

Mathematics X

**Chapter-wise
Assertion-Reason Questions,
Case Study Based Questions**

ASSERTION – REASON QUESTIONS

[BASIC / STANDARD]

1. **Assertion (A)** : The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M. = 162.

Reason (R) : If a and b are two positive integers, then their $\text{H.C.F.} \times \text{L.C.M.} = a \times b$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
2. **Assertion (A)** : 2 is a rational number.

Reason (R) : The square root of all positive integers are irrationals

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
3. **Assertion (A)** : If $\text{LCM}(p, q) = 30$ and $\text{HCF}(p, q) = 5$, then $p \times q = 150$.

Reason (R) : $\text{LCM}(a, b) \times \text{HCF}(a, b) = a \times b$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
4. **Assertion (A)** : $\sqrt{5}$ is an irrational number.

Reason (R) : If m is an odd number greater than 1, then $\sqrt{m}$ is irrational.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
5. **Assertion (A)** : Given that $\text{HCF}(306, 657) = 9$, and $\text{LCM}(306, 657)$ is 2238.

Reason (R) : If a and b are two positive integers and $\text{HCF}(a, b) = 9$, then

$$\text{LCM}(a + b) = \frac{a+b}{2}$$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
6. **Assertion (A)** : π is an irrational number.

Reason (R) : $\sqrt{5}$ is an irrational number.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

7. **Assertion (A) :** $\sqrt{3} + \sqrt{5}$ is an irrational number.

Reason (R) : The sum of a rational number and an irrational number is an irrational number.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

8. **Assertion (A) :** 6^n can end with the digit 0 for any natural number n .

Reason (R) : Any positive integer ending with the digits 0 or 5 is divisible by 5 and so its prime factorisation must contain the prime 5.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

9. **Assertion (A) :** The HCF of two numbers is 5 and their LCM is 150. If one of the numbers is 15, then the other is 50.

Reason (R) : For any two positive integers a and b $\text{HCF}(a, b) \times \text{LCM}(a, b) = a \times b$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

10. **Assertion (A) :** 100 can be expressed as a product of primes.

Reason (R) : 100 is a composite number.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

11. **Assertion (A) :** $\sqrt{p}$ is an irrational number, where p is a prime number.

Reason (R) : Square root of any prime number is an irrational number.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

12. **Assertion (A) :** $x^2 + 4x + 5$ has two zeroes.

Reason (R) : A quadratic polynomial can have at the most two zeroes.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

13. **Assertion (A) :** Zeroes of $p(x) = x^2 - 4x - 5$ are 5, -1.

Reason (R) : The polynomial whose zeroes are $2 + \sqrt{3}$, $2 - \sqrt{3}$ is $x^2 - 4x + 7$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

14. Assertion (A) : Degree of the zero polynomial is not defined.

Reason (R) : Degree of non-zero constant polynomial is 0.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

15. Assertion (A) : If 2, 3 are the zeroes of a quadratic polynomial, then the polynomial $x^2 - 5x + 6$.

Reason (R) : If α, β are the zeroes of a quadratic polynomial, then polynomial is $x^2 - (\alpha + \beta)x + \alpha \cdot \beta$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

16. Assertion (A) : The polynomial $x^4 + 4x^2 + 5$ has four zeroes.

Reason (R) : If $p(x)$ is divided by $(x - k)$, then the remainder $= p(k)$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

17. Assertion (A) : If one zero of the polynomial $p(x) = (k^2 + 4)x^2 + 13x + 4k$ is reciprocal of other, then $k = 2$.

Reason (R) : If $(x - a)$ is a factor of $p(x)$, then $p(a) = 0$ i.e., a is a zero of $p(x)$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

18. Assertion (A) : If α, β and γ are the zeroes of $x^3 - 2x^2 + qx - r$ and $\alpha + \beta = 0$, then $2q = r$.

Reason (R) : If α, β and γ are the zeroes of $ax^3 + bx^2 + cx + d$, then $\alpha + \beta + \gamma = \frac{-b}{a}$, $\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a}$, $\alpha\beta\gamma = \frac{-d}{a}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

19. Assertion (A) : If α, β are the zeroes of the polynomial $x^2 - ax + 1$, then $\frac{1}{\alpha} + \frac{1}{\beta} = a$

Reason (R) : If α, β are the zeroes of the polynomial $ax^2 + bx + c$, then $\alpha + \beta = \frac{-b}{a}$, $\alpha\beta = \frac{c}{a}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

20. Assertion (A) : If α, β are the zeroes of the polynomial $x^2 - 3x + p$ and $2\alpha + 3\beta = 15$, then $p = 54$.

Reason (R) : If α, β are the zeroes of the polynomial $ax^2 + bx + c$, then $\alpha + \beta = \frac{-b}{a}$ and $\alpha\beta = \frac{c}{a}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

21. Assertion (A) : The graph of a polynomial $p(x)$ is as given in the figure, then number of zeroes of $p(x)$ is 2.

Reason (R) : If α, β are the zeroes of the polynomial $ax^2 + bx + c$, then $\alpha + \beta = \frac{-b}{a}$ and $\alpha\beta = \frac{c}{a}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

22. Assertion (A) : The polynomial of $p(x) = x^3 + x$ has only one real zero.

Reason (R) : A polynomial of n th degree must have n real zeroes.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

23. Assertion (A) : $2 - \sqrt{3}$ is one zero of the quadratic polynomial then other zero will be $2 + \sqrt{3}$.

Reason (R) : Irrational zeroes always occur in pairs.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

24. Assertion (A) : $p(x) = x^3 - 5x^2 + 6x + 5$ is a polynomial of degree 2.

Reason (R) : The highest power of x in the polynomial $p(x)$ is the degree of the polynomial.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

25. Assertion (A) : $3x + 4y + 5 = 0$ and $6x + ky + 9 = 0$ represent parallel lines if $k = 8$.

Reason (R) : $a_1x + b_1y + c_1 = 0$; $a_2x + b_2y + c_2 = 0$ represent parallel lines if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

26. Assertion (A) : $x + y - 4 = 0$ and $2x + ky - 3 = 0$ has no solution, if $k = 2$.

Reason (R) : $a_1x + b_1y + c_1 = 0$; $a_2x + b_2y + c_2 = 0$ are consistent if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

27. Assertion (A) : If the system of equations $2x + 3y = 7$ and $2ax + (a + b)y = 28$ has infinitely many solutions, then $2a - b = 0$

Reason (R) : The system of equations $3x - 5y = 9$ and $6x - 10y = 8$ has unique solution.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

28. Assertion (A) : If a pair of lines are coincident, then we say that pair is consistent and it has a unique solution.

Reason (R) : If a pair of lines are parallel, then the pair has no solution and is called inconsistent pair of equations.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

29. Assertion (A) : If $kx - y - 2 = 0$ and $6x - 2y - 3 = 0$ are inconsistent, then $k = 3$.

Reason (R) : $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are inconsistent if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

- 30. Assertion (A) :** $3x - 4y = 7$ and $6x - 8y = k$ have infinite number of solution if $k = 14$
Reason (R) : $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
- 31. Assertion (A) :** The linear equations $x - 2y - 3 = 0$ and $3x + 4y - 20 = 0$ have exactly one solution.
Reason (R) : The linear equations $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$ have unique solution.
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
- 32. Assertion (A) :** $kx + 2y = 5$ and $3x + y = 1$ have unique solution if $k = 6$.
Reason (R) : $x + 2y = 3$ and $5x + ky + 7 = 0$ have unique solution, if $k \neq 10$.
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
- 33. Assertion (A) :** If the pair of equations $x + y = \sqrt{2}$ and $x \sin \theta + y \cos \theta = 1$ has infinitely many solutions, then $\theta = 45^\circ$.
Reason (R) : The system of equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has infinitely many solutions, if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$.
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
- 34. Assertion (A) :** If the pair of lines are coincident then we say that it has infinitely many solutions.
Reason (R) : If the pair of lines are parallel, then the pair has no solution and is called inconsistent pair of equations.
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
- 35. Assertion (A) :** $3x + 4y + 5 = 0$ and $6x + ky + 9 = 0$ represent parallel lines if $k = 8$.
Reason (R) : $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ represent parallel lines if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

36. Assertion (A) : The pair of equations $ax + 2y = 7$ and $3x + by = 16$ represents parallel lines if $ab = 6$

Reason (R) : $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ represent parallel lines if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

37. Assertion (A) : If the equation $x^2 - ax + b = 0$ and $x^2 + bx - a = 0$ have a common root then, $a + b \neq 0$ and $a - b = 1$.

Reason (R) : A common root of two equations satisfies both the equations.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

38. Assertion (A) : If the roots of the equation $\frac{1}{x+p} + \frac{1}{x+q} = \frac{1}{r}$ are equal in magnitude and opposite in sign, then p, r, q are in A.P.

Reason (R) : The sum of the roots of the equation $ax^2 + bx + c = 0$ is $-\frac{b}{a}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

39. Assertion (A) : If roots of the equation $(2k - 1)x^2 + 4x - 3 = 0$ are reciprocal of each other, then $k = -1$.

Reason (R) : If $a = c$, then roots of $ax^2 + bx + c = 0$ are reciprocal of each other.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

40. Assertion (A) : The roots of the equation $x^2 + 3x + 4 = 0$ are imaginary.

Reason (R) : If for the quadratic equation $ax^2 + bx + c = 0$, $b \neq 0$, $b^2 - 4ac < 0$, then its roots are imaginary.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

41. Assertion (A) : Roots of every quadratic equation can be obtained by quadratic formula.

Reason (R) : If $ax^2 + bx + c = 0$, $b \neq 0$, then the quadratic formula for finding roots is

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

42. Assertion (A) : Roots of equation $x - \frac{1}{x} - 3$, $x \neq 0$ are $\frac{3 \pm \sqrt{13}}{2}$.

Reason (R) : Quadratic Equation $ax^2 + bx + c = 0$ has no real roots, if $D < 0$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

43. Assertion (A) : If -5 is a root of $2x^2 + 2px - 15 = 0$ and $p(x^2 + x) + k = 0$ has equal roots then $k = \frac{7}{8}$.

Reason (R) : The equation $ax^2 + bx + c = 0$, ($a \neq 0$) has equal roots, if $b^2 - 4ac = 0$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

44. Assertion (A) : The roots of $2x^2 + x - 6 = 0$ are -2 and $\frac{3}{2}$.

Reason (R) : Roots of the equation $ax^2 + bx + c = 0$, $a \neq 0$ are $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

45. Assertion (A) : If $px^2 - 2x + 2 = 0$ has no real roots, then $p > \frac{1}{2}$.

Reason (R) : The equation $(a^2 + b^2)x^2 + 2(ac + bd)x + (c^2 + d^2) = 0$ has no real roots, if $ad \neq bc$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

46. Assertion (A) : The possible values of p for which $2x^2 + px + 3 = 0$ has two real roots is given by $p > 2\sqrt{6}$.

Reason (R) : The quadratic equation $ax^2 + bx + c = 0$ has two real roots if $b^2 - 4ac < 0$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)

- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

47. **Assertion (A) :** $x^2 + 5kx + 16 = 0$ has no real roots if $-\frac{8}{5} < k < \frac{8}{5}$

Reason (R) : The quadratic equation $ax^2 + bx + c = 0$ ($a \neq 0$) has two equal roots if $b^2 - 4ac = 0$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

48. **Assertion (A) :** If one root of the quadratic equation $6x^2 - x - k = 0$ is $\frac{2}{3}$, then the value of k is 2.

Reason (R) : The quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ has atmost two roots.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

49. **Assertion (A) :** $(2x - 1)^2 - 4x^2 + 5 = 0$ is not a quadratic equation.

Reason (R) : An equation of the form $ax^2 + bx + c = 0$, $a \neq 0$, where $a, b, c \in \mathbb{R}$ is called a quadratic equation.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

50. **Assertion (A) :** Sum of natural numbers from 1 to 100 is 5050

Reason (R) : Sum of n natural numbers is $\frac{n(n+1)}{2}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

51. **Assertion (A) :** Sum of first 15 terms of $2 + 5 + 8 \dots$ is 345.

Reason (R) : Sum of first n terms in an A.P. is given by the formula:

$$S_n = \frac{n}{2} [2a + (n - 1)d]$$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

52. **Assertion (A) :** The common difference of 5, 4, 3, 2,... A.P. is -1 .

Reason (R) : The constant difference between any two terms of an AP is commonly known as common difference.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)

- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

53. Assertion (A) : The value of n , if $a = 10$, $d = 5$, $a_n = 95$ is 16.

Reason (R) : The formula of general term a_n is $a_n = a + (n - 1)d$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

54. Assertion (A) : The 11th term of an AP is 7, 9, 11, 13, ... is 27.

Reason (R) : If S_n is the sum of first n terms of an AP, then its n th term a_n is given by $a_n = S_n + S_{n-1}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

55. Assertion (A) : The 10th term of the A.P. 5, 8, 11, 14, ... is 35.

Reason (R) : If S_n is the sum of the first n terms of an A.P., then its n th term a_n is given by $a_n = S_n - S_{n-1}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

56. Assertion (A) : The sum of the series with the n th term, $a_n = (9 - 5n)$ is 465, when number of terms, $n = 15$.

Reason (R) : The sum of first n terms of an AP is given by

$$S_n = \frac{n}{2} [2a + (n - 1)d]$$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

57. Assertion (A) : 5, 10, 15 are three consecutive terms of an AP.

Reason (R) : If a , b , c are three consecutive terms of an AP, then $2b = a + c$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

58. Assertion (A) : Sum of n terms of the AP. 3, 13, 23... is $5n^2 - 8n$.

Reason (R) : The sum of first n terms of an AP is given by $S_n = \frac{n}{2} [2a + (n - 1)d]$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)

- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

59. Assertion (A) : Common difference of an AP, whose n th term is given by $a_n = 4n - 70$ is 4.

Reason (R) : $d = a_n - a_{n-1}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

60. Assertion (A) : The first term of an AP is 5, the last term is 45 and its sum is 400. Then the number of terms of the AP = 12.

Reason (R) : Sum of first n even natural numbers is $n(n + 1)$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

61. Assertion (A) : Common difference of the AP having sum of first n terms as $an^2 + bn$ is $2a$.

Reason (R) : If sum of n terms of an AP is denoted by S_n , then its n th term is $S_n - S_{n-1}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

62. Assertion (A) : 10th term from the end of the AP: 100, 95, 90, 85,...10 is 55.

Reason (R) : The n th term from the end of the AP having last term l and common difference d is $l - (n - 1)d$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

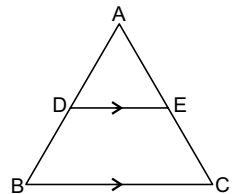
63. Assertion(A) : In a $\triangle ABC$, a line $DE \parallel BC$, intersects AB in D and AC in E , then $\frac{AB}{AD} = \frac{AC}{AE}$.

Reason (R) : If a line is drawn parallel to one side of a triangle intersecting the other two sides, then the other two sides are divided in the same ratio.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

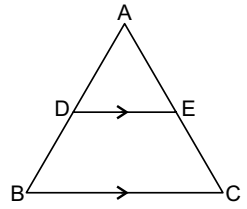
64. Assertion (A) : In the given figure, $DE \parallel BC$ and $\frac{AD}{DB} = \frac{3}{5}$. If $AC = 4.8$ cm then the length of AE is 1.8 cm.

Reason (R) : If a line divides any two sides of a triangle in the same ratio, then the line must be parallel to the third side.



- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

65. **Assertion (A) :** In the given figure, $DE \parallel BC$, so that $AD = (4x - 3)$ cm, $AE = (8x - 7)$ cm, $BD = (3x - 1)$ cm and $CE = (5x - 3)$ cm then, the value of x is 1.



Reason (R) : In triangle ABC, if $DE \parallel BC$, then $\frac{AD}{BD} = \frac{AE}{CE}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
66. **Assertion (A) :** The line segment joining the midpoints of any two sides of a triangle is parallel to the third side.

Reason (R) : A line drawn through the midpoint of one side of a triangle parallel to another side bisects the third side.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
67. **Assertion (A) :** A vertical stick which is 15 cm long casts a 12 cm long shadow on the ground. At the same time, a vertical tower casts a 50 m long shadow on the ground, then the height of the tower is 50 m.

