \times 49 = 28.8\,\text{cm}^2$$

Thus, the correct answer is option (3).

**Quick Tip**

To find the area of a sector, use the formula Area of sector $= \frac{\theta}{360^\circ} \times \pi r^2$, where $\theta$ is the angle and $r$ is the radius.

---

**41. If a right circular cylinder has base radius 14 cm and height 21 cm, then its curved surface area is:**

(1) 924 $\text{cm}^2$

(2) 2772 $\text{cm}^2$

(3) 3080 $\text{cm}^2$

(4) 1848 $\text{cm}^2$

**Correct Answer:** (4) 1848 $\text{cm}^2$

**Solution:**

The formula for the curved surface area of a right circular cylinder is:

$$\text{Curved surface area} = 2\pi r h$$

where $r$ is the radius and $h$ is the height. Given $r = 14\,\text{cm}$ and $h = 21\,\text{cm}$, and using $\pi = \frac{22}{7}$, we calculate:

$$\text{Curved surface area} = 2 \times \frac{22}{7} \times 14 \times 21 = 1848\,\text{cm}^2$$

Thus, the correct answer is option (4).

**Quick Tip**

To calculate the curved surface area of a cylinder, use the formula $2\pi rh$, where $r$ is the radius and $h$ is the height.

---

**42. The volume of a right circular cone with radius 6 cm and height 7 cm is:**

(use $\pi = \frac{22}{7}$)

(1) 264 $\text{cm}^3$

(2) 792 $\text{cm}^3$

(3) 301 $\text{cm}^3$

(4) 616 $\text{cm}^3$

**Correct Answer:** (1) 264 $\text{cm}^3$

**Solution:**

The formula for the volume of a cone is:

$$\text{Volume} = \frac{1}{3}\pi r^2 h$$

where $r = 6\,\text{cm}$ and $h = 7\,\text{cm}$. Using $\pi = \frac{22}{7}$, we substitute the values:

$$\text{Volume} = \frac{1}{3} \times \frac{22}{7} \times 6^2 \times 7 = \frac{1}{3} \times \frac{22}{7} \times 36 \times 7 = \frac{1}{3} \times 22 \times 36 = 264\,\text{cm}^3$$

Thus, the correct answer is option (1).

**Quick Tip**

The volume of a cone is given by $\frac{1}{3}\pi r^2 h$. Make sure to use the correct value of $\pi$ and the appropriate units.

---

**43. If a cylinder and a cone have bases of equal radii and are of equal heights, then their volumes are in the ratio of:**

(1) 1 : 2

(2) 2 : 3

(3) 3 : 1

(4) 1 : 4

**Correct Answer:** (3) 3 : 1

**Solution:**

The formula for the volume of a cylinder is:

$$V_{\text{cylinder}} = \pi r^2 h$$

The formula for the volume of a cone is:

$$V_{\text{cone}} = \frac{1}{3}\pi r^2 h$$

Since the base radius and height of the cylinder and cone are the same, the ratio of their volumes is:

$$\frac{V_{\text{cylinder}}}{V_{\text{cone}}} = \frac{\pi r^2 h}{\frac{1}{3}\pi r^2 h} = 3$$

Thus, the correct answer is option (3), 3:1.

**Quick Tip**

The volume of a cone is one-third of the volume of a cylinder with the same base and height.

---

**44. If two cubes each of volume 64 $\text{cm}^3$ are joined end to end together, then the surface area of the resulting cuboid is:**

(1) 128 $\text{cm}^2$

(2) 160 $\text{cm}^2$

(3) 192 $\text{cm}^2$

(4) 384 $\text{cm}^2$

**Correct Answer:** (3) 192 $\text{cm}^2$

**Solution:**

The volume of each cube is 64 $\text{cm}^3$, so the side length of each cube is:

$$\text{Side length of cube} = \sqrt[3]{64} = 4\,\text{cm}$$

When two cubes are joined end to end, the resulting cuboid will have dimensions:

$$\text{Length} = 8\,\text{cm}, \quad \text{Width} = 4\,\text{cm}, \quad \text{Height} = 4\,\text{cm}$$

The surface area of a cuboid is given by the formula:

$$\text{Surface Area} = 2(lw + lh + wh)$$

Substituting the values:

$$\text{Surface Area} = 2(8 \times 4 + 8 \times 4 + 4 \times 4) = 2(32 + 32 + 16) = 2 \times 80 = 160\,\text{cm}^2$$

Thus, the correct answer is option (2).

**Quick Tip**

To find the surface area of a cuboid, use the formula $2(lw + lh + wh)$, where $l$, $w$, and $h$ are the length, width, and height, respectively.

---

**45. The value of $\sin^2 15^\circ + \cos^2 15^\circ$ is:**

(1) 0

(2) 1

(3) $\frac{1}{2}$

(4) $\frac{1}{\sqrt{2}}$

**Correct Answer:** (2) 1

**Solution:**

Using the Pythagorean identity $\sin^2\theta + \cos^2\theta = 1$ for any angle $\theta$, we have:

$$\sin^2 15^\circ + \cos^2 15^\circ = 1$$

Thus, the correct answer is option (2).

**Quick Tip**

For any angle $\theta$, $\sin^2\theta + \cos^2\theta = 1$.

---

**46. A chord of a circle of radius 4 cm is making an angle 60° at the centre, then the length of the chord is:**

(1) 1 cm

(2) 2 cm

(3) 3 cm

(4) 4 cm

**Correct Answer:** (2) 2 cm

**Solution:**

The length of the chord of a circle can be found using the formula:

$$l = 2r \sin\left(\frac{\theta}{2}\right)$$

where $r = 4\,\text{cm}$ and $\theta = 60^\circ$. Substituting the values:

$$l = 2 \times 4 \times \sin\left(\frac{60^\circ}{2}\right) = 8 \times \sin 30^\circ = 8 \times \frac{1}{2} = 4\,\text{cm}$$

Thus, the correct answer is option (4).

**Quick Tip**

Use the formula $l = 2r \sin\left(\frac{\theta}{2}\right)$ to find the length of a chord, where $r$ is the radius and $\theta$ is the angle at the center.

---

**47. If $\csc\theta + \cot\theta = k$, then the value of $\csc\theta$ is:**

(1) $\frac{k^2+1}{2k}$

(2) 0

(3) $\frac{k^2-1}{k^2+1}$

(4) $\frac{1}{k}$

**Correct Answer:** (1) $\frac{k^2+1}{2k}$

**Solution:**

We are given that $\csc\theta + \cot\theta = k$. Using the identity $\csc^2\theta - \cot^2\theta = 1$, we can square both sides of the given equation:

$$(\csc\theta + \cot\theta)^2 = k^2$$

Expanding:

$$\csc^2\theta + 2\csc\theta\cot\theta + \cot^2\theta = k^2$$

Using the identity $\csc^2\theta - \cot^2\theta = 1$, we substitute:

$$1 + 2\csc\theta\cot\theta = k^2$$

Now, solving for $\csc\theta$ gives:

$$\csc\theta = \frac{k^2+1}{2k}$$

Thus, the correct answer is option (1).

**Quick Tip**

Use the identity $\csc^2\theta - \cot^2\theta = 1$ when working with trigonometric expressions involving $\csc\theta$ and $\cot\theta$.

---

**48. If $A$, $B$, and $C$ are interior angles of triangle $ABC$, then the value of $\cos\left(\frac{A+B}{2}\right)$ is:**

(1) $\cos\left(\frac{A-B}{2}\right)$

(2) $\sin\left(\frac{A+B}{2}\right)$

(3) $\sin\left(\frac{C}{2}\right)$

(4) $\cos\left(\frac{B}{2}\right)$

**Correct Answer:** (3) $\sin\left(\frac{C}{2}\right)$

**Solution:**

In any triangle, the sum of the interior angles is $180^\circ$. Hence,

$$A + B + C = 180^\circ$$

This implies:

$$A + B = 180^\circ - C$$

Thus, we can write:

$$\cos\left(\frac{A+B}{2}\right) = \cos\left(\frac{180^\circ - C}{2}\right) = \sin\left(\frac{C}{2}\right)$$

Thus, the correct answer is option (3).

**Quick Tip**

In a triangle, the sum of the interior angles is $180^\circ$. Use this property to simplify trigonometric expressions involving the angles of a triangle.

