QUESTION BANK

CLASS: X

SUBJECT: MATHEMATICS STANDARD (041)

QUESTIONS FROM

CBSE QUESTION PAPERS, YEAR- 2025

Each question is followed by suggestive value points for answer formulation.

CHAPTER 1: REAL NUMBERS

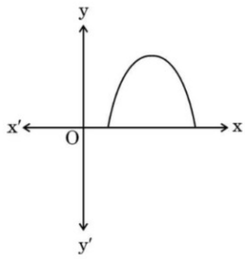
1 MARK QUESTIONS		
1.	If $x = ab^3$ and $y = a^3b$ where a and b are prime numbers, then [HCF (x, y)-LCM (x, y)] is equal to: (A) $1 - a^3b^3$ (B) ab(1 - ab) (C) $ab - a^4b^4$ (D) ab(1 - ab)(1 + ab)	**MAIN**
Value point: (D) ab(1 - ab)(1 + ab)		
2.	$(1 + \sqrt{3})^2 - (1 - \sqrt{3})^2$ is: (A) a positive rational number. (B) a negative integer. (C) a positive irrational number. (D) a negative irrational number.	**MAIN**
Value point: (C) a positive irrational number.		
3.	The total number of factors of the square of a prime number is : (A) 1 (B) 2 (C) 3 (D) 4	**COMPTT.**
Value point: (C) 3		
4.	The ratio of the HCF to the LCM of 7, 21 and 28 is : (A) 1:4 (B) 3:4 (C) 1:8 (D) 1:12	**COMPTT.**
Value point: (D) 1:12		
5.	$2.\overline{35}$ is : (A) an integer (B) a rational number (C) an irrational number (D) a natural number	**COMPTT.**
Value point: (B) a rational number		
6.	HCF and LCM of 14,21 and 77 are respectively: (A) 7, 77 (B) 14, 462 (C) 7, 462 (D) 21, 77	**MAIN**
Value point: (C) 7, 462		
ASSERTION- REASON QUESTIONS		
Directions : In the following questions, an Assertion (A) is followed by a Reason (R). Choose the correct option: A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). B. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A). C. Assertion (A) is true but Reason (R) is false. D. Assertion (A) is false but Reason (R) is true.		
7.	Assertion (A) : For any natural number n, the digit at unit's place in 3^n cannot be an even number. Reason (R) : For any natural number n, 2 cannot be a prime factor of 3^n .	**MAIN**
Value point: (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).		
8.	Assertion (A): For any natural number, the number 4^n ends with the digit 0. Reason (R): For a natural number 'x' having two prime factors 2 and 5, 'x' always	**MAIN**

	ends with the digit 0, where n is a natural number.	
Value point: (D) Assertion (A) is false but Reason (R) is true.		
2 MARK QUESTIONS		
9.	If the least common multiple of 51 and 85 can be expressed as 6z - 9, then find the value of z.	**COMPTT.**
Value point: LCM (51, 85) = 3 × 5 ×17 = 255 Now, 6z – 9 = 255 ⟹ z = 44		
10.	If $\sqrt{7}$ is an irrational number, then prove that number $2\sqrt{7}$ is also an irrational	**COMPTT.**
Value point: Let $2\sqrt{7} = \frac{a}{b}$ where a & b are co-prime. ⟹ $\sqrt{7} = \frac{a}{2b}$ RHS is rational which contradicts the fact that √7 is irrational. Therefore 2√7 is an irrational number.		
11.	Show that 14^n cannot end with the digit 0 or 5 for any natural number n.	**COMPTT.**
Value point: $14^n = 2^n \times 7^n$ To end with a digit 0 or 5, 14^n must have at least one prime factor 5, which is not there. ∴ 14^n can not end with digit 0 or 5.		
12.	Find HCF and LCM of 35 and 55. Also verify your Value point:wer.	**MAIN**
Value point: HCF = 5 LCM = 5 × 7 × 11 = 385 HCF × LCM =5×385= 1925 Product of two numbers =35×55=1925 Hence HCF × LCM = Product of two numbers		
3 MARK QUESTIONS		
13.	Prove that √2 is an irrational number.	**MAIN**
Value point: Let √2 be a rational number. ∴ $\sqrt{2} = \frac{p}{q}$, where $q \neq 0$ and let p & q be co-primes. ⟹ p^2 is divisible by 2 ⟹ p is divisible by 2 ----- (i) ⟹ $p = 2a$, where 'a' is some integer and $4a^2 = 2q^2$ ⟹ q^2 is divisible by 2 ⟹ q is divisible by 2 ----- (ii) (i) and (ii) leads to contradiction as 'p' and 'q' are co-primes.		
14.	Let x and y be two different prime numbers and $p = x^2y^3$, $q = xy^4$, $r = x^5y^2$. Find the HCF and LCM of p, q and r. Also check whether HCF (p, q, r) × LCM(p,q,r) = p × q × r or not.	**MAIN**
Value point: HCF $(p,q,r) = xy^2$ LCM $(p,q,r) = x^5y^4$ HCF × LCM = x^6y^6 $p \times q \times r = x^8y^9$ ⟹ HCF (p,q,r) × LCM $(p,q,r) \neq p \times q \times r$		
15.	Ranjita, Neha and Salma start knitting sweaters for the children of an orphanage together. They need 15, 18 and 20 days respectively to knit a sweater. After how many days will they all start knitting a new sweater together again? How many sweaters will they have made by that time?	**COMPTT.**
Value point: LCM (15, 18, 20) = 180 They will start new sweater again after 180 days. Total number of sweaters completed in 180 days = $\frac{180}{15} + \frac{180}{18} + \frac{180}{20} = 31$		
16.	Prove that √5 is an irrational number.	**MAIN**
Value point: Let √5 be a rational number. ∴ $\sqrt{5} = \frac{p}{q}$, where $q \neq 0$ and let p & q be co-primes.		

	$\Rightarrow p^2$ is divisible by 5 $\Rightarrow p$ is divisible by 5 ----- (i) $\Rightarrow p = 5a$, where 'a' is some integer and $25a^2 = 5\,q^2$ $\Rightarrow q^2$ is divisible by 5 $\Rightarrow q$ is divisible by 5 ----- (ii) (i) and (ii) leads to contradiction as 'p' and 'q' are co-primes.	
	4 MARK QUESTIONS *(CASE STUDY)*	
17.	The science department of a college is conducting an international seminar in which the number of participants in Physics, Chemistry and Biology are 65, 91 and 117 respectively. The coordinator has made the arrangement such that in each room, the same number of participants are to be seated with all of them being in the same subject.  Based on the information given above, answer the following questions : (i) Find the HCF of 65, 91 and 117. (ii) Find the LCM of 65, 91 and 117. (iii) Find the minimum number of rooms required based on the above conditions. OR Find the minimum number of participants to be accommodated in each of the rooms.	**COMPTT.**
Value point:	(i) $65 = 5 \times 13$; $91 = 7 \times 13$; $117 = 3^2 \times 13$ HCF (65, 91 & 117) = 13 (ii) LCM (65, 91 & 117) = $3^2 \times 5 \times 7 \times 13 = 4095$ (iii) minimum number of rooms = $\frac{65}{13} + \frac{91}{13} + \frac{117}{13} = 21$ OR minimum number of participants = 1	

CHAPTER 2: POLYNOMIALS

	1 MARK QUESTIONS	
1.	Which of the following statements is correct for a polynomial p(x) of degree 3? (A) p(x) has at most two distinct zeroes. (B) p(x) has at least two distinct zeroes. (C) p(x) has three distinct zeroes. (D) p(x) has at most three distinct zeroes.	**MAIN**
Value point:	(D) p(x) has at most three distinct zeroes.	
2.	In the graph given below, two polynomials are shown. The number of distinct zeroes of these two polynomials is :	**COMPTT.**

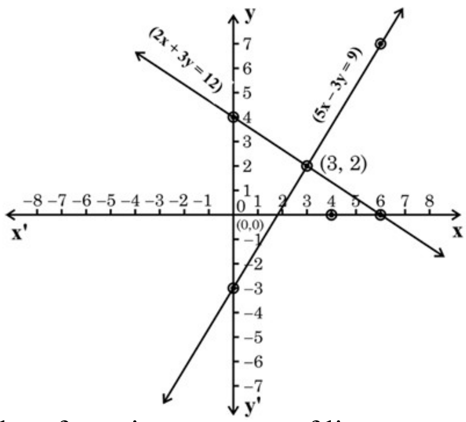
	 (A) $a < 0$ (B) $b^2 < 4ac$ (C) $c > 0$ (D) a and b are of same sign	
Value point: (A) $a < 0$		
3.	If one zero of the quadratic polynomial $4x^2+4x-m$ is $\frac{3}{2}$, then the other zero is: (A) $\frac{2}{5}$ (B) $\frac{5}{2}$ (C) $-\frac{5}{2}$ (D) $-\frac{1}{2}$	**COMPTT.**
Value point: (C) $-\frac{5}{2}$		
4.	The zeroes of the quadratic polynomial $x^2 + 99x + 127$ are : (A) both positive (B) both negative (C) one positive and one negative (D) both equal 5.	**COMPTT.**
Value point: (B) both negative		
5.	A quadratic polynomial whose one zero is 3 and the product of zeroes is 0, is : (A) $x^2 - 3$ (B) $x^2 - 9$ (C) $x^2 + 3x$ (D) $x^2 - 3x$	**COMPTT.**
Value point: (D) $x^2 - 3x$		
6.	The value of x, for which the polynomials $9 - x^2$ and $6x + x^2 + 9$ vanish simultaneously, is (A) 3 (B) 2 (C) –2 (D) –3	**MAIN**
Value point: (D) – 3		
7.	If the square of the difference of the zeroes of the quadratic polynomial $y^2 + py + 36$ is equal to 81, then the values of p are: (A) ± 5 (B) ± 15 (C) ± 18 (D) ± 12	**MAIN**
Value point: (B) ± 15		
3 MARK QUESTIONS		
8.	α and β are the zeroes of quadratic polynomial $x^2 - ax - b$. Obtain a quadratic polynomial whose zeroes are $3\alpha + 1$ and $3\beta + 1$.	**MAIN**
Value point: $\alpha+\beta=a$, $\alpha\beta=-b$ Sum of zeroes of required polynomial $=(3\alpha+1)+(3\beta+1) = 3a+2$ Product of zeroes of required polynomial $=(3\alpha+1)(3\beta+1) = -9b+3a+1$ ∴ The required polynomial is $x^2 - (3a+2)\,x + (3a-9b+1)$		
9.	α and β are the zeroes of polynomial $px^2 + qx + 1$. Form a quadratic polynomial whose zeroes are $\frac{2}{\alpha}$ and $\frac{2}{\beta}$.	**MAIN**
Value point: $\alpha+\beta= -\frac{-q}{p}$, $\alpha\beta= \frac{1}{p}$ Sum of zeroes of the required polynomial = $-2q$ Product of zeroes of the required polynomial = $4p$ ∴ required polynomial is $x^2 + 2qx + 4p$		
10.	If a, b are the zeroes of the polynomial $p(x) = x^2 - 2x - 3$, then find a polynomial where zeroes are $(2a + 3b)$ and $(3a + 2b)$.	**COMPTT.**
Value point: $p(x) = x^2 - 2x - 3$ Here $\alpha+\beta = 2$ and $\alpha\beta = -3$. Let the required polynomial be $x^2 - Sx + P$		

	$S = (2\alpha + 3\beta) + (3\alpha + 2\beta) = 5(\alpha+\beta) = 5 \times 2 = 10$ $P = (2\alpha + 3\beta) \times (3\alpha + 2\beta) = 6(\alpha^2 + \beta^2) + 13\alpha\beta = 21$ So, required polynomial is $x^2 - 10x + 21$	
11.	α and β are the zeroes of the quadratic polynomial $p(x) = x^2 - 4x + k$, such that $\alpha - \beta = 8$. Find the value of k.	**COMPTT.**
Value point:	Here, $\alpha+\beta = 4$ and $\alpha\beta = k$ $(\alpha-\beta)^2 = (\alpha+\beta)^2 - 4\alpha\beta \Longrightarrow (8)^2 = (4)^2 - 4k \Longrightarrow k = -12$	
12.	If α and β are the zeroes of polynomial $ax^2 - x + c$. Obtain a polynomial whose zeroes are $\alpha - 3$ and $\beta - 3$.	**MAIN**
Value point:	$\alpha+\beta = \frac{1}{a}$, $\alpha\beta = \frac{c}{a}$ Sum of zeroes of required polynomial = $\alpha+\beta-6 = \frac{1-6a}{a}$ Product of zeroes of required polynomial = $\alpha\beta - 3(\alpha+\beta) + 9 = \frac{c}{a} - \frac{3}{a} + 9$ $\therefore$ required polynomial is $x^2 - (\frac{1-6a}{a})x + \frac{c-3+9a}{a}$ or $ax^2-(1-6a)x + (c-3+9a)$	
13.	Zeroes of the quadratic polynomial $p(x) = (a^2 + 10)x^2 - 74x + 7a$ are reciprocal of each other and they are rational. Find the value of 'a'.	**COMPTT.**
Value point:	Since zeroes are reciprocal of each other, $\therefore \frac{7a}{(a^2+10)} = 1$ $\Longrightarrow a^2 - 7a + 10 = 0 \Longrightarrow a = 2 , 5$ For a = 5, zeroes are rational.	