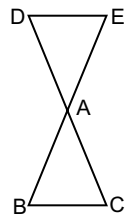
Reason (R) : The ratio of the perimeters of two similar triangles is the same as the ratio of their corresponding sides.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
68. **Assertion (A) :** The perimeters of two similar triangles are 25 cm and 15 cm respectively. If one side of the first triangle is 9 cm, then the corresponding side of the second triangle is 5.4 cm.

Reason (R) : The ratio of the perimeters of two similar triangles is the same as the ratio of their corresponding sides.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
69. **Assertion (A) :** In the figure $\triangle ABC \sim \triangle AED$. If $BC = 8$ cm, $AB = 6.5$ cm, $AD = 2.8$ cm and $DE = 4$ cm, then $AC = 5.6$ cm.

Reason (R) : If in two triangles, angles of one triangle are proportional to the angles of the other triangle, then their corresponding sides are equal, and hence, the two triangles are similar.



- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

70. Assertion (A) : All congruent triangles are similar but the similar triangles need not be congruent.

Reason (R) : If the corresponding sides of two triangles are proportional, then they are similar.

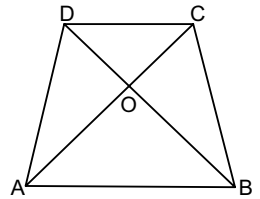
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

71. Assertion (A) : If the corresponding sides of two triangles are proportional then their corresponding angles are equal, and hence the two triangles are similar

Reason (R) : If the bisector of an angle of a triangle bisects the opposite side, then the triangle is isosceles.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

72. Assertion (A) : If in the given figure, AB is parallel to CD.
If $OA = 3x - 19$, $OB = x - 4$, $OC = x - 3$ and $OD = 4$, then $x = 11$ units or 8 units.



Reason (R) : The diagonals of a trapezium divide each other proportionally.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

73. Assertion (A) : In $\triangle ABC$, $DE \parallel BC$ and $AD = 4x - 3$, $AE = 8x - 7$, $BD = 3x - 1$ and $CE = 5x - 3$, then $x = 5$ units.

Reason (R) : If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

74. Assertion (A) : A line drawn through the midpoint of one side of a triangle parallel to another side bisects the third side.

Reason (R) : In a $\triangle ABC$, if D is the mid-point of side AB and $DE \parallel BC$, then $AE = EC$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

- 75. Assertion (A) :** In $\triangle ABC$, if D and E are midpoints of sides AB and AC, then $DE \parallel BC$.
Reason (R) : If one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then the two triangles are similar.
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (A) is true but (R) is false
 - (A) is false but (R) is true
- 76. Assertion (A) :** Points (1, 7), (4, 2), (-1, -1) and (-4, 4) are the vertices of a square.
Reason (R) : If all the four sides of the quadrilateral are equal and diagonals are also equal, then quadrilateral is a square.
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (A) is true but (R) is false
 - (A) is false but (R) is true
- 77. Assertion (A) :** The distance between the points (0, 0) and (36, 15) is 439.
Reason (R) : Distance from the origin of the point (x, y) is $\sqrt{x^2 + y^2}$.
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (A) is true but (R) is false
 - (A) is false but (R) is true
- 78. Assertion (A) :** The point on the x-axis which is equidistant from (2, -5) and (-2, 9) is (8, 0).
Reason (R) : Points lies on the y-axis are always of the form (0, y).
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (A) is true but (R) is false
 - (A) is false but (R) is true
- 79. Assertion (A) :** Points (1, 5), (2, 3) and (-2, -11) are collinear.
Reason (R) : Three points are said to be collinear, when they all lie of the same line.
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (A) is true but (R) is false
 - (A) is false but (R) is true
- 80. Assertion (A) :** If P(x, y) is equidistant from the points A(7, 1) and B(3, 5), then $x - y = 2$.
Reason (R) : If point P is equidistant from the points A and B, then $AP = BP$.
- Both (A) and (R) are true and (R) is the correct explanation of (A)
 - Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (A) is true but (R) is false
 - (A) is false but (R) is true
- 81. Assertion (A) :** The coordinates of the midpoint P of the join of the points $A(x_1, y_1)$ and $B(x_2, y_2)$ is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

Reason (R) : The mid-point of a line segment divides the line segment in the ratio 1:1.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

- 82. Assertion (A) :** The point $(-4, 6)$ divides the line segment joining the points $A(-6, 10)$ and $B(-7, 4)$ in the ratio 2:9.

Reason (R) : The coordinates of the point $P(x, y)$ which divides the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ internally in the ratio $m_1 : m_2$ are $\left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

- 83. Assertion (A) :** If the points $A(6, 1)$, $B(8, 2)$, $C(9, 4)$ and $D(p, 3)$ are the vertices of a parallelogram, taken in order, then the value of p is 7.

Reason (R) : Diagonals of parallelogram, ABCD bisect each other and therefore, midpoint of AC = midpoint of BD.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

- 84. Assertion (A) :** If three vertices of a parallelogram taken in order are $(-1, -6)$, $(2, -5)$ and $(7, 2)$, then its fourth vertex is $(4, 1)$.

Reason (R) : Diagonals of a parallelogram bisect each other.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

- 85. Assertion (A) :** The points $(5, -2)$, $(6, 4)$ and $(7, -2)$ are the vertices of an isosceles triangle.

Reason (R) : The points $(1, 5)$, $(2, 3)$ and $(-2, -11)$ are collinear.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

- 86. Assertion (A) :** If the points $(8, 1)$, $(k, -4)$, $(2, -5)$ are collinear, then $k = 4$.

Reason (R) : Three points are said to be collinear if they all lie on the same line.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

87. Assertion (A) : Points A(3, 2), B(-2, -3) and C(2, 3) form a triangle.

Reason (R) : Sum of the two sides of a triangle is always greater than the third side.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

88. Assertion (A) : The coordinates of the point which divides the line segment joining the points (4, -3) and (8, 5) in the ratio 3:1 are $\left(\frac{22}{3}, \frac{22}{3}\right)$.

Reason (R) : The ratio in which the y-axis divides the line segment joining the points (5, -6) and (-1, -4) is 5:1.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

89. Assertion (A) : If $\sec \theta + \tan \theta = a$, then $\sec \theta = \frac{a^2 + 1}{2a}$

Reason (R) : $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

90. Assertion (A) : If $x = 2 \sin^2 \theta$ and $y = 2 \cos^2 \theta + 1$, then the value of $x + y = 3$.

Reason (R) : For any value of θ , $\sin^2 \theta + \cos^2 \theta = 1$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

91. Assertion (A) : The value of $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$ is 1

Reason (R) : $\sin 90^\circ = 1$ and $\cos 90^\circ = 0$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

92. Assertion (A) : The value of $2 \tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$ is 2.

Reason (R) : Value of $\tan 45^\circ = 1$, $\cos 30^\circ = \sqrt{\frac{3}{2}}$ and $\sin 60^\circ = \sqrt{\frac{3}{2}}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

93. Assertion (A) : $\sin A$ is the product of $\sin$ and A .

Reason (R) : The value of $\sin \theta$ increases as θ increases.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

94. Assertion (A) : In a right $\triangle ABC$, right angled at B , if $\tan A = 1$, then $2\sin A \cdot \cos A = 1$

Reason (R) : $\sin A = \frac{1}{\sqrt{2}}$; $\cos A = \frac{1}{\sqrt{2}}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

95. Assertion (A) : If $\cos A + \cos^2 A = 1$, then $\sin^2 A + \sin^4 A = 1$.

Reason (R) : $\sin^2 A + \cos^2 A = 1$, for any value of A .

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

96. Assertion (A) : $\sin(A - B) = \sin A - \sin B$

Reason (R) : For any value of θ , $1 + \tan^2 \theta = \sec^2 \theta$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

97. Assertion (A) : In $\triangle ABC$, right-angled at B , $AB = 24$ cm, $BC = 7$ cm. The value of $\tan C$ is $\frac{24}{7}$.

Reason (R) : $\tan C = \frac{AB}{BC}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

98. Assertion (A) : $\frac{2 \tan 30^\circ}{1 + \tan^2 30^\circ} = \sin 60^\circ$

Reason (R) : $\tan 30^\circ = \frac{1}{\sqrt{3}}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

99. Assertion (A) : $\cot A$ is not defined for $A = 0^\circ$

Reason (R) : $\sin \theta = \cos \theta$ for all values of θ .

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

100. Assertion (A) : If θ is an acute angle and $\sin \theta = \cos \theta$, then the value of $2\tan^2 \theta + \sin^2 \theta = 1$

Reason (R) : If $\cos(40^\circ + x) = \sin 30^\circ$, then the value of x is 20° .

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

101. Assertion (A) : $\sin(A + B) = 1$, $\cos(A - B) = 1$, then $A = 45^\circ$ and $B = 45^\circ$.

Reason (R) : If $\sin(A + B) = 1$, then $A + B = 90^\circ$ and if $\cos(A - B) = 1$, then $A - B = 0^\circ$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

102. Assertion (A) : If the angle of elevation of Sun, above a perpendicular line (tower) decreases, then the shadow of tower increases.

Reason (R) : It is due to decrease in slope of the line of sight.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

103. Assertion (A) : When we move towards the object, angle of elevation decreases.

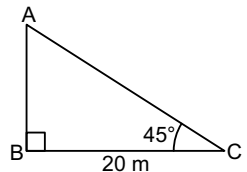
Reason (R) : As we move towards the object, it subtends large angle at our eye than before.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

104. Assertion (A) : In the figure, if $BC = 20$ m, then the hypotenuse

$$AC = \frac{40}{\sqrt{2}} \text{ m.}$$

Reason (R) : For any acute angle θ , $\cos \theta = \frac{\text{base}}{\text{hypotenuse}}$



- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

105. Assertion (A) : If the length of shadow of a vertical pole is equal to its height, then the angle of elevation is 45° .

Reason (R) : According to Pythagoras Theorem, $H^2 = P^2 + B^2$, where P = Perpendicular, B = Base and H = Hypotenuse.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

106. Assertion (A) : The angle of elevation of an object viewed, is the angle formed by the line of sight with the horizontal when it is above the horizontal level.

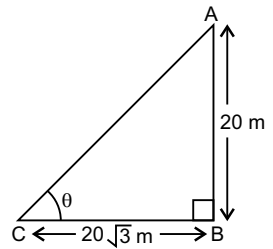
Reason (R) : The angle of depression of an object viewed, is the angle formed by the line of sight with the horizontal when it is below the horizontal level.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

107. Assertion (A) : The angle of elevation of the Sun is 30° , when the shadow of a pole h metres high is $\sqrt{3} h$ metres long.

Reason (R) : In $\triangle ABC$, $\tan \theta = \frac{1}{\sqrt{3}} \Rightarrow \theta = 30^\circ$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true



108. Assertion (A) : At some time of the day, the length of the shadow of a tower is equal to its height, then the sun's altitude is 45° .

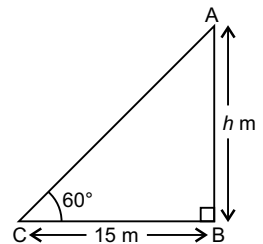
Reason (R) : The angle which the line of sight makes with the horizontal line passing through the eye of the observer, when the object is above the observer is called the angle of elevation.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

109. Assertion (A) : A tower stands vertically on the ground. From a point on the ground, which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60° . Then the height of the tower is $15\sqrt{3}$ m.

Reason (R) : In $\triangle ABC$, $\tan 60^\circ = \frac{AB}{BC} \Rightarrow \sqrt{3} = \frac{h}{15} \Rightarrow h = 15\sqrt{3}$ m

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true



110. Assertion (A) : A line which intersects a circle in two distinct points is called a secant to the circle.

Reason (R) : A line meeting a circle only in one point is called a tangent to the circle at that point.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

111. **Assertion (A) :** From a point P, 10 cm away from the centre of a circle, a tangent PT of length 8 cm is drawn, then the radius of the circle is 5 cm.

Reason (R) : A line drawn through the end of a radius and perpendicular to it is a tangent to the circle.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

112. **Assertion (A) :** The tangents drawn at the ends of a diameter of a circle are parallel.

Reason (R) : The line segment joining the points of contact of two parallel tangents to a circle is a diameter of the circle.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

113. **Assertion (A) :** The angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segments joining the points of contact to the centre.

Reason (R) : The tangent to a circle is perpendicular to the radius through the point of contact.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

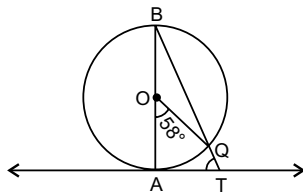
114. **Assertion(A) :** There is one and only one tangent at any point on the circumference of a circle.

Reason (R) : The perpendicular at the point of contact of the tangent to a circle never passes through the centre.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

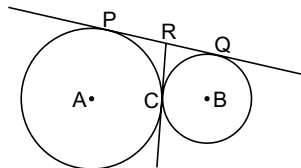
115. **Assertion (A) :** In the given figure, AB is the diameter of a circle with centre O and AT is a tangent. If $\angle AOQ = 58^\circ$, then $\angle ABQ = 29^\circ$.

Reason (R) : The angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.



- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

- 116. Assertion (A) :** In the given figure, two circles touch each other at the point C. The common tangent to the circles at C, bisects the common tangent at P and Q.



Reason (R) : Tangents drawn from an external point to a circle are equal.

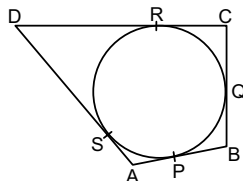
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
- 117. Assertion (A) :** A circle is inscribed in a $\triangle ABC$, touching BC, CA and AB at P, Q and R respectively. If $AB = 10$ cm, $AQ = 7$ cm and $CQ = 5$ cm then the length of BC is 8 cm.

Reason (R) : We know that the lengths of tangents drawn from an external point to a circle are equal.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

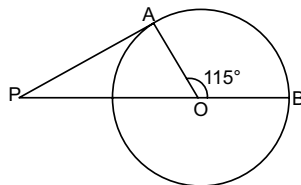
- 118. Assertion (A) :** If a quadrilateral ABCD is drawn to circumscribe a circle, as shown in the figure, then $AB + CD = AD + BC$.

Reason (R) : The parallelogram circumscribing a circle is a rhombus



- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

- 119. Assertion (A) :** In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle AOB = 115^\circ$, then $\angle APO = 25^\circ$.



Reason (R) : The tangent at a point to a circle is perpendicular to the radius passing through the point of contact.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (c) (A) is true but (R) is false
 - (d) (A) is false but (R) is true
- 120. Assertion (A) :** If the length of a tangent from an external point to a circle is 8 cm, then the length of the other tangent from the same point the circle is 8 cm.

Reason (R) : Length of the tangents drawn from an external point to a circle are equal.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

121. Assertion (A) : In two concentric circles, the chord of the larger circle, which touches the smaller circle, is bisected at the point of contact.

Reason (R) : The lengths of tangents drawn from an external point to a circle are equal.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

122. Assertion (A) : The tangents drawn at the ends of a diameter of a circle are parallel

Reason (R) : Opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

123. Assertion (A) : In a circle of radius 6 cm, the angle of a sector is 60° . Then the area of the sector is $\frac{132}{7} \text{ cm}^2$.

Reason (R) : Area of the circle with radius r is πr^2 .

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

124. Assertion (A) : If the circumference of a circle is 176 cm, then its radius is 28 cm.

Reason (R) : Circumference = $2\pi \times \text{radius}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

125. Assertion (A) : The length of the minute hand of a clock is 7 cm. Then the area swept by the minute hand in 5 minutes is $\frac{77}{6} \text{ cm}^2$.

Reason (R) : The length of an arc of a sector of angle θ and radius r is given by

$$l = 2\pi r \times \frac{\theta}{360^\circ}$$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

126. **Assertion (A) :** In a circle of radius 6 cm, the angle of a sector 60° . Then the area of the sector is $18\frac{6}{7} \text{ cm}^2$

Reason (R) : Circumference of the circle with radius r is $2\pi r$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

127. **Assertion (A) :** If the circumference of a circle is 176 cm ,then its radius is 28 cm.

Reason (R) : Circumference = $2\pi r$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

128. **Assertion (A) :** A wire is looped in the form of a circle of radius 28 cm. It is bent into a square. Then the area of the square is 1936 cm^2 .

Reason (R) : Angle described by a minute hand in 1 minute = 6° .

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

129. **Assertion (A) :** A bicycle wheel makes 5000 revolutions in covering 11 km. Then diameter of the wheel is 35 cm.