---

**49. The value of $\cos 54^\circ \cos 36^\circ - \sin 54^\circ \sin 36^\circ$ is:**

(1) 0

(2) 1

(3) $\frac{\sqrt{3}}{2}$

(4) $\frac{1}{\sqrt{2}}$

**Correct Answer:** (1) 0

**Solution:**

We can use the trigonometric identity for the cosine of the sum of two angles:

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

Using this identity with $A = 54^\circ$ and $B = 36^\circ$, we get:

$$\cos 54^\circ \cos 36^\circ - \sin 54^\circ \sin 36^\circ = \cos(54^\circ + 36^\circ) = \cos 90^\circ = 0$$

Thus, the correct answer is option (1).

**Quick Tip**

Remember the cosine addition formula: $\cos(A + B) = \cos A \cos B - \sin A \sin B$. This is useful for simplifying expressions with multiple angles.

---

**50. A boy observed the top of an electric pole at an angle of elevation of $60^\circ$ when the observation point is 6 meters away from the foot of the pole, then the height of the pole is:**

(1) 6 m

(2) $6\sqrt{2}$ m

(3) $6\sqrt{3}$ m

(4) $6/\sqrt{3}$ m

**Correct Answer:** (2) $6\sqrt{2}$ m

**Solution:**

We can use the formula for the tangent of an angle in a right triangle:

$$\tan(\theta) = \frac{\text{Opposite}}{\text{Adjacent}}$$

Here, $\theta = 60^\circ$, the adjacent side is the distance from the foot of the pole, which is 6 meters,

and the opposite side is the height of the pole $h$. Therefore:

$$\tan 60^\circ = \frac{h}{6}$$

Since $\tan 60^\circ = \sqrt{3}$, we have:

$$\sqrt{3} = \frac{h}{6} \quad \Rightarrow \quad h = 6\sqrt{3}\,\text{m}$$

Thus, the correct answer is option (3).

**Quick Tip**

To find the height of an object using the angle of elevation, use the tangent function: $\tan(\theta) = \frac{\text{height}}{\text{distance}}$.

---

**51. From a helicopter, a person observes an object on the ground at an angle of depression of $30^\circ$. If the helicopter is flying at a height of 500 m from the ground, then the distance between the person and the object is:**

(1) 500 m

(2) 1000 m

(3) $500\sqrt{2}$ m

(4) $500/\sqrt{3}$ m

**Correct Answer:** (3) $500\sqrt{2}$ m

**Solution:**

The angle of depression and the angle of elevation are equal. Thus, the angle of depression is $30^\circ$. Using trigonometry, we can relate the height of the helicopter, the distance to the object on the ground, and the distance between the person and the object using the tangent function:

$$\tan(30^\circ) = \frac{\text{height}}{\text{distance}}$$

Let the distance be $d$. Therefore:

$$\tan 30^\circ = \frac{500}{d}$$

Since $\tan 30^\circ = \frac{1}{\sqrt{3}}$, we have:

$$\frac{1}{\sqrt{3}} = \frac{500}{d} \quad \Rightarrow \quad d = 500\sqrt{3}\,\text{m}$$

Thus, the correct answer is option (3).

**Quick Tip**

When working with angles of depression, use the tangent function $\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$ to calculate the distance between the observer and the object.

---

**52. Two boys on either side of a temple of 45 meters height observe its top at the angles of elevation 30° and 60° respectively. Find the distance between the two boys.**

(1) $60\sqrt{3}$ m

(2) $40\sqrt{3}$ m

(3) $60/\sqrt{3}$ m

(4) $40/\sqrt{3}$ m

**Correct Answer:** (2) $40\sqrt{3}$ m

**Solution:**

Let the distance between the two boys be $d$. We will use trigonometric functions to find this distance. The height of the temple is $45$ m, and the angles of elevation are $30^\circ$ and $60^\circ$. Let the distances from the temple to the boys be $x_1$ and $x_2$ respectively. Using the tangent function:

$$\tan(30^\circ) = \frac{45}{x_1} \quad \text{and} \quad \tan(60^\circ) = \frac{45}{x_2}$$

We know that $\tan 30^\circ = \frac{1}{\sqrt{3}}$ and $\tan 60^\circ = \sqrt{3}$. Thus:

$$\frac{45}{x_1} = \frac{1}{\sqrt{3}} \quad \Rightarrow \quad x_1 = 45\sqrt{3}$$

$$\frac{45}{x_2} = \sqrt{3} \quad \Rightarrow \quad x_2 = 15/\sqrt{3}$$

The total distance between the two boys is:

$$d = x_1 + x_2 = 45\sqrt{3} + 15/\sqrt{3} = 40\sqrt{3}\,\text{m}$$

Thus, the correct answer is option (2).

**Quick Tip**

When dealing with angles of elevation and height, use the tangent function to relate the height and distance from the base.

**53. Two dice are thrown at the same time. What is the probability that the sum of the two numbers appearing on the top of the dice is 13?**

(1) 1

(2) $\frac{1}{2}$

(3) $\frac{2}{3}$

(4) 0

**Correct Answer:** (4) 0

**Solution:**

The maximum sum that can appear when two dice are rolled is 12 (if both dice show 6). Thus, it is impossible for the sum of the two dice to be 13. Therefore, the probability is 0.

**Quick Tip**

The maximum sum of two dice rolls is 12, so sums greater than this, such as 13, are impossible.

---

**54. One card is selected from a well-shuffled deck of 52 cards, the probability of getting the queen of diamonds is:**

(1) $\frac{1}{52}$

(2) $\frac{3}{26}$

(3) $\frac{1}{26}$

(4) $\frac{1}{13}$

**Correct Answer:** (1) $\frac{1}{52}$

**Solution:**

In a deck of 52 cards, there is exactly 1 queen of diamonds. The probability of selecting one specific card is:

$$P(\text{queen of diamonds}) = \frac{1}{52}$$

Thus, the correct answer is option (1).

Quick Tip

The probability of drawing a specific card from a deck is $\frac{1}{52}$ for any particular card.

---

**55. A Kiddy bank contains hundred 50 paise coins, fifty 1 coins, twenty 2 coins, and ten 5 coins. If one of the coins will fall out when the bank is turned upside down, what is the probability that the coin is a 5 coin?**

(1) $\frac{5}{9}$

(2) $\frac{5}{18}$

(3) $\frac{1}{9}$

(4) $\frac{1}{18}$

**Correct Answer:** (3) $\frac{1}{9}$

**Solution:**

The total number of coins is:

$$100\,(50 \text{ paise}) + 50\,(1) + 20\,(2) + 10\,(5) = 180$$

The number of 5 coins is 10. Therefore, the probability of picking a 5 coin is:

$$P(5 \text{ coin}) = \frac{10}{180} = \frac{1}{18}$$

Thus, the correct answer is option (4).

Quick Tip

The probability of an event happening is calculated as the ratio of favorable outcomes to the total outcomes.

---

**56. Rainfall of a town in a week is 4 cm, 5 cm, 12 cm, 3 cm, 6 cm, 8 cm, and 4 cm, then the average rainfall per day is:**

(1) 4 cm

(2) 5 cm

(3) 6 cm

(4) 7 cm

**Correct Answer:** (2) 5 cm

**Solution:**

To find the average rainfall per day, first calculate the total rainfall in the week:

$$\text{Total rainfall} = 4 + 5 + 12 + 3 + 6 + 8 + 4 = 42\,\text{cm}$$

Now, divide the total rainfall by the number of days in a week (7 days):

$$\text{Average rainfall per day} = \frac{42}{7} = 6\,\text{cm}$$

Thus, the correct answer is option (3).

**Quick Tip**

To find the average, sum the values and divide by the number of days (or observations).

---

**57. Which of the following is not a formula for arithmetic mean?**

(1) $\frac{\sum f_i x_i}{\sum f_i}$

(2) $a + \frac{\sum f_i d_i}{\sum f_i}$

(3) $a + \left[\frac{\sum f_i \mu_i}{\sum f_i}\right] \times h$

(4) $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$

**Correct Answer:** (4) $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$

**Solution:**

The formula

$$l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

is used for calculating the mode, not the arithmetic mean. The arithmetic mean uses the formulas in options (1), (2), and (3).

**Quick Tip**

To calculate the arithmetic mean, use formulas like $\frac{\sum f_i x_i}{\sum f_i}$ or the weighted average formula. The formula in option (4) is used for the mode calculation.