CHAPTER 3: LINEAR EQUATION IN TWO VARIABLES

	1 MARK QUESTIONS	
1.	The value of 'k' for which the pair of linear equations has no solution, is: $(k + 1) x + 2(1 - k) y = 15$ $4y = 3x - 8$ (A) 3 (B) $\frac{1}{5}$ (C) 5 (D) $\frac{37}{8}$	**COMPTT**
Value point:	(C) 5	
2	If the pair of linear equations $2x + 3y = 5$ and $4ky - (1 - 3k) x = 6k + 2$ represents coincident lines, then the value of 'k' is : (A) $-\frac{1}{3}$ (B) 3 (C) $\frac{1}{4}$ (D) 4	**COMPTT**
Value point:	(B) 3	
3.	The value of 'p' for which the equations $px + 3y = p - 3$ $12x + py = p$ has infinitely many solutions is: (A) -6 only (B) 6 only (C) ±6 (D) Any real number except ± 6	**MAIN**
Value point:	(B) 6 only	
4.	The pair of linear equations $9x - 15y + 19 = 0$ and $5y - 3x - 9 = 0$ represents two lines which are : (A) intersecting exactly at one point. (B) intersecting exactly at two points. (C) parallel.	**COMPTT**

	(D) coincident.	
Value point: (C) parallel		
5.	Graphically, the pair of equations 8x – 4y + 12 = 0 and 2x – y + 5 = 0 represents two lines which are : (A) intersecting at exactly one point (B) intersecting at exactly two points (C) parallel (D) coincident	**COMPTT**
Value point: (C) parallel		
6.	If the system of equations 3x + 2y = 4 4ax + (a + b) y = 16 has infinitely many solutions, then (A) 5a = 3b (B) 3a = 5b (C) a + b = 15 (D) a – b = 2	**MAIN**
Value point: (A) 5a = 3b		
2 MARK QUESTIONS		
7.	Solve the following system of equations algebraically: 37x + 63y = 137 63x + 37y = 163	**MAIN**
Value point: Adding and subtracting the given equations, $x + y = 3$ … (i) and $x - y = 1$ … (ii) Solving (i) and (ii), $x = 2$, $y = 1$		
8.	Solve the following system of equations algebraically: 40x + 55y = 13 30x + 44y = 10	**MAIN**
Value point: Given equations can be rewritten as $120x + 176y = 40$ …(i) & $120x + 165y = 39$ …(ii) Subtracting both $y = \frac{1}{11}$ and Substituting to get $x = \frac{1}{5}$		
9.	Find the value(s) of k for which the pair of linear equations has infinitely many solutions. $kx + y = k^2$ $x + ky = 1$	**COMPTT**
Value point: For infinitely many solutions $\frac{k}{1} = \frac{1}{k} = \frac{k^2}{1} \Rightarrow k^2 = 1$ and $k^3 = 1$ $\Rightarrow k = \pm 1$ and $k = 1$ $\therefore k = 1$		
10.	Solve the following system of equations algebraically: 73x – 37y = 109 37x – 73 y = 1	**MAIN**
Value point: Adding and subtracting the given equations, $x - y = 1$ … (i) and $x + y = 3$ … (ii) Solving (i) and (ii), $x = 2$, $y = 1$		
3 MARK QUESTIONS		
11.	The two angles of a right angled triangle other than 90^0 are in the ratio 2:3. Express the given situation algebraically as a system of linear equations in two variables and hence solve it.	**MAIN**
Value point: Let the measures of two angles be x and y ATQ $x + y = 90°$ … (i) and $\frac{x}{y} = \frac{2}{3} \Rightarrow 3x - 2y = 0$ … (ii) Solving (i) and (ii), $x = 36°$, $y = 54°$		

<table>
<tr><td>12.</td><td>The monthly incomes of two persons are in the ratio 9:7 and their monthly expenditures are in the ratio 4: 3. If each saved₹ 5,000, express the given situation algebraically as a system of linear equations in two variables. Hence, find their respective monthly incomes.</td><td>MAIN</td></tr>
<tr><td colspan="3">Value point: Let us assume that income of two persons be ₹ $9x$ and ₹ $7x$ and their expenditures be ₹ $4y$ and ₹ $3y$
ATQ $9x - 4y = 5000$ and $7x - 3y = 5000$
Solving $x = 5000$
∴ Monthly incomes of two persons are ₹ 45000 and ₹ 35000 respectively.</td></tr>
<tr><td>13.</td><td>Check graphically whether the pair of linear equations $2x + 3y = 12$; $5x - 3y = 9$ is consistent. If so, solve it graphically.</td><td>COMPTT</td></tr>
<tr><td colspan="3">Value point:


As lines are intersecting, therefore given system of linear equations is consistent.
Solution is x = 3 , y = 2</td></tr>
<tr><td>14.</td><td>The perimeter of a rectangle is 70 cm. The length of the rectangle is 5 cm more than twice its breadth. Express the given situation algebraically as a system of linear equations in two variables and hence solve it.</td><td>MAIN</td></tr>
<tr><td colspan="3">Value point: Let the length and breadth of rectangle be x and y respectively.
ATQ $x + y = 35$ …(i) and $x - 2y = 5$ … (ii)
Solving (i) and (ii), $x = 25$ and $y = 10$
Hence the length and breadth of rectangle are 25 cm and 10 cm respectively.</td></tr>
<tr><td>15.</td><td>A 2-digit number is obtained by either multiplying the sum of the digits by 7 and then adding 3 or by multiplying the difference of the digits by 19 and then subtracting 1. It is given that the digit at ten's place is greater than that of unit's place. Find the number.</td><td>COMPTT</td></tr>
<tr><td colspan="3">Value point: Let the unit's place digit be y and ten's digit be x. So, number be 10 x + y
Therefore, $10x + y = 7(x + y) + 3 \Rightarrow x - 2y = 1$ --- ①
Also, $10x + y = 19(x - y) - 1 \Rightarrow -9x + 20y = -1$ --- ②
Solving ① and ②, x = 9, y = 4 ∴ the required number is 94.</td></tr>
<tr><td>16.</td><td>For what values of m and n, does the following pair of linear equations have infinitely many solutions?
$2x + 3y = 7$
$m(x + 2y) + n(x - y) = 21$</td><td>MAIN</td></tr>
</table>

Value point: For infinitely many solutions, we have $\frac{2}{m+n} = \frac{3}{2m-n} = \frac{7}{21} = \frac{1}{3}$ $\Rightarrow m + n = 6$ & $2m - n = 9$ Solving $m = 5$, $n = 1$		
17.	The ratio of monthly incomes of two persons is 11:7 and the ratio of their monthly expenditures is 9:5. If each of them saves ₹ 400 per month, find their monthly incomes.	**COMPTT**
Value point: Let the monthly income of two persons be ₹ 11x & ₹ 7x and monthly expenditure be ₹ 9y & ₹ 5y Therefore, $11x - 9y = 400$ --- ① & $7x - 5y = 400$ --- ② Solving ① and ②, $x = 200$ ∴ monthly income of two persons are ₹ 2200 and ₹ 1400		
18.	The sum of the numerator and the denominator of a fraction is 4 more than twice the numerator. If the numerator and denominator are increased by 3, they are in the ratio 2: 3. Determine the fraction.	**MAIN**
Value point: Let the fraction be $\frac{x}{y}$, $y \neq 0$ ∴ $x + y = 4 + 2x \Rightarrow y = x + 4$ ----- (i) And $\frac{x+3}{y+3} = \frac{2}{3} \Rightarrow 3x - 2y + 3 = 0$ ------- (ii) Solving (i) and (ii) , $x = 5$, $y = 9$ ∴ Fraction is $\frac{5}{9}$		

CHAPTER 4: QUADRATIC EQUATIONS

1 MARK QUESTIONS		
1.	The value(s) of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is/are : (a) 0 only (b) 0, 4 (c) 8 only (d) 0, 8	**COMPTT**
Value point: (d) 0, 8		
2	If one root of the quadratic equation $3x^2 - 9x + k - 1 = 0$ is reciprocal of the other, then the value of k is : (a) 4 (b) – 4 (c) – 2 (d) 3	**COMPTT**
Value point: (a) 4		
3.	The value of 'a' for which $ax^2 + x + a = 0$ has equal and positive roots is: (a) 2 (b) -2 (c) $\frac{1}{2}$ (d) $\frac{-1}{2}$	**MAIN**
Value point: (d) $\frac{-1}{2}$		
ASSERTION – REASON QUESTIONS		
Directions : In the following questions, an Assertion (A) is followed by a Reason (R). Choose the correct option: A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). B. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A). C. Assertion (A) is true but Reason (R) is false. D. Assertion (A) is false but Reason (R) is true.		

4.	Assertion (A): The quadratic equation $x^2 + 4x + 5 = 0$ has real roots. Reason (R): The quadratic equation $ax^2 + bx + c = 0, a \neq 0$ has real roots if $b^2 - 4ac \geq 0$.	**COMPTT**
Value point: D. Assertion (A) is false but Reason (R) is true.		
3 MARK QUESTIONS		
5.	Solve the following equation for x : $\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}$; $x \neq -4, 7$	**COMPTT**
Value point: $\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30} \Rightarrow x^2 - 3x + 2 = 0 \Rightarrow (x-2)(x-1) = 0 \Rightarrow x = 1, 2$		
5 MARK QUESTIONS		
6.	The sides of a right triangle are such that the longest side is 4 m more than the shortest side and the third side is 2 m less than the longest side. Find the length of each side of the triangle. Also, find the difference between the numerical values of the area and the perimeter of the given triangle.	**MAIN**
Value point: Let the length of shortest side be x m $\therefore$ length of longest side $=(x+4)$ m and length of third side $=(x+2)$ m Now, $(x+4)^2=x^2+(x+2)^2 \Rightarrow (x-6)(x+2)=0 \Rightarrow x=6$ $\therefore$ sides are 6 m, 8 m and 10 m Area $=\frac{1}{2}\times6\times8=24$ m^2 Perimeter $=6+8+10=24$ m Difference $=0$		
7.	Find the value of p for which the quadratic equation $(2p + 1)x^2 - (7p + 2)x + (7p - 3) = 0$ has equal roots. Also, find these roots.	**MAIN**
Value point: For equal roots, $D = 0 \Rightarrow [-(7p + 2)^2] - 4(2p + 1)(7p - 3) = 0$ $\Rightarrow 7p^2 - 24p - 16 = 0$ $\Rightarrow (7p + 4)(p - 4) = 0 \Rightarrow p = 4, \ p = \frac{-4}{7}$ For p = 4, the equation is $9x^2 - 30x + 25 = 0$ whose roots are $\frac{5}{3}, \frac{5}{3}$ For $p = \frac{-4}{7}$, the equation is $x^2 - 14x + 49 = 0$ whose roots are 7 ,7		
8.	Express the equation $\frac{x-2}{x-3} + \frac{x-4}{x-5} = \frac{10}{3}$ $(x \neq 3,5)$ as a quadratic equation in standard form. Hence, find the roots of the equation so formed.	**MAIN**
Value point: $\frac{x-2}{x-3} + \frac{x-4}{x-5} = \frac{10}{3} \Rightarrow \frac{(x-2)(x-5)+(x-4)(x-3)}{(x-5)(x-3)} = \frac{10}{3}$ Simplifying, we get $2x^2 - 19x + 42 = 0 \Rightarrow (x-6)(2x-7)=0 \Rightarrow x = 6$ or $x = \frac{7}{2}$		
9.	At present, Sourav's age is 3 years more than the square of his son Ravi's age. When Ravi grows to his father's present age, Sourav's age would be 6 years less than 13 times the present age of Ravi. Find present ages of Ravi and Sourav.	**COMPTT**
Value point: Let the present age of Ravi be 'r' years and the present age of Sourav be 's' years. Therefore, $s = 3 + r^2$ --- ① Ravi grows to father's present age in (s – r) years. $\therefore$ father's age after (s – r) years = (2s – r) years and Ravi's age after (s – r) years = 's' years Therefore, $s = 7r - 3$ --- ② Using ① and ②, $r^2 - 7r + 6 = 0 \Rightarrow (r-6)(r-1) = 0 \Rightarrow r = 6, 1$ Ignoring r = 1 as $s \neq 4$, we have r = 6, Hence s = 39		

10.	The denominator of a fraction is 2 more than the numerator. If 2 is added to both its numerator and denominator, then the sum of the new fraction and the original fraction is $\frac{46}{35}$. Find the original fraction.	COMPTT
Value point: Let the fraction be $\frac{x-2}{x-3}+\frac{x-4}{x-5}=\frac{10}{3}$ Therefore, $\frac{x}{x+2}+\frac{x+2}{x+4}=\frac{46}{35}$ $\Rightarrow 6x^2 + x - 57 = 0 \Rightarrow (6x + 19)(x - 3) = 0$ $x \neq \frac{-19}{6}$ $\therefore x = 3$ So, the required fraction is $\frac{3}{5}$.		

