CHAPTER-WISE QUESTION BANK

CLASS-X

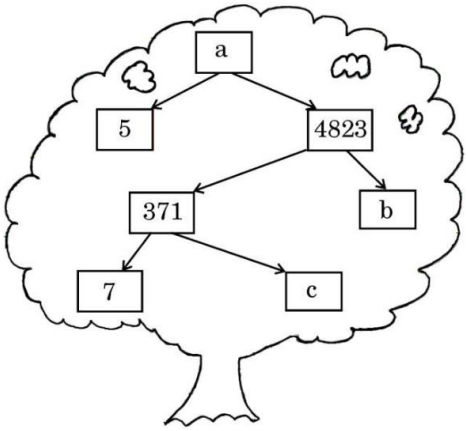
SUBJECT-MATHEMATICS BASIC (241)

NOTE: Suggestive Value Points are provided with each question for answer formulation.

Chapter 1–Real Numbers

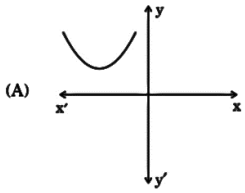
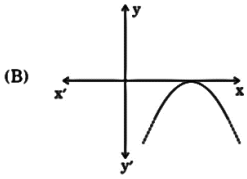
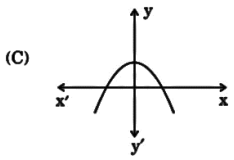
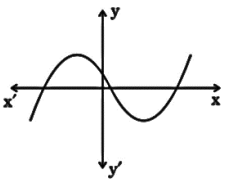
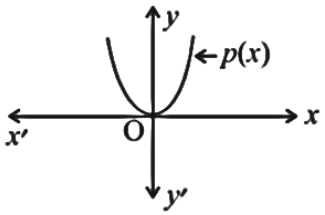
	1-MARK QUESTIONS	
1.	If HCF (x, 20) = 2 and LCM (x, 20) = 60, then the value of x is: (A) 3 (B) 6 (C) 20 (D) 10	
Appropriate Option	(B) 6	
2.	The LCM of two numbers is 3600. Which of the following cannot be their HCF? (A) 600 (B) 400 (C) 500 (D) 150	
Appropriate Option	(C) 500	
3.	The sum of first five prime numbers is: (A) 18 (B) 26 (C) 28 (D) 39	**For visually impaired candidates**
Appropriate Option	(C) 28	
	2-MARKS QUESTIONS	
4.	Show that 45^n cannot end with digit 0, n being a natural number. Write the prime number 'a' which on multiplying with 45^n makes the product end with the digit 0.	
Value Point	For a digit to end with 0 it should have both 2 and 5 as a factor. $45 = 3 \times 3 \times 9$ 45 has 5 as a factor and 2 is missing. Hence, any number of the form 45^n (where n is any natural number) cannot end with the digit zero	
5.	In a school, there are two Sections A and B of Class X. There are 48 students in Section A and 36 students in Section B. Determine the minimum number of books required for their class library so that they can be distributed equally among the students of Section A or that of Section B.	**Comptt.**
Value Point	$48 = 2\times2\times2\times2\times3$ $36 = 2\times2\times3\times3$ Minimum number of books required = LCM(48, 36) = 144	
6.	Find the greatest number which divides 285 and 1249 leaving remainders 9 and 7 respectively.	**For visually impaired candidates**