---

**58. Mode of the data 9, 10, 19, 7, 11, 5, 6, 7, 8, 14, 10, 7, 6 is**

(1) 6

(2) 7

(3) 10

(4) 19

**Correct Answer:** (2) 7

**Solution:**

The mode is the value that appears most frequently in the data. In this case, the number 7 appears the most times (3 times). Thus, the mode is 7.

Quick Tip

The mode is the most frequent number in a set of data. Identify the number that appears the most to find the mode.

---

**59. In a grouped frequency distribution, the formula to find median is**

(1) $1 + \frac{n}{2} - cf \div f \times h$

(2) $1 - \frac{n}{2} + cf \div f \times h$

(3) $1 + \frac{n}{2} - cf \div f \times h$

(4) $1 - \frac{n}{2} - cf \div f \times h$

**Correct Answer:** (1) $1 + \frac{n}{2} - cf \div f \times h$

**Solution:**

The correct formula to find the median in a grouped frequency distribution is given by:

$$\text{Median} = 1 + \frac{n}{2} - cf \div f \times h$$

Where: - $n$ is the total number of observations - $cf$ is the cumulative frequency before the median class - $f$ is the frequency of the median class - $h$ is the class width

Quick Tip

To find the median, use the formula for grouped data. Ensure to use cumulative frequency and the class width for accurate results.

---

**60. The median of 75, 21, 56, 36, 81, 05, and 42 is**

(1) 36

(2) 42

(3) 56

(4) 21

**Correct Answer:** (2) 42

**Solution:**

To find the median, first arrange the numbers in ascending order:

$$05, 21, 36, 42, 56, 75, 81$$

The median is the middle number in an odd set of numbers. Since we have 7 numbers, the median is the 4th number, which is 42. Thus, the correct answer is option (2).

Quick Tip

To find the median, arrange the data in ascending order and pick the middle value. If there is an even number of values, take the average of the two middle values.

---

## SECTION B -PHYSICS

**61. Convex mirror is used as**

(1) Focussing mirror

(2) Shaving mirror

(3) Rear view mirror in automobiles

(4) Dentist mirror

**Correct Answer:** (3) Rear view mirror in automobiles

**Solution:**

Convex mirrors are used in automobiles as rear-view mirrors because they provide a wide field of view and always form virtual, diminished, and erect images.

Quick Tip

Convex mirrors are commonly used for rear-view mirrors in automobiles due to their wide field of view and ability to form smaller, upright images.

---

**62. Concave mirrors can produce**

(1) Only virtual

(2) Only real

(3) Both real and virtual

(4) None

**Correct Answer:** (3) Both real and virtual

**Solution:**

Concave mirrors can form both real and virtual images depending on the position of the object relative to the mirror's focal point. When the object is beyond the focal point, a real image is formed, and when the object is between the focal point and the mirror, a virtual image is formed.

Quick Tip

Concave mirrors are versatile and can produce both real and virtual images depending on the object's distance from the mirror.

---

**63. The mirror which always gives diminished image is**

(1) Plano convex

(2) Convex mirror

(3) Concave mirror

(4) Plane mirror

**Correct Answer:** (2) Convex mirror

**Solution:**

A convex mirror always gives a diminished image, regardless of the object's distance from the mirror. The image is virtual, erect, and smaller in size.

Quick Tip

Convex mirrors always produce virtual, diminished images.

---

**64. The focal length of a concave mirror is 20 cm. At what distance the object is placed**

**to obtain the virtual image?**

(1) Less than 20 cm

(2) At 20 cm

(3) More than 20 cm

(4) None

**Correct Answer:** (1) Less than 20 cm

**Solution:**

To obtain a virtual image from a concave mirror, the object must be placed between the focal point and the mirror. Since the focal length is given as 20 cm, the object must be placed at a distance less than 20 cm.

Quick Tip

In concave mirrors, a virtual image is formed when the object is placed between the focal point and the mirror.

---

**65. The midpoint of a thin lens is called**

(1) Optic center

(2) Principal axis

(3) Focal point

(4) Centre of curvature

**Correct Answer:** (1) Optic center

**Solution:**

The optic center is the central point of a lens through which the principal axis passes. It is the point where light rays passing through the lens are not refracted.

Quick Tip

The optic center is the point in the lens where no refraction occurs.

---

**66. A light ray passing along the principal axis of a lens is**

(1) Deviated

(2) Reflected

(3) Refracted

(4) Undeviated

**Correct Answer:** (4) Undeviated

**Solution:**

When a light ray passes along the principal axis of a lens, it passes straight through without being deviated or refracted. Therefore, the correct answer is ”Undeviated.”

Quick Tip

A light ray passing along the principal axis of a lens remains undeviated, unlike rays passing at angles that get refracted.

---

**67. In which one among the following cases the convex lens does not give a real image?**

(1) When the object is between focal point and optic centre

(2) When the object is beyond the centre of curvature

(3) When the object is between the centre of curvature and focal point

(4) None

**Correct Answer:** (1) When the object is between focal point and optic centre

**Solution:**

For a convex lens, a real image is formed when the object is placed beyond the focal point. If the object is placed between the focal point and the optic centre, the lens forms a virtual image, not a real one. Thus, the correct answer is option (1).

Quick Tip

For a convex lens, real images are formed when the object is placed outside the focal point, while virtual images are formed when the object is between the focal point and the lens.

---

**68. A convex lens kept in a medium with refractive index less than the refractive index of the lens behaves like**

(1) Diverging lens

(2) Converging lens

(3) Plane mirror

(4) Concave mirror

**Correct Answer:** (1) Diverging lens

**Solution:**

When a convex lens is placed in a medium with a lower refractive index than the lens, it behaves like a diverging lens. This is because the difference in refractive indices causes the lens to diverge light instead of converging it.

Quick Tip

When the refractive index of the surrounding medium is less than that of the lens, the convex lens acts like a diverging lens, forming diverging rays.

---

**69. The focal length of double concave lens having refractive index 1.5 kept in air with two spherical surfaces of radii $R_1 = 20$ cm and $R_2 = 80$ cm is**

(1) 16 cm

(2) 24 cm

(3) 32 cm

(4) 48 cm

**Correct Answer:** (2) 24 cm

**Solution:**

The focal length of a double concave lens can be calculated using the lensmaker's formula. Given that the refractive index is $n = 1.5$ and the radii of curvature are $R_1 = 20$ cm and $R_2 = 80$ cm, the focal length is calculated to be 24 cm. Thus, the correct answer is option (2).

Quick Tip

For a concave lens, use the lensmaker's formula to calculate the focal length based on the radii of curvature and refractive index.

---

**70. The formula for refractive index of a prism is**

(1) $\frac{\sin\left(\frac{A}{2}\right)}{\sin\left(\frac{A+D}{2}\right)}$

(2) $n = \frac{\sin\left(\frac{D}{2}\right)}{\sin\left(\frac{A}{2}\right)}$

(3) $n = \frac{\sin\left(\frac{A+D}{2}\right)}{\sin\left(\frac{A}{2}\right)}$

(4) $n = \frac{\sin(A+D)}{\sin(A)}$

**Correct Answer:** (3) $n = \frac{\sin\left(\frac{A+D}{2}\right)}{\sin\left(\frac{A}{2}\right)}$

**Solution:**

The refractive index $n$ of a prism is given by the formula:

$$n = \frac{\sin\left(\frac{A+D}{2}\right)}{\sin\left(\frac{A}{2}\right)}$$

This formula relates the angle of the prism $A$ and the deviation angle $D$. Thus, the correct answer is option (3).

**Quick Tip**

For calculating the refractive index of a prism, use the formula $n = \frac{\sin\left(\frac{A+D}{2}\right)}{\sin\left(\frac{A}{2}\right)}$, where $A$ is the angle of the prism and $D$ is the angle of deviation.

---

**71. The least distance of distinct vision of a healthy person is**

(1) 25 mm

(2) 25 cm

(3) 25 m

(4) 25 km

**Correct Answer:** (2) 25 cm

**Solution:**

The least distance of distinct vision, also known as the near point, for a healthy person is approximately 25 cm. This is the closest distance at which the eye can clearly focus an object. Thus, the correct answer is option (2).

Quick Tip

For a healthy person, the least distance of distinct vision is 25 cm, which is the minimum distance at which the eye can see clearly.

---

**72. The focal length of a lens having power 4D is**

(1) 5 cm

(2) 15 cm

(3) 10 cm

(4) 25 cm

**Correct Answer:** (2) 15 cm

**Solution:**

The power $P$ of a lens is related to its focal length $f$ by the formula:

$$P = \frac{1}{f}$$

Given that the power is 4D, we can find the focal length as:

$$f = \frac{1}{P} = \frac{1}{4}\,\text{m} = 0.25\,\text{m} = 25\,\text{cm}$$

Thus, the correct answer is option (2).