CHAPTER 5: ARITHMATIC PROGRESSIONS

1 MARK QUESTIONS		
1.	The 21st term of an AP, whose first two terms are – 3 and 4 respectively, is : (A) 17 (B) 143 (C) 137 (D) 153	**COMPTT.**
Value point: (C) 137		
2.	The 6th term of the AP $\sqrt{27}$, $\sqrt{75}$, $\sqrt{147}$ .... is: (A) $\sqrt{243}$ (B) $\sqrt{363}$ (C) $\sqrt{300}$ (D) $\sqrt{507}$	**COMPTT.**
Value point: (D) $\sqrt{507}$		
3.	The 5th term from the end of an AP – 11, – 8, – 5,…, 55 is : (A) 1 (B) 43 (C) 40 (D) 46	**COMPTT.**
Value point: (B) 43		
4.	If the sum of the first 'n' terms of an AP is $2n^2 + 5n$ then its common difference is: (A) 2 (B) 4 (C) 5 (D) 7	**COMPTT.**
Value point: (B) 4		
5.	Which term of the AP 7, 10, 13, ... is 52 ? (A) 13th (B) 15th (C) 16th (D) 17th	**COMPTT.**
Value point: (C) 16th		
6.	If the 23rd term of an AP exceeds its 16th term by 21, then the common difference is : (A) 1 (B) 2 (C) 3 (D) 7	**COMPTT.**
Value point: (C) 3		
ASSERTION-REASON QUESTIONS		
Directions : In the following questions, an Assertion (A) is followed by a Reason (R). Choose the correct option: A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). B. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A). C. Assertion (A) is true but Reason (R) is false. D. Assertion (A) is false but Reason (R) is true.		
7.	Assertion (A) : Common difference of the AP : 5, 1, -3, -7 is 4. Reason (R): Common difference of the AP : $a_1, a_2, a_3........a_n$ is obtained by $d = a_n - a_{n-1}$.	**COMPTT.**
Value point: D. Assertion (A) is false but Reason (R) is true.		
3 MARK QUESTIONS		

8.	The sum of the third and seventh terms of an AP is 40 and the sum of its sixth and fourteenth terms is 70. Find the sum of the first ten terms of the AP.	**MAINS**

Value point: $a_3 + a_7 = 40 \Longrightarrow a + 4d = 20$ --- ①

$a_6 + a_{14} = 70 \Longrightarrow a + 9d = 35$ --- ②

Solving ① and ②, we get a = 8 and d = 3

$S_{10} = \frac{10}{2} \times [\,(2\times8) + (9\times3)] = 215$

4 MARK QUESTIONS *(CASE STUDY)*

9. Cable cars at hill stations are one of the major tourist attractions. On a hill station, the length of cable car ride from base point to top most point on the hill is 5000 m. Poles are installed at equal intervals on the way to provide support to the cables on which car moves. The distance of first pole from base point is 200 m and subsequent poles are installed at equal interval of 150 m. Further, the distance of last pole from the top is 300 m. **MAINS**

Based on above information, answer the following questions using Arithmetic Progression:

(i) Find the distance of 10th pole from the base.

(ii) Find the distance between 15th pole and 25th pole.

(iii) Find the time taken by cable car to reach 15th pole from the top if it is moving at the speed of 5m/sec and coming from top.

OR

Find the total number of poles installed along the entire journey.

Value point: AP formed is 200,350,500,…

(i) Distance of 10th pole from base = a_{10} = 200+9×150 =1550 m

(ii) Distance between 15th pole and 25th pole = $a_{25} - a_{15}$ =10×150=1500 m

(iii) Distance of 15th pole from the top =300+14×150 =2400 m

Time taken by cable car = $\frac{2400}{5}$ = 480 seconds or 8 minutes

OR

Distance of last pole from the base =(5000−300) m =4700 m

$\therefore a_n$=4700 $\Longrightarrow$ n=31

10.	In the month of September, villagers of Ankurhut were falling ill with high temperature. Paracetamol was one of the highest sold medicines during that phase. A survey was conducted to estimate the overall sale of Paracetamol of each pharmacy during the last 7 days. It was observed that the number of Paracetamol sold in different shops were all 3-digit numbers, divisible by 13, taken in order. Based on the information given above, answer the following questions: (i) How many Paracetamols were sold by the 7th pharmacy?	**COMPTT.**

	(ii) What was the difference between the number of Paracetamols sold by the 14th and the 9th pharmacy? (iii) How many Paracetamols were sold by the 9th pharmacy from the last? OR What was the total number of Paracetamols sold in that week?	

Value point: (i) A.P. formed is 104, 117, 130, … with a = 104 and d = 13

$a_7 = 104 + 6 \times 13 = 182$

(ii) $a_{14} - a_9 = 5 \times 13 = 65$

(iii) Last term of A.P. is 988 and d = – 13 $\Rightarrow a_9 = 988 + 8 \times (-13) = 884$

OR

Last term of A.P. is 988 and d = – 13 $\Rightarrow n = 69$

$S_{69} = 37674$

11.	To inculcate the good habit of savings in her children, Reema brought a piggy bank and after putting a ₹10 coin in it, she handed it over to her daughter Amisha and asked her to put money in it from her pocket money at the beginning of every week. Amisha put two ten rupee coins at the beginning of next (second) week and in this way increases her savings by one ₹10 coin every week. Based on the above, answer the following questions: (a) How many coins were added in the piggy bank at the beginning of 5th week? (b) How many ₹10 coins will be there in the piggy bank after the end of 7 weeks? (c) If the piggy bank can hold a maximum of 300 ₹10 coins, after how many weeks it would be full? OR Find the total amount of money in the piggy bank at the end of 20 weeks.	**MAINS**

Value point: (a) $a_5 = 1 + 4(1) = 5$

(b) $S_7 = \frac{7}{2}[2 + 6\times1] = 28$ coins

(c) $S_n = \frac{n}{2}[2 + (n-1)\times1] = 300 \Rightarrow n = 24$ weeks

OR

$S_{20} = 10[20 + 19\times10] =$ ₹ 2100

5 MARK QUESTIONS

12.	The sum of the third term and the seventh term of an AP is 6 and their product is 8. Find the sum of the first sixteen terms of the AP.	**MAINS**

Value point: ATQ, $(a+2d)+(a+6d)=6$ and $(a+2d)(a+6d)=8 \Rightarrow d = \pm\frac{1}{2}$

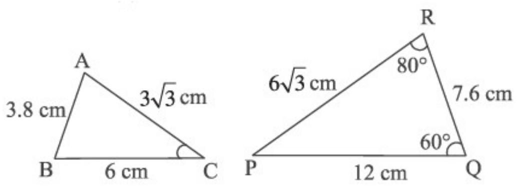
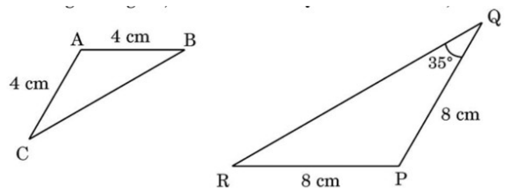
When $d = \frac{1}{2} \Rightarrow a=1 \Rightarrow S_{16} = \frac{16}{2}[2\times1+15\times1\ 2] =76$

When $d = -\frac{1}{2} \Rightarrow a=5 \Rightarrow S_{16} = \frac{16}{2}[2\times5+15\times(-1\ 2)] =20$

13.	The minimum age of children eligible to participate in a painting competition is 8 years. It is observed that the age of the youngest boy was 8 years and the ages of the	**MAINS**

	participants, when seated in order of age, have a common difference of 4 months. If the sum of the ages of all the participants is 168 years, find the age of the eldest participant in the painting competition.	
Value point: The ages of the participants form the following AP 8, $8\frac{1}{3}$, $8\frac{2}{3}$, 9,⋯ $S_n=\frac{n}{2}[2\times8+(n-1)\frac{1}{3}]=168 \Rightarrow n^2+47n-1008=0$ $\Rightarrow n=16$ ∴the age of the eldest participant = $8+15\times\frac{1}{3}$ =13 years		

CHAPTER 6: TRIANGLES

1 MARK QUESTIONS		
1.	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 length of the corresponding side of the second triangle is : (A) 5.4 cm (B) 6.8 cm (C) 2.5 cm (D) 4 cm	**COMPTT.**
Value point: (A) 5.4 cm		
2.	△ABC and △PQR are shown in the adjoining figures. The measure of C is:  (A) 140° (B) 80° (C) 60° (D) 40°	**MAIN**
Value point: (D) 40°		
3.	ABCD is a trapezium with AB‖DC and the diagonals intersect at O. If AO = (2x + 1) cm, OC = (5x – 7) cm, DO = (7x – 5) cm and OB = (7x + 1) cm, then the value of x is : (A) 2 (B) 3 (C) 4 (D) 1	**COMPTT.**
Value point: (A) 2		
4.	The points E and F are on the sides AB and AC of △ABC such that $\frac{AE}{EB}=\frac{AF}{FC}=\frac{1}{2}$. Which of the following relation is true? (A) EF = 2BC (B)BC = 2EF (C)EF = 3BC (D) BC = 3EF	**MAIN**
Value point: (D) BC = 3EF		
5.	In the given figure, △ABC and △PQR will be similar, if :  (A) Length of side BC is 4 2cm (B) BC : RQ = 2 : 1 (C) Measure of ∠A is 35° (D) Measure of ∠A is 110°	**COMPTT.**
Value point: (D) Measure of ∠A is 110°		
6.	Raina is 1.5 m tall. At an instant, his shadow is 1.8 m long. At the same instant, the shadow of a pole is 9 m long. How tall is the pole? (A) 6.5 m (B) 7.5 m (C) 8.5 m (D) 6.2 m	
Value point: (B) 7.5 m		

2 MARK QUESTIONS

7. A 1.5 m tall boy is walking away from the base of a lamp post which is 12 m high, at the speed of 2.5 m/sec. Find the length of his shadow after 3 seconds. **MAIN**

Value point: Distance covered in 3 seconds = 7.5 m

$\Delta ABE \sim \Delta CDE \Rightarrow \frac{CD}{AB} = \frac{DE}{BE}$

$\Rightarrow = \frac{1.5}{12} = \frac{x}{7.5+x} \Rightarrow x = 1.07$ approx.

Hence length of shadow is 1.07 m

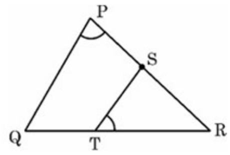
8. S and T are points on sides PR and QR of $\triangle PQR$ such that $\angle P = \angle RTS$. Show that $\angle RPQ \sim \angle RTS$. **COMPTT**

Value point: In Δ RPQ and Δ RTS,

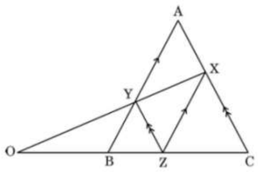
$\angle P = \angle RTS$

$\angle PRT = \angle SRT$

$\therefore \Delta RPQ \sim \Delta RTS$



9. In the given figure, Z is a point on the side BC of $\triangle ABC$ such that XZ∥AB and YZ ∥ AC. If XY and CB are produced to meet at O. then prove that $ZO^2 = OB \times OC$. **COMPTT**



Value point: In ΔOZX, $\frac{OB}{OZ} = \frac{OY}{OX}$ --- ①

In ΔOCX, $\frac{OZ}{OC} = \frac{OY}{OX}$ --- ②

Using ① and ②, $\frac{OB}{OZ} = \frac{OZ}{OC} \Rightarrow ZO^2 = OB \times OC$

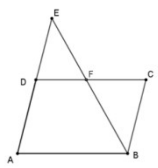
10. In parallelogram ABCD, side AD is produced to a point E and BE intersects CD at F. Prove that $\triangle ABE \backsim \triangle CFB$. **MAIN**

Value point: In ΔABE and ΔCFB,

$\angle AEB = \angle CBF$

$\angle A = \angle C$

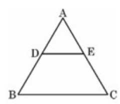
$\therefore \Delta ABE \sim \Delta CFB$



11. If a line intersects sides AB and AC of $\triangle ABC$ at D and E respectively and is parallel to BC, prove that $\frac{AD}{AB} = \frac{AE}{AC}$. **COMPTT**

Value point: $\Delta ADE \sim \Delta ABC$

$\therefore \frac{AD}{AB} = \frac{AE}{AC}$



4 MARK QUESTIONS *(CASE STUDY)*

12. On a road leading to a school, there is a triangle (ABC) shaped board on the road. It is divided into two parts by a line DE, which is parallel to BC. On the upper part, it is written 'DRIVE SLOW' and on the lower part it is written, 'SCHOOL AHEAD'. **COMPTT**

Based on the information given above, answer the following questions :

(i) If AD = 3 cm, BD = 5 cm and AE = 4 cm, then find the length of AC.

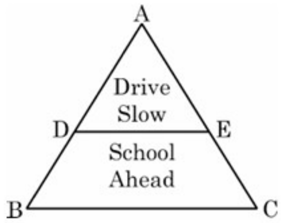
(ii) If $\angle ADE = 50°$ and $DAE = \angle 45°$, then find $\angle ACB$.

(iii) If AD = 4 cm and BD = 6 cm, then find $\frac{DE}{BC}$.

OR

If AD = 3 cm, BD = 6 cm and AE = 5 cm, then find $\frac{AB}{AC}$.

Value point: (i) $\frac{3}{3+5} = \frac{4}{AC} \Rightarrow AC = \frac{32}{3}$ cm



(ii) ∠ACB = ∠AED = 180° – (50° + 45°) = 85°

(iii) Δ ADE ~ Δ ABC ⇒ $\frac{DE}{BC} = \frac{AD}{AB} = \frac{4}{10}$

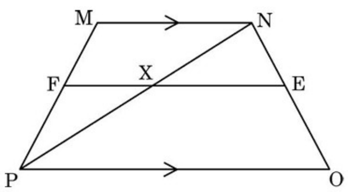
OR

DE ∥ BC ⇒ $\frac{3}{6} = \frac{5}{EC} \Rightarrow EC = 10$

$\frac{AB}{AC} = \frac{3+6}{5+10} = \frac{9}{15}$

5 MARK QUESTIONS

13. In the figure, MNOP is a trapezium with, MN∥PO and PO = 2 MN. A line segment FE drawn parallel to MN intersects MP at F and NO at E such that $\frac{NE}{EO} = \frac{3}{4}$. Diagonal PN intersects FE at X. Prove that 7FE = 10MN. **COMPTT**



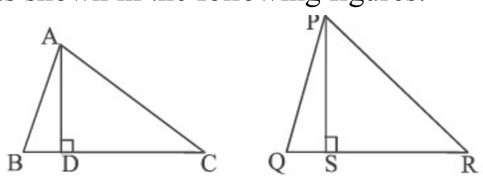
Value point: $\frac{NE}{EO} = \frac{3}{4} \Rightarrow \frac{NE}{NO} = \frac{3}{7}$

$\frac{NX}{NP} = \frac{NE}{NO} = \frac{XE}{PO} = \frac{3}{7} \Rightarrow \frac{XE}{MN} = \frac{6}{7}$ --- ①

$\frac{XP}{NP} = \frac{FX}{MN} = \frac{4}{7}$ --- ②

Using ① and ②, $\frac{XE}{MN} + \frac{FX}{MN} = \frac{6}{7} + \frac{4}{7} \Rightarrow 7FE = 10MN$

14. The corresponding sides of △ABC and △PQR are in the ratio 3: 5. AD⊥ BC and PS⊥QR as shown in the following figures: **MAIN**



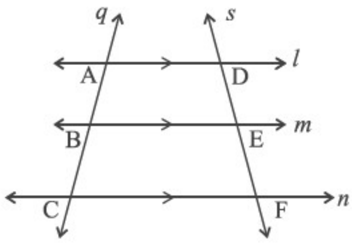
(i) Prove that △ADC ∽ △PSR.
(ii) If AD=4 cm, find the length of PS.
(iii) Using (ii) find ar (ΔABC): ar (ΔPQR) .