Reason (R) : If a wire of length 22 cm is bent in the shape of a circle, then area of the circle so formed is 38.5 cm^2 .

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

130. **Assertion (A) :** If the circumference of two circles are in the ratio 2 : 3, then ratio of their areas is 4 : 9.

Reason (R) : The circumference of a circle of radius r is $2\pi r$ and its area is πr^2 .

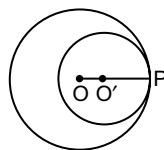
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

131. **Assertion (A) :** Distance moved by a wheel in 1 rotation = its area.

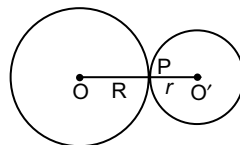
Reason (R) : Number of rotations in 1 minute = $\frac{\text{distance moved in 1 minute}}{\text{circumference}}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

132. **Assertion (A)** : When two circles touch internally [see fig. (i)], then distance between their centres = difference of their radii



Reason (R) : When two circles touch externally [see fig. (ii)], then distance between their centres = sum of their radii



- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
133. **Assertion (A)** : Two circles touch externally. The sum of their areas is 130π sq cm and the distance between their centres is 14 cm. Then, radii of the circles are 11 cm and 3 cm.

Reason (R) : When two circles touch externally, then sum of their radii = distance between their centres.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
134. **Assertion (A)** : Two circles touch internally. The sum of their areas is 116π cm² and the distance between their centres is 6 cm. Then, radii of the circles are 4 cm and 10 cm.

Reason (R) : When two circles touch internally. Then, difference of their radii = distance between their centres

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
135. **Assertion (A)** : A chord of a circle of radius 14 cm makes a right angle at the centre. The area of the minor segment is 56 cm².

Reason (R) : Angle described by the minute hand in 5 minutes = 6°

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
136. **Assertion (A)** : Volume of a cylinder of radius 7cm and height 10 cm is 490π cm³.

Reason (R) : Volume of a cylinder = $\pi r^2 h$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true

137. Assertion (A) : Length of diagonal of a cube of side 7 cm is $7\sqrt{3}$ cm.

Reason (R) : Length of diagonal of a cube of edge x unit = $\frac{x}{\sqrt{3}}$ units.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

138. Assertion (A) : Volume of a hemisphere of radius $\frac{7}{2}$ cm is $\frac{343}{4}\pi$ cm³.

Reason (R) : Volume of a hemisphere of radius r is given by $\frac{2}{3}\pi r^3$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

139. Assertion (A) : Slant height of a cone of height 4 cm and radius 3 cm is 5 cm.

Reason (R) : Curved surface area of a cone is given by πrl .

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

140. Assertion (A) : Volume of a cube having length of diagonal as $5\sqrt{3}$ cm is 125 cm³.

Reason (R) : For a cube, Diagonal = side $\sqrt{3}$ and volume = (side)³

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

141. Assertion (A) : Surface area of a cuboid of length = 5 m, breadth = 3 m and height = 2 m is 30 m².

Reason (R) : Surface area of a cuboid = $2(L \times B + B \times H + H \times L)$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

142. Assertion (A) : Volume of a cylinder of radius 2 cm and height 3 cm is 12π cm³.

Reason (R) : Total surface area of a cylinder = $2\pi r(r + h)$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

143. Assertion (A) : Volume of a cone of height 7 cm and radius 10 cm is $\frac{700}{3}\pi$ cm³.

Reason (R) : Volume of cone = $\frac{1}{3}\pi r^2 h$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

144. Assertion (A) : Total surface area of a hemisphere of radius 2 cm is $4\pi \text{ cm}^2$.

Reason (R) : Total surface area of a hemisphere = $3\pi r^2$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

145. Assertion (A) : Surface area of a sphere of radius 10 cm is $400\pi \text{ cm}^2$.

Reason (R) : Surface area of a sphere of radius r is $\frac{4}{3}\pi r^3$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

146. Assertion (A) : The maximum volume of a cone that can be carved out of a solid hemisphere of radius r is $\frac{1}{3}r^3$.

Reason (R) : For a cone of radius r and height h , volume is given by $\pi r^2 h$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

147. Assertion (A) : The largest sphere is carved out of a cube of side 7 cm. Then, the volume of the sphere is $\frac{539}{3} \text{ cm}^3$.

Reason (R) : Volume of a sphere = $\frac{1}{3}\pi r^2$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

148. Assertion (A) : The volume of the largest right circular cone that can be cut out of a cube whose edge is 7 cm is 50 cm^2 .

Reason (R) : Volume of a cone is $\frac{1}{3}\pi r^2 h$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

149. Assertion (A) : If the median and mode of a frequency distribution are 50 and 60 respectively, then its mean is 45.

Reason (R) : Mean, median and mode of a frequency distribution are related as:

$$\text{Mode} = 3(\text{Median}) - 2(\text{Mean})$$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

150. Assertion (A) : Median of first eleven prime numbers is 13.

Reason (R) : Median of a grouped frequency distribution is given by

Median = $l + \frac{\frac{N}{2} - cf}{f} \times h$, l = lower limit of the median class, cf = cumulative frequency of the class preceding the median class, f = frequency of the median class, h = class width, N =Total frequency.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

151. Assertion (A) : The following table shows the weights of 12 students.

Weight(in kg)	67	70	72	73	75
Number of students	4	3	2	2	1

Mean of the given data is 70.25 kg

Reason (R) : If A is the assumed mean and $\bar{x}$ is the mean for a frequency distribution, then $\bar{x} = A + \frac{1}{N} \sum f_i d_i$ where $d_i = x_i - A$ and $N = \sum_{i=1}^n f_i x_i$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

152. Assertion (A) : The mode of the following distribution is 52.

Class interval	0-20	20-40	40-60	60-80
Frequency	4	3	2	2

Reason (R) : The value of the observation which occurs most often is the mode.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

153. Assertion (A) : Consider the following frequency distribution:

Class interval	3-6	6-9	9-12	12-15	15-18	18-21
Frequency	2	5	21	23	10	12

The mode of the above data is 12.4.

Reason (R) : The value of the observation which occurs most often is the mode.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)

- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true

154. Assertion (A) : If the mean of the following distribution is 7.5, then the value of missing frequency f is 8.

x_i	5	6	7	8	9	10	11	12
f_i	20	17	16	10	f	6	7	6

Reason (R) : Mean, $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true

155. Assertion (A) : The mean of the following data is 9.

x	4	6	9	10	15
f	5	10	10	7	8

Reason (R) : Mean, $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true

156. Assertion (A) : The median of following distribution is 35.

x	20	25	35	40	50
f	5	11	24	16	5

Reason (R) : For odd number of observations (n), median = $\left(\frac{n+1}{2}\right)^{th}$ observation.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true

157. Assertion (A) : The probability that a leap year has 53 Mondays is $\frac{2}{7}$.

Reason (R) : The probability that a non-leap year has 53 Mondays is $\frac{1}{7}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true

158. Assertion (A) : When a die is rolled, the probability of getting a number which is a multiple of 3 and 5 both is zero.

Reason (R) : The probability of an impossible event is zero.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)

- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

159. Assertion (A) : A cubical die is rolled. The probability of getting a composite number is $\frac{1}{3}$.

Reason (R) : In a throw of a cubical die, the probability of getting a prime number is $\frac{2}{3}$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

160. Assertion (A) : Manisha and Madhvi were born in the year 2000. The probability that they have the same birthday is $\frac{1}{366}$.

Reason (R) : Leap year has 366 days.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

161. Assertion (A) : If a box contains 5 white, 2 red and 4 black marbles, then the probability of not drawing a white marble from the box is $\frac{5}{11}$.

Reason (R) : $P(\bar{E}) = 1 - P(E)$, where E is any event.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

162. Assertion (A) : In rolling dice, the probability of getting the number 8 is zero.

Reason (R) : It is an impossible event.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

163. Assertion (A) : In tossing a coin one time, probability of getting head and tail are equal.

Reason (R) : Probability of a certain event is 1.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

164. Assertion (A) : Probability of getting at least one head in tossing 3 coins together is $\frac{1}{8}$.

Reason (R) : When three coins are tossed simultaneously, then sample space is HHH, HHT, HTH, HTT, THH, THT, TTH, TTT.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

165. Assertion (A) : Probability of a sure event is 1.

Reason (R) : For a sure event, number of favorable outcomes is less than the total number of outcomes.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

166. Assertion (A) : Probability of getting a doublet in a single throw of a pair dice is 1.

Reason (R) : Probability of a sure event is 1.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

167. Assertion (A) : Probability of getting an even number or an odd number in a single throw of a die is 1.

Reason (R) : Each elementary event is a favourable event.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

168. Assertion (A) : Probability of any even cannot be more than 1.

Reason (R) : $P(E) + P(\bar{E}) = 0$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

169. Assertion (A) : It is given that in a group of 3 students, the probability of 2 students not having the same birthday is 0.992. The probability that the 2 students have the same birthday is 0.008.

Reason (R) : $P(E) + P(\bar{E}) = 1$, where $\bar{E}$ denotes the event of non-occurrence of event E.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

ANSWERS

1. (d)	2. (c)	3. (a)	4. (c)	5. (c)	6. (b)	7. (b)	8. (a)	9. (a)	10. (a)
11. (a)	12. (b)	13. (c)	14. (b)	15. (a)	16. (b)	17. (d)	18. (a)	19. (b)	20. (a)
21. (b)	22. (c)	23. (a)	24. (d)	25. (a)	26. (b)	27. (c)	28. (d)	29. (a)	30. (a)

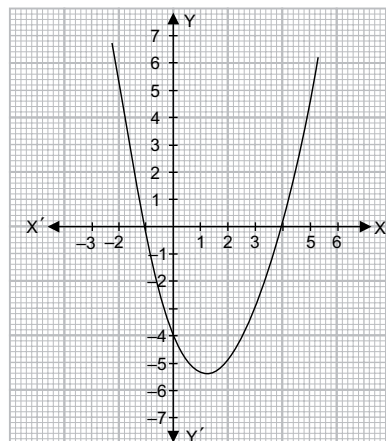
31. (c)	32. (d)	33. (c)	34. (b)	35. (a)	36. (c)	37. (a)	38. (c)	39. (a)	40. (a)
41. (a)	42. (b)	43. (a)	44. (a)	45. (d)	46. (c)	47. (a)	48. (b)	49. (a)	50. (c)
51. (d)	52. (a)	53. (d)	54. (c)	55. (d)	56. (d)	57. (a)	58. (d)	59. (a)	60. (d)
61. (a)	62. (a)	63. (a)	64. (b)	65. (a)	66. (b)	67. (d)	68. (a)	69. (c)	70. (b)
71. (b)	72. (a)	73. (a)	74. (b)	75. (b)	76. (a)	77. (a)	78. (d)	79. (d)	80. (a)
81. (a)	82. (d)	83. (a)	84. (a)	85. (c)	86. (d)	87. (a)	88. (b)	89. (b)	90. (a)
91. (b)	92. (a)	93. (d)	94. (a)	95. (a)	96. (d)	97. (a)	98. (a)	99. (c)	100. (b)
101. (a)	102. (a)	103. (d)	104. (a)	105. (b)	106. (b)	107. (a)	108. (a)	109. (a)	110. (b)
111. (d)	112. (b)	113. (a)	114. (c)	115. (a)	116. (a)	117. (a)	118. (b)	119. (a)	120. (a)
121. (b)	122. (b)	123. (b)	124. (a)	125. (a)	126. (b)	127. (a)	128. (b)	129. (d)	130. (a)
131. (d)	132. (b)	133. (a)	134. (a)	135. (c)	136. (a)	137. (c)	138. (d)	139. (b)	140. (a)
141. (d)	142. (b)	143. (a)	144. (d)	145. (c)	146. (c)	147. (c)	148. (d)	149. (a)	150. (b)
151. (a)	152. (d)	153. (a)	154. (a)	155. (a)	156. (a)	157. (b)	158. (a)	159. (c)	160. (b)
161. (d)	162. (a)	163. (b)	164. (d)	165. (c)	166. (b)	167. (a)	168. (a)	169. (a)	

CASE STUDY BASED QUESTIONS

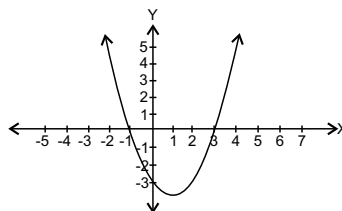
[BASIC / STANDARD]

1. If we jerk a stretched rope certain waves are produced on the rope. The figure given below shows a part of the wave. Answer the given questions by looking at the figure:

- What is the shape of the graph shown above?
- How many zeroes are there for the polynomial?
- When does the graph of $y = ax^2 + bx + c$, open upwards?
- What is the expression of the given polynomial?
- What are the zeroes of the polynomial?



2. A park in Shakti Nagar in Delhi has swings made of rubber and iron chain. Kanishka who is studying in class X has noticed that this is a Mathematical shape, she has learned in Maths class. She drew the shape of the swing on her notebook as shown. Following questions raised in her mind.



- What is the shape of the curve?

- (ii) How many zeroes are there for the polynomial (shape of the swing)?
- (iii) What are the zeroes of the polynomial shown above?
- (iv) Write the expression of the polynomial.
- (v) What is the value of the polynomial if $x = 1$?

3. One day Mahima visited a shopping mall with her mother. There, she observed different stores, such as
Shoe store, Clothes store, Fruit store etc.

In the shoe store the price list was as below : In the clothes store the price list was as below:

Types of shoes	Price (₹)
Casual	500
Formal	350
Sports	750



Types of Clothes	Price (₹)
T-Shirt	300
Trouser	600
Blazer	2000



In the fruit store the price list was as below:

Fruits	Price (₹)
Apple	70 per kg
Orange	40 per kg
Guava	30 per kg



Based upon the given information, answer the following questions:

- (i) Mahima's mother purchased x trousers and y kg oranges for ₹1400. She also purchased x pairs of sport shoes and y kg apple for ₹1850. Write of the equations that relate x and y .
 - (ii) Mahima bought a Blazer and gave eleven notes in denominations of ₹200 and ₹100. Which pair of equations can be used if number of ₹200 notes be denoted as x and the number of ₹100 notes as y ?
 - (iii) State the condition when the pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution.
 - (iv) Mahima's mother bought 5 kg fruit in which there are oranges and guavas. She paid ₹160. Find the weight of oranges and guavas she bought.
 - (v) In Diwali sale there is a discount of 25% in clothes store and 20% in shoe store. How much money Mahima saved if she bought one blazer and 4 pairs of formal shoes?
4. The given figure shows playing cards stacked together. 42 cards are stacked in the manner. 12 cards are in the bottom row, 10 in the next row, 8 in the row next to it and so on. Based on the above situation, answer the following questions:
- (i) Find the total number of rows in which the cards are stacked.
 - (ii) Find the number of cards in the top row.
 - (iii) Which mathematical concept is applied in solving the above problem?
 - (iv) Find the number of cards in the third row.
 - (v) Find the number of cards in the seventh row.

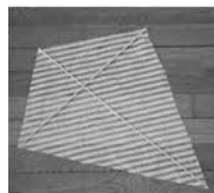


5. Bal Bharti Vidyalaya decided to go for plantation drive on the occasion of VANMAHOTSAVA. It was decided that the number of trees, that each section of each class will plant, will be the same as the class in which they are studying, e.g., a section of Class I will plant 1 tree, a section of Class II will plant 2 trees and so on, till Class X. There are five sections of each class. Ms. Anshu Sharma, Principal of the Vidyalaya asked forest department to provide plants for VANMAHOTSAVA.



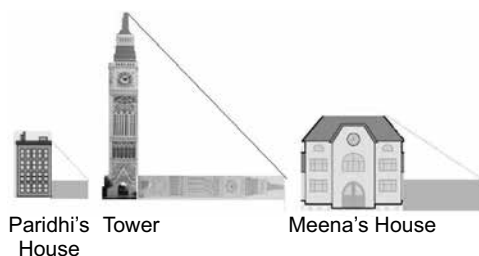
- How many plants were needed for plantation by all sections of class IV?
- How many plants were needed for plantation by all sections of primary classes (1st to 5th)?
- How many plants were needed for plantation by all sections of class 7?
- How many plants were needed for plantation by the whole school?
- How many plants were needed for plantation by classes 6th to 8th?

6. Rahul is studying in X Standard. He is making a kite to fly it on a Sunday. Few questions came to his mind while making the kite. Give answers to his questions by looking at the figure.