Quick Tip

To find the focal length from the power, use the formula $f = \frac{1}{P}$, where $P$ is the power in diopters.

---

**73. The defect in eye vision that people cannot see objects at long distance is**

(1) Hypermetropia

(2) Presbyopia

(3) Myopia

(4) None

**Correct Answer:** (3) Myopia

**Solution:**

Myopia, also known as nearsightedness, is a condition where people cannot see distant objects clearly, as the eye focuses images in front of the retina. Therefore, the correct answer is option (3).

**Quick Tip**

In myopia, distant objects appear blurry, and this condition can be corrected with concave lenses.

---

**74. The process of an eye lens to adjust its focal length to form a sharp image on retina is called**

(1) Distinct vision

(2) Accommodation

(3) Cornea

(4) Pupil

**Correct Answer:** (2) Accommodation

**Solution:**

Accommodation is the process by which the eye lens changes its shape to focus on objects at different distances. This adjustment allows the formation of a sharp image on the retina. Thus, the correct answer is option (2).

**Quick Tip**

Accommodation occurs when the eye lens changes its curvature to focus light on the retina, allowing us to see objects clearly at various distances.

---

**75. The appearance of red colour of the Sun during Sunrise and Sunset is due to**

(1) Dispersion of light

(2) Scattering of light

(3) Total internal reflection

(4) None

**Correct Answer:** (2) Scattering of light

**Solution:**

The red appearance of the Sun during sunrise and sunset is due to the scattering of light, specifically the scattering of shorter wavelengths, which causes the longer wavelengths (like red) to dominate. Thus, the correct answer is option (2).

**Quick Tip**

Scattering of light is responsible for the colors of the sky, with red dominating at sunrise and sunset due to the scattering of shorter wavelengths by atmospheric particles.

---

**76. The S.I. unit of electrical resistance is**

(1) Ampere

(2) Volt

(3) Farad

(4) Ohm

**Correct Answer:** (4) Ohm

**Solution:**

The S.I. unit of electrical resistance is the ohm (symbol: ), named after the German physicist Georg Simon Ohm. Thus, the correct answer is option (4).

**Quick Tip**

Electrical resistance is measured in ohms, and it is a measure of how much a material resists the flow of electric current.

---

**77. Formula for specific resistance is**

(1) $\rho = \frac{RA}{L}$

(2) $\rho = \frac{LA}{R}$

(3) $\rho = \frac{IR}{L}$

(4) $\rho = \frac{RL}{A}$

**Correct Answer:** (1) $\rho = \frac{RA}{L}$

**Solution:**

Specific resistance (also known as resistivity) is calculated using the formula $\rho = \frac{RA}{L}$, where $R$ is the resistance, $A$ is the cross-sectional area, and $L$ is the length of the material. Thus, the correct answer is option (1).

**Quick Tip**

Specific resistance is a fundamental property of a material, used to describe its ability to resist the flow of electric current.

---

**78. The current in a conductor is directly proportional to the potential difference between its ends at constant temperature. This is known as**

(1) Faraday's law

(2) Kirchhoff's law

(3) Ohm's law

(4) Newton's law

**Correct Answer:** (3) Ohm's law

**Solution:**

Ohm's law states that the current in a conductor is directly proportional to the potential difference and inversely proportional to the resistance, assuming the temperature is constant. This is represented as $I = \frac{V}{R}$. Thus, the correct answer is option (3).

**Quick Tip**

Ohm's law is essential in understanding how electric circuits work. It relates voltage, current, and resistance in a simple equation.

---

**79. Kirchhoff's junction law is based on conservation of**

(1) Energy

(2) Momentum

(3) Charge

(4) Angular momentum

**Correct Answer:** (3) Charge

**Solution:**

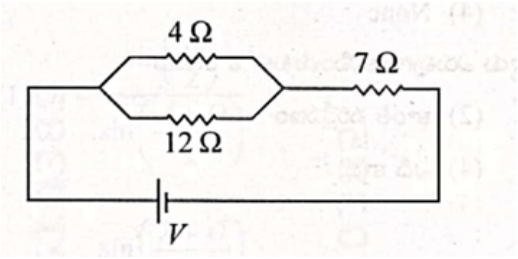
Kirchhoff's junction law is based on the conservation of charge, stating that the total current entering a junction is equal to the total current leaving the junction. This reflects the principle of conservation of electric charge. Thus, the correct answer is option (3).

**Quick Tip**

Kirchhoff's junction rule is crucial in analyzing electrical circuits as it helps to ensure that charge is conserved at junctions.

---

**80. Calculate the resultant resistance in the following circuit.**




(1) 3 Ω

(2) 10 Ω

(3) 13 Ω

(4) 7 Ω

**Correct Answer:** (2) 10 Ω

**Solution:**

In this circuit, we have a combination of resistors. The 4 Ω and 7 Ω resistors are in series, so their total resistance is:

$$R_1 = 4\,\Omega + 7\,\Omega = 11\,\Omega$$

Now, this combination is in parallel with the 12 Ω resistor. The total resistance for resistors in parallel is given by:

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{12\,\Omega}$$

$$\frac{1}{R} = \frac{1}{11\,\Omega} + \frac{1}{12\,\Omega} \Rightarrow R = 10\,\Omega$$

Thus, the resultant resistance is 10 Ω.

Quick Tip

For resistors in series, add their resistances directly. For parallel resistors, use the reciprocal formula.

---

**81. The instrument to measure potential difference is**

(1) Ammeter

(2) Voltmeter

(3) Galvanometer

(4) Wattmeter

**Correct Answer:** (2) Voltmeter

**Solution:**

A voltmeter is an instrument used to measure the potential difference (voltage) across two points in a circuit. An ammeter measures current, a galvanometer detects current but is sensitive to small values, and a wattmeter measures power. Thus, the correct answer is a voltmeter.

Quick Tip

To measure potential difference, always use a voltmeter, and connect it in parallel across the two points where the voltage is to be measured.

---

**82. The tangent drawn to the magnetic field line at a point gives**

(1) magnetic flux

(2) current

(3) direction of the magnetic field

(4) charge

**Correct Answer:** (3) direction of the magnetic field

**Solution:**

The tangent to a magnetic field line at any point gives the direction of the magnetic field at that point. It helps to determine the orientation of the magnetic field in space. Magnetic flux is related to the area and strength of the magnetic field, current is related to the flow of

charge, and charge refers to the fundamental property of matter. Thus, the correct answer is the direction of the magnetic field.

**Quick Tip**

The tangent to a magnetic field line always represents the direction of the field at that point.

---

**83. The magnetic flux passing through unit area taken perpendicular to the uniform magnetic field is called**

(1) Magnetic flux density

(2) Magnetic flux

(3) Magnetic field

(4) Induced electromotive force

**Correct Answer:** (1) Magnetic flux density

**Solution:**

Magnetic flux density (or magnetic field strength) is the measure of the strength of the magnetic field at a specific point. It is defined as the magnetic flux passing through a unit area perpendicular to the field. Magnetic flux is the total number of magnetic field lines passing through a surface, and induced electromotive force is related to the change in the magnetic field over time. Thus, the correct answer is magnetic flux density.

**Quick Tip**

Magnetic flux density (B) is calculated as the magnetic flux divided by the area through which the flux passes.

---

**84. The direction of the magnetic field lines outside the current carrying solenoid is from**

(1) South to North

(2) North to South

(3) East to West

(4) West to East

**Correct Answer:** (2) North to South

**Solution:**

When a current flows through a solenoid, it produces a magnetic field that has a definite direction. The magnetic field lines inside the solenoid run from the South to the North pole, while the magnetic field lines outside the solenoid run from the North pole to the South pole. This is the direction of the magnetic field outside a current-carrying solenoid.

Quick Tip

The magnetic field outside a solenoid is directed from the North to the South pole.

---

**85. In electric motors**

(1) Electrical energy is converted into mechanical energy

(2) Mechanical energy is converted into electrical energy

(3) Electrical energy is converted into light energy

(4) Mechanical energy is converted into light energy

**Correct Answer:** (1) Electrical energy is converted into mechanical energy

**Solution:**

In an electric motor, electrical energy is converted into mechanical energy. The motor uses the flow of electric current to produce a magnetic field that causes the motor's rotor to rotate, converting electrical energy into mechanical energy that can be used for work. This is the fundamental working principle of electric motors.