Value point: As, $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{3}{5} \Rightarrow$ Δ ABC ~ Δ PQR

(i) In Δ ADC and Δ PSR, ∠ ADC= ∠ PSR and ∠ C= ∠R

∴ Δ ADC ~ Δ PSR

(ii) $\frac{AD}{PS} = \frac{AC}{PR} = \frac{3}{5} \Rightarrow PS = \frac{20}{3}$ cm

	(iii) ar (ΔABC): ar (ΔPQR) = 9:25	
15.	State basic proportionality theorem. Use it to prove the following: If three parallel lines l, m, n are intersected by transversals q and s as shown in the adjoining figure, then $\frac{AB}{BC} = \frac{DE}{EF}$. 	**MAIN**
Value point:	Correct statement Join AF intersecting line m at G In Δ ACF,BG ∥CF $\Longrightarrow \frac{AB}{BC} = \frac{AG}{GF}$ … (i) In Δ FDA,GE ∥AD $\Longrightarrow \frac{DE}{EF} = \frac{AG}{GF}$ … (ii) From, (i) and (ii), $\frac{AB}{BC} = \frac{DE}{EF}$	

CHAPTER 7: COORDINATE GEOMETRY

	1 MARK QUESTIONS	
1.	A(- 4, 5) and C(8,2) are the two opposite vertices of a parallelogram ABCD. Its diagonals intersect each other at P(a,b). The relation between 'a' and 'b' is: (A) b = a – 1.5 (B) b = a + 1.5 (C) b = a - 4.5 (D) b = a + 4.5	**COMPTT.**
Value point:	(B) b = a + 1.5	
2.	The distance of a point A from x-axis is 3 units. Which of the following cannot be coordinates of the point A? (A) (1,3) (B) (-3,-3) (C) (3,3) (D) (3,1)	**MAIN**
Value point:	(D) (3,1)	
3.	The distance of which of the following points from origin is less than 5 units? (A) (3,4) (B) (2,6) (C) (-3,4) (D) (1,4)	**MAIN**
Value point:	(D) (1,4)	
4.	M is a point on y-axis at a distance of 4 units from x-axis and it lies below the x-axis. The distance of point M from point Q (5, 1) is: (A) $\sqrt{2}$ units (B) $\sqrt{34}$ units (C) $\sqrt{50}$ units (D) $\sqrt{90}$ units	**COMPTT.**
Value point:	(C) $\sqrt{50}$ units	
5.	The distance of a point P(1,-1) from x-axis is : (A) 1 (B) -1 (C) 0 (D) $\sqrt{2}$	**MAIN**
Value point:	(A) 1	
6.	The distance between the points (4 cos θ + 3sin θ, 0) and (0, 4 sin θ-3 cos θ) is: (A) 25 (B) 7 (C) 5 (D) $\sqrt{7}$	**MAIN**
Value point:	(C) 5	
7.	A circle with centre P(4, 5) passes through the point A(0, 9). The length of the diagonal of the largest square inside this circle is :	**COMPTT.**

	(A) $4\sqrt{2}$ units (B) $8\sqrt{2}$ units (C) $\sqrt{53}$ units (D) $2\sqrt{53}$ units	
Value point: (B) $8\sqrt{2}$ units		
8.	The point on y-axis which is equidistant from points A(1, 3) and B(4, 4) is: (A) (0, 11) (B) (11,0) (C) (0,13) (D) (0,12)	**MAIN**
Value point: (A) (0, 11)		
9.	The line represented by $2y – x = 4$ intersects the y-axis at : (A) (2, 0) (B) (0, – 4) (C) (0, 2) (D) (2, 2)	**COMPTT.**
Value point: (C) (0, 2)		
10.	If the points A(5, 4) and B(x, 6) are on a circle with centre (3, 4), then the value of x is : (A) 6 (B) 7 (C) 3 (D) 1	**COMPTT.**
Value point: (C) 3		

ASSERTION – REASON QUESTIONS

Directions : In the following questions, an Assertion (A) is followed by a Reason (R). Choose the correct option:

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
B. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
C. Assertion (A) is true but Reason (R) is false.
D. Assertion (A) is false but Reason (R) is true.

11.	Assertion (A): The point (-2, 4) divides the line segment joining the points (-4, 8) and (5, -10) in the ratio 2: 7 internally. Reason (R) : If three points P, Q and R are collinear, then PQ + QR = PR.	**COMPTT.**
Value point: B. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).		

2 MARK QUESTIONS

12.	Show that the points (a, a), (– a, – a) and $(-\sqrt{3}a, \sqrt{3}a)$ are the vertices of an equilateral triangle.	**COMPTT.**
Value point: $AB = BC = CA = 2\sqrt{2}\,a$ Since AB = BC = CA Therefore, Δ ABC is an equilateral triangle.		
13.	Find the coordinates of point C which lies on the line AB produced such that AC = 2BC, where coordinates of A and B are (-1,7) and (4,-3) respectively**.**	**MAIN**
Value point: AC = 2 BC ⟹ B is mid-point of AC ⟹ $y = -13$ ∴ Coordinates of C are (9,−13)		

3 MARK QUESTIONS

14.	In what ratio does the point (2, p) divide the line segment joining the points (– 4, 2) and (5, – 1) ? Also, find the value of 'p'.	**COMPTT.**
Value point: Let the ratio be k : 1 ⟹ k = 2 ∴ required ratio is 2 : 1 Now, p = 0		
15.	The points A(3, 6), B(k, 2) and C(6, 2) are the vertices of a right triangle ABC right-angled at B. Find the value of k.	**COMPTT.**
Value point: $AC^2 = 25$ $AB^2 = k^2 – 6k + 25$ $BC^2 = k^2 – 12k + 36$ Since Δ ABC is right angled at B. ∴ $AB^2 + BC^2 = AC^2$ ⟹ $k^2 – 9k + 18 = 0$ ⟹ k = 3, 6		
16.	P (x, y), Q (2,3) and R (2, 3) are the vertices of a right triangle PQR right angled at P. Find the relationship between x and y. Hence, find all possible values of x for which y = 2.	**MAIN**

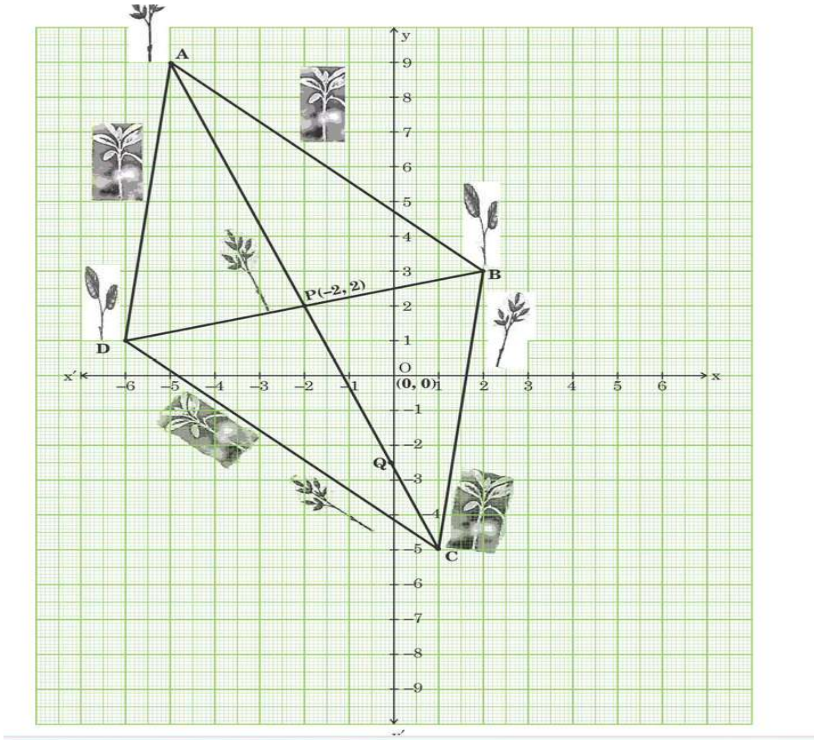
Value point: In Δ PQR, $\angle P=90°$ $\therefore PQ^2+PR^2 = QR^2$

$\Rightarrow (x+2)^2 + (y+3)^2 + (x-2)^2 + (y-3)^2 = 42+62$ gives $x^2+y^2=13$

Now for $y = 2$, $x = \pm 3$

4 MARK QUESTIONS *(CASE STUDY)*

17. Trees act the natural filters. By planting trees in and around school premises, we create cleaner and healthier air for students and local residents, reducing respiratory problems. A school in Noida has proposed and organised a community drive on tree plantation under the title "Save Earth, Plant Trees". Students of that school have planted saplings in the field such that it formed a quadrilateral as shown in the figure: **COMPTT.**



Based on the information given above, answer the following questions:

(i) Find the distance between the two saplings at A and D.

(ii) One student plants one sapling at the mid-point of AD. Then he moves along a straight line parallel to DB and sows another sapling on AB. What are the coordinates of the positions of these two new saplings?

OR

A new sapling is kept at a point M on DB such that DM: MB = 3: 1. Find the coordinates of M.

(iii) The line segments AC and BD bisect each other at P(-2, 2). Find the coordinates of C.

Value point: (i) Coordinates of points are A (– 5, 9) and D (– 6, 1) $\Rightarrow$ AD = $\sqrt{65}$

(ii) Mid point of AD = $\left(-\frac{11}{2}, 5\right)$

Student will sow another sapling at mid point of AB. Point B is (2, 3)

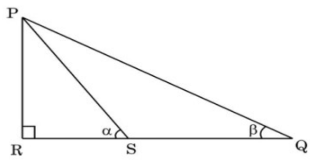
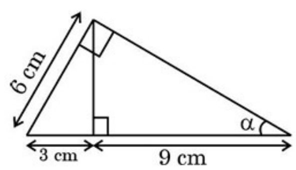
Mid point of AB = $\left(-\frac{3}{2}, 6\right)$

OR

Coordinates of M = $\left(0, \frac{5}{2}\right)$

(iii) Coordinates of C are (1, – 5)

CHAPTER 8: INTROUCTION TO TRIGONOMETRY

	1 MARK QUESTIONS	
1.	If cot A = $\frac{7}{12}$ then the value of (cos A + sin A) cosec A is: (A) $\frac{5}{12}$ (B) $\frac{19}{12}$ (C) $\frac{19}{7}$ (D) $\frac{49}{144}$	**COMPTT.**
Value point: (B) $\frac{19}{12}$		
2.	tan 2A = 3 tan A is true, when the measure of A is: (A) 90° (B) 60^0 (C) 45^0 (D) 30^0	**MAIN**
Value point: (D) 30^0		
3.	If x = p $\cos^3\propto$ and y =q $\sin^3\propto$ then the value of $(\frac{x}{p})^{2/3} + (\frac{y}{q})^{2/3}$ is : (A) 1 (B) 2 (C) p (D) q	**COMPTT.**
Value point: (A) 1		
4.	Which of the following statements is true? (A) sin 20^0 > sin 70^0 (B) sin20^0 > cos 20^0 (C) cos 20^0 > cos 70^0 (D) tan 20^0 > tan 70^0	**MAIN**
Value point: (C) cos 20^0 > cos 70^0		
5.	Find the value of $\frac{\tan \propto}{\tan \beta}$ from the following diagram. It is given that RS : SQ = 1:2.  (A) 1 (B) 2 (C) 3 (D) 4	**COMPTT.**
Value point: (C) 3		
6.	If cot $\theta = \frac{p}{q}$ (q ≠0), then sin θ is equal to : (A) $\frac{p}{\sqrt{p^2+q^2}}$ (B) $\frac{\sqrt{p^2+q^2}}{p}$ (C) $\frac{q}{\sqrt{p^2+q^2}}$ (D) $\frac{q}{\sqrt{p^2-q^2}}$	**COMPTT.**
Value point: (C) $\frac{q}{\sqrt{p^2+q^2}}$		
7.	Sec A = 2cos A is true for A = (A) 0° (B) 30^0 (C) 45^0 (D) 60^0	**MAIN**
Value point: (C) 45^0		
8.	Which of the following is a trigonometric identity? (A) $\sin^2\theta = 1 + \cos^2\theta$ (B) $\text{cosec}^2\theta + \cot^2\theta = 1$ (C) $\sec^2\theta = 1 + \tan^2\theta$ (D) $\sin 2\theta = 2\sin\theta$	**MAIN**
Value point: (C) $\sec^2\theta = 1 + \tan^2\theta$		
	2 MARK QUESTIONS	
9.	From the given figure, find the value of sin **α**. 	**COMPTT.**