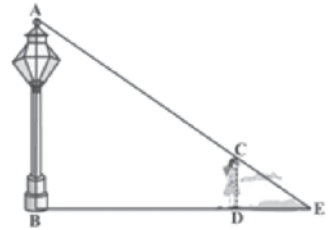
- Rahul tied the sticks at what angles to each other?
- Which is the correct similarity criteria applicable for smaller triangles at the upper part of this kite?
- If sides of two similar triangles are in the ratio 4 : 9, then find the ratio between the corresponding medians of these triangles.
- If a line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the other two sides in the same ratio. This theorem is called Thales' Theorem. Is it true?
- What is the area of the kite, formed by two perpendicular sticks of length 12 cm and 14 cm?

7. Paridhi is trying to find the approximate height of a tower near her house. She is using the properties of similar triangles. The height of Paridhi's house is 20 m and it casts a shadow 10 m long on the ground. At the same time, the tower casts a shadow 50 m long on the ground. At the same time, the house of Meena casts 20 m long shadow on the ground.

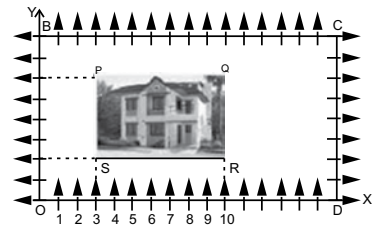


- What is the height of the tower?
- What will be the length of the shadow of the tower when Paridhi's house casts a shadow of 12 m?
- What is the height of Meena's house?

- (iv) When the tower casts 40 m long shadow, at that time what will be the length of the shadow of Meena's house?
- (v) When the tower casts 40 m long shadow, at that time what will be the length of the shadow of Paridhi's house?
8. A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. The lamp is 3.6 m above the ground. Now, answer the following questions :
- The line segment DE shows the length of the shadow. Is it true?
 - What would be the length of the girl shadow after 4 seconds?
 - How far is the girl from the lamp-post?
 - Triangle ABE and CDE are similar because of AA criterion. Is it true?
 - AB denotes the lamp-post and CD the girl after walking for 4 seconds, away from the lamp-post. Is it true?



9. In Nainital, Uttarakhand, Sunil is having a rectangular plot OBCD as shown in the following figure. Saplings of Gulmohar are planted on the boundary at a distance of 1 m from each other. In the plot, Sunil builds his house in the rectangular area PQRS. In the remaining part of plot, Sunil wants to grow grass.

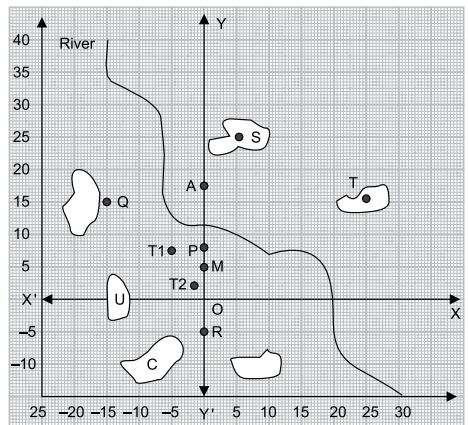


Answer the following questions:

- Find the coordinates of vertices P and S of rectangle PQRS.
- Find the coordinates of mid-point of diagonal QS.
- Find the area of rectangle PQRS.
- Find the coordinates of vertices R and Q of rectangle PQRS.
- Find the length and breadth of rectangle PQRS.

10. **National Park:** A national park is an area set aside by the government to preserve and protect natural environment.

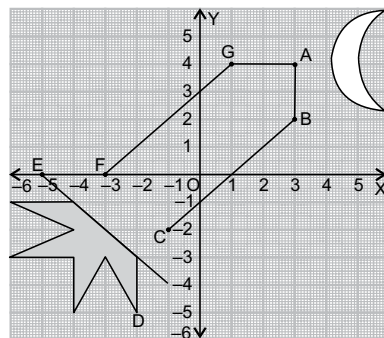
The graph below shows a map of the National Park. The shaded areas indicate woods. The plain areas indicate meadows and fields without trees. Point O on the graph represents the location of the park's supervisor's office, and points P and Q are the ranger's towers.



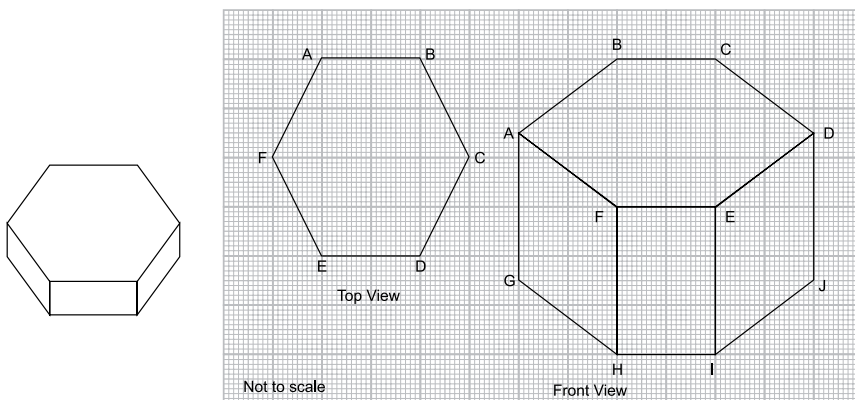
- Find the distance between the towers P(0, 7.5) and Q(-15, 15).
- Find the distance of the point S(5, 25) from x-axis.
- Find the point on x-axis (other than O) equidistant from the points R(0, -5) and M(0, 5).
- There are two trees $T_1(-5, 7)$ and $T_2(-1, 3)$ in the park. Find the coordinates of the mid-point of the line segment joining both the trees.
- There is a circular pond in the park. The end points of a diameter of it are (-6, 3) and (6, 4). Find the coordinates of the centre of the pond.

11. The diagram shows a model of Rocket which is made on a graph paper. Look at the model and answer the following questions :

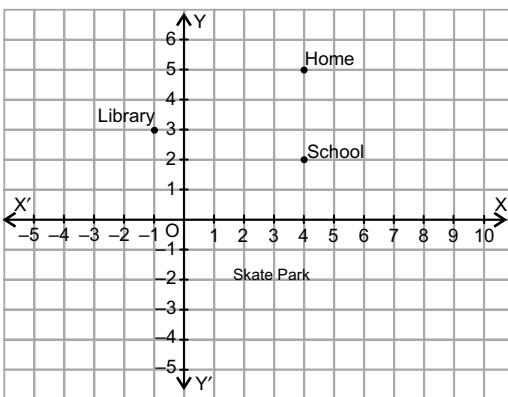
- Find the mid-point of the segment joining the points F and G.
- Find the distance of the point A from the x-axis.
- Find the distance between the points A and C.
- Find the co-ordinates of the point which divides the line segment joining the points A and B in the ratio 1 : 3 internally.
- Find the coordinates of D.



12. An aquarium is a transparent tank of water in which live fish and other water creatures are kept. The diagram below shows the plans for an aquarium. It will be built in hexagonal shape. It will be made using six rectangular shaped clear glasses and one regular hexagon clear glass for roof.

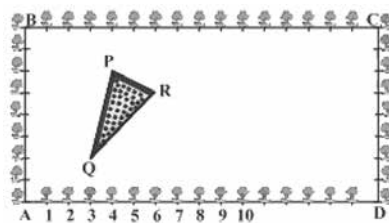


- Find the value of x for which the distance between the points $F(2, -3)$ and $C(x, 5)$ is 10.
 - Find coordinates of the mid-point of the line segment joining the points $E(8, 11)$ and $B(11, 15)$.
 - Find the distance of the point $F(8, 6)$ from origin.
 - Find the perimeter of square $EFHI$, where $E(-2, 0)$, $F(3, 0)$, $H(3, 5)$ and $I(-2, 5)$.
 - Find the coordinates of the point which divides segment joining the points $A(-4, 5)$ and $D(6, 3)$ in the ratio 3 : 2.
13. Two brothers Mahesh and Sudhir were at home and have to reach school. Mahesh went to library first to return a book and then reaches school directly whereas Sudhir went to Skate Park first to meet his friend and then reaches school directly. The places have been shown in a coordinate plane. Here all distances are in km.
- How far is school from their home?



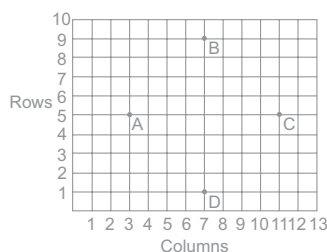
- (ii) What is the extra distance travelled by Mahesh in reaching his school?
- (iii) What is the extra distance travelled by Sudhir in reaching his school?
- (iv) Find the coordinates of the point marked library.
- (v) Find the coordinates the point marked as home.

14. The Class X students of a secondary school in Krishinagar have been allotted a rectangular plot of land for their gardening activity. Sapling of Gulmohar is planted on the boundary of the plot at a distance of 1m from each other. There is a triangular grassy lawn inside the plot as shown in Fig. The students have to sow seeds of flowering plants on the remaining area of the plot.



- (i) Considering A as the origin, find the coordinates of A.
- (ii) Find the coordinates of P.
- (iii) Find the coordinates of R.
- (iv) Find the coordinates of D.
- (v) Find the coordinates of P, if D is taken as the origin.

15. Students of a school are standing/seating in rows and columns in their playground for Yoga practice. A, B, C and D are the positions of four students as shown in the figure.



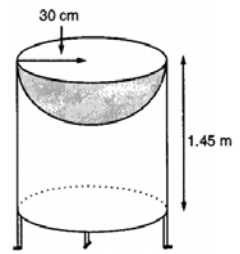
- (i) Find the coordinates of A, B respectively.
- (ii) Find the distance between A and B.
- (iii) It is possible to place Tanvika in the drill in such a way that she is equidistant from each of the four students A, B, C and D, then locate the position of Tanvika.
- (iv) Find the distance between A and C.
- (v) Find the coordinates of C and B respectively.

16. To promote cooperation, culture, creativity, sharing, self-confidence, and other social values, a student adventure camp was organized by the school for class-X students and their accommodation was planned in tents. The teacher divides the students into groups, each group of four students was given to prepare a conical tent of radius 7 m and canvas of area 551 m^2 in which 1 m^2 is used in stitching and wasting of canvas:



- (i) Find the curved surface of conical tent.
- (ii) Find the height of the conical tent.
- (iii) Find the volume of tent.
- (iv) Find the slant height of the tent.
- (v) Find the cost of canvas required for making the tent, if the canvas cost ₹ 70 per sq. m

17. Mayank a student of class 10th is fond of birds. One day he had an idea in his mind to make a bird-bath on his garden. His brother who is studying in class 12th helped him to choose the material and shape of the birdbath. They made it in the shape of a cylinder with a hemispherical depression at one end as shown in the Figure below. They opted for the height of the hollow cylinder as 1.45 m and its radius is 30 cm



Answer the following questions :

- Find the curved surface area of the hemisphere.
 - Find the curved surface area of the cylinder.
 - Find the total surface area of the bird-bath.
 - Find the curved surface area of the cylinder.
 - Find the volume of the hemispherical depression.
18. Education with vocational training is helpful in making a student self-reliant and to help and serve the society. Keeping this in view, a teacher made the following table giving the frequency distribution of a student undergoing vocational training from the training institute.



Age (in years)	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-above
No. of participants	62	132	96	37	13	8	6	4	4	3

- Find the median class of the above data.
 - Find the modal class of the above data.
 - What is the empirical relationship between mean, median, mode?
 - If mode = 80 and mean = 110, then find the median.
 - The mode is the least frequent value. Is it true?
19. Thirty women were examined in a hospital by a doctor and the number of heartbeats per minute was recorded and summarised as follows:



Number of heartbeats per minute	65-68	68-71	71-74	74-77	77-80	80-83	83-86
Number of women	2	4	3	8	7	4	2

- Find the mean heartbeats per minute for these women.
- Find the modal class of the given data.
- How many women have heart-beats less than 74 per minute?
- Find the sum of the upper limit and lower limit of the median class.
- Find the median class of the above data.

20. The agewise participation of students of a school in the International Yoga day Celebration that was held in the school ground is shown in the following distribution. By analysing the data given below answer the questions that follow:



Age(in years)	5 - 7	7 - 9	9 - 11	11 - 13	13 - 15	15 - 17	17 - 19
Number of students	x	15	18	30	50	48	x

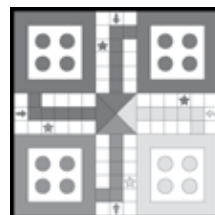
If in all 181 students participated then answer the following questions :

- Find the median class of the data.
 - Find the value of missing frequency(x).
 - Find the modal class.
 - Find the class mark of the modal class.
 - Find the sum of lower limits of the median class and upper limit of modal class.
21. A medical camp was held in a school to impart health education and the importance of exercise to children. During this camp, a medical check of 35 students was done and their weights were recorded as follows:

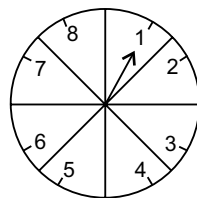
Weight (in kg)	Number of Students
below 40	3
below 42	5
below 44	9
below 46	14
below 48	28
below 50	31
below 52	35



- Find the modal class of given data.
 - Find the median class of the given data.
 - Mean of a data cannot be determined graphically. Is it true?
 - Find the frequency of the median class.
 - Mode and the mean of a data are 12k and 15K respectively. Find the median of the data.
22. Ruby and Rita are playing a game of ludo with 2 dice.
- To win a game, Ruby wanted a total of 7. What is the probability of winning a game by Ruby?
 - To win a game, Rita wanted 8 as the sum. What is the probability of winning a game by Rita?
 - What is the probability that the sum of the numbers on the both the dice is divisible by 4 or 6?
 - Find the probability of getting a total of atleast 10.
 - Find the probability that 5 will come up at least in 1 die.



23. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 as shown in the figure and these are equally likely outcomes. Now answer the following questions :



- What is the probability of getting a prime number?
- What is the probability of getting an odd number?
- What is the probability of getting a number less than 7?
- What is the probability of getting a number greater than 8?
- What is the probability of getting a number greater than 0?

ANSWERS

- parabola
 - 2
 - $a > 0$
 - $x^2 - 3x - 4$
 - 1, 4
- parabola
 - 2
 - 1, 3
 - $x^2 - 2x - 3$
 - 4
- $600x + 40y = 1400$, $750x + 70y = 1850$
 - $x + y = 11$, $200x + 100y = 2000$
 - $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$
 - 1 kg, 4 kg
 - ₹780
- 6
 - 2
 - AP
 - 8
 - 0
- 20
 - 75
 - 35
 - 275
 - 105
- 90°
 - RHS
 - $2 : 3$
 - yes
 - 84 cm^2
- 100 m
 - 60 m
 - 40 m
 - 16 m
 - 15 m
- yes
 - 1.6 m
 - 6.4 m
 - yes
 - yes
- (3, 6), (3, 2)
 - $\left(\frac{13}{2}, 4\right)$
 - 28 m^2
 - (10, 2), (10, 6)
 - 7 units, 4 units
- $\sqrt{281.25}$ units
 - 25 units
 - U
 - (-3, 5)
 - $\left(0, \frac{7}{2}\right)$
- (-1, 2)
 - 4 units
 - $2\sqrt{13}$
 - (3, 3.5)
 - (-2, -5)
- 8 or -4
 - $\left(\frac{19}{2}, 13\right)$
 - 10 units
 - 20 units
 - $\left(8, \frac{13}{2}\right)$
- 3 km
 - 7.48 km
 - 4.33 km
 - (-1, 3)
 - (4, 5)
- (0, 0)
 - (4, 6)
 - (6, 5)
 - (16, 0)
 - (-12, 6)
- (3, 5), (7, 9)
 - $6\sqrt{2}$ units
 - $4\sqrt{2}$ units
 - 6 units
 - (11, 5), (7, 9)
- 550 m^2
 - 24 m
 - 1232 m^3
 - 25 m
 - ₹38570
- 0.56 m^2
 - 2.73 m^2
 - 3.3 m^2
 - $2\pi rh$
 - 0.05 m^3
- 19.5 - 24.5
 - 19.5 - 24.5
 - Mode = 3 Median - 2 Mean
 - 100
 - no
- 75.9
 - 74 - 77
 - 9
 - 151
 - 74 - 77
- 13 - 15
 - 10
 - 13 - 15
 - 14
 - 28
- 46 - 48
 - 46 - 48
 - yes
 - 14
 - 14 K
- $\frac{1}{6}$
 - $\frac{5}{36}$
 - $\frac{7}{18}$
 - $\frac{1}{6}$
 - $\frac{11}{36}$
- $\frac{1}{2}$
 - $\frac{1}{2}$
 - $\frac{3}{4}$
 - 0
 - 1

MODEL TEST PAPER 1 (STANDARD)

(Based on the latest CBSE Sample Question Paper Released by the CBSE for the Board Examination to be held in 2023)

Time: 3 hours

Maximum Marks: 80

General Instructions

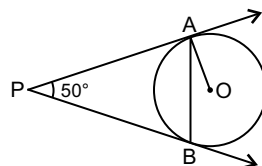
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

(Section A consists of 20 questions of 1 mark each.)