Quick Tip

Electric motors work on the principle of converting electrical energy into mechanical energy through the interaction of magnetic fields.

---

**86. Which law states "the induced current set up in the coil is in such a direction that it opposes the changes in the flux"?**

(1) Kirchhoff's law

(2) Lenz's law

(3) Coulomb's law

(4) Ohm's law

**Correct Answer:** (2) Lenz's law

**Solution:**

Lenz's Law states that the direction of the induced current in a coil due to a change in magnetic flux is such that it opposes the change in flux. This is a direct consequence of the law of conservation of energy. Lenz's law is essentially a manifestation of Faraday's law of electromagnetic induction.

Quick Tip

Lenz's law tells us that the induced current always opposes the change in magnetic flux that caused it.

---

**87. Induction stove works on the principle of**

(1) Magnetic induction

(2) Electrostatic induction

(3) Electromagnetic induction

(4) Electric shock

**Correct Answer:** (3) Electromagnetic induction

**Solution:**

An induction stove works on the principle of electromagnetic induction. When an alternating current flows through the coil, it generates a changing magnetic field, which induces eddy currents in the base of the cookware, heating it. This is an example of electromagnetic induction.

Quick Tip

Induction stoves use electromagnetic induction to heat the cooking vessel directly without a flame.

---

**88. A conductor of length 'l' is moving perpendicular to magnetic field 'B' with a speed 'v'. The motional emf is given by -**

(1) Blv

(2) Bv2l

(3) B$\frac{}{v}$

(4) Bl$\frac{}{v}$

**Correct Answer:** (1) Blv

**Solution:**

The motional emf (electromotive force) induced in a conductor moving perpendicular to a magnetic field is given by the formula emf $= B \cdot l \cdot v$, where $B$ is the magnetic field strength, $l$ is the length of the conductor, and $v$ is the velocity at which the conductor is moving.

**Quick Tip**

Motional emf is directly proportional to the magnetic field, the length of the conductor, and the speed of motion.

---

**89. The magnetic force exerted on a 3 m length conductor carrying 2A current when placed in a uniform magnetic field 0.4 T at an angle 30° is**

(1) 12 N

(2) 1.2 N

(3) 2.4 N

(4) 24 N

**Correct Answer:** (3) 2.4 N

**Solution:**

The magnetic force on a current-carrying conductor is given by the formula $F = B \cdot I \cdot L \cdot \sin(\theta)$, where $B = 0.4\,\text{T}$, $I = 2\,\text{A}$, $L = 3\,\text{m}$, and $\theta = 30°$.

$$F = 0.4 \cdot 2 \cdot 3 \cdot \sin(30°) = 2.4\,\text{N}.$$

**Quick Tip**

Use the formula $F = BIL\sin(\theta)$ to calculate the force on a current-carrying conductor in a magnetic field.

---

**90. Which one of the following statements is correct?**

(1) AC changes its magnitude but not direction

(2) DC changes its magnitude and direction

(3) DC changes its direction only

(4) AC changes both its magnitude and direction

**Correct Answer:** (4) AC changes both its magnitude and direction

**Solution:**

Alternating current (AC) changes both its magnitude and direction periodically. In contrast, direct current (DC) maintains a constant magnitude but its direction can change depending on the external factors, such as polarity reversal.

**Quick Tip**

Remember that AC periodically reverses direction and its magnitude can vary, while DC flows in a constant direction with a constant magnitude.

---

## SECTION C- CHEMISTRY

**91. What is the symbol used in a chemical equation to represent the gas evolved in a reaction?**

(1) $\rightarrow$

(2) $\leftarrow$

(3) $\uparrow$

(4) $\downarrow$

**Correct Answer:** (3) $\uparrow$

**Solution:**

In chemical reactions, the symbol $\uparrow$ is used to represent the evolution of gas, indicating that

the gas is produced during the reaction.

**Quick Tip**

When you see $\uparrow$ in a chemical equation, it means gas is being evolved in the reaction.

---

**92. Volume occupied by 10 g of hydrogen at STP in litres is**

(1) 224

(2) 112

(3) 56

(4) 22.4

**Correct Answer:** (4) 22.4

**Solution:**

At STP, 1 mole of any ideal gas occupies 22.4 litres. The molar mass of hydrogen ($H_2$) is 2 g. Thus, 10 g of hydrogen corresponds to $\frac{10}{2} = 5$ moles of hydrogen. The volume occupied is then $5 \times 22.4 = 112$ litres.

**Quick Tip**

At STP, 1 mole of gas occupies 22.4 L. Use this value to calculate the volume of gases.

---

**93. Quantum mechanical model of the atom was developed by**

(1) Neils Bohr

(2) Sommerfeld

(3) Erwin Schrodinger

(4) Rutherford

**Correct Answer:** (3) Erwin Schrodinger

**Solution:**

The quantum mechanical model of the atom was developed by Erwin Schrodinger, who formulated the wave equation. This model describes electrons as matter waves.

Quick Tip

Schrodinger's wave equation is a key part of the quantum mechanical model of the atom.

---

**94. Maximum no. of electrons in a subshell is equal to**

(1) $2n^2$

(2) $n^2$

(3) $2(2l+1)$

(4) $2l+1$

**Correct Answer:** (1) $2n^2$

**Solution:**

The maximum number of electrons in a subshell is given by $2n^2$, where $n$ is the principal quantum number of the subshell.

Quick Tip

The formula for the maximum number of electrons in a subshell is $2n^2$.

---

**95. Number of unpaired electrons present in carbon atom is**

(1) 6

(2) 4

(3) 3

(4) 2

**Correct Answer:** (4) 2

**Solution:**

In a carbon atom, the electron configuration is $1s^2 2s^2 2p^2$. The two electrons in the 2p orbital are unpaired. Hence, the number of unpaired electrons is 2.

Quick Tip

Carbon has 2 unpaired electrons in its 2p orbital.

**96. Law of octaves was proposed by**

(1) Dobereiner

(2) Moseley

(3) Mendeleev

(4) Newlands

**Correct Answer:** (4) Newlands

**Solution:**

The Law of Octaves was proposed by John Newlands. According to this law, every eighth element, when arranged in increasing order of atomic masses, has similar properties to the first.

Quick Tip

John Newlands proposed the Law of Octaves.

---

**97. Number of elements present in the sixth period of the modern periodic table**

(1) 32

(2) 8

(3) 18

(4) 19

**Correct Answer:** (1) 32

**Solution:**

The sixth period of the modern periodic table contains 32 elements, as it starts from the element Cesium (Cs) and ends with Radon (Rn).

Quick Tip

The sixth period of the periodic table contains 32 elements.

---

**98. Which one of the following atoms is smaller in size?**

(1) F

(2) O

(3) N

(4) C

**Correct Answer:** (1) F

**Solution:**

Fluorine (F) has the smallest size among the given elements because as we move across a period from left to right, the atomic size decreases due to an increase in effective nuclear charge. Thus, fluorine, being the rightmost in the period, has the smallest atomic size.

Quick Tip

In a period, atomic size decreases as we move from left to right.

---

**99. Ionization energy along a period from left to right generally**

(1) increases

(2) decreases

(3) remains same

(4) none of the above

**Correct Answer:** (1) increases

**Solution:**

Ionization energy increases from left to right across a period due to the increase in nuclear charge, which attracts the electrons more strongly, making it harder to remove an electron.

Quick Tip

Ionization energy increases as we move across a period from left to right.

---

**100. Element with atomic number 17 belongs to**

(1) VI A group, 2nd period

(2) VII A group, 2nd period

(3) VI A group, 3rd period

(4) VII A group, 3rd period

**Correct Answer:** (4) VII A group, 3rd period

**Solution:**

The element with atomic number 17 is chlorine (Cl), which belongs to the VII A group (halogens) in the 3rd period of the periodic table.

Quick Tip

The halogens belong to Group VII A in the periodic table.

---

**101. Oxygen gains ____ electrons during the chemical changes.**

(1) 1

(2) 2

(3) 3

(4) 4

**Correct Answer:** (2) 2

**Solution:**

Oxygen typically gains 2 electrons to form a stable configuration, as it has a valency of 2. Therefore, oxygen gains 2 electrons during chemical changes.

Quick Tip

Oxygen gains 2 electrons to complete its valence shell in most chemical reactions.