Value point: $\sin\alpha = \frac{\text{Perpendicular}}{\text{Hypotenuse}} = \frac{6}{3+9} = \frac{1}{2}$		
10.	If $\sin(2A + 3B) = 1$ and $\cos(2A - 3B) = \frac{\sqrt{3}}{2}$ where $0^0 < 2A + 3B \leq 90^0$ and $A > B$ then find A and B.	**COMPTT.**
Value point: $\sin(2A + 3B) = 1 \Rightarrow 2A + 3B = 90°$ --- ① $\cos(2A - 3B) = \frac{\sqrt{3}}{2} \Rightarrow 2A - 3B = 30°$ --- ② Solving ① and ②, A = 30° and B = 10°		
11.	Find the value of x for which $(\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2 = x + \tan^2 A + \cot^2 A$.	**MAIN**
Value point: $(\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2 = x + \tan^2 A + \cot^2 A$ $\Rightarrow \sin^2 A + \text{cosec}^2 A + 2 + \cos^2 A + \sec^2 A + 2 = x + \tan^2 A + \cot^2 A$ $\Rightarrow \quad x = 7$		
12.	Evaluate the following: $$\frac{3\sin 30° - 4\sin^3 30°}{2\sin^2 50° + 2\cos^2 50°}$$	**MAIN**
Value point: $\frac{3\sin 30° - 4\sin^3 30°}{2\sin^2 50° + 2\cos^2 50°} = \frac{3\times\frac{1}{2} - 4\times\frac{1}{8}}{2(\sin^2 50° + \cos^2 50°)} = \frac{1}{2}$		
3 MARK QUESTIONS		
13.	Prove that: $\frac{1}{\cot^2 A} + \frac{1}{1+\tan^2 A} = \frac{1}{1-\sin^2 A} - \frac{1}{\text{cosec}^2 A}$	**COMPTT.**
Value point: LHS = $\tan^2 A + \cos^2 A$ RHS = $\sec^2 A - \sin^2 A = \tan^2 A + 1 - \sin^2 A = \tan^2 A + \cos^2 A$ $\therefore$ LHS = RHS		
14.	Prove that: $$\frac{\cot\theta + \text{cosec }\theta - 1}{\cot\theta - \text{cosec }\theta + 1} = \frac{1+\cos\theta}{\sin\theta}$$	**COMPTT.**
Value point: LHS = $\frac{(\cot\theta + \text{cosec}\theta) - (\text{cosec}^2\theta - \cot^2\theta)}{\cot\theta - \text{cosec}\theta + 1}$ $= \frac{(\cot\theta + \text{cosec}\theta)(\cot\theta - \text{cosec}\theta + 1)}{\cot\theta - \text{cosec}\theta + 1}$ $= (\cot\theta + \text{cosec}\theta) = \frac{1+\cos\theta}{\sin\theta}$ = RHS		
15.	Prove that: $$\frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta} = \sec\theta\,\text{cosec}\,\theta - 2\sin\theta\cos\theta$$	**COMPTT.**
Value point: LHS = $\frac{\sin^3\theta}{\cos\theta} + \frac{\cos^3\theta}{\sin\theta} = \frac{(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta}{\sin\theta\cos\theta}$ $= \frac{1}{\sin\theta\cos\theta} - 2\sin\theta\cos\theta$ $= \text{cosec}\theta\sec\theta - 2\sin\theta\cos\theta$ = RHS		

16.	Prove that $\frac{\cos A+\sin A-1}{\cos A-\sin A+1}$ = cosec(A) - cot A	**MAIN**

Value point: LHS = $=\frac{\cot A+1-\text{cosec} A}{\cot A-1+\text{cosec } A}=\frac{\cot A-\text{cosec} A+ cosec^2 A-cot^2 A}{\cot A-1+\text{cosec } A}$

$=\frac{(\text{cosec } A-\cot\ )(-1+\text{cosec } A+\cot A)}{\cos A-\sin A+1}$

= cosec A− cotA= RHS

17.	If cot θ + cos θ = p and cot θ - cos θ = q, then prove that $p^2 - q^2 = 4\sqrt{pq}$.	**MAIN**

Value point: LHS = $(\cot\theta+\cos\theta)^2-(\cot\theta-\cos\theta)^2$

$=[(\cot\theta+\cos\theta)+(\cot\theta-\cos\theta)][(\cot\theta+\cos\theta)-(\cot\theta-\cos\theta)]$

$= 2\cot\theta \times 2\cos\theta = 4\cot\theta\cos\theta$

RHS $= 4\sqrt{(\cot\theta+\cos\theta)(\cot\theta-\cos\theta)} = 4\sqrt{cos^2\theta\ (cosec^2\theta-1)}$

$= 4\cot\theta\cos\theta$

∴ LHS = RHS

CHAPTER 9: HEIGHTS & DISTANCES

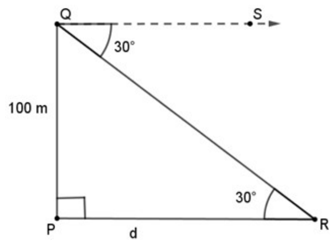
1 MARK QUESTIONS

1.	A 14 m long ladder rests against a wall. If the foot of the ladder is 7 m from the wall, the angle of elevation of the top of the wall is: (a) 15° (b) 30° (c) 45° (d) 60°	**MAINS**
Value point : (d) 60°		
2.	A kite is flying at a height of 50 m above the ground. The angle of elevation of the string with the ground is 60°. The length of the kite string is: (a) $\frac{100}{\sqrt{3}}$ m (b) $100\sqrt{3}$ m (c) 150 m (d) $\frac{50}{\sqrt{3}}$ m	**COMPTT.**
Value point : (a) $\frac{100}{\sqrt{3}}$ m		
3.	A 30 m long rope is tightly stretched and tied from the top of pole to the ground. If the rope makes an angle of 60°with the ground, the height of the pole is: (a) $10\sqrt{3}$ m (b) $30\sqrt{3}$ m (c) 15 m (d) $15\sqrt{3}$ m	**MAINS**
Value point : (d) $15\sqrt{3}$ m		
4.	A kite is flying at a height of 150 m above the ground. The string to which it is attached makes an angle of 30° with the horizontal direction of the ground. The length of the string is: (a) $100\sqrt{3}$ m (b) 300 m (c) $150\sqrt{2}$ m (d) $150\sqrt{3}$ m	**MAINS**
Value point : (b) 300 m		
5.	A peacock sitting at the top of a tree 10 m high sees a snake moving on the ground. If the snake is $10\sqrt{3}$ m from the base of the tree, the angle of depression of the snake from the peacock's eye is: (a) 30° (b) 45° (c) 60° (d) 90°	**MAINS**
Value point : (a) 30°		

4 MARK QUESTIONS *(CASE STUDY)*

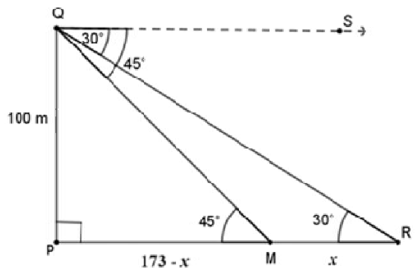
6.	A drone was used to facilitate the movement of an ambulance on a highway directly opposite a point P on the ground where the accident occurred. The ambulance was travelling at a speed of 60 km/h. The drone stopped at a point Q, 100 m perpendicular to the point P. The angle of depression of the ambulance was found to be 30° at a particular instant. Based on the above information, answer the following questions: (i) Represent the above situation with a diagram. (ii) Find the distance between the ambulance and the accident spot (P) at a particular instant. (iii) Find the time (in seconds) in which the angle of depression changes from 30° to 45°. OR How much time (in seconds) will it take for the ambulance to reach point P from a point T on the highway, given that the angle of depression of the ambulance at T is 60° from the drone?	**MAINS**

Value point : (i)



(ii) In Δ PQR, $\frac{100}{d}$ = tan 30° $\Rightarrow$ d=100√3 = 173 m

(iii)



In Δ PQM, $\frac{100}{173-x}$ = tan 45° = 1

$\Rightarrow x = 73$ m

Time taken = $\frac{73\times18}{60\times5} = \frac{219}{50}$ or 4.4 seconds (approx.)

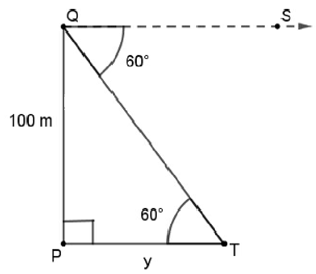
OR

In Δ PQT, $\frac{100}{y}$ = tan 60°

$\Rightarrow$ y = $\frac{100}{\sqrt{3}}$ or $\frac{173}{3}$ m

Time taken = $\frac{100\sqrt{3} \times 18}{3 \times 60 \times 5}$

= 2√3 or 3.5 seconds (approx.)



7.	The International Kite Festival is held every year on 14 January. The main attractions of the festival include a parade of national and international kite flyers, kite flying, traditional stalls, etc. On this day, some kite flyers gathered at a point 'O' on the ground. Three kites A, B, C were positioned such that A and B were at the same vertical height of 40 m from the ground. The angles of elevation of A, B and C from O were 60°, 45° and 30° respectively.	**COMPTT.**

	A vertical tower SD is erected at point S and a camera is fixed at the top of the tower for photography. Based on the information above, answer the following questions: (i) What is the length of the kite's string at A? (ii) If the length of the kite's string at C is 40 m, find the height of kite C from the ground. (iii) What is the horizontal distance between the kites at A and B? OR If the angle of depression of the kite at A is 30° from the camera at D and the distance between A and D is 60 m, find the height of the tower.	

Value point : (i) $\sin 60° = \frac{\sqrt{3}}{2} \Rightarrow OA = \frac{80\sqrt{3}}{3}$ m

(ii) $\sin 30° = \frac{1}{2} \Rightarrow RC = 20$ m

(iii) $\tan 45° = \frac{40}{OQ} \Rightarrow OQ = 40$ m

Also, $\tan 60° = \frac{40}{OP} \Rightarrow OP = \frac{40}{\sqrt{3}}$ m

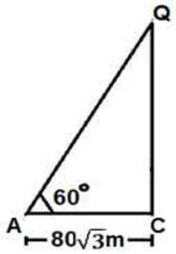
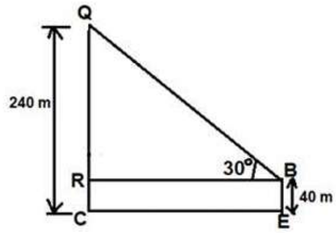
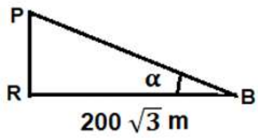
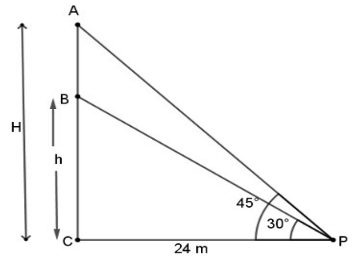
$AB = PQ = (40 + \frac{40}{\sqrt{3}})$ m

OR

$\sin 30° = \frac{1}{2} \Rightarrow h = 30$ m

Height of the tower = 40 + 30 = 70 m

8.	The Statue of Unity, located in Gujarat, is the world's tallest statue, standing on a 58-meter-high platform. As a project, a student constructed an inclinometer and used it to determine the height of the Statue of Unity. He noted the following observations from two locations: Case I: From point A, which is 80√3 meters from the base, the angle of elevation of the top of the statue is found to be 60°. Case II: From point B, which is 40 meters from the base, the angle of elevation of the top of the statue is found to be 30°, and the total height of the statue, including the height of B from the ground, is found to be 240 meters.  Based on the above information, answer the following questions: (i) Represent Case I with a diagram. (ii) Represent Case II with a diagram. (iii) Calculate the height of the statue excluding the base and the height including the base using the diagram for Case I. OR Find the horizontal distance from the statue to point B (Case II) and the value of tan a, where a is the angle of elevation of the top of the base of the statue from point B.	**MAINS**

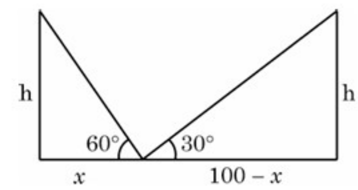
Value point : (i)  (ii)  (iii) In Δ ACQ, $\frac{QC}{AC}$ = tan 60° ⟹ QC = 240 m Height of statue including base = 240 m Height of statue excluding base = 240 – 58 = 182 m OR QR = 240 – 40 = 200 m In Δ QRB, $\frac{QR}{RB}$ = tan 30° Horizontal distance RB = 200 √3 m In Δ PRB, tan α = $\frac{3\sqrt{3}}{100}$ 		
9.	A clinometer is an instrument for measuring angles of elevation. It allows us to determine the height of very tall objects, which we cannot normally reach. Harish used it to determine the angle of elevation of the roof of a building from a point P on the ground as 45°. The society's logo was also displayed at a certain height on the wall of the building, and Harish determined its angle of elevation to be 30°. Point P is 24 m from the base of the building. Based on the above, answer the following questions: (i) What is the height of the people on the building from the ground? OR What is the height of the building from the ground? (ii) What is the aerial (slant) distance of point P from the top of the building? (iii) If point P is moved 9 m towards the base of the building, then find tan θ.	**MAINS**
Value point : (i) In Δ BCP, $\frac{h}{24}$ = tan 30° ⟹ h = 8√3 m OR In Δ ACP, $\frac{H}{24}$ = tan 45° ⟹ H = 24 m (ii) Slant distance = AP = $\sqrt{24^2 + 24^2}$ = 24√2 m (iii) CP = (24−9) = 15 m tan θ = $\frac{24}{15}$ or $\frac{8}{5}$ 		
5 MARK QUESTIONS		
10.	Two poles of equal height are placed opposite each other on either side of a 100-m wide road. The angles of elevation of the tops of the poles from a point on the road between the two poles are 60° and 30°, respectively. Find the heights of the poles.	**COMPTT.**

Value point : Let 'h' be the height of pole $\Rightarrow h = \sqrt{3}x$ --- ①

Also, $h = 100 - x\sqrt{3}$ --- ②

From ① and ②, $x = 25$

Hence, $h = 25\sqrt{3}$ m



11. Two ships are sailing at sea on either side of a lighthouse. Viewed from the top of the lighthouse, the angles of depression of the two ships are 60° and 45°, respectively. If the distance between the two ships is $100(\frac{1+\sqrt{3}}{\sqrt{3}})$ m , find the height of the lighthouse. **MAINS**

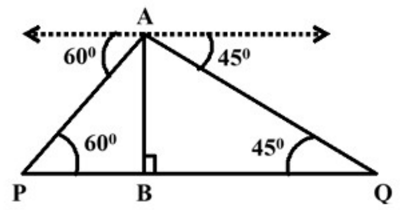
Value point : Here, AB represents the height of the lighthouse.