1. If the product of two numbers a and b is 1152 and HCF of a and b is 12, then LCM of a and b is :
(a) 88 (b) 90 (c) 92 (d) 96
2. If one root of the equation $2x^2 - 10x + p = 0$ is 2, then the value of p is :
(a) -3 (b) -6 (c) 9 (d) 12
3. If α and β are the zeroes of the polynomial $p(x) = 2x^2 + 5x + k$ satisfying the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, then the value of k is :
(a) 1 (b) 2 (c) 3 (d) 4
4. The values of x and y respectively if $99x + 101y = 499$ and $101x + 99y = 501$ are :
(a) 3 and 2 (b) 5 and 6 (c) -3 and 2 (d) -3 and -2
5. If $A\left(\frac{m}{2}, 5\right)$ is the mid-point of the line segment joining the points $Q(-6, 7)$ and $R(-2, 3)$, then the value of m is :
(a) -8 (b) -4 (c) 12 (d) -6
6. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$, then :
(a) $CA^2 = BC \cdot CD$ (b) $BC^2 = CA \cdot CD$
(c) $CD^2 = CA \cdot BC$ (d) none of these
7. $\sec^4 \theta (1 - \sin^2 \theta) - \tan^2 \theta =$
(a) 0 (b) 1 (c) -1 (d) none of these

8. If $\operatorname{cosec} \theta + \cot \theta = p$, then $\frac{p^2 - 1}{p^2 + 1} =$
 (a) $\sin \theta$ (b) $\tan \theta$ (c) $\operatorname{cosec} \theta$ (d) $\cos \theta$
9. If in triangles ABC and DEF, $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3 DE$, then the two triangles are:
 (a) congruent but not similar (b) similar but not congruent
 (c) neither congruent nor similar (d) congruent as well as similar
10. If $\triangle ABC \sim \triangle EDF$ and $\triangle ABC$ is not similar to $\triangle DEF$, then which of the following is not true?
 (a) $BC \cdot EF = AC \cdot FD$ (b) $AB \cdot EF = AC \cdot DE$
 (c) $BC \cdot DE = AB \cdot EF$ (d) $BC \cdot DE = AB \cdot FD$
11. In the figure, PA and PB are tangents to the circle with centre O such that $\angle APB = 50^\circ$, then the measure of $\angle OAB =$
 (a) 37° (b) 36°
 (c) 50° (d) 25°



12. If the perimeter of a circle is equal to that of a square, then the ratio of their areas is:
 (a) $\pi : 2$ (b) $4 : \pi$ (c) $1 : 2$ (d) $2 : \pi$
13. A rectangular sheet of paper $40 \text{ cm} \times 22 \text{ cm}$, is rolled to form a hollow cylinder of height 40 cm. The radius of the cylinder is :
 (a) 3.5 cm (b) 5.5 cm (c) 6.5 cm (d) 7.5 cm
14. Consider the following frequency distribution of the heights of 60 students of a class.

Height (in cm)	150-155	155-160	160-165	165-170	170-175	175-180
No. of students	15	13	10	8	9	5

The sum of the lower limit of the modal class and upper limit of the median class is :

- (a) 310 (b) 315 (c) 320 (d) 330
15. The radius of a circle whose circumference is equal to the sum of the circumferences of the two circles of diameter 36 cm and 20 cm, is:
 (a) 56 cm (b) 42 cm (c) 28 cm (d) 16 cm
16. The frequency distribution table of agricultural holdings in a village is given below :

Area of land (hectares)	1-3	3-5	5-7	7-9	9-11	11-13
No. of families	20	45	80	55	40	12

The modal agricultural holdings of the village is :

- (a) 5.8 (b) 4.7 (c) 6.2 (d) 7.5
17. Two dice are thrown simultaneously. The probability of getting a doublet of even number is :
 (a) $\frac{1}{12}$ (b) $\frac{5}{12}$ (c) $\frac{7}{12}$ (d) $\frac{3}{4}$
18. $9 \sec^2 \theta - 9 \tan^2 \theta =$
 (a) 1 (b) 9 (c) 8 (d) 0

Direction : In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option :

19. Assertion (A) : The product $(5 + \sqrt{3})(3 - \sqrt{3}) = 12 - 2\sqrt{3}$ is an irrational number.

Reason (R) : The product of two irrational numbers is always an irrational number.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

20. Assertion (A) : The point on the x -axis which is equidistant from $(2, -5)$ and $(-2, 9)$ is $(8, 0)$.

Reason (R) : Points lies on the y -axis are always of the form $(0, y)$.

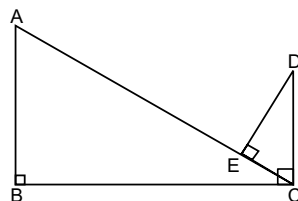
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

SECTION B

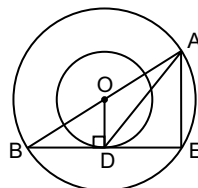
(Section B consists of 5 questions of 2 marks each)

21. Find c , if the system of equations $cx + 3y + (3 - c) = 0$; $12x + cy - c = 0$ has infinitely many solutions.

22. In the figure, if $AB \perp BC$, $DC \perp BC$ and $DE \perp AC$, prove that $\triangle CED \sim \triangle ABC$.



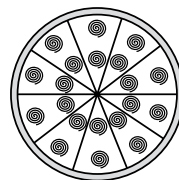
23. In the figure, the radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle. BD is a tangent to the smaller circle touching it at D. Find the length of AD.



24. What is the perimeter of a sector of a circle with radius 7 cm and central angle 45° ?
[Use $\pi = 22/7$]

OR

A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters which divide the circle into 10 equal sectors as shown in the figure. Find the total length of the silver wire required.



25. Prove that $\sqrt{\frac{\sec\theta-1}{\sec\theta+1}} + \sqrt{\frac{\sec\theta+1}{\sec\theta-1}} = 2 \operatorname{cosec}\theta$

OR

Prove that $\frac{\cot^2\theta}{1+\cot^2\theta} + \frac{\tan^2\theta}{1+\tan^2\theta} = 1$

SECTION C

(Section C consists of 6 questions of 3 marks each.)

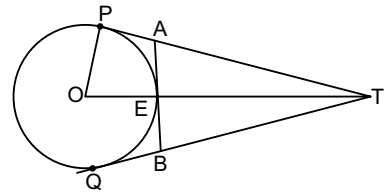
26. Show that 12^n cannot end with the digit 0 or 5 for any natural number n .
27. Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{2}$ and $-\frac{3}{2}$, respectively. Also find its zeroes.
28. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/h more than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed?

OR

If Zeba were younger by 5 years than what she really is, then the square of her age (in years) would have been 11 more than five times her actual age. What is her age now?

29. If $a \sin\theta + b \cos\theta = c$, then prove that $a \cos\theta - b \sin\theta = \sqrt{a^2 + b^2 - c^2}$.

30. In the figure, O is the centre of a circle of radius 5 cm, T is a point such that OT = 13 cm and OT intersects the circle at E. If AB is the tangent to the circle at E, find the length of AB.



OR

In a right triangle ABC in which $\angle B = 90^\circ$, a circle is drawn with AB as diameter intersecting the hypotenuse AC at P. Prove that the tangent to the circle at P bisects BC.

31. All the jacks, queens and kings are removed from a deck of 52 playing cards. The remaining cards are well shuffled and then one card is drawn at random. Giving ace a value 1 similar value for other cards, find the probability that the card has a value.
- (i) 7 (ii) greater than 7 (iii) less than 7

SECTION D

(Section D consists of 4 questions of 5 marks each.)

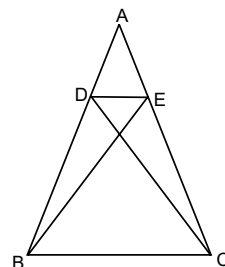
32. The difference of squares of two numbers is 180. If the square of the smaller number is 8 times the larger number, find the two numbers.

OR

Solve for x : $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$, $a \neq 0$, $b \neq 0$, $x \neq 0$.

33. (i) Two poles of height a metres and b metres are p metres apart. Prove that height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ metres.

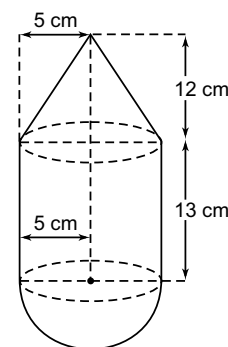
- (ii) In the figure, if $\triangle ABE \cong \triangle ACD$, show that $\triangle ADE \sim \triangle ABC$.



34. A building is in the form of a cylinder surmounted by a hemispherical dome. The base diameter of the dome is equal to $\frac{2}{3}$ of the total height of the building. Find the height of the building, if it contains $67\frac{1}{21}\text{m}^3$ of air.

OR

A toy in the shape of a right circular cylinder with a hemisphere on one end and a cone on the other. The height and radius of the cylindrical part are 13 cm and 5 cm respectively. The radii of the hemispherical and conical parts are the same as that of the cylindrical part. Calculate the surface area of the toy if height of the conical part is 12 cm.



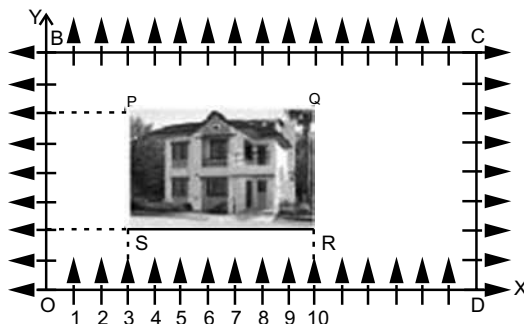
35. The mean of the following data is 42. Find the missing frequencies x and y , if the total frequency is 100 :

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	7	10	x	13	y	10	14	9

SECTION E

(Case study based questions are compulsory.)

36. In Nainital, Uttarakhand, Sunil is having a rectangular plot OBCD as shown in the following figure. Saplings of Gulmohar are planted on the boundary at a distance of 1 m from each other. In the plot, Sunil builds his house in the rectangular area PQRS. In the remaining part of plot, Sunil wants to grow grass.



Answer the following questions:

- (i) Find the coordinates of vertices P and S of rectangle PQRS.
- (ii) Find the length and breadth of rectangle PQRS
- (iii) Find the area of the rectangle PQRS.

OR

Find the coordinates of mid-point of diagonal QS.

37. Sprint events in track and field usually consists of the 100 m, 200 m and 400 m race though 60 m dashes are also held on occasion. These races are largely based upon the athlete's ability to accelerate to his or her maximum speed in the quickest time possible.



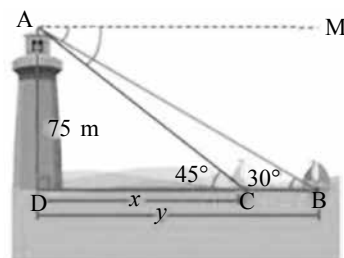
Girish wants to participate in the 200 m Sprint. He can currently run that distance in 45 sec. But he wants to do that in under 30 sec. With each day of practice, it takes him 2 sec less. Based on the above situation, answer the following questions:

- (i) What is the minimum number of days he needs to practice till his goal is accomplished?
- (ii) Find the AP formed in the given situation.
- (iii) Find the n th term of the sequence $a, a + d, a + 2d...$

OR

Is 30 a term of the given AP in the given situation?

38. A lighthouse is a tower with a bright light at the top and serves as a navigational aid and also warns ships of dangerous areas. In the given figure, a man on top of a 75 m high lighthouse is observing two ships approaching towards its base. Observe the figure carefully and answer the following questions:



- (i) Find the distance of the ship B from the foot of the lighthouse.
- (ii) Find the distance of the ship C from the foot of the lighthouse.
- (iii) Find the distance between the two ships.

OR

What would have been the distance of two ships if the ships were on either side of the lighthouse?

MODEL TEST PAPER 2 (STANDARD)

(Based on the latest CBSE Sample Question Paper Released by the CBSE for the Board Examination to be held in 2023)

Time: 3 hours

Maximum Marks: 80

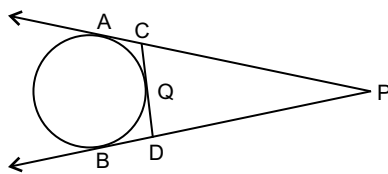
General Instructions

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

(Section A consists of 20 questions of 1 mark each.)

1. If the mid-point of the line segment joining the points P(6, $b - 2$) and Q(-2, 4) is (2, -3), then the value of b =
(a) -5 (b) -6 (c) -7 (d) -8
2. Roots of the quadratic equation $(2x - 3)^2 = 16$ are :
(a) $\frac{7}{2}, \frac{-1}{2}$ (b) $\frac{5}{2}, \frac{-3}{2}$ (c) $\frac{7}{2}, \frac{3}{2}$ (d) $\frac{11}{2}, \frac{7}{2}$
3. If α and β are the zeroes of the quadratic polynomial $p(x) = ax^2 + bx + c$, then $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$ is :
(a) $\frac{-ab - 2c^2}{ac}$ (b) $\frac{ab + 2c^2}{ac}$ (c) $\frac{ab + b^2}{2c}$ (d) $\frac{-c^2 + ab}{2ac}$
4. The value of k , for which the pair of linear equations $4x + 6y - 1 = 0$ and $2x - ky = 7$ represents parallel lines is :
(a) 2 (b) -3 (c) 4 (d) -2
5. The fourth vertex D of a parallelogram ABCD whose three vertices are A(-2, 3), B(6, 7) and C(8, 3) is:
(a) (0, 1) (b) (0, -1) (c) (-1, 0) (d) (1, 0)
6. If $\triangle ABC \sim \triangle EDF$ and $\triangle ABC$ is not similar to $\triangle DEF$, then which of the following is not true?
(a) $BC \cdot EF = AC \cdot FD$ (b) $AB \cdot EF = AC \cdot DE$
(c) $BC \cdot DE = AB \cdot EF$ (d) $BC \cdot DE = AB \cdot FD$
7. $\frac{\sin^3 \theta + \cos^3 \theta}{\sin \theta + \cos \theta} + \sin \theta \cdot \cos \theta =$
(a) 0 (b) 1 (c) -1 (d) $\frac{1}{2}$