Value Point	The numbers are given by the difference exactly divisible by the required number are given as: 285 – 9 = 276 and 1249 – 7 = 1242 To find the greatest number that exactly divides these are given by their H.C.F: $276 = 2 \times 2 \times 3 \times 23$ $1242 = 2 \times 3 \times 3 \times 3 \times 23$ H.C.F. = 138 Therefore, the greatest number which divides 285 and 1249 leaving the remainder 9 and 7 respectively is 138.	
	3-MARKS QUESTIONS	
7.	Prove that $\sqrt{3}$ is an irrational number.	
Value Point	Let's assume $\sqrt{3}$ is a rational number of the form of p/ q where p and q are co-prime integers and $q \neq 0$. $\Rightarrow \sqrt{3} = p/q$ $\Rightarrow \sqrt{3}q = p$ (1) $\Rightarrow 3q^2 = p^2$ $\because$ 3 is a prime number that divides p^2, so 3 divides p. $\Rightarrow$ 3 is a factor of p. Let p = 3a where a is a whole number. Substitute the value of p in equation (1) $\Rightarrow 3q^2 = (3a)^2$ $\Rightarrow 3q^2 = 9a^2$ $\Rightarrow q^2 = 3a^2$ $\Rightarrow q^2/3 = a^2$ (2) $\because$ 3 is a prime number that divides q^2, so 3 divides q. $\Rightarrow$ 3 is a factor of q. From equation (1) and (2), we can conclude that 3 is a factor of both p and q. This leads to the contradiction to our assumption that p and q are co-primes Hence, $\sqrt{3}$ is an irrational number.	
8.	Prove that $\sqrt{5}$ is an irrational number.	
Value Point	Please refer to Q. 7 and proceed accordingly.	
9.	Prove that $\sqrt{2}$ is an irrational number.	
Value Point	Please refer to Q. 7 and proceed accordingly.	
	4-MARKS QUESTIONS	
10.	A Mathematics exhibition is being conducted in your school and one of your friends is making a model of a 'factor tree'. He has some difficulty and asks for your help in completing a quiz for the audience. Observe the following 'factor tree' and answer the following questions:	**Comptt.**

	 (i) What is the value of a? **1** (ii) (a) What is the value of b? **2** **OR** (b) What is the value of c? (iii) Write the prime factorization of 24115. **1**	
Value Point	(i) 24115 (ii) (a) 13 **OR** (iii) (b) 53 (iv) $24115=5 \times 13 \times 7 \times 53$	

Chapter 2–Polynomials

	1-MARK QUESTIONS	
1.	One of the zeroes of the polynomial $p(x) = kx^2 - 9x + 3$ is $\left(-\frac{3}{2}\right)$. The value of *k* is: (A) $\frac{22}{3}$ (B) $-\frac{14}{3}$ (C) $\frac{14}{3}$ (D) $-\frac{22}{3}$	
Appropriate Option	(D) $-\frac{22}{3}$	
2.	α, β are the zeroes of the polynomial $2x^2 + 5x + 1$. The value of $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ is: (A) $-\frac{5}{4}$ (B) 5 (C) $\frac{5}{4}$ (D) -5	
Appropriate Option	(D) -5	
3.	If α, β are the zeroes of the polynomial $3x^2 + 14x - 5$, then the value of $3\left(\frac{\alpha+\beta}{\alpha\beta}\right)$ is: (A) $\frac{14}{5}$ (B) $\frac{42}{5}$ (C) $-\frac{14}{5}$ (D) $-\frac{42}{5}$	
Appropriate Option	(D) $-\frac{42}{5}$	
4.	If α, β are the zeroes of the polynomial $p(x) = 2x^2 + 6x - 6$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is equal to: (A) -1 (B) 1 (C) -3 (D) 3	**Comptt.**
Appropriate Option	(B) 1	
5.	If α, β are the zeroes of the polynomial $p(x) = x^2 + 3x + 2$, then the value of $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ is equal to: (A) $-\frac{3}{2}$ (B) $\frac{3}{2}$ (C) -1 (D) 1	**Comptt.**