In right Δ ABP, $PB = \frac{AB}{\sqrt{3}}$ --- ①

In right Δ ABQ, $BQ = AB$ --- ②

Adding ① and ②, $PB + BQ = \frac{AB}{\sqrt{3}} + AB$

$\Rightarrow PQ = AB\left(\frac{1+\sqrt{3}}{\sqrt{3}}\right) \Rightarrow AB = 100$ m



12. The angles of depression of the top and base of an 8-meter-high building from the top of a multi-story building are 30° and 45°, respectively. Find the height of the multi-story building and the distance between the two buildings. **MAINS**

Value point : Here, CD represents the multi-storeyed building.

In right Δ DEA, $AE = \sqrt{3}\,DE$ --- ①

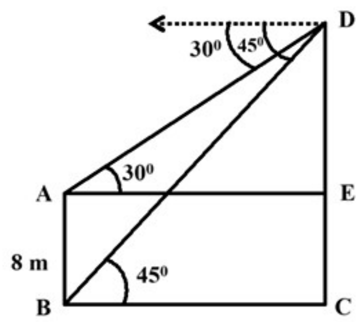
In right Δ DCB, $BC = DC$ --- ②

From figure, $AE = BC \therefore \sqrt{3}\,DE = DC$

$\Rightarrow \sqrt{3}(DC - 8) = DC$

$\Rightarrow DC = (12 + 4\sqrt{3})$ m

From ②, $BC = (12 + 4\sqrt{3})$ m



13. The angle of elevation of a helicopter flying from a point A on the ground is 45°. After 15 seconds of flight, the helicopter's angle of elevation becomes 30°. If the helicopter is flying at a constant altitude of 2000 m, find the helicopter's speed. (Take $\sqrt{3} = 1.732$) **MAINS**

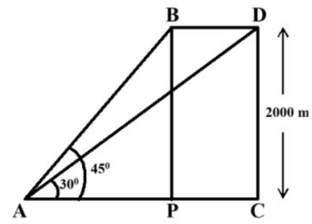
Value point : In right Δ APB, $\frac{2000}{AP} = \tan 45° \Rightarrow AP = 2000$ m

In right Δ ACD, $AC = 2000\sqrt{3}$ m

$BD = PC = AC - AP = 2000\sqrt{3} - 2000 = 1464$ m

Time taken from B to D = 15 sec

Speed = 97.6 m/s



14. A 1.5 m tall girl stands some distance away from a 30 m high tower. As she walks toward the tower, the angle of elevation of the top of the tower at her eye increases from 30° to 60°. Find the distance she walks toward the tower. **MAINS**

Value point : $AF = 30 - 1{\cdot}5 = 28{\cdot}5$ m

In right Δ AFE, $EF = \frac{28.5}{\sqrt{3}}$ m

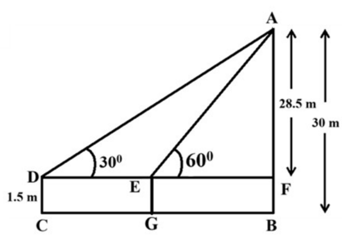
In right Δ ADF, $DF = 28.5\sqrt{3}$ m

Distance travelled by the girl towards the tower,

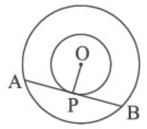
$DE = DF - EF = 28.5\sqrt{3} - \frac{28.5}{\sqrt{3}}$

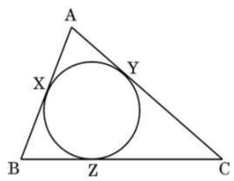
$= 19\sqrt{3}$ m or 32.91 m approx.

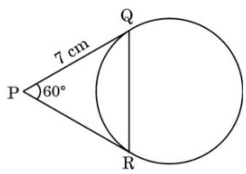
Distance travelled by girl towards the tower is $19\sqrt{3}$ m or 32.91 m.



CHAPTER 10: CIRCLE

<table>
<tr><th colspan="3">1 MARK QUESTIONS</th></tr>
<tr><td>1.</td><td>In the given figure, chord AB of the larger circle touches the smaller circle. The centre of both circles is r. If AB = 2r and OP = r, then the radius of the larger circle is:


(A) 2r (B) 3r (C) $2\sqrt{2}$ (D) $\sqrt{2}$ r</td><td>MAIN</td></tr>
<tr><td colspan="3">Value point : (D) $\sqrt{2}$ r</td></tr>
<tr><td>2.</td><td>The numerical value of the area of a circle is equal to the numerical value of the circumference of a semicircular disk, given that both radii are equal. The radius is:
(A) 1 unit (B) 2 units (C) π+2/π units (D) (2π+2)/π units</td><td>COMPTT.</td></tr>
<tr><td colspan="3">Value point : (C) π+2/π units</td></tr>
<tr><td>3.</td><td>A parallelogram circumscribing a circle has one side 5 cm long. The perimeter of this parallelogram is:
(A) 20 cm (B) less than 20 cm
(C) more than 20 cm but less than 40 cm (D) 40 cm</td><td>MAIN</td></tr>
<tr><td colspan="3">Value point : (A) 20 cm</td></tr>
<tr><td>4.</td><td>If the perimeter of a square is equal to the circumference of a circle, then the ratio of their areas is:
(A) 7:22 (B) 11:14 (C) 22:7 (D) 14:11</td><td>COMPTT.</td></tr>
<tr><td colspan="3">Value point : (B) 11:14</td></tr>
<tr><td>5.</td><td>In the given figure, a triangle ABC is drawn to circumscribe a circle such that its sides AB, BC, and CA touch the circle at points X, Z, and Y, respectively.


If AB = 12 cm, AY = 8 cm, and CY = 6 cm, then the length of BC is:
(A) 14 cm (B) 12 cm (C) 10 cm (D) 8 cm</td><td>COMPTT.</td></tr>
<tr><td colspan="3">Value point : (C) 10 cm</td></tr>
<tr><td>6.</td><td>In the given figure, PQ and PR are tangents to the circle, where PQ = 7 cm and ∠ RPQ = 60°.


The length of chord QR is:
(A) 5 cm (B) 7 cm (C) 9 cm (D) 14 cm</td><td>COMPTT.</td></tr>
<tr><td colspan="3">Value point : (B) 7 cm</td></tr>
<tr><td>7.</td><td>If the radii of two concentric circles are 4 cm and 5 cm, then the length of each chord of one circle which is tangent to the other circle is:
(A) 3 cm (B) 1 cm (C) 6 cm (D) 9 cm</td><td>COMPTT.</td></tr>
<tr><td colspan="3">Value point : (C) 6 cm</td></tr>
<tr><td>8.</td><td>The perimeter of a regular hexagon inscribed in a circle of radius 3 cm is:
(A) 9 cm (B) 18 cm (C) 27 cm (D) 36 cm</td><td>MAIN</td></tr>
<tr><td colspan="3">Value point : (B) 18 cm</td></tr>
</table>

9.	Two circles of radii 10 cm and 17 cm intersect each other at P and Q. If the centres of the circles are A and B and PQ = 16 cm, then the distance AB is equal to: (A) 30 cm (B) 12 cm (C) 21 cm (D) 16 cm	**MAIN**

Value point : (C) 21 cm

ASSERTION- REASON QUESTIONS

Directions : In the following questions, an Assertion (A) is followed by a Reason (R). Choose the correct option:

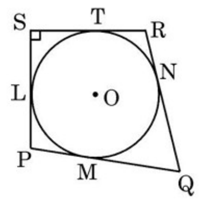
A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
B. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
C. Assertion (A) is true but Reason (R) is false.
D. Assertion (A) is false but Reason (R) is true.

10.	Assertion (A): Tangents drawn at the ends of a diameter of a circle are parallel. Reason (R): The lengths of tangents drawn from an external point to a circle are equal.	**MAIN**

Value point : B. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

2 MARK QUESTIONS

11.	In the given figure, PQRS is a quadrilateral with ∠S = 90°. A circle with center 'O' is inscribed in this quadrilateral such that the circle touches the four sides PQ, QR, RS, and SP of the quadrilateral at points M, N, T, and L, respectively. If MQ = 19 cm, RQ = 30 cm, and SR = 21 cm, find the radius of the circle.	**COMPTT.**

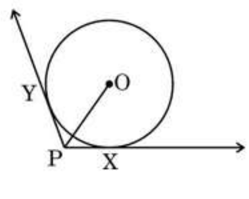


Value point : NQ = MQ = 19 ∴ RN = 30 – 19 = 11 cm ⇒ RT = 11 cm

∴ TS = 21 – 11 = 10 cm

Since SLOT is a square , therefore radius of the circle = TS = 10 cm

12.	Two tangents PX and PY are drawn from an external point P to a circle with centre O. If ∠XPY = 120° then prove that PX + PY = PO.	**COMPTT.**

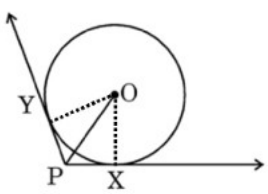


Value point : Join OX and OY

∠XPY = 120° ⟹ ∠XPO = 60°

Now, cos 60° $= \frac{PX}{OP}$ ⟹ 2 PX = OP

As PX = PY ∴ PX + PY = OP



3 MARK QUESTIONS

13.	A rectangle ABCD is drawn to circumscribe a circle of radius 10 cm. Prove that this rectangle ABCD is a square. Therefore, find the perimeter of ABCD.	**MAIN**

Value point : AP = AS; BP = BQ; CR = CQ; DR = DS

Adding AB + CD = AD + CB --- (i)

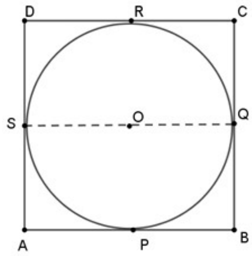
Since ABCD is a rectangle ∴ AB = CD and BC = AD

⟹ from (i), 2 AB = 2 AD or AB = AD

Hence ABCD is a square

side of square = diameter of circle = 20 cm

∴ Perimeter of square = 4 × 20 cm = 80 cm

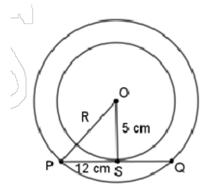


14.	In two concentric circles, a chord of length 24 cm of the larger circle is a tangent to the smaller circle whose radius is 5 cm. Find the radius of the larger circle.	**MAIN**

Value point : Let the radius of larger circle be R.

∠S=90° and PS = $\frac{24}{2}$ = 12 cm

⇒ $12^2 + 5^2 = R^2 \Longrightarrow R = 13$ cm



15.	Prove that the intercept of a tangent between two parallel tangents to a circle subtends right angle at the centre.	**MAIN**

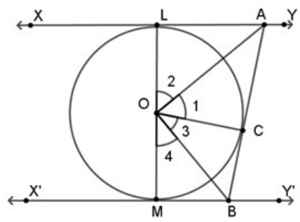
Value point : Let XY ∥ X′Y′ be two parallel tangents with LM as diameter

ΔOAL ≅ ΔOAC ⇒ ∠1 = ∠2 Similarly, ∠3 = ∠ 4

But ∠1 + ∠2 + ∠ 3 + ∠4 = 180°

∴ 2 ∠1 + 2 ∠3 = 180° or ∠1 + ∠3 = 90°

⟹AB subtends right angle at the centre.