8. If a pole 6 m high, casts a shadow $2\sqrt{3}$ m long on the ground, then the Sun's elevation is :
 (a) 60° (b) 30° (c) 45° (d) 90°
9. If in triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when:
 (a) $\angle B = \angle E$ (b) $\angle A = \angle D$ (c) $\angle B = \angle D$ (d) $\angle A = \angle F$
10. In the given figure, PA and PB are tangents to the circle from an external point P. CD is another tangent touching the circle at Q. If PA = 12 cm, QC = QD = 3 cm, then PC + PD is :
 (a) 22 cm (b) 20 cm
 (c) 19 cm (d) 18 cm
- 
11. If four sides of quadrilateral ABCD are tangential to a circle, then:
 (a) $AC + AD = BD + CD$ (b) $AB + CD = AD + BC$
 (c) $AB + CD = AC + BC$ (d) $AC + AD = BC + DB$
12. If the perimeter of a semi-circular protractor is 36 cm, then its diameter is:
 (a) 8 cm (b) 12 cm (c) 14 cm (d) 18 cm
13. A sphere of diameter 12 cm, is dropped in a right circular cylindrical vessel, partly filled with water. If the water level in the cylindrical vessel rises by $3\frac{5}{9}$ cm, then the diameter of the cylindrical vessel is :
 (a) 16 cm (b) 17 cm (c) 18 cm (d) 20 cm
14. If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, then $\cos \theta - \sin \theta =$
 (a) $\sqrt{2} \tan \theta$ (b) $\sqrt{2} \cot \theta$ (c) $\frac{1}{\sqrt{2}} \sin \theta$ (d) $\sqrt{2} \sin \theta$
15. A hemispherical depression is cut out from one face of cubical block of side a cm, such that the diameter of the hemisphere is equal to the edge of the cube. The surface area of the remaining solid is :
 (a) $6a^2 + \pi\left(\frac{a}{2}\right)^2$ (b) $5a^2 + \pi r^2$ (c) $a^2 + 6\pi r^2$ (d) $a^2 - \pi r^2$
16. In the formula $\bar{x} = a + h \left(\frac{\sum f_i u_i}{\sum f_i} \right)$ for finding the mean of a grouped frequency distribution, u_i is :
 (a) $\frac{x_i + a}{h}$ (b) $h(x_i - A)$ (c) $\frac{x_i - a}{h}$ (d) $\frac{a - x_i}{h}$
17. An unbiased die is tossed once. The probability of getting a multiple of 2 or 3 is :
 (a) $\frac{1}{6}$ (b) $\frac{5}{6}$ (c) $\frac{1}{2}$ (d) $\frac{2}{3}$
18. Simplified form of $\frac{3 - \tan \theta}{3 \operatorname{cosec} \theta - \sec \theta}$ is :
 (a) $\cos \theta$ (b) $\sin \theta$ (c) $\operatorname{cosec} \theta$ (d) $\tan \theta$

Direction : In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option :

19. Assertion (A) : Degree of the zero polynomial is not defined.

Reason (R) : Degree of a non-zero constant polynomial is 0.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

20. Assertion (A) : If coordinates of the midpoints of the sides AB and AC of triangle ABC are D(3, 5) and E(-3, -3) respectively, then $BC = 20$ units

Reason (R) : The line joining the midpoints of two sides of a triangle is parallel to the third side and equal to half of it.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

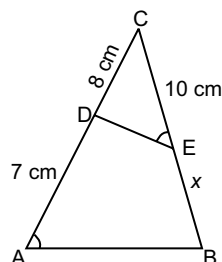
SECTION B

(Section B consists of 5 questions of 2 marks each)

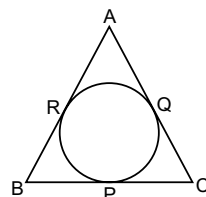
21. For which value(s) of k will the pair of equation:

$$kx + 3y = k - 3; 12x + ky = k \text{ have no solution ?}$$

22. In the given figure, if $\angle A = \angle CED$, prove that $\triangle CAB \sim \triangle CED$. Also find the value of x .



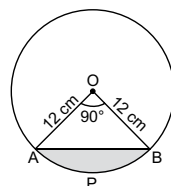
23. In the given figure, a circle inscribed in $\triangle ABC$, touches its sides BC, CA and AB at the points P, Q and R respectively. If $AB = AC$ then prove that $BP = CP$.



24. The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector.

OR

In a circle with centre O, AB is a chord of the circle. $AO = 12$ cm and angle $AOB = 90^\circ$. Find the area of the shaded region. (Use $\pi = 3.14$).



25. If $\operatorname{cosec} \theta + \cot \theta = m$, then prove that $\frac{m^2 - 1}{m^2 + 1} = \cos \theta$.

OR

If $7 \sin^2 \theta + 3 \cos^2 \theta = 4$, find the value of $\sec \theta + \operatorname{cosec} \theta$.

SECTION C

(Section C consists of 6 questions of 3 marks each.)

26. Can two numbers have 18 as their HCF and 380 as their LCM? Give reasons.
27. If $P(9a - 2, -b)$ divides line segment joining $A(3a + 1, -3)$ and $B(8a, 5)$ in the ratio $3 : 1$, find the values of a and b .
28. At present Asha's age (in years) is 2 more than the square of her daughter Nisha's age. When Nisha grows to her mother's present age, Asha's age would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.

OR

Had Ajita scored 10 more marks in her mathematics test out of 30 marks, 9 times these marks would have been the square of her actual marks. How many marks did she get in the test?

29. Given that $\sin \theta + 2\cos \theta = 1$, then prove that $2\sin \theta - \cos \theta = 2$.
30. AB is a diameter, AC is a chord of a circle with centre O such that $\angle BAC = 30^\circ$. The tangent at C intersects extended AB at a point D. Prove that $BC = BD$.

OR

If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R, respectively, prove that $AQ = \frac{1}{2} (BC + CA + AB)$

31. The king, queen and jack of clubs are removed from a deck of 52 playing cards and then well shuffled. Now one card is drawn at random from the remaining cards. Determine the probability that the card is :
- (i) a heart (ii) a king

SECTION D

(Section D consists of 4 questions of 5 marks each.)

32. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + (b^2 - ac) = 0$ are equal, prove that either $a = 0$ or $a^3 + b^3 + c^3 = 3abc$.

OR

Solve for x : $\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0$ $\left[x \neq 3, -\frac{3}{2} \right]$

33. (i) If AD and PM are medians of triangles ABC and PQR, respectively where $\triangle ABC \sim \triangle PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

- (ii) D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CB \cdot CD$.

34. Find the volume of a solid in the form of a right circular cylinder with hemispherical ends, whose total height is 2.7 m and the diameter of each hemispherical end is 0.7 m.

OR

A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the capacity and the inner surface area of the vessel.

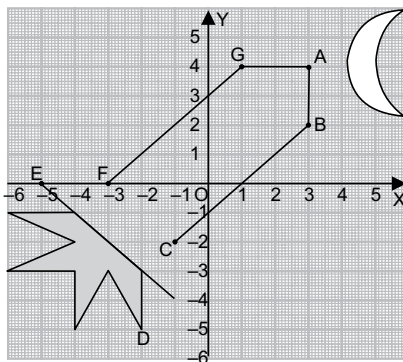
35. A man is standing on the deck of a ship which is 25 m above water level. He observes the angle of elevation of the top of a lighthouse as 60° and the angle of depression of the base of the lighthouse as 45° . Calculate the height of the lighthouse.

SECTION E

(Case study based questions are compulsory.)

36. The diagram shows a model of rocket which is made on a graph paper. Look at the model and answer the following questions :

- Find the distance of the point A from the x-axis.
- Find the distance between the points A and C.
- Find the midpoint of the line segment joining the points F and G.



OR

Find the coordinates of the point which divides the line segment joining the points A and B in the ratio 1 : 3 internally.

37. Bal Bharti Vidyalaya decided to go for plantation drive on the occasion of VANMAHOTSAVA. It was decided that the number of trees, that each section of each class will plant, will be the same as the class in which they are studying, e.g., a section of Class I will plant 1 tree, a section of Class II will plant 2 trees and so on, till Class X. There are five sections of each class. Ms. Anshu Sharma, Principal of the Vidyalaya asked forest department to provide plants for VANMAHOTSAVA.



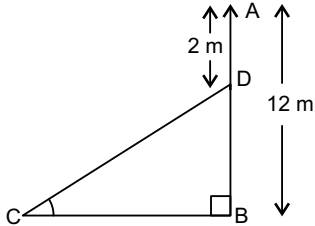
- (i) How many plants were needed for plantation by all sections of Class IV?

- (ii) How many plants were needed for plantation by all sections of class 7?
- (iii) How many plants were needed for plantation by classes 6th to 8th?

OR

How many plants were needed for plantation by all sections of primary classes (1st to 5th)?

- 38.** An electrician has to repair an electric fault on the pole of height 12 m. He needs to reach a point 2 m below the top of the pole to undertake the repair work. (see figure).



Now answer the following questions :

- (i) What should be the length of ladder so that it makes an angle of 60° with the ground?
- (ii) Find measure of $\angle BDC$.
- (iii) Find the distance between the foot of ladder and the base of the pole.

OR

When BD and BC are equal, find $\angle BCD$.

MODEL TEST PAPER 3 (STANDARD)

(Based on the latest CBSE Sample Question Paper Released by the CBSE for the Board Examination to be held in 2023)

Time: 3 hours

Maximum Marks: 80

General Instructions

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

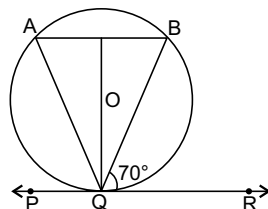
SECTION A

(Section A consists of 20 questions of 1 mark each.)

1. The perpendicular bisector of the line segment joining the points A(1, 5) and B(4, 6) cuts the y-axis at
(a) (0, 13) (b) (0, -13) (c) (0, 12) (d) (13, 0)
2. Values of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is :
(a) 0 only (b) 4 (c) 8 only (d) 0, 8
3. If one of the zeroes of the cubic polynomial $x^3 + ax^2 + bx + c$ is -1, then the product of the other two zeroes is :
(a) $b - a + 1$ (b) $b - a - 1$ (c) $a - b + 1$ (d) $a - b - 1$
4. If $x = a$, $y = b$ is the solution of the equation $x - y = 2$ and $x + y = 4$, then the values of a and b are, respectively.
(a) 3 and 5 (b) 5 and 3 (c) 3 and 1 (d) -1 and -3
5. If the point P(2, 1) lies on the line segment joining points A(4, 2) and B(8, 4), then :
(a) $AP = \frac{1}{3} AB$ (b) $AP = PB$ (c) $PB = \frac{1}{3} AB$ (d) $AP = \frac{1}{2} AB$
6. If in triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when:
(a) $\angle B = \angle E$ (b) $\angle A = \angle D$ (c) $\angle B = \angle D$ (d) $\angle A = \angle F$
7. If $\sin \theta - \cos \theta = 0$, then the value of $(\sin^4 \theta + \cos^4 \theta)$ is :
(a) 1 (b) $\frac{3}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

8. The ratio of the length of a rod and its shadow is $1 : \sqrt{3}$. The angle of elevation of the sun is :
 (a) 30° (b) 60° (c) 45° (d) none of these
9. D and E are respectively the points on the sides AB and AC of a triangle ABC such that $AD = 2$ cm, $BD = 3$ cm, $BC = 7.5$ cm and $DE \parallel BC$. Then, length of DE (in cm) is :
 (a) 2.5 (b) 3 (c) 5 (d) 6

10. In the figure, if PQR is the tangent to a circle at Q whose centre is O. AB is a chord parallel to PR and $\angle BQR = 70^\circ$, then $\angle AQB$ is equal to :
 (a) 20° (b) 40°
 (c) 35° (d) 45°



11. If $\triangle ABC \sim \triangle EDF$ and $\triangle ABC$ is not similar to $\triangle DEF$, then which of the following is not true?
 (a) $BC \cdot EF = AC \cdot FD$ (b) $AB \cdot EF = AC \cdot DE$
 (c) $BC \cdot DE = AB \cdot EF$ (d) $BC \cdot DE = AB \cdot FD$
12. If the perimeter of a circle is equal to that of a square, then the ratio of their areas is :
 (a) $22 : 7$ (b) $14 : 11$ (c) $7 : 22$ (d) $11 : 14$
13. The volume of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is :
 (a) 9.7 cm^3 (b) 77.6 cm^3 (c) 58.2 cm^3 (d) 19.4 cm^3
14. AOBC is a rectangle whose three vertices are vertices A(0, 3), O(0, 0) and B(5, 0). The length of its diagonal is :
 (a) 5 (b) 3 (c) $\sqrt{34}$ (d) 4
15. The number of polynomials having zeroes as -2 and 5 is :
 (a) 1 (b) 2 (c) 3 (d) more than 3
16. Consider the following distribution :

Marks obtained	Number of students
More than or equal to 0	63
More than or equal to 10	58
More than or equal to 20	55
More than or equal to 30	51
More than or equal to 40	48
More than or equal to 50	42

The frequency of the class 30-40 is :

- (a) 3 (b) 4 (c) 48 (d) 51
17. If the probability of an event is p , the probability of its complementary event will be :
 (a) $p - 1$ (b) p (c) $1 - p$ (d) 0.1
18. If $\sin A + \sin^2 A = 1$, then the value of the expression $(\cos^2 A + \cos^4 A)$ is :
 (a) 1 (b) $\frac{1}{2}$ (c) 2 (d) 3

Direction : In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option :

19. **Assertion (A) :** Slant height of a cone of height 4 cm and radius 3 cm is 5 cm.

Reason (R) : Curved surface area of a cone is given by πrl .

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true

20. **Assertion (A) :** If $\sec \theta + \tan \theta = a$, then $\sec \theta = \frac{a^2 + 1}{2a}$

Reason (R) : $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true

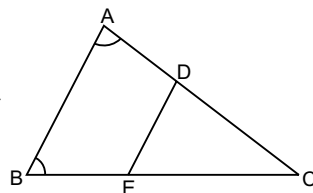
SECTION B

(Section B consists of 5 questions of 2 marks each)

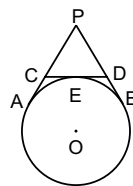
21. Find the value of k for which each of the following pairs of linear equations has an infinite number of solutions:

$$2x + 3y = 7; (k + 2)x - 3(1 - k)y = 5k + 1$$

22. In the figure, if $\angle A = \angle B$ and $AD = BE$, show that $DE \parallel AB$.



23. From an external point P, tangents PA and PB are drawn to a circle with centre O. If CD is the tangent to the circle at a point E and $PA = 14$ cm, find the perimeter of $\triangle PCD$.



24. The length of a minor arc is $\frac{2}{9}$ of the circumference of the circle. Write the measure of the angle subtended by the arc at the centre of the circle.

OR

The length of the minute hand of a clock is 5 cm. Find the area swept by the minute hand during the time period 6.05 am and 6.40 am.

25. If $\sin \theta + \cos \theta = \sqrt{3}$, then prove that $\tan \theta + \cot \theta = 1$

OR

If $2\sin^2 \theta - \cos^2 \theta = 2$, then find the value of θ .

SECTION C

(Section C consists of 6 questions of 3 marks each.)

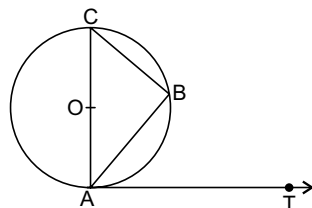
26. The sum of the first three terms of an AP is 33. If the product of the first and the third term exceeds the second term by 29, find the AP.
27. Find the ratio in which the line $2x + 3y - 5 = 0$ divides the line segment joining the points $(8, -9)$ and $(2, 1)$. Also find the coordinates of the point of division.
28. A two-digit number is obtained by either multiplying the sum of the digits by 8 and then subtracting 5 or by multiplying the difference of the digits by 16 and then adding 3. Find the number.

OR

The age of the father is twice the sum of the ages of his two children. After 20 years, his age will be equal to the sum of the ages of his children. Find the age of the father.

29. Prove that $\frac{1 + \sec \theta - \tan \theta}{1 + \sec \theta + \tan \theta} = \frac{1 - \sin \theta}{\cos \theta}$

30. If AB is a chord of a circle with centre O, AOC is a diameter and AT is the tangent at A, as shown in the figure. Prove that $\angle BAT = \angle ACB$



OR

From an external point P, two tangents, PA and PB are drawn to a circle with centre O. At one point E on the circle a tangent is drawn which intersects PA and PB at C and D, respectively. If $PA = 10$ cm, find the perimeter of the triangle PCD.

31. Two dice are thrown at the same time. Find the probability of getting :
 - (i) same number on both dice.
 - (ii) different numbers on both dice.

SECTION D

(Section D consists of 4 questions of 5 marks each.)

32. One-fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total number of camels.

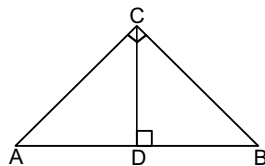
OR

Solve for x : $3\left(\frac{3x-1}{2x+3}\right) - 2\left(\frac{2x+3}{3x-1}\right) = 5$; $x \neq \frac{1}{3}, \frac{-3}{2}$

33. (i) Sides AB and AC and median AD of a triangle ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that $\triangle ABC \sim \triangle PQR$.

- (ii) In the figure, $\angle ACB = 90^\circ$ and $CD \perp AB$.

Prove that $\frac{CB^2}{CA^2} = \frac{BD}{AD}$.



34. A circus tent is cylindrical to a height of 3 m and conical above it. If its base radius is 52.5 m and slant height of the conical portion is 53 m, find the area of the canvas required to make the tent. $\left(\text{Use } \pi = \frac{22}{7} \right)$

OR

An inverted cone of vertical height 12 cm and radius of base 9 cm contains water to a depth of 4 cm. Find the area of the interior surface of the cone not in contact with the water.