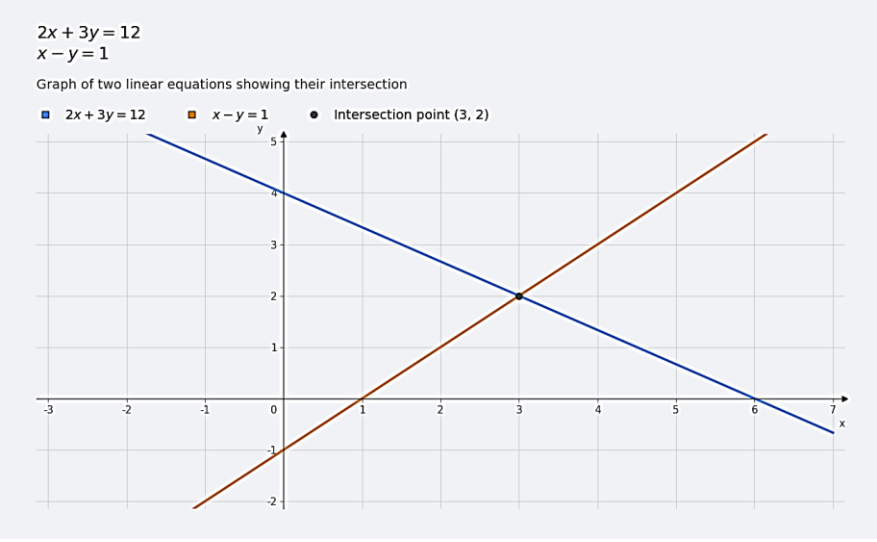
Appropriate Option	(A) $-\frac{3}{2}$	
6.	Which of the following is ***not*** the graph of a quadratic polynomial? (A)  (B)  (C)  (D) 	**Comptt.**
Appropriate Option	(D)	
7.	In the given figure, graph of $p(x)$ is shown. Number of distinct zeroes of $p(x)$ is:  (A) 0 (B) 1 (C) 2 (D) many	
Appropriate Option	(A) 0	
8.	A quadratic polynomial, the sum and product of whose zeroes are -1 and -2 respectively, is: (A) $x^2 - x - 2$ (B) $2x^2 + x - 1$ (C) $x^2 + x - 2$ (D) $\frac{1}{2}x^2 + x - 4$	**For visually impaired candidates**
Appropriate Option	(C) $x^2 + x - 2$	
9.	The graph of the polynomial $ax^2 + bx + c$ is a downward parabola if: (A) $a > 0$ (B) $a < 0$ (C) $a = 0$ (D) $a > 1$	**For visually impaired candidates**
Appropriate Option	(B) $a < 0$	
10.	If α, β are the zeroes of the polynomial $x^2 - x - 4$, then the value of $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ is: (A) -4 (B) $-\frac{1}{4}$ (C) $\frac{1}{4}$ (D) 4	**For visually impaired candidates**

Appropriate Option	(B) $-\frac{1}{4}$	
	2-MARKS QUESTIONS	
11.	Find the zeroes of the polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$. **OR** Find a quadratic polynomial in x, whose one zero is 15 and sum of the zeroes is 42.	**Comptt.**
Value Point	$7y^2 - \frac{11}{3}y - \frac{2}{3} = 0$ $21y^2 - 11y - 2 = 0$ $(3y-2)(7y+1) = 0$ $y = 2/3, -1/7$ **OR** The other zero is = $42 - 15 = 27$ A quadratic polynomial in x with zeroes 15 and 27 is: $x^2 - (\alpha+\beta)x + \alpha\beta = x^2 - 42x + 405$	
12.	Find the zeroes of the polynomial $p(x) = x^2 + \frac{1}{6}x - 2$. **OR** Find a quadratic polynomial whose one zero is 4 and product of zeroes is -20.	**Comptt.**
Value Point	$p(x) = x^2 + \frac{1}{6}x - 2$ $6x^2 + x - 12$ $6x^2 + 9x - 8x - 12$ $3x(2x + 3) - 2(2x + 3)$ $x = 2/3, -3/2$ **OR** The other zero is = $-20 \div 4 = -5$ A quadratic polynomial in x with zeroes 4 and -5 is: $x^2 - (\alpha+\beta)x + \alpha\beta = x^2 + x - 20$	
	3-MARKS QUESTIONS	
13.	Find the zeroes of the polynomial $p(x) = 6x^2 + 13x - 5$ and verify the relationship between its zeroes and the coefficients.	
Value Point	$(3x-1)(2x+5)=0$ $x = 1/3, -5/2$ **Verification:**	