5 MARK QUESTIONS

16.	Prove that the opposite sides of a quadrilateral circumscribing a circle make supplementary angles at the centre of the circle.	**COMPTT.**

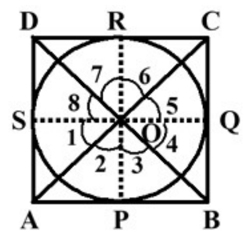
Value point : Δ OPA ≅ Δ OSA ⟹ ∠ 1 = ∠ 2

Similarly, ∠ 3 = ∠ 4, ∠ 5 = ∠ 6, ∠ 7 = ∠ 8

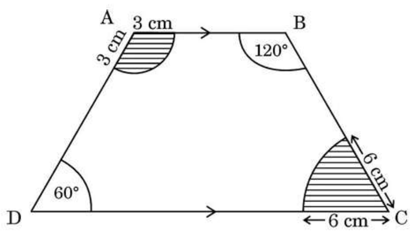
Now, ∠ 1 + ∠ 2 + ∠ 3 + ∠ 4 + ∠ 5 + ∠ 6 + ∠ 7 + ∠ 8 = 360°

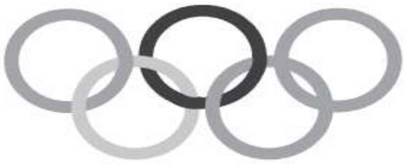
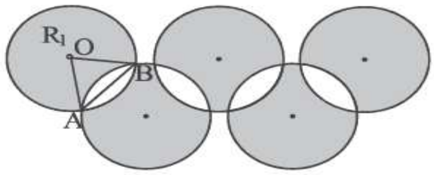
⟹ (∠ 1 + ∠ 8) + (∠ 4 + ∠ 5) = 180°

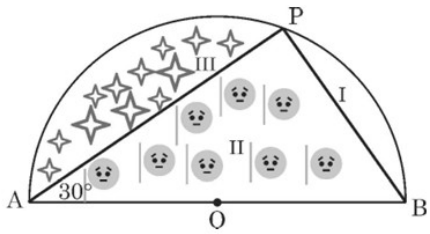
⟹ ∠ AOD + ∠ BOC = 180°



CHAPTER 11 : AREA RELATED TO CIRCLES

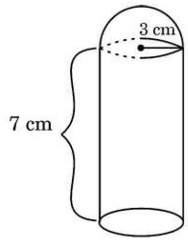
1 MARK QUESTIONS		
1.	In a circle of radius 14 cm, the area of the sector made by an arc of length 11 cm with the centre, is: (A) 154 cm^2 (B) 102.67 cm^2 (C) 205.33 cm^2 (D) 77 cm^2	**MAIN**
Value point : (D) 77 cm^2		
2.	A sector is cut from a circular sheet of radius 50 cm, the central angle of the sector being 90°. If another circle of the same area as the sector is formed, then the radius of the new circle is: (A) 25 cm (B) 50 cm (C) 12.5 cm (D) 20 cm	**MAIN**
Value point : (A) 25 cm		
2 MARK QUESTIONS		
3.	The perimeter of a sector of a circle of radius 15 cm is 80 cm. Find the area of the sector.	**COMPTT**
Value point : Perimeter of sector = 30 + ℓ = 80 $\Rightarrow$ ℓ = 50 cm $\therefore$ Area of the sector = $\frac{1}{2} \times 15 \times 50 = 375$ cm^2		
4.	A chord of a circle of radius 14 cm subtends a right angle at the centre. Find the area of the minor segment.	**MAIN**
Value point : Area of segment = $\frac{120°}{360°} \times \frac{22}{7} \times 14 \times 14 - (\frac{1}{2} \times 14 \times 14) = 56$ cm^2		
5.	In the given figure, ABCD is a trapezium with AB‖DC. Find the area of the shaded region. (Keep the answer in terms of π). 	**COMPTT**
Value point : ABCD is a trapezium. $\therefore$ ∠A = 120° and ∠C = 60° Area of shaded region = $\frac{120°}{360°} \times \pi \times (3)^2 + \frac{60°}{360°} \times \pi \times (6)^2 = 9\pi$ cm^2		
6.	The perimeter of a sector of a circle of radius 21 cm is 75 cm. Find the area of the sector.	**MAIN**
Value point : $\frac{\theta}{360°} \times 2 \times \frac{22}{7} \times 21 + 42 = 75 \Rightarrow \frac{\theta}{360°} = \frac{1}{4}$ Area of sector = $\frac{1}{4} \times \frac{22}{7} \times 21 \times 21 = \frac{693}{2}$ or 346.5 cm^2		
3 MARK QUESTIONS		
7.	The hour hand of a clock is 10 cm long. Find the area of the minor sector formed by the hour hand between 5 a.m. and 8 a.m. Also find the area of the major sector.	**MAIN**
Value point : Central angle subtended by hour hand between 5 am to 8 am = $\frac{360°}{12} \times 3 = 90°$		

Area of minor segment = $\frac{\theta}{360°} \times \frac{22}{7} \times (10)^2 = \frac{550}{7}$ or 78.57 cm^2 approx. Area of circle = $\frac{22}{7} \times (10)^2 = \frac{2200}{7}$ cm^2 Area of major segment = $\frac{2200}{7} - \frac{550}{7} = \frac{1650}{7}$ or 235.71 cm^2 approx.		
4 MARK QUESTIONS *(CASE STUDY)*		
8.	The Olympic symbol comprising five interlocking rings represents the union of the five continents of the world and the meeting of athletes from all over the world at the Olympic games. In order to spread awareness about Olympic games, students of Class-X took part in various activities organised by the school. One such group of students made 5 circular rings in the school lawn with the help of ropes. Each circular ring required 44 m of rope. Also, in the shaded regions as shown in the figure, students made rangoli showcasing various sports and games. It is given that △OAB is an equilateral triangle and all unshaded regions are congruent.   Based on above information, answer the following questions: (i) Find the radius of each circular ring. (ii) What is the measure of ∠AOB? (iii) Find the area of shaded region R_1. OR Find the length of rope around the unshaded regions.	**MAIN**
Value point : (i) $2 \times \frac{22}{7} \times r = 44 \Rightarrow r = 7$ m (ii) ∠ AOB = 60° (iii) Area of shaded region R_1 = area of circle – area of 2 segments $= \frac{22}{7} \times 7 \times 7 - 2 \times (\frac{60°}{360°} \times \frac{22}{7} \times 7 \times 7 - \frac{\sqrt{3}}{4} \times 7 \times 7) = 145.05$ m^2 (approx.) OR Length of rope around unshaded regions = 8 × length of arc $= \frac{176}{3}$ m or 58.66 m (approx.)		
9.	Harit needs to cut a round pizza into equal parts so that he and all seven of his friends get equal-sized portions. The diameter of the pizza is 35 cm. Based on the above information, answer the following questions: (i) How many times must Harit cut along the diameter to make 8 equal portions? (ii) What is the radius of each portion? (iii) Find the area of each portion of the pizza. OR Find the area of the entire pizza.	**COMPTT**

Value point : (i) 4 times (ii) Radius = 17.5 cm (iii) Area of each slice = $\frac{45^\circ}{36\ ^\circ} \times \frac{22}{7} \times (17.5)^2 = 120.31\ cm^2$ approx. OR Area of entire pizza = $\frac{22}{7} \times (17.5)^2 = 962.5\ cm^2$		
10.	Anurag purchased a farmhouse in the shape of a semicircle with a diameter of 70 m. He divided it into three parts, taking a point P on the semicircle, such that ∠PAB = 30°, with O as the centre of the semicircle, as shown in the figure below.  In Part I, he grew mango trees, in Part II, he grew tomatoes, and in Part III, he grew oranges. Based on the above information, answer the following questions: (i) What is the measure of ∠POA? (ii) Find the length of wire required to fence the entire piece of land. (iii) Find the area of the field where the mango trees are planted. OR Find the length of wire required to fence around Region III.	**MAIN**
Value point : (i) ∠ POA = 120° (ii) Length of wire needed to fence entire piece of land = $\frac{22}{7} \times 35 + 70 = 180$ m (iii) Required area = $\frac{60^\circ}{36\ ^\circ} \times \frac{22}{7} \times (35)^2 - \frac{\sqrt{3}}{4} \times (35)^2 = 111.89\ m^2$ (approx.) OR In Δ APB, $\frac{AP}{AB} = \cos 30^\circ \Rightarrow AP = 35\sqrt{3}$ m Required length of wire = $\frac{120^\circ}{360^\circ} \times 2 \times \frac{22}{7} \times 35 + 35\sqrt{3} = 133.8$ m (approx.)		

CHAPTER 12 : SURFACE AREA & VOLUME

1 MARK QUESTIONS		
1.	On the top face of the wooden cube of side 7 cm, hemispherical depressions of radius 0.35 cm are to be formed by taking out the wood. The maximum number of depressions that can be formed is: (a) 400 (b) 100 (c) 20 (d) 10	**MAIN**
Value point : (b) 100		
ASSERTION- REASON QUESTIONS		
Directions : In the following question, an Assertion (A) is followed by a Reason (R).		

	Choose the correct option: A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). B. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A). C. Assertion (A) is true but Reason (R) is false. D. Assertion (A) is false but Reason (R) is true.	
2.	Assertion (A): In the given figure, a toy is in the form of a cylinder surmounted by a hemisphere of the same radius. If the radius of the cylinder is 3 cm and its height is 7 cm, then the volume of toy is 81π cm³ .  Reason (R): Volume of the given solid is the sum of the volume of the cylinder and the volume of the hemisphere.	**COMPTT**
Value point : A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).		
3.	Assertion (A): If the total surface area of a solid hemisphere is 462 cm^2 then its radius is 7 cm. Reason (R): The total surface area of a solid hemisphere of radius r is $3\pi r^2$.	**MAIN**
Value point : A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).		
4.	Assertion (A): A right circular cone with radius 3.5 cm and slant height 4 cm has a curved surface area of 44 sq cm. Reason (R): A right circular cone with radius r and slant height ℓ has a curved surface area of $\pi r \ell$.	**COMPTT**
Value point : A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).		
4 MARK QUESTIONS *(CASE STUDY)*		
5.	To make the teaching-learning process easier, creative and innovative, a teacher brings clay in the classroom to teach the topic of mensuration. She forms a cylinder of radius 2.1 cm and height 5 cm with the clay and put a hemisphere of same radius on its top in such a way that the base of hemisphere covers the top of cylinder. Using the above information, and $\pi = \frac{22}{7}$, find : (i) The volume of cylinder so formed. (ii) The volume of hemispherical part. (iii) The surface area of the complete solid. OR The surface area of the cylindrical part, if hemisphere is not put on it.	**MAIN**
Value point : (i) Volume of cylinder = $\frac{22}{7} \times \frac{21}{10} \times \frac{21}{10} \times 5$ = 69.3 cm3 (ii) Volume of hemispherical part = $\frac{2}{3} \times \frac{22}{7} \times \frac{21}{10} \times \frac{21}{10} \times \frac{21}{10}$ = 19.404 cm^3 (iii) Surface area of the complete solid		

$= 2 \times \frac{22}{7} \times \frac{21}{10} \times 5 + 3 \times \frac{22}{7} \times \frac{21}{10} \times \frac{21}{10} = 107.58\ cm^2$ OR Required surface area $= 2 \times \frac{22}{7} \times \frac{21}{10} \times 5 + 2 \times \frac{22}{7} \times \frac{21}{10} \times \frac{21}{10} = 93.72\ cm^2$		
5 MARK QUESTIONS		
6.	From a solid cylinder of height 2.4 cm and radius 0.7 cm, a conical cavity of the same height and same radius is hollowed out. Find the volume and total surface area of the remaining solid.	**COMPTT**
Value point : Volume of the remaining solid = Volume of cylinder – volume of cone $= \frac{22}{7} \times (0.7)^2 \times 2.4 - \frac{1}{3} \times \frac{22}{7} \times (0.7)^2 \times 2.4 = 2.464\ cm^3$ Slant height of cone $= \sqrt{0.7^2 + 2.4^2} = 2.5$ cm Total Surface area = CSA of cylinder + CSA of cone + Area of base $= 2 \times \frac{22}{7} \times 0.7 \times 2.4 + \frac{22}{7} \times 0.7 \times 2.5 + \frac{22}{7} \times (0.7)^2 = 17.6$ cm		
7.	A wooden cubical die is formed by forming hemispherical depressions on each face of the cube such that face 1 has one depression, face 2 has two depressions and so on. The sum of number of hemispherical depressions on opposite faces is always 7. If the edge of the cubical die measures 5 cm and each hemispherical depression is of diameter 1.4 cm, find the total surface area of the die so formed.	**MAIN**
Value point : Number of hemispherical depressions = 21 Total surface area of the die formed = TSA of cube + CSA of 21 hemispheres – Base area of 21 hemispherical depressions $= 182.34\ cm^2$		
8.	A carpenter is making a wooden toy (lattu) which is conical in shape and surmounted by a hemisphere. The ratio of the height of the hemisphere and the cone is 3: 4. If the radius of the cone and the hemisphere is 2.1 cm, find the volume of wood required to make this toy. Also, find the area to be painted after making the toy.	**COMPTT**
Value point : Let $r = 3x$, $h = 4x$ $\because r = 3x = 2.1 \Longrightarrow x = 0.7$ Hence h = 2.8 cm Volume of wood required to make the toy = Volume of cone + Volume of hemisphere $= \frac{1}{3} \times \frac{22}{7} \times (2.1)^2 \times 2.8 + \frac{2}{3} \times \frac{22}{7} \times (2.1)^3 = 32.34\ cm^3$ Slant height of cone $= \sqrt{(2.1)^2 + (2.8)^2} = 3.5$ cm Total Surface Area = CSA of cone + CSA of hemisphere $= 50.82\ cm^2$		
9.	A 16 m deep well with diameter 3.5 m is dug up and the earth from it is spread evenly to form a platform of size 27.5 m × 7 m. Find the height of the platform.	**MAIN**
Value point : Volume of the earth dug up $= \frac{22}{7} \times \frac{7}{4} \times \frac{7}{4} \times 16$ Area of platform $= 27.5 \times 7$		

Height of platform = $\frac{Volume\ of\ earth\ dug}{Area\ of\ platform}$ = $\frac{4}{5}$ m or 80 cm		
10.	A tent is of the shape of a right circular cylinder up to a height of 3 metres surmounted by a right circular cone of same radius such that the total height of the tent is 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of 2 per square metre, if the radius of the base is 14 metres.	**MAIN**
Value point : $l = \sqrt{(14)^2 + (10.5)^2}$ = 17.5 m Total Surface Area (inside) = 2 × $\frac{22}{7}$ × 14 × 3 + $\frac{22}{7}$ × 14 × 17.5 = 1034 m^2 Cost = 1034 × 2 = ₹ 2068		
11.	A spherical glass vessel has a cylindrical neck with a length of 8 cm and a diameter of 2 cm, while the diameter of the spherical part is 8.5 cm. Find the volume of water it can hold. Also find its outer curved surface area. (Use π = 3.14)	**COMPTT**
Value point : Amount of water hold by vessel = Volume of spherical part + Volume of cylindrical part = $\frac{4}{3}$ × 3.14 × $(\frac{85}{20})^3$ + 3.14 × $(1)^2$ × 8 = 346.51 cm^3 approx. External CSA = CSA of spherical part + CSA of cylindrical part = 277.11 cm^2 approx.		
12.	A toy is in the shape of a cone of radius 3.5 cm, mounted on a hemisphere of the same radius. The toy's total height is 15.5 cm. Find the toy's total surface area.	**COMPTT**
Value point : Height of conical part = 15.5 – 3.5 = 12 cm Slant height = $\sqrt{(3.5)^2 + (12)^2}$ = 12.5 cm Total surface area of toy = CSA of conical part + CSA of hemispherical part = 214.5 cm^2		

CHAPTER 13: STATISTICS

1 MARK QUESTIONS		
1.	The cumulative frequency for calculating median is obtained by adding the frequencies of all the: (a) classes up to the median class (b) classes following the median class (c) classes preceding the median class (d) all classes	**MAIN**
Value point: (c) classes preceding the median class		
2.	The median of a set of 15 distinct observations is 30.5. If each of the largest 7 observations of the set is increased by 3, then the median of the new set. (a) is increased by 3. (b) is decreased by 3. (c) is three times the original median. (d) remains the same as that of the original set.	**MAIN**
Value point: (d) remains the same as that of the original set.		
3.	If mean and median of given set of observations are 10 and 11 respectively, then the value of mode is:	**MAIN**

	(a) 10.5 (b) 8 (c) 13 (d) 21	

Value point: (c) 13

4.	If mode and median of given set of observations are 13 and 11 respectively, then the value of mean is: (a) 17 (b) 7 (c) 10 (d) 28	**MAIN**

Value point: (c) 10

3 MARK QUESTIONS

5.	Weekly expenditure on Ayurvedic medicines of few households in a locality is recorded below.	**COMPTT**

Weekly Expenditure (in ₹)	Number of Households
100-150	4
150-200	5
200-250	y
250-300	2
300-350	2

If the mean expenditure for this is ₹211, then find the value of the missing frequency 'y'.