---

**102. Number of bond pairs and lone pairs in the valence shell of nitrogen in $NH_3$**

(1) 2, 2

(2) 1, 3

(3) 3, 1

(4) 4, 0

**Correct Answer:** (3) 3, 1

**Solution:**

In $NH_3$, nitrogen has 3 bond pairs (from the three N-H bonds) and 1 lone pair of electrons in its valence shell. Thus, the correct answer is 3 bond pairs and 1 lone pair.

Quick Tip

Nitrogen in $NH_3$ has 3 bond pairs and 1 lone pair.

---

**103. Bond angle in $BeCl_2$ molecule is**

(1) 120°

(2) 180°

(3) 109° 28’

(4) 107° 48’

**Correct Answer:** (1) 120°

**Solution:**

$BeCl_2$ has a linear structure because beryllium forms two bonds with chlorine atoms, resulting in an angle of 180° between the bonds. Therefore, the bond angle in $BeCl_2$ is 180°.

Quick Tip

$BeCl_2$ molecule has a linear structure, with bond angles of 180°.

---

**104. Ionic bond is formed due to transfer of electrons from**

(1) metal atom to non-metal atom

(2) non-metal atom to metal atom

(3) non-metal atom to non-metal atom

(4) metal atom to metal atom

**Correct Answer:** (2) non-metal atom to metal atom

**Solution:**

An ionic bond is formed when an electron is transferred from a metal atom to a non-metal atom, resulting in the formation of ions that are held together by electrostatic forces.

Quick Tip

Ionic bonds form when electrons are transferred between metal and non-metal atoms.

---

**105. Polar covalent bond present in**

(1) NaCl

(2) $N_2$

(3) $Na_2O$

(4) HCl

**Correct Answer:** (1) NaCl

**Solution:**

NaCl forms a polar covalent bond because sodium (Na) is a metal and chlorine (Cl) is a non-metal, leading to an unequal sharing of electrons, resulting in a polar bond.

Quick Tip

In a polar covalent bond, electrons are shared unequally between atoms.

---

**106. Double bond present in**

(1) $H_2$

(2) HCl

(3) $N_2$

(4) $O_2$

**Correct Answer:** (4) $O_2$

**Solution:**

$O_2$ has a double bond between the oxygen atoms, where two pairs of electrons are shared. This is the correct answer, as other molecules listed have single bonds.

Quick Tip

A double bond involves the sharing of two pairs of electrons between atoms.

---

**107. The colour of methyl orange indicator in basic solution is**

(1) Yellow

(2) Green

(3) Orange

(4) Red

**Correct Answer:** (1) Yellow

**Solution:**

Methyl orange is yellow in basic solution and turns red in acidic solution. It is commonly used to indicate pH changes.

Quick Tip

Methyl orange is yellow in basic conditions and red in acidic conditions.

---

**108. The reaction of an acid with a base to give a salt and water is known as**

(1) Oxidation

(2) Reduction

(3) Neutralization

(4) Combustion

**Correct Answer:** (3) Neutralization

**Solution:**

The process where an acid reacts with a base to produce a salt and water is called neutralization. This occurs when the hydrogen ions from the acid combine with the hydroxide ions from the base to form water.

Quick Tip

Neutralization reactions always produce salt and water.

---

**109. Which one of the following is used for disinfecting drinking water?**

(1) Baking soda

(2) Bleaching powder

(3) Washing soda

(4) Plaster of paris

**Correct Answer:** (2) Bleaching powder

**Solution:**

Bleaching powder is commonly used to disinfect drinking water as it contains calcium hypochlorite, which releases chlorine when dissolved in water, helping to purify it.

**Quick Tip**

Bleaching powder is widely used for water purification due to its disinfecting properties.

---

**110. The process of dissolving acid or base in water is**

(1) Exothermic process

(2) Endothermic process

(3) Neutralisation

(4) None of the above

**Correct Answer:** (1) Exothermic process

**Solution:**

When an acid or base dissolves in water, it typically releases heat, which is characteristic of an exothermic process. The reaction releases energy as the ions dissociate in water.

**Quick Tip**

The dissolution of acids and bases in water usually releases heat, making it an exothermic reaction.

---

**111. The metal that occurs in the free form (native) is**

(1) Pb

(2) Au

(3) Fe

(4) Hg

**Correct Answer:** (2) Au

**Solution:**

Gold (Au) is the metal that occurs naturally in its native form, meaning it is found as a pure metal in nature, unlike many other metals that are typically found as ores.

Quick Tip

Gold is commonly found in its pure form in nature, which is why it is called a native metal.

---

**112. Galena is an ore of**

(1) Al

(2) Pb

(3) Hg

(4) Zn

**Correct Answer:** (2) Pb

**Solution:**

Galena is the primary ore of lead (Pb). It consists of lead sulfide (PbS) and is the most important source of lead.

Quick Tip

Galena (PbS) is the primary ore of lead, commonly used in the extraction of lead metal.

---

**113. In smelting the ore it is**

(1) Oxidized

(2) Neutralized

(3) Reduced

(4) None of these

**Correct Answer:** (3) Reduced

**Solution:**

In the smelting process, ores are reduced to extract the metal. This involves the removal of oxygen from the ore.

Quick Tip

Smelting involves reduction, where metal oxides are reduced to metals.

**114. The hydrocarbons containing only single bonds between carbon atoms are called**

(1) Alkanes

(2) Alkenes

(3) Alkynes

(4) Benzene

**Correct Answer:** (1) Alkanes

**Solution:**

Alkanes are hydrocarbons that contain only single bonds between carbon atoms. They are saturated hydrocarbons.

Quick Tip

Alkanes are also called saturated hydrocarbons as they contain only single bonds.

---

**115. Which one of the following is a ketone?**

(1) CH3–C–CH3

(2) CH3–O–CH3

(3) CH3–CH2OH

(4) CH3–CHO

**Correct Answer:** (1) CH3–C–CH3

**Solution:**

The structure CH3–C–CH3 represents acetone, which is a ketone. A ketone contains a carbonyl group (C=O) bonded to two carbon atoms.

Quick Tip

Ketones contain a carbonyl group (C=O) attached to two carbon atoms.

---

**116. If the hydrogen atom of -COOH gets replaced by 'R' (alkyl group) ___ are obtained.**

(1) Acids

(2) Esters

(3) Ketones

(4) Amines

**Correct Answer:** (2) Esters

**Solution:**

When the hydrogen atom in the carboxyl group (-COOH) is replaced by an alkyl group ('R'), esters are formed. Esters have the general formula R-COO-R.

Quick Tip

Esters are formed by the replacement of a hydrogen atom from the carboxyl group with an alkyl group.

---

**117. The number of sigma and $\pi$-bonds in ethyne molecule:**

(1) 1 sigma, 1 $\pi$

(2) 2 sigma, 2 $\pi$

(3) 2 sigma, 1 $\pi$

(4) 3 sigma, 2 $\pi$

**Correct Answer:** (2) 2 sigma, 2 $\pi$

**Solution:**

In ethyne (C2H2), there are two sigma bonds (one from each C-H and C-C bond) and two pi bonds (one from the overlap of p orbitals of the two carbon atoms).

Quick Tip

Ethyne (C2H2) has two sigma bonds and two pi bonds due to the triple bond between the carbon atoms.

---

**118. The process of conversion of starches and sugars to C2H5OH is called**

(1) Combustion

(2) Hydrolysis

(3) Fermentation

(4) Esterification

**Correct Answer:** (3) Fermentation

**Solution:**

Fermentation is the process through which sugars and starches are converted to ethanol (C2H5OH) by microorganisms, typically yeast, in the absence of oxygen.

Quick Tip

Fermentation is used to produce alcohol (ethanol) from sugars and starches.

---

**119. Which of the following is an unsaturated compound?**

(1) CH4

(2) CH3 - CH3

(3) CH3 - CH = CH2

(4) CH3 - CH2 - CH3

**Correct Answer:** (3) CH3 - CH = CH2

**Solution:**

An unsaturated compound contains one or more double or triple bonds between carbon atoms. In this case, CH3 - CH = CH2 is an unsaturated compound because it contains a double bond.

Quick Tip

Unsaturated compounds have double or triple bonds between carbon atoms, unlike saturated compounds that only have single bonds.

---

**120. The final compound formed when methane reacts with chlorine in the presence of sunlight is**

(1) CH3Cl

(2) CH2Cl2

(3) CHCl3

(4) CCl4

**Correct Answer:** (1) CH3Cl

**Solution:**

When methane reacts with chlorine in the presence of sunlight, chloromethane (CH3Cl) is formed as a result of a substitution reaction.