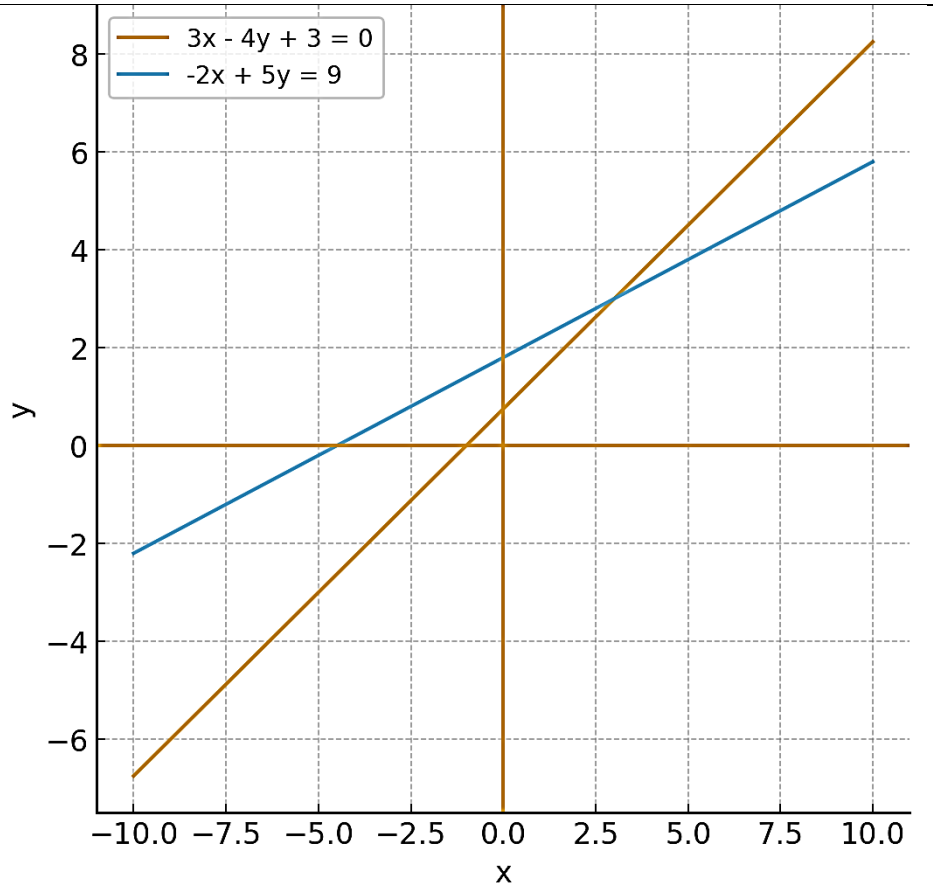
	Sum of zeroes = $\frac{1}{3} + \left(-\frac{5}{2}\right) = -\frac{13}{6} = -\frac{b}{a}$ Product of zeroes = $\frac{1}{3} \times \left(-\frac{5}{2}\right) = -\frac{5}{6} = \frac{c}{a}$	
14.	Find the zeroes of the polynomial $p(x) = 4x^2 - 4x - 3$ and verify the relationship between its zeroes and the coefficients.	
Value Point	Please refer to Q. No. 13 and proceed accordingly.	
15.	Find the zeroes of the polynomial $p(x) = 9x^2 - 6x - 35$ and verify the relationship between its zeroes and the coefficients.	
Value Point	Please refer to Q. No. 13 and proceed accordingly.	

Chapter 3–Pair of Linear Equations in Two Variables

	1-MARK QUESTIONS	
1.	The value of m for which lines 14x + my = 20 and −3x + 2y = 16 are parallel, is: (A) $-\frac{3}{14}$ (B) $-\frac{7}{3}$ (C) $-\frac{28}{3}$ (D) $-\frac{3}{28}$	
Appropriate Option	(C) $-\frac{28}{3}$	
2.	The solution of the pair of the linear equations 3x + 4y = 5; 4x + 3y = 9 is: (A) x = −3, y = 1 (B) x = 3, y = 1 (C) x = 3, y = −1 (D) x = −3, y = −1	**Comptt.**
Appropriate Option	(C) x = 3, y = −1	
3.	The pair of equations 7x – 14 y = −7 and 3x − 6y = 21 has: (A) unique solution (B) two solutions (C) no solution (D) infinitely many solution	**For visually impaired candidates**
Appropriate Option	(C) no solution	
	2-MARKS QUESTIONS	
4.	Solve the following system of linear equations for x and y: 3x + 2y = 11 2x + 3y = 4	**For visually impaired candidates**
Value Point	3x + 2y = 11 (1) 2x + 3y = 4 (2) Multiply the first equation by 3 and the second by 2: 9x + 6y = 33 (3) 4x + 6y = 8 (4) Subtracting equation (4) from equation (3), we get x = 5, y = −2	
	3-MARKS QUESTIONS	
5.	Solve the following pair of linear equations: $\frac{x}{a}-\frac{y}{b}=1$; $ax + by = a^2 + b^2$ **OR** For what value of 'p' will the following system of linear equations have ***no*** solution? (2p − 1)x + (p − 1)y = 2p + 1 3x + y = 1	**Comptt.**