Value point :

Class - interval	x_i	f_i	$u_i = \frac{x_i - 225}{50}$	$f_i u_i$
100-150	125	4	-2	-8
150-200	175	5	-1	-5
200-250	225	y	0	0
250-300	275	2	1	2
300-350	325	2	2	4
Total		13 + y		-7

$$\text{Mean} = 225 + \frac{-7}{13+y} \times 50 = 211 \Rightarrow y = 12$$

6.	If the mean of the following distribution is 54, find the value of p:	**COMPTT**

Class	0-20	20-40	40-60	60-80	80-100
Frequency	7	p	10	9	13

Value point:

Class	x_i	f_i	$f_i x_i$
0-20	10	10	70
20-40	30	9	30p
40-60	50	7	500
60-80	70	p	630
80-100	90	13	1170
Total		39 + p	2370 + 30p

$$\text{Mean} = \frac{2370+30\,p}{39+p} = 54 \Rightarrow p = 11$$

7.	One healthcare centre working for the welfare of the patients suffering from 'Dengue', recorded the following information:	**COMPTT**

Age of Patients	0-15	15-30	30-45	45-60	60-75	75-90
No. of Patients	8	5	x	16	12	9

If the modal age of the patients is 54, then find the value of x.

Value point: Modal class is 45 – 60

$\therefore$ Mode = 45 + ($\frac{16-x}{2\times16-x-12}$)$\times$ 15 = 54 $\Rightarrow$ x = 10

8. The mean of the following distribution is 62.8. Find the values of f_1 and f_2. **COMPTT**

Class	0-20	20-40	40-60	60-80	80-100	100-120	Total
Frequency	5	f_1	10	f_2	7	8	50

Value point:

Class	f_i	x_i	f_ix_i
0-20	5	10	50
20-40	f_1	30	$30f_1$
40-60	10	50	500
60-80	f_2	70	$70f_2$
80-100	7	90	630
100 - 120	8	110	880
Total	$50 + f_1 + f_2$	39 + p	$2060 + 30f_1 + 70f_2$

Mean = $\frac{2060+30f_1+70f_2}{50}$ = 62.8 $\Rightarrow 3f_1 + 7f_2 = 108$ --- ①

Also, $30 + f_1 + f_2 = 50 \Rightarrow f_1 + f_2 = 20$ --- ②

Solving ① and ②, $f_1 = 8$ and $f_2 = 12$

5 MARK QUESTIONS

9. The median of the following distribution is 545. If the sum of all frequencies is 100, then find the values of x and y. **COMPTT**

Class	Frequency
0-100	3
100-200	4
200-300	5
300-400	x
400-500	17
500-600	20
600-700	19
700-800	y
800-900	8
900-1000	3

Value point:

C . I.	f	cf
0-100	3	3
100-200	4	7
200-300	5	12
300-400	x	12 + x
400-500	17	29 + x
500-600	20	49 + x
600-700	19	68 + x
700-800	y	68 + x + y
800-900	8	76 + x + y
900-1000	3	79 + x + y

Therefore, $79 + x + y = 100 \Rightarrow x + y = 21$

Median class is 500 – 600.

$$\text{Median} = 500 + \frac{\frac{100}{2} - (29+x)}{20} \times 100 = 545 \Rightarrow x = 12 \text{ and } y = 9$$

10. The following table shows the number of patients of different age group who were discharged from the hospital in a particular month: **MAIN**

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65	Total
Number of Patients Discharged	6	11	21	23	14	5	80

Find the mean and mode of the above data.

Value point:

C. I.	f_i	x_i	$f_i x_i$
5-15	6	10	60
15-25	11	20	220
25-35	21	30	630
35-45	23	40	920
45-55	14	50	700
55-65	5	60	300
Total	$\Sigma f_i = 80$		$\Sigma f_i x_i = 2830$

Mean = $\frac{2830}{80}$ or 35.38 years

Modal class is 35 - 45

$$\text{Mode} = 35 + \frac{23-21}{2\times 23-21-14} \times 10 = \frac{405}{11} \text{ or } 36.82 \text{ years (approx.)}$$

11.	Calculate the mode and the median for the following distribution:	**MAIN**

Class	**Frequency**
5-10	5
10-15	6
15-20	15
20-25	10
25-30	5
30-35	4
35-40	2
40-45	2

Value point:

Class	**Frequency**	**cf**
5-10	5	5
10-15	6	11
15-20	15	26
20-25	10	36
25-30	5	41
30-35	4	45
35-40	2	47
40-45	2	49

Median Class is 15 - 20

$$\text{Median} = 15 + \frac{\frac{49}{2} - 11}{15} \times 5 = \frac{39}{2} \text{ or } 19.5$$

Modal Class is 15 - 20

$$\text{Mode} = 15 + \frac{15 - 6}{30 - 6 - 10} \times 5 = \frac{255}{14} \text{ or } 18.21$$

12.	The median of the following distribution is 35. Find the value of x, hence find mode of the distribution.	**COMPTT**

Class	0-10	10-20	20-30	30-40	40-50	50 -60	60-70
Frequency	2	3	x	6	5	3	2

Value point:

Class	**Frequency**	**cf**
0-10	2	2
10-20	3	5
20-30	x	5 + x
30-40	6	11 + x
40-50	5	16 + x
50-60	3	19 + x
60-70	2	21 + x

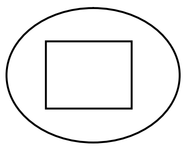
Median class is 30 – 40

$$\therefore \text{ Median} = 30 + \left(\frac{\frac{21+x}{2} - (5+x)}{6}\right) \times 10 = 35 \Longrightarrow x = 5$$

Modal class is 30 – 40

$$\text{Mode} = 30 + \left(\frac{6-5}{2\times6-5-5}\right) \times 10 = 35$$

CHAPTER 14: PROBABILITY

1 MARK QUESTIONS		
1.	The number of red balls in a bag is 10 more than the number of black balls. If the probability of drawing a red ball at random from this bag is $\frac{3}{5}$ then the total number of balls in the bag is: (a) 50 (b) 60 (c) 80 (d) 40	**MAIN**
Value Point: (a) 50		
2	The probability that a 2-digit number less than 20, selected at random will be a multiple of 2 and not a multiple of 3, is (a) $\frac{1}{2}$ (b) $\frac{1}{5}$ (c) $\frac{3}{10}$ (d) $\frac{3}{11}$	**MAIN**
Value Point: (c) $\frac{3}{10}$		
3.	A card is drawn at random from a deck of 52 playing cards. The probability that the drawn card is not a red face card, is: (a) $\frac{3}{26}$ (b) $\frac{23}{26}$ (c) $\frac{7}{52}$ (d) $\frac{23}{52}$	**MAIN**
Value Point: (b) $\frac{23}{26}$		
4.	Cards numbered 10, 11, 12, ..., 30 are kept in a box and shuffled thoroughly. Rohit draws a card at random from the box. The probability that the number on the card is a multiple of 4 or 5 is: (a) $\frac{9}{20}$ (b) $\frac{9}{21}$ (c) $\frac{10}{20}$ (d) $\frac{10}{21}$	**COMPTT**
Value Point: (b) $\frac{9}{21}$		
5.	Two dice are thrown simultaneously and the product of the numbers appearing on the tops is noted. The probability of the product to be less than 6 is: (a) $\frac{1}{6}$ (b) $\frac{1}{4}$ (c) $\frac{5}{18}$ (d) $\frac{7}{18}$	**COMPTT**
Value Point: (c) $\frac{5}{18}$		
6.	There is a square lawn of side 8 m inside a circular park of radius 20 m. Mr. Joseph wants to plant a sapling in the park. The probability that he can plant it outside the lawn is:  (a) $\frac{32}{400\pi}$ (b) $\frac{64}{400\pi}$ (c) $\frac{400\pi-32}{400\pi}$ (d) $\frac{400\pi-64}{400\pi}$	**COMPTT**
Value Point: (d) $\frac{400\pi-64}{400\pi}$		
7.	Two dice are thrown simultaneously. The probability that the sum of the numbers on both dice is 8 is: (a) $\frac{5}{8}$ (b) $\frac{5}{12}$ (c) $\frac{5}{36}$ (d) $\frac{1}{9}$	**COMPTT**
Value Point: (c) $\frac{5}{36}$		

8.	A pair of dice is thrown. The probability that sum of numbers appearing on top faces is at most 10 is: (a) $\frac{1}{11}$ (b) $\frac{10}{11}$ (c) $\frac{5}{6}$ (d) $\frac{11}{12}$	**MAIN**
Value Point: (d) $\frac{11}{12}$		

ASSERTION- REASON QUESTIONS

Directions : In the following questions, an Assertion (A) is followed by a Reason (R). Choose the correct option:

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

9.	Assertion (A): Event E_1: getting a number less than 3 and event E_2: getting a number greater than 3 are complementary events. Reason (R): If two events E and F are complementary, then P(E) + P(F) = 1.	**MAIN**
Value Point: d. Assertion (A) is false but Reason (R) is true.		
10.	Assertion (A): The probability of choosing a number at random from 1 to 20 is 1. Reason (R): For any event E, if P(E) = 1, then E is a certain event.	**MAIN**
Value Point: d. Assertion (A) is false but Reason (R) is true.		

2 MARK QUESTIONS

11.	Two friends Anil and Ashraf were born in the December month in the year 2010. Find the probability that: (i) they share same date of birth. (ii) they have different dates of birth.	**MAIN**
Value Point: Number of days in December 2010 = 31 (i) P (same date of birth) = $\frac{1}{31}$ (ii) P (different dates of birth) = $\frac{30}{31}$		
12.	Saima and Arya were born in June 2012. Find the probability that: (i) they have different dates of birth. (ii) they have the same date of birth.	**MAIN**
Value Point: Number of days in June 2012 = 30 (i) P (different dates of birth) = $\frac{29}{30}$ (ii) P (same date of birth) = $\frac{1}{30}$		
13.	Renu and Simran were both born in the year 2000, which was a leap year. Find the probability that: (i) They have the same birthday. (ii) They have different birthdays.	**MAIN**
Value Point: Number of days in a leap year = 366 (i) P (both have same birthday) = $\frac{1}{366}$ (ii) P (both have different birthdays) = $\frac{365}{366}$		

14.	The jack of diamonds, queen of hearts, and king of hearts are removed from a deck of 52 cards. One card is drawn at random from the remaining cards. Find the probability that this card is a face card or a spade card.	**COMPTT**

Value Point: Number of cards after removing jack, queen and king of diamonds = 52 – 3 = 49

P (getting a face card or a card of spades) = $\frac{19}{49}$

15.	Three different coins are tossed simultaneously. Find the probability that at least two tails appear.	**COMPTT**

Value Point: Total number of possible outcomes = 8

P (atleast two tails) = $\frac{4}{8}$ or $\frac{1}{2}$

3 MARK QUESTIONS

16.	Two dice are thrown simultaneously. Find the probability that the difference between the numbers on the two dice is 2.	**MAIN**

Value Point: Favourable outcomes are (1,3) , (3,1) , (2,4) , (4,2) , (3,5) , (5,3) , (4,6) and (6,4)

P (difference is 2) = $\frac{8}{36}$ or $\frac{2}{9}$

4 MARK QUESTIONS *(CASE STUDY)*

17. Rahul is the lucky charm for his cricket team. He has a jar of cards marked with numbers from 10 to 74. Before every match, he draws a card from this jar. If the card drawn has an even number on it, the team wins. If the number is even and divisible by 5, the team wins by a large margin. If the number is an odd number less than 30, the team wins by a small margin. If the number is a prime number between 50 and 74, the team loses. **MAIN**

If Rahul draws a card today, answer the following questions:

(i) What is the probability that Rahul draws an even number on his card?

(ii) What is the probability that Rahul draws an odd number less than 30?

(iii) What is the probability that Rahul draws a prime number between 50 and 74?

OR

What is the probability that Rahul draws an even number divisible by 5?

Value Point: (i) Total possible outcomes = 74 – 10 + 1 = 65

P (even number) = $\frac{33}{65}$

(ii) P (odd number less than 30) = $\frac{10}{65}$ or $\frac{2}{13}$

(iii) Favourable outcomes are 53, 59, 61, 67, 71, 73

P (prime number between 50 and 74) = $\frac{6}{65}$

OR

Favourable outcomes are 10, 20, 30, 40, 50, 60, 70

P (even number divisible by 5) = $\frac{7}{65}$