Quick Tip

The reaction between methane and chlorine in the presence of sunlight leads to the formation of chloromethane (CH3Cl).

---

## SECTION D- BIOLOGY

**121. Which test is performed to identify the presence of starch in leaves?**

(1) Picric acid test

(2) Iodine test

(3) Nessler's test

(4) None of the above

**Correct Answer:** (2) Iodine test

**Solution:**

The iodine test is used to detect the presence of starch in leaves. When iodine solution is applied to a leaf containing starch, it turns blue-black.

Quick Tip

The iodine test is a common method to test for starch presence. If the solution turns blue-black, starch is present.

---

**122. In the mouth, the crushed food mixed with saliva which forms a slippery lump is called?**

(1) Bolus

(2) Chyme

(3) Peptones

(4) None of the above

**Correct Answer:** (1) Bolus

**Solution:**

The crushed food mixed with saliva forms a slippery lump called bolus, which is then swallowed for further digestion.

Quick Tip

Bolus is the term used for food that has been chewed and mixed with saliva in the mouth.

---

**123. Which of the following statement is true?**

(1) Chlorophyll 'a' is bluish green in colour and Chlorophyll 'b' is yellowish green in colour

(2) Chlorophyll 'a' is black in colour and Chlorophyll 'b' is grey in colour

(3) Chlorophyll 'a' is yellowish green in colour and Chlorophyll 'b' is bluish green in colour

(4) Both Chlorophyll 'a' and Chlorophyll 'b' are white in colour

**Correct Answer:** (1) Chlorophyll 'a' is bluish green in colour and Chlorophyll 'b' is yellowish green in colour

**Solution:**

Chlorophyll 'a' has a bluish green colour, while chlorophyll 'b' has a yellowish green colour. These pigments are essential for photosynthesis in plants.

Quick Tip

Chlorophyll 'a' is the main pigment involved in photosynthesis, while chlorophyll 'b' assists in light absorption.

---

**124. Choose the correct sequence of steps in Respiration.**

(1) Breathing → Gaseous exchange at lungs level → Gas transport by blood → Gaseous exchange at tissue level → Cellular Respiration

(2) Breathing → Gas transport by blood → Gaseous exchange at lungs level → Gaseous exchange at tissue level → Cellular Respiration

(3) Gaseous exchange at lungs level → Breathing → Gas transport by blood → Gaseous exchange at tissue level → Cellular Respiration

(4) Cellular Respiration → Gaseous exchange at lungs level → Gas transport by blood →

Gaseous exchange at tissue level → Breathing

**Correct Answer:** (3) Gaseous exchange at lungs level → Breathing → Gas transport by blood → Gaseous exchange at tissue level → Cellular Respiration

**Solution:**

In the process of respiration, first, the gaseous exchange happens at the lungs level, followed by breathing, gas transport by blood, then gaseous exchange at tissue level, and finally, cellular respiration.

Quick Tip

Remember the sequence of respiration steps: Gaseous exchange at lungs, breathing, gas transport, tissue-level exchange, and cellular respiration.

---

**125. Each ATP molecule gives how much energy?**

(1) 8700 calories

(2) 10800 calories

(3) 7200 calories

(4) 10000 calories

**Correct Answer:** (3) 7200 calories

**Solution:**

Each molecule of ATP provides 7200 calories of energy when it is hydrolyzed. This energy is used by cells for various functions.

Quick Tip

ATP is the main energy carrier in cells, and each molecule stores about 7200 calories of energy.

---

**126. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy. This equation summarizes which process?**

(1) Excretion

(2) Respiration

(3) Photosynthesis

(4) Digestion

**Correct Answer:** (2) Respiration

**Solution:**

This equation represents the process of respiration, where glucose ($C_6H_{12}O_6$) reacts with oxygen to produce carbon dioxide, water, and energy. This is a key process in the metabolism of living organisms.

Quick Tip

Remember that respiration is the process in which glucose is broken down to produce energy, $CO_2$, and water.

---

**127. The yellowish straw colored fluid portion that forms after the blood clot is called**

(1) Plasma

(2) Fibrin

(3) Serum

(4) Thrombin

**Correct Answer:** (3) Serum

**Solution:**

Serum is the clear, yellowish fluid that remains after blood has clotted. It contains water, proteins, and other substances but lacks the clotting factors that are present in plasma.

Quick Tip

Serum is different from plasma because it does not contain clotting factors. It is the liquid part of blood after clotting has occurred.

---

**128. What is the name of the valve present on the right Auriculo-Ventricular septum between right atrium and right ventricle called?**

(1) Tricuspid valve

(2) Bicuspid valve

(3) Mitral valve

(4) Pulmonary valve

**Correct Answer:** (1) Tricuspid valve

**Solution:**

The valve present between the right atrium and the right ventricle is called the tricuspid valve. It has three flaps or cusps that control the blood flow between these chambers of the heart.

Quick Tip

The tricuspid valve ensures one-way blood flow from the right atrium to the right ventricle, preventing backflow.

---

**129. Regarding blood pressure, what is the systolic pressure in a healthy young adult?**

(1) 80 mm of Hg

(2) 100 mm of Hg

(3) 120 mm of Hg

(4) 20 mm of Hg

**Correct Answer:** (3) 120 mm of Hg

**Solution:**

In a healthy young adult, the systolic pressure is typically around 120 mm of Hg. This represents the pressure in the arteries when the heart beats and pumps blood.

Quick Tip

Normal systolic pressure for an adult is around 120 mm of Hg. Blood pressure readings consist of systolic and diastolic values, with systolic being the higher value.

---

**130. Evaporation of water through leaves is called?**

(1) Respiration

(2) Transpiration

(3) Transportation

(4) Circulation

**Correct Answer:** (2) Transpiration

**Solution:**

The process of evaporation of water through the leaves of plants is called transpiration. It helps in cooling the plant and also in the movement of water and nutrients.

Quick Tip

Transpiration is a vital process for plants, contributing to nutrient transport and temperature regulation.

---

**131. Deficiency of Vasopressin causes excessive dilute urination. This condition is called?**

(1) Diabetes mellitus

(2) Diabetes insipidus

(3) Scurvy

(4) Beri beri

**Correct Answer:** (2) Diabetes insipidus

**Solution:**

Diabetes insipidus is a condition where there is a deficiency of vasopressin, leading to excessive urine production with dilute urine. This hormone is responsible for regulating water balance in the body.

Quick Tip

Diabetes insipidus is different from diabetes mellitus, which involves blood sugar levels.

---

**132. The maximum urine storage capacity of urinary bladder is?**

(1) 2000-3000 ml

(2) 50-100 ml

(3) 10000-20000 ml

(4) 700-800 ml

**Correct Answer:** (4) 700-800 ml

**Solution:**

The maximum storage capacity of the urinary bladder is typically around 700-800 ml. Beyond this capacity, the urge to urinate becomes more intense.

Quick Tip

The bladder can hold urine for a certain time before signaling the body to release it.

---

**133. Kidneys are the excretory organs in which animals?**

(1) Amoeba

(2) Sponges

(3) Birds

(4) Earthworm

**Correct Answer:** (3) Birds

**Solution:**

In birds, kidneys are responsible for excretion and regulation of water balance. Other animals like amoeba and sponges have different mechanisms of excretion.

Quick Tip

Kidneys in birds efficiently filter waste products from the blood and help in conserving water.

---

**134. Which of the following poisonous, nitrogenous byproducts are stored in different parts of the plants?**

(1) Tannins

(2) Resins

(3) Alkaloids

(4) Latex

**Correct Answer:** (3) Alkaloids

**Solution:**

Alkaloids are nitrogenous compounds that are commonly stored in various parts of plants. They often have toxic properties and are used by plants as a defense mechanism.

Quick Tip

Alkaloids include substances like nicotine and morphine.

---

**135. ..... is an endocrine gland, secretes the hormones insulin and glucagon.**

(1) Thyroid

(2) Adrenal

(3) Ovary

(4) Pancreas

**Correct Answer:** (4) Pancreas

**Solution:**

The pancreas is an endocrine gland that plays a vital role in regulating blood sugar levels by secreting insulin and glucagon. These hormones help maintain glucose homeostasis.

Quick Tip

Insulin lowers blood glucose, while glucagon raises it.