Value Point	$bx - ay = ab$.....(1) $ax + by = a^2+b^2$.....(2) multiply the first equation by b and the second equation by a $b^2x - aby = ab^2$.....(3) $a^2x + aby = a^3+ab^2$.....(4) Adding equation (3) and (4) and solving, we get $x = \frac{a^3+2ab^2}{a^2+b^2}$, $y = \frac{b^3}{a^2+b^2}$ **OR** For the given equations to have no solution means $\frac{2p - 1}{3} = \frac{p - 1}{1} \neq \frac{2p + 1}{1}$ Solving for the condition for p, we get p = 2	
6.	For what value of p, pair of equations 2x + 3y = 4, (p + 2)x + 6y = (3p + 2) will have infinitely many solutions?	**For visually impaired candidates**
Value Point	For the given equations to have no solution means $\frac{2}{p+2} = \frac{3}{6} = \frac{p+2}{3p+2}$ Solving for the condition for p, we get p = 2	
7.	Find the value of p for which the following system of linear equations has infinitely many solutions: x + (p + 1)y = 5; (p + 1)x + 9y = 8p − 1	**For visually impaired candidates**
Value Point	$\frac{1}{p+1} = \frac{p+1}{9} = \frac{5}{8p-1}$ Solving for the condition for p, we get p = 2 or p = −4	
	5-MARKS QUESTIONS	
8.	Determine graphically whether the following pair of linear equations 2x + 3y = 12 and x − y = 1 has unique solution or infinitely many solutions.	
Value Point	$\frac{2}{1} \neq \frac{3}{-1}$ Therefore, the graph of the given equation will intersect at a point (unique solution).  	

9.	The sum of a 2-digit number and the number obtained by reversing the order of its digits, is 121. The two digits differ by 3. (i) Represent the above information in the form of pair of linear equations (ii) Show that the equations have unique solution. (iii) Solve the equations and find the number.	
Value Point	(i) Let the two-digit number be represented by $10x+y$, where x is the tens digit and y is the unit's digit. The reversed number is $10y+x$ $(10x+y)+(10y+x)=121$ x + y = 11……..(1) x – y = 3 or y – x = 3…….(2) (ii) As $\frac{1}{1} \neq \frac{-1}{1}$ Therefore, the equations have unique solution. (iii) On solving equations (1) and (2), we get x = 7 and y = 4 or x = 4 and y = 7. Therefore, the number is 74 or 47.	
10.	Solve the following pair of equations using graphical method: $3x - 4y + 3 = 0$ and $-2x + 5y = 9$	
Value Point	Clearly, $\frac{3}{-2} \neq \frac{-4}{5}$ Therefore, the graph of the given equation will intersect at a point (unique solution).	



4-MARKS QUESTIONS

11. A telecommunication company came up with two plans- plan A and plan B for its customers.

The plans are represented by linear equations where 't' represents the time (in minutes) bought and 'C' represents the cost. The equations are:

Plan A: 3C = 20t

Plan B: 3C = 10t + 300

Based on above information, answer the following questions:

(i) If you purchase plan B, how much initial amount you have to pay? **1**

(ii) Charu purchased plan A. How many minutes she bought for 250? **1**

(iii) (a) At how many minutes, do both the plans charge the same amount? What is that amount? **2**

OR

(iii) (b) Which plan is better if you want to buy 60 minutes? Give reason for your answer. **2**

Value Point

(i) The initial amount (fixed cost) is the cost when the time used (t) is 0 minutes. For Plan B, we substitute (t=0) into the equation, we get C = 100.

(ii) For Plan A, we are given the cost (C=250). Putting C = 250 in the first equation and solving for t, we get t = 37.5

(iii) (a) Equating both the equation we get: $20t = 10t + 300 \Rightarrow t = 30$

For plan A, when t = 30, C = 200

For plan B, when t = 30, C = 200

OR

(iii) (b) For plan A, when t = 60, C = 400

For plan B, when t = 60, C = 300

	Therefore, plan B is cheaper.	