35. The angle of elevation of a cloud from a point 60 m above the surface of the water of a lake is 30° and the angle of depression of its shadow in water of the lake is 60° . Find the height of the cloud from the surface of the water.

SECTION E

(Case study based questions are compulsory.)

36. To enhance the reading skills of grade X students, the school nominates you and two of your friends to set up a class library. There are two sections- section A and section B of grade X. There are 32 students in section A and 36 students in section B.

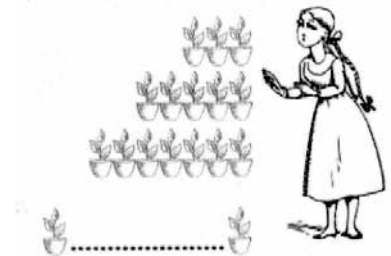


- (i) If the product of two positive integers is equal to the product of their HCF and LCM is true then, find the HCF of (32, 36).
- (ii) Express 36 as a product of its primes.
- (iii) If p and q are positive integers such that $p = ab^2$ and $q = a^2b$, where a, b are prime numbers, then find the LCM of (p, q) .

OR

What is the minimum number of books you will acquire for the class library, so that they can be distributed equally among students of Section A or Section B?

37. Reeya, being a plant lover decides to open a nursery and she bought 120 plants with pots. She wants to place pots in such a way that number of pots in first row is 3, in second row is 5, in third row is 7 and so on.



- (i) How many pots are placed in the last row?
- (ii) What is the difference in the number of pots placed in 8th and 3rd row?

(iii) Find the number of pots in the 4th row from the last row.

OR

Find the number of rows formed in this arrangement.

38. A stopwatch was used to find the time that it took a group of students to run 100 m.



Time (seconds)	0-10	10-20	20-30	30-40	40-50
No. of students	7	10	15	8	10

- (i) What will be the upper limit of the modal class?
- (ii) Find the sum of lower limits of median class and modal class.
- (iii) Estimate the mean time taken by a student to finish the race.

OR

Find the range and class mark of the modal class.

MODEL TEST PAPER 4 (STANDARD)

(Based on the latest CBSE Sample Question Paper Released by the CBSE for the Board Examination to be held in 2023)

Time: 3 hours

Maximum Marks: 80

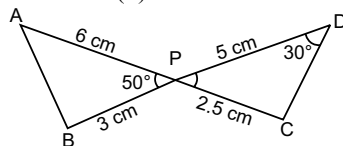
General Instructions

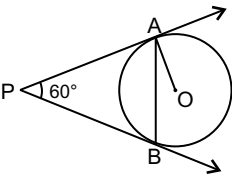
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

(Section A consists of 20 questions of 1 mark each.)

1. The vertices of a parallelogram in order are A(1, 2), B(4, y), C(x, 6), D(3, 6), then the value of x and y respectively are :
(a) 6, 2 (b) 3, 6 (c) 5, 6 (d) 1, 4
2. If $\frac{1}{x-2} + \frac{2}{x-1} = \frac{6}{x}$ (where $x \neq 0, 1, 2$), then $x =$
(a) 3, $\frac{2}{3}$ (b) 5, $\frac{7}{3}$ (c) 3, $\frac{4}{3}$ (d) 7, $\frac{5}{3}$
3. The value of k, if -4 is a zero of polynomial $x^2 - x - (2k + 2)$, is :
(a) 5 (b) 6 (c) 7 (d) 9
4. For what value of k, $2x + 3y = 4$ and $(k + 2)x + 6y = 3k + 2$ will have infinitely many solutions?
(a) 5 (b) -5 (c) 2 (d) -2
5. If the distance between the points (4, k) and (1, 0) is 5, then what can be the possible value of k?
(a) ± 2 (b) ± 3 (c) ± 4 (d) ± 5
6. In the figure, two line segments AC and BD intersect each other at the point P such that PA = 6 cm, PB = 3 cm, PC = 2.5 cm, PD = 5 cm, $\angle APB = 50^\circ$ and $\angle CDP = 30^\circ$. Then $\angle PBA$ is equal to:
(a) 50° (b) 30°
(c) 60° (d) 100°



7. If $x = a \cos^3 \theta$, $y = b \sin^3 \theta$, then $\left(\frac{x}{a}\right)^{\frac{2}{3}} + \left(\frac{y}{b}\right)^{\frac{2}{3}} =$
- (a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{3}{2}$ (d) 1
8. The length of the shadow cast by a rod is equal to length of the rod. Then the angle of elevation of the Sun is :
- (a) 30° (b) 45° (c) 60° (d) 90°
9. It is given that $\triangle ABC \sim \triangle DFE$, $\angle A = 30^\circ$, $\angle C = 50^\circ$, $AB = 5$ cm, $AC = 8$ cm and $DF = 7.5$ cm. Then, which of the following is true?
- (a) $DE = 12$ cm, $\angle F = 50^\circ$ (b) $DE = 12$ cm, $\angle F = 100^\circ$
 (c) $EF = 12$ cm, $\angle D = 100^\circ$ (d) $EF = 12$ cm, $\angle D = 30^\circ$
10. In the figure, PA and PB are tangents to the circle with centre O. If $\angle APB = 60^\circ$, then $\angle OAB$ is :
- (a) 40° (b) 30°
 (c) 25° (d) 20°
- 
11. If in triangles DEF and PQR, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following is not true?
- (a) $\frac{EF}{PR} = \frac{DE}{QR}$ (b) $\frac{DE}{PQ} = \frac{EF}{RP}$ (c) $\frac{DE}{QR} = \frac{DF}{PQ}$ (d) $\frac{EF}{RP} = \frac{DE}{QR}$
12. The area of a quadrant of a circle where the circumference of circle is 176 m, is :
- (a) 2464 m^2 (b) 1232 m^2 (c) 616 m^2 (d) 308 m^2
13. Volume and surface area of a solid hemisphere are numerically equal. The diameter of hemisphere is :
- (a) 7 units (b) 9 units (c) 12 units (d) 16 units
14. If $P\left(\frac{a}{2}, 4\right)$ is the mid-point of the line segment joining the points A(-6, 5) and B(-2, 3), then the value of a is :
- (a) -8 (b) 7 (c) -6 (d) -5
15. The value of k such that $3x^2 + 2kx - k - 5$ has the sum of the zeroes as half of their product is :
- (a) $\frac{2}{3}$ (b) $\frac{5}{3}$ (c) $\frac{7}{3}$ (d) $\frac{8}{3}$
16. If the median of the data : 24, 25, 26, $x + 2$, $x + 3$, 30, 31, 34 is 27.5, then the value of x is :
- (a) 25 (b) 27 (c) 28 (d) 30
17. Cards marked with numbers 1, 3, 5, ..., 101 are placed in a bag and mixed thoroughly. A card is then drawn at random from the bag. The probability that the number on the drawn card is a prime number less than 20 is :
- (a) $\frac{7}{51}$ (b) $\frac{5}{51}$ (c) $\frac{13}{51}$ (d) $\frac{9}{51}$

18. If $\sin \theta + \cos \theta = 1$, then the value of $\sin \theta \cdot \cos \theta =$
 (a) 1 (b) 0 (c) -1 (d) 2

Direction : In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option :

19. **Assertion (A) :** In a circle of radius 6 cm, the angle of a sector is 60° . Then the area of the sector is $\frac{132}{7} \text{ cm}^2$.

Reason (R) : Area of the circle with radius r is πr^2 .

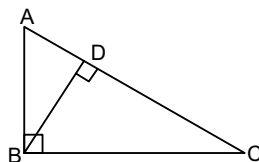
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true
20. **Assertion (A) :** If the shadow of a vertical tower is of its height, then the altitude of the sun is 60° .
- Reason (R) :** If the sun's altitude is 45° , then the shadow of a vertical pole is same as its altitude.
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (c) (A) is true but (R) is false
 (d) (A) is false but (R) is true

SECTION B

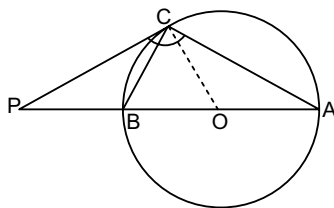
(Section B consists of 5 questions of 2 marks each)

21. Can the number 6^n , n being a natural number, end with the digit 5? Give reasons.

22. In the figure, ABC is a triangle right angled at B and $BD \perp AC$.
 If $AD = 4 \text{ cm}$ and $CD = 5 \text{ cm}$, find BD and AB.



23. In the figure, the tangent at a point C of a circle and a diameter AB when extended intersect at P. If $\angle PCA = 110^\circ$, find $\angle CBA$.



24. Find the area of the sector a circle of radius 5 cm, if the corresponding arc length is 3.5 cm.

OR

The wheel of a motorcycle is of radius 35 cm. How many revolutions per minute must the wheel make so as to keep a speed of 66 km/h?

25. If $\operatorname{cosec} \theta + \cot \theta = p$, then prove that $\cos \theta = \frac{p^2-1}{p^2+1}$.

OR

If $\tan \theta + \sec \theta = l$, then prove that $\sec \theta = \frac{l^2+1}{2l}$.

SECTION C

(Section C consists of 6 questions of 3 marks each.)

26. In an AP, the sum of first n terms is $\left(\frac{3n^2}{2} + \frac{5n}{2}\right)$. Find its 25th term.
27. If the point $P(x, y)$ is equidistant from the points $A(3, 6)$ and $B(-3, 4)$, prove that $3x + y - 5 = 0$.
28. Seven times a given two-digit number is equal to four times the number obtained by interchanging the digits and the difference of the digits is 3. Find the number.

OR

Solve: $99x + 101y = 499$; $101x + 99y = 501$. Use method of Elimination.

29. If $\operatorname{cosec} (A - B) = 2$, $\cot (A + B) = \frac{1}{\sqrt{3}}$, $0^\circ < (A + B) \leq 90^\circ$, $A > B$, then find A and B .
30. Show that the points $A(2, -2)$, $B(8, 4)$, $C(5, 7)$ and $D(-1, 1)$ are the vertices of a rectangle ABCD.

OR

Determine the ratio in which the line $2x + y - 4 = 0$ divides the line segment joining the points $A(2, -2)$ and $B(3, 7)$.

31. A bag contains 12 balls, out of which x are white. (i) If one ball is drawn at random, what is the probability that it will be a white ball? (ii) If 6 more white balls are put in the bag, the probability of drawing a white ball will become double than that in (i), find x .

SECTION D

(Section D consists of 4 questions of 5 marks each.)

32. Solve for x : $\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$.

OR

Two trains leave a railway station at the same time. The first train travels due west and the second train due north. The first train travels 5 km/hr faster than the second train. If after two hours, they are 50 km apart, find the average speed of each train.

33. ABC is a right angled triangle with $\angle ABC = 90^\circ$, $BD \perp AC$, $DM \perp BC$ and $DN \perp AB$. Prove that (i) $DM^2 = DN \times MC$ (ii) $DN^2 = DM \times AN$.
34. Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively offered to the state government to provide place and the canvas for 1500 tents to be fixed

by the government and decided to share the whole expenditure equally. The lower part of each tent is cylindrical of base radius 2.8 m and height 3.5 m, with conical upper part of same base radius but height 2.1 m. If the canvas used to make the tent costs ₹120 per sq. m, find the amount shared by each school to set up the tents. [Use $\pi = 22/7$]

OR

A cylindrical vessel with internal diameter 10 cm and height 10.5 cm is full of water. A solid cone of base diameter 7 cm and height 6 cm is completely immersed in water. Find the volume of:

- (i) Water displaced out of the cylindrical vessel.
- (ii) Water left in the cylindrical vessel. [Take $\pi = 22/7$]

35. Amit standing on a horizontal plane, finds a bird flying at a distance of 200 m from him at an elevation of 30° . Deepak standing on the roof of 50 metres high building, finds the angle of elevation of the same bird to be 45° . Both Amit and Deepak are on opposite sides of the bird. Find the distance of bird from Deepak.

SECTION E

(Case study based questions are compulsory.)

36. Indian Army is the third biggest military contingent in the World next to USA and China. However, there are many firsts that make Indian army stand out in the world, making us all Indians very proud. Knowing them, will help you celebrate Republic day with greater vigour and gratitude.



On 71th republic day Parade in Delhi Captian RS Meel is planing for parade of following two group: (a) First group of

Army contingent of 624 members behind an army band of 32 members. (b) Second group of CRPF troops with 468 soldiers behind the 228 members of bikers. These two groups are to march in the same number of columns. This sequence of soldiers is followed by different states Jhanki which are showing the culture of the respective states.

- (i) What is the maximum number of columns in which the army troop can march?
- (ii) What is the maximum number of columns in which the CRPF troop can march?
- (iii) What should be subtracted with the numbers of CRPF soldiers and the number of bikers so that their maximum number of column is equal to the maximum number of column of army troop?

OR

What should be added with the numbers of CRPF soldiers and the number of bikers so that their maximum number of column is equal to the maximum number of column of army troop?

37. India is a competitive manufacturing location due to the low cost manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year.



- Find the production in the 1st year.
- Find the production in the 5th year.
- In which year production is ₹29,200

OR

Find the difference of the production during 7th year and 4th year.

38. The Kendriya Vidyalaya Sangathan (KVS) is a system of premier central government schools in India that are instituted under the aegis of the Ministry of Education (MHRD), Government of India. As of October 2020, it has a total of 1239 schools. It is one of the world's largest chains of schools. The



The system came into being in 1963 under the name 'Central Schools'. Later, the name was changed to Kendriya Vidyalaya. Its schools are all affiliated to the Central Board of Secondary Education (CBSE). The objective of KVS is to cater to the educational needs of the children of transferable Central Government employees including Defence and Para-Military personnel by providing a common programme of education.

Marks obtained by the students of a class of a Kendriya Vidyalaya are given below :

Marks obtained	0-20	20-40	40-60	60-80	80-100
Number of students	15	18	21	29	22

- Find the lower limit of the median class.
- Find the class mark of the median class.
- What is the value of modal marks?

OR

What is the value of median marks?

MODEL TEST PAPER 5 (STANDARD)

(Based on the latest CBSE Sample Question Paper Released by the CBSE for the Board Examination to be held in 2023)

Time: 3 hours

Maximum Marks: 80

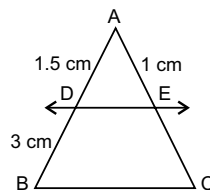
General Instructions

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

(Section A consists of 20 questions of 1 mark each.)

1. A circle drawn with origin as the centre passes through $\left(\frac{13}{2}, 0\right)$. The point which does not lie in the interior of the circle is:
(a) $\left(\frac{-3}{4}, 1\right)$ (b) $\left(2, \frac{7}{3}\right)$ (c) $\left(5, \frac{-1}{2}\right)$ (d) $\left(-6, \frac{5}{2}\right)$
2. The value of p for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other is :
(a) 5 (b) 3 (c) -3 (d) 2
3. If α, β are the zeroes of $x^2 - 6x + k$, then the value of k when $3\alpha + 2\beta = 20$ is :
(a) 13 (b) -14 (c) 15 (d) -16
4. The values of x and y if $23x + 35y = 209$ and $35x + 23y = 197$, are :
(a) 3 and 4 (b) 4 and 5 (c) -3 and 2 (d) 5 and 3
5. If the distances of $P(x, y)$ from $A(5, 1)$ and $B(-1, 5)$ are equal, then :
(a) $x = y$ (b) $3x = 5y$ (c) $5x = 2y$ (d) $3x = 2y$
6. In the given figure, if $DE \parallel BC$, then length of EC is :
(a) 5 cm (b) 4 cm
(c) 3 cm (d) 2 cm
7. If $\sin\theta + \cos\theta = \sqrt{3}$, then $\tan\theta + \cot\theta =$
(a) 1 (b) -1 (c) 2 (d) -2



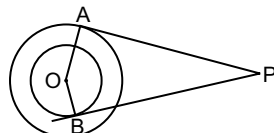
8. The angle of elevation of the sun, when the shadow of a pole h metres high is $\sqrt{3}h$ is :

- (a) 30° (b) 45° (c) 60° (d) None of these

9. It is given that $\triangle ABC \sim \triangle DFE$, $\angle A = 30^\circ$, $\angle C = 50^\circ$, $AB = 5$ cm, $AC = 8$ cm and $DF = 7.5$ cm. Then, which of the following is true?