---

**136. ..... causes ripening of fruits.**

(1) Ethylene

(2) Auxins

(3) Cytokinins

(4) Gibberellins

**Correct Answer:** (1) Ethylene

**Solution:**

Ethylene is a plant hormone that regulates various aspects of plant growth, including fruit ripening. It is often used commercially to accelerate the ripening process of fruits like bananas and tomatoes.

Quick Tip

Ethylene is a gas that naturally occurs in plants and plays a key role in the maturation of fruits.

---

**137. Roots grow downwards, plants respond positively for gravitational force. What is this called?**

(1) Phototropism

(2) Geotropism

(3) Hydrotropism

(4) Thigmotropism

**Correct Answer:** (2) Geotropism

**Solution: Geotropism** is the growth response of plants to gravity. Roots grow downwards in response to the gravitational force, which is also called geotropism.

Quick Tip

Remember, phototropism is the response to light, geotropism is the response to gravity, hydrotropism is the response to water, and thigmotropism is the response to touch.

---

**138. ..... bacteria is responsible for the formation of curd from milk.**

(1) Bacillus thuringiensis

(2) Lactobacillus

(3) Pseudomonas

(4) Xanthomonas

**Correct Answer:** (2) Lactobacillus

**Solution:** The bacterium responsible for curd formation is **Lactobacillus**. It ferments lactose in milk to produce lactic acid, which causes the milk to coagulate into curd.

Quick Tip

Lactobacillus is a common probiotic bacterium used in the fermentation of milk into yogurt and curd.

**139. Examples of propagation by stem are:**

(1) Stolons and runners

(2) Bulbs and corms

(3) Rhizome and tuber

(4) All of the above

**Correct Answer:** (4) All of the above

**Solution:** Stem propagation involves the formation of new plants from parts of the stem. **Stolons, runners, bulbs, corms, rhizomes, and tubers** are all forms of vegetative propagation through stems, where new plants grow from the stem.

Quick Tip

Stolons, runners, and rhizomes are modified stems that grow horizontally, while bulbs, corms, and tubers are underground storage organs that also serve for propagation.

---

**140. Majority of flowering plants have an embryo sac consisting of:**

(1) 7 cells and 8 nuclei

(2) 8 cells and 8 nuclei

(3) 7 cells and 7 nuclei

(4) 5 cells and 4 nuclei

**Correct Answer:** (1) 7 cells and 8 nuclei

**Solution:**

The majority of flowering plants have an embryo sac consisting of 7 cells and 8 nuclei. This structure is characteristic of the embryo sac in most angiosperms, with 7 cells and 8 nuclei forming the basis of fertilization and seed development.

Quick Tip

Remember that the typical embryo sac in flowering plants has 7 cells, with one cell being the egg cell and the others forming various supporting roles.

---

**141. The correct order of passage of spermatozoa is:**

(1) Seminiferous tubules → Vasa efferentia → Epididymis → Ejaculatory duct → Urethra

(2) Seminiferous tubules → Epididymis → Vasa efferentia → Ejaculatory duct → Urethra

(3) Seminiferous tubules → Ejaculatory duct → Vasa efferentia → Epididymis

(4) Seminiferous tubules → Ejaculatory duct → Vasa efferentia → Urethra

**Correct Answer:** (1) Seminiferous tubules → Vasa efferentia → Epididymis → Ejaculatory duct → Urethra

**Solution:**

The correct passage of spermatozoa begins in the seminiferous tubules, where they are produced. From there, the sperm move into the vasa efferentia, then into the epididymis for maturation. After that, the sperm enter the ejaculatory duct before exiting through the urethra during ejaculation. This pathway ensures proper sperm maturation and transport.

Quick Tip

Focus on the key structures of the male reproductive system and their sequential roles in sperm maturation and transport for a clear understanding of sperm movement.

---

**142. The walls of the food pipe secrete a slippery substance called:**

(1) Amylase

(2) Lipase

(3) Mucus

(4) Bolus

**Correct Answer:** (3) Mucus

**Solution:**

The walls of the food pipe (esophagus) secrete mucus, which helps in the smooth passage of food through the digestive system. Mucus acts as a lubricant, facilitating the movement of the food bolus.

Quick Tip

Mucus plays a key role in digestion by lubricating the food pipe, allowing food to move smoothly without friction.

---

**143. From the stomach, the partially digested food (chyme) is released into:**

(1) Duodenum

(2) Large intestine

(3) Small intestine

(4) Rectum

**Correct Answer:** (1) Duodenum

**Solution:**

Partially digested food, known as chyme, is released from the stomach into the duodenum, which is the first part of the small intestine. In the duodenum, bile and pancreatic enzymes further aid in the digestion process.

Quick Tip

Remember, the duodenum plays a crucial role in the digestion of food, especially fats and proteins, using bile and digestive enzymes.

---

**144. The phenotypic ratio of F2 generation in a monohybrid cross is:**

(1) 1:2:1

(2) 3:1

(3) 9:3:3:1

(4) 2:1

**Correct Answer:** (2) 3:1

**Solution:**

In a monohybrid cross, the typical phenotypic ratio in the F2 generation is 3:1, where three individuals exhibit the dominant trait, and one individual exhibits the recessive trait. This follows Mendel's laws of inheritance.

Quick Tip

In a monohybrid cross, always remember the classic 3:1 phenotypic ratio, where the dominant allele appears three times more frequently than the recessive one.

---

**145. The number of allosomes in human cells are:**

(1) 2

(2) 4

(3) 23

(4) 46

**Correct Answer:** (2) 4

**Solution:**

Allosomes, also known as sex chromosomes, are the chromosomes that determine the biological sex of an organism. In humans, there are two allosomes (X and Y), which can combine in different ways to produce male (XY) or female (XX) offspring. Thus, the number of allosomes in human cells is 4 in the case of a male (XX or XY) cell pair.

Quick Tip

Humans have 46 chromosomes, but only 2 of them are allosomes (X and Y), determining gender.

---

**146. Change in the frequency of genes in small populations is called:**

(1) Variation

(2) Mutation

(3) Genetic drift

(4) Evolution

**Correct Answer:** (3) Genetic drift

**Solution:**

Genetic drift refers to the random change in the frequency of alleles in a small population. This can occur due to chance events rather than natural selection. It is a key factor in the

evolution of small populations.

Quick Tip

Genetic drift plays a significant role in small populations, where random events can cause significant allele frequency changes.

---

**147. Occurrence of vestigial organs abruptly in human beings is called:**

(1) Atavism

(2) Dwarfism

(3) Regeneration

(4) Mutation

**Correct Answer:** (1) Atavism

**Solution:**

Atavism refers to the reappearance of a characteristic or trait in an organism that had disappeared in previous generations. The appearance of vestigial organs, which were once functional but are no longer needed, is considered an example of atavism.

Quick Tip

Atavism is the reappearance of traits that were once present in distant ancestors but had been lost over generations.

---

**148. The process of entry of pollutants into a food chain is known as:**

(1) Restoration

(2) Bioaccumulation

(3) Biomagnification

(4) Food web

**Correct Answer:** (3) Biomagnification

**Solution:**

Biomagnification is the process where pollutants accumulate in the food chain, typically increasing in concentration at higher trophic levels. This happens when toxins accumulate in

organisms and pass on to predators, leading to higher concentrations of harmful substances.

Quick Tip

Biomagnification occurs as pollutants increase in concentration as they move up the food chain, impacting top predators the most.

---

**149. Seeds from ..... plants are used for the production of biofuel.**

(1) Jatropha

(2) Chrysanthemum

(3) Hibiscus

(4) Cuscuta

**Correct Answer:** (1) Jatropha

**Solution:**

Jatropha plants are widely used for biofuel production because their seeds contain high levels of oil that can be converted into biodiesel. This plant has been recognized as a major source of biofuel.

Quick Tip

Jatropha is one of the most common plants used for biofuel due to its high oil content, which is ideal for biodiesel production.

---

**150. Coal, Petroleum (oil), and Natural Gas belong to which type of fuels?**

(1) Chemical fuels

(2) Bio fuels

(3) Sunlight

(4) Fossil fuels

**Correct Answer:** (4) Fossil fuels

**Solution:**

Coal, petroleum, and natural gas are all examples of fossil fuels, which are derived from ancient organic matter that has been buried and subjected to high pressure and temperature

over millions of years. They are non-renewable sources of energy.

**Quick Tip**

Fossil fuels, including coal, petroleum, and natural gas, are a major source of energy but are non-renewable and contribute to environmental issues.

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