Chapter 4–Quadratic Equations

	1-MARK QUESTIONS	
1.	The value of k for which the quadratic equation $x^2 + k(2x + k - 1) + 2 = 0$ has real and equal roots of x is: (A) 2 (B) 3 (C) 4 (D) 5	**For visually impaired candidates**
Appropriate Option	(A) 2	
2.	The number of possible solutions of a quadratic equation are: (A) exactly two (B) at most two (C) at least two (D) at least one	**For visually impaired candidates**
Appropriate Option	(A) Exactly two	
3.	If the quadratic equation $ax^2 + ax + c = 0$ $(a \neq 0)$ has real and equal roots, then: (A) $a = 4c$ (B) $4a = c$ (C) $a = -4c$ (D) $c = -4a$	**Comptt.**
Appropriate Option	(A) $a = 4c$	
4.	The value of k for which the roots of the quadratic equation $6x^2 + 4kx + k = 0$ are real and equal, is: (A) 0 (B) $\frac{3}{4}$ (C) $-\frac{3}{2}$ (D) $\frac{3}{2}$	
Appropriate Option	(D) $\frac{3}{2}$	
5.	The roots of the equation $x^2 - 8 = 0$ are: (A) rational and distinct (B) irrational and distinct (C) real and equal (D) not real	
Appropriate Option	(B) irrational and distinct	
6.	The value of k for which roots of quadratic equation $kx(x - 2) + 6 = 0$ are real and equal, is: (A) 0 only (B) 0, 6 (C) 6 only (D) -6 only	
Appropriate Option	(C) 6 only	

	3-MARKS QUESTIONS	
7.	The sum of the squares of two consecutive even numbers is 452. Find the numbers.	
Value Point	Let the two consecutive even numbers be: x, x+2 According to the question: $x^2+(x+2)^2 = 452$ $(x+16)(x-14)=0$ So, x = 14 or x = −16 (Reject) Numbers are 14 and 16	
	5-MARKS QUESTIONS	
8.	(A) It is given that $p^2x^2 + (p^2 - q^2)x - q^2 = 0; (p \neq 0)$ Show that the discriminant (D) of above equation is a perfect square. Find the roots of the equation. **OR** (B) Three consecutive positive integers are such that the sum of the square of smallest and product of other two is 67. Find the numbers, using quadratic equation.	
Value Point	(A) $D = (p^2 - q^2)^2 - 4(p^2)(-q^2)$ $D = p^2 + 2p^2q^2 + q^2$ This expression can be factored as a perfect square trinomial: $D= (p^2 + q^2)^2$ Since D can be expressed as the square of $(p^2 + q^2)$, the discriminant of the given equation is a perfect square. Using quadratic formula, roots of the given equation are $\frac{q^2}{p^2}, -1$ (B) Let the three consecutive positive integers be x, x + 1, and x + 2. $x^2 + (x + 1)(x + 2) = 67$ $2x^2 + 3x - 65 = 0$ Solving this equation, we get x = 5 or x = -6.5 (reject) Therefore, the numbers are 5, 6 and 7.	
9.	(a) In a class test, the sum of marks obtained by Ananya in Mathematics and Science is 28. Had she got 3 marks more in Mathematics and 4 marks less in Science, the product of marks obtained in the two subjects would have been 180. Find the marks obtained in the two subjects separately. **OR** (b) Solve for x: $\frac{150}{x} + x + 18 = 10x + \frac{15}{x}; x \neq 0$	**Comptt.**
Value Point	(a) Let marks obtained in Mathematics = x and in Science = y. Given x + y = 28 and (x+3)(y – 4) = 180. (x + 3) (24 – x) = 180.	

	$-x^2+21x+72 = 180$ $(x-12)(x-9) = 0$ $x = 12$ or $x = 9$. Then $y = 16$ or $y = 19$. Answers: (Maths, Science) = (12, 16) or (9, 19). (b) $\frac{150}{x} + x + 18 = 10x + \frac{15}{x}; x \neq 0$ $-9x^2+18x+135 = 0$ $(x-5)(x+3)=0$ $x = 5$