- (a) $DE = 12$ cm, $\angle F = 50^\circ$ (b) $DE = 12$ cm, $\angle F = 100^\circ$
(c) $EF = 12$ cm, $\angle D = 100^\circ$ (d) $EF = 12$ cm, $\angle D = 30^\circ$

10. Tangents PA and PB are drawn from an external point P to two concentric circles with centre O and radii 8 cm and 5 cm respectively, as shown in the figure. If $AP = 15$ cm, then the length of BP is :



- (a) $2\sqrt{33}$ cm (b) $2\sqrt{66}$ cm (c) $2\sqrt{11}$ cm (d) $2\sqrt{35}$ cm

11. In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $AD = 4x - 3$, $AE = 8x - 7$, $BD = 3x - 1$ and $CE = 5x - 3$, then the value of x is :

- (a) 3 cm (b) 2 cm (c) 1.5 cm (d) 1 cm

12. A bicycle wheel makes 5000 revolutions in moving 11 km, then diameter of the wheel is:

- (a) 40 cm (b) 108 cm (c) 70 cm (d) 9 cm

13. If a marble of radius 2.1 cm is put into a cylindrical cup full of water of radius 5 cm and height 6 cm, then how much water flows out of the cylindrical cup?

- (a) 38.8 cm^3 (b) 55.4 cm^3 (c) 19.4 cm^3 (d) 471.4 cm^3

14. The x -coordinate of a point P is twice its y -coordinate. If P is equidistant from $Q(2, -5)$ and $R(-3, 6)$, then coordinates of P are :

- (a) (14, 8) (b) (16, 8) (c) (12, 6) (d) (15, 12)

15. If 2 and -3 are the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$, then the value of $a + b$ is :

- (a) -5 (b) 0 (c) 6 (d) -6

16. The median class of the following data is :

Marks	Below 20	Below 40	Below 60	Below 80	Below 100
No. of Students	17	22	29	37	50

- (a) 20-40 (b) 40-60 (c) 60-80 (d) 80-100

17. The probability that the drawn card from a pack of 52 cards is neither an ace nor a spade is :

- (a) $\frac{9}{13}$ (b) $\frac{35}{52}$ (c) $\frac{10}{13}$ (d) $\frac{19}{26}$

18. If $\sin\theta + 2\cos\theta = 1$, then $2\sin\theta - \cos\theta =$

- (a) 1 (b) 0 (c) 2 (d) 3

Direction : In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option :

19. **Assertion (A) :** If the circumferences of two circles are in the ratio 4 : 5, then their areas are in the ratio 16 : 25.

Reason (R) : If the circumferences of two circles are in the ratio $C_1 : C_2$, then their areas are in the ratio $C_1^2 : C_2^2$.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

20. **Assertion (A) :** If the angle of elevation of the top of a tower from a point on the ground, 100 m away from the foot of the tower is 30° , then the height of the tower is $\frac{100}{\sqrt{3}}$ m.

Reason (R) : $\tan 45^\circ = 1$

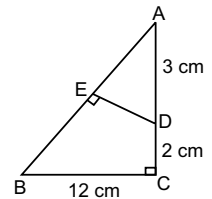
- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

SECTION B

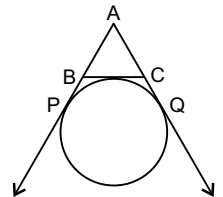
(Section B consists of 5 questions of 2 mark each)

21. Explain why $7 \times 11 \times 13 + 13$ and $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ are composite numbers.

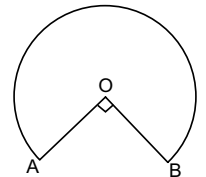
22. In the given figure, ABC is a right triangle, right angled at C. Prove that $\triangle ABC \sim \triangle ADE$ and find the length of AE and DE.



23. In the given figure, AP, AQ and BC are tangents to the circle. If AB = 5 cm, AC = 6 cm and BC = 4 cm, then find the length of AP.



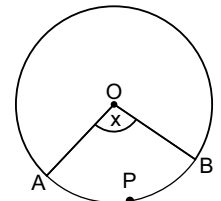
24. In the given figure, the shape of the top of a table is that of a sector of a circle with centre O and $\angle AOB = 90^\circ$. If $AO = OB = 42$ cm, then find the perimeter of the top of the table. $\left[\text{Use } \pi = \frac{22}{7} \right]$.



OR

In the figure, O is the centre of a circle. The area of sector APB is $\frac{5}{18}$ of the area of the circle. Find x .

25. If $\sin (A + B) = 1$ and $\cos (A - B) = 1$, find A and B.



OR

If $a \cos \theta - b \sin \theta = c$, prove that $a \sin \theta + b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}$

SECTION C

(Section C consists of 6 questions of 3 marks each.)

26. How many terms of the AP, 9, 17, 25, ..., must be taken to get a sum of 450?
27. The line segment joining the points (3, -4) and (1, 2) is trisected at the points P and Q. If the coordinates of P and Q are $(p, -2)$ and $\left(\frac{5}{3}, q\right)$ respectively, find the values of p and q .
28. A father's age is three times the sum of ages of his two children. After 5 years, his age will be two times the sum of their ages. Find the present age of the father.

OR

For which values of a and b , will the following pair of linear equations have infinitely many solutions?

$$x + 2y = 1; (a - b)x + (a + b)y = a + b - 2$$

29. Prove that : $\cos^4\theta - \cos^2\theta = \sin^4\theta - \sin^2\theta$
30. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.

OR

PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length of TP.

31. A card is drawn at random from a pack of 52 cards. Find the probability that the card drawn is : (i) either a black card or a king (ii) a jack, a queen or a king (iii) neither a heart nor a king.

SECTION D

(Section D consists of 4 questions of 5 marks each.)

32. One-fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total number of camels.

OR

If the roots of the equation $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ are equal, prove that $ad = bc$.

33. If a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then it divides the two other sides in the same ratio. Prove.

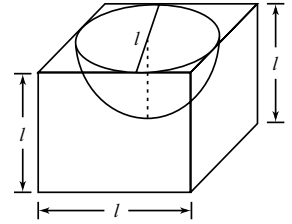
Using the above, solve the following :

In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $AD = 4x - 3$, $AE = 8x - 7$, $BD = 3x - 1$ and $CE = 5x - 3$, find the value of x .

34. A solid toy is in the form of a hemisphere surmounted by a right circular cone. Height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the solid, find the difference of the volumes of the cylinder and the toy. (Take $\pi = 3.14$)

OR

A hemispherical depression is cut-out from one face of a cubical wooden block such that the diameter l of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

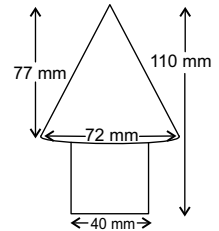


35. If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake is β , prove that the height of the cloud is $\frac{h(\tan \beta + \tan \alpha)}{\tan \beta - \tan \alpha}$.

SECTION E

(Case study based questions are compulsory.)

36. In a toys manufacturing company, wooden parts are assembled and painted to prepare a toy. For the wood processing activity center, the wood is taken out of storage to be sawed, after which it undergoes rough polishing, then is cut, drilled and has holes punched in it. It is then fine polished using sandpaper. For the retail packaging and delivery activity center, the polished wood sub-parts are assembled together, then decorated using paint.

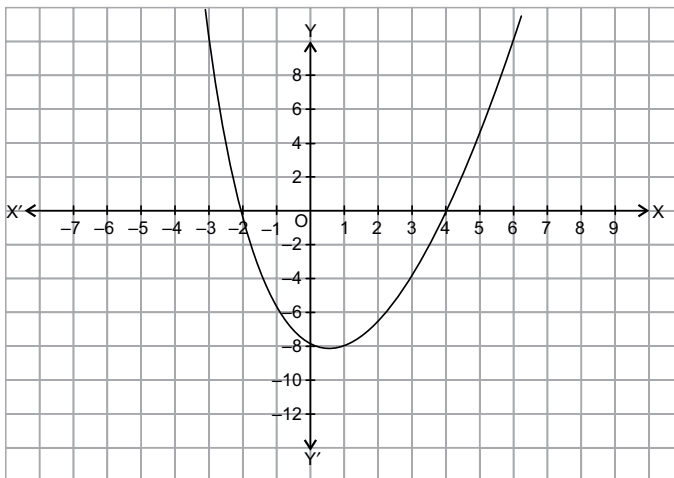


- Write the formula of curved surface area of the cone.
- Write the formula of the total surface area of the cylinder.
- If its cylindrical part is to be painted red, then find the surface area need to be painted.

OR

If its conical part is to be painted blue, then find the surface area need to be painted.

37. Three friends Raani, Kamla, and Beena are skipping a rope. At a time two of them hold the rope and the third one skips it. At a moment, Kamla observed that the shape of the rope was parabolic. After returning home, she drew the shape of the rope on a graph paper as shown below.



Based on the above information, answer the following questions:

- (i) What does the above graph represent?
- (ii) Are the zeroes of the above polynomial real?
- (iii) Where does the curve cut y -axis?

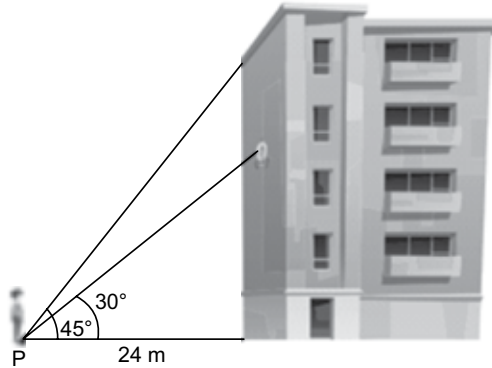
OR

Find the zeroes of the polynomial whose graph is given above.

- 38.** A clinometer is a tool that is used to measure the angle of elevation, or angle from the ground, in a right - angled triangle. We can use a clinometer to measure the height of tall things that you can't possibly reach to the top of, flag poles, buildings, trees.



Ravish got a clinometer from school lab and started the measuring elevation angle in surrounding. He saw a building on which society logo is painted on wall of building.



- (i) What is the height of the building logo from ground?
- (ii) What is the height of the building from ground?
- (iii) What is the aerial distance of the point P from the top of the building?

OR

If the point of observation P is moved 16 m towards the base of the building, then find the angle of elevation θ of the logo on the building.

ANSWERS

MODEL TEST PAPER 1

1. (d) 2. (d) 3. (b) 4. (a) 5. (a) 6. (a)
 7. (b) 8. (d) 9. (b) 10. (c) 11. (d) 12. (b)
 13. (a) 14. (b) 15. (c) 16. (c) 17. (a) 18. (b)
 19. (c) 20. (d) 21. 6 23. 19 cm 24. 19.5 cm **OR** 285 mm
 27. $x^2 - \sqrt{2}x - \frac{3}{2}$; $\frac{-1}{\sqrt{2}}$, $\frac{3}{\sqrt{2}}$ 28. 42 km/h **OR** 14 years 30. $\frac{20}{3}$ cm
 31. (i) $\frac{1}{10}$ (ii) $\frac{3}{10}$ (iii) $\frac{3}{5}$
 32. (12, 18) or (-12, 18) **OR** $x = -a$ or $-b$ 34. 6 m **OR** 770 cm²
 35. $x = 12$, $y = 25$
 36. (i) P(3, 6), Q(3, 2) (ii) 7 m, 4 m (iii) 28 m² **OR** $\left(\frac{13}{2}, 4\right)$
 37. (i) 8 (ii) 45, 43, 41, ... (iii) $a + (n - 1)d$ **OR** no
 38. (i) $75\sqrt{3}$ m (ii) 75 m (iii) $75(\sqrt{3} - 1)$ m **OR** $75(\sqrt{3} + 1)$ m

MODEL TEST PAPER 2

1. (d) 2. (a) 3. (a) 4. (b) 5. (b) 6. (c)
 7. (b) 8. (a) 9. (c) 10. (d) 11. (b) 12. (c)
 13. (c) 14. (d) 15. (a) 16. (c) 17. (d) 18. (b)
 19. (b) 20. (a) 21. -6 22. 2 cm 24. 15.6 cm² **OR** 41.04 cm²
 26. no 27. $a = 1$, $b = -3$ 28. 5 years, 27 years **OR** 15
 31. (i) $\frac{13}{49}$ (ii) $\frac{3}{49}$ 32. **OR** $x = -1$
 34. 0.95 m³ **OR** 1642.67 cm³; 572 cm² 35. 68.3 cm
 36. (i) 4 units (ii) $2\sqrt{13}$ units (iii) (-1, 2) **OR** (3, 3.5)
 37. (i) 20 (ii) 35 (iii) 105 **OR** 75
 38. (i) $20\sqrt{3}$ m (ii) 30° (iii) 5 m **OR** 45°

MODEL TEST PAPER 3

1. (a) 2. (d) 3. (a) 4. (c) 5. (d) 6. (c)
 7. (c) 8. (a) 9. (b) 10. (b) 11. (c) 12. (b)
 13. (d) 14. (c) 15. (d) 16. (a) 17. (c) 18. (a)
 19. (b) 20. (b) 21. 6 23. 28 cm 24. 80° **OR** 45.83 cm²
 26. 2, 11, 20, ... or 20, 11, 2, ... 27. 8 : 1; $\left(\frac{8}{3}, -\frac{1}{9}\right)$
 28. 83 **OR** 40 years 30. **OR** 20 cm

31. (i) $\frac{1}{6}$ (ii) $\frac{5}{6}$ 32. 36 OR $x = 0$, or -7
 34. 9735 cm^2 OR 377.146 cm^2 35. 120 m
 36. (i) 4 (ii) $2 \times 2 \times 3 \times 3$ (iii) a^2b^2 OR 288
 37. (i) 25 (ii) 10 (iii) 15 OR 10
 38. (i) 30 (ii) 40 (iii) 25.6 OR 10, 15

MODEL TEST PAPER 4

1. (a) 2. (c) 3. (d) 4. (c) 5. (c) 6. (d)
 7. (d) 8. (b) 9. (b) 10. (b) 11. (b) 12. (c)
 13. (b) 14. (a) 15. (b) 16. (a) 17. (a) 18. (b)
 19. (b) 20. (d) 21. no 22. $2\sqrt{5} \text{ cm}$, 6 cm 23. 70°
 24. 8.7 cm^2 OR 500 26. 76 28. 36 OR $x = 3$, $y = 2$
 29. $A = 45^\circ$, $B = 15^\circ$ 30. OR 2 : 9
 31. (i) $\frac{x}{12}$ (ii) 3 32. $x = -a$ or $-\frac{b}{2}$ OR 20 km/h, 15 km/h
 34. ₹332640 OR (i) 77 cm^3 (ii) 748 cm^3 35. $50\sqrt{2} \text{ m}$
 36. (i) 12 (ii) 4 (iii) 4, 4 (iv) 12, 12
 37. (i) 5000 (ii) 13800 (iii) 12th OR 6600
 38. (i) 40 (ii) 50 (iii) 70.6 OR 58.6

MODEL TEST PAPER 5

1. (d) 2. (b) 3. (d) 4. (a) 5. (d) 6. (d)
 7. (a) 8. (a) 9. (b) 10. (b) 11. (d) 12. (c)
 13. (a) 14. (b) 15. (d) 16. (b) 17. (b) 18. (c)
 19. (a) 20. (b) 22. $\frac{15}{13} \text{ cm}$, $\frac{36}{13} \text{ cm}$ 23. 7.5 cm
 24. 282 cm OR 100° 25. 45° , 45° 26. 10 27. $\frac{7}{3}$, 0
 28. 45 years OR $a = 3$, $b = 1$ 30. OR $\frac{20}{3} \text{ cm}$
 31. (i) $\frac{7}{13}$ (ii) $\frac{3}{13}$ (iii) $\frac{9}{13}$ 32. 36 33. 1
 34. 25.12 cm^3 OR $\frac{P^2}{4} (\pi + 24)$
 36. (i) $\pi r l$ (ii) $\pi r(l + 2r)$ (iii) $1720\pi \text{ mm}^2$ OR $3956\pi \text{ mm}^2$
 37. (i) A quadratic polynomial (ii) yes (iii) $(-8, 0)$ OR $-2, 4$
 38. (i) $8\sqrt{3} \text{ m}$ (ii) 24 m (iii) $24\sqrt{2} \text{ m}$ OR $\frac{8\sqrt{3}}{15} \text{ m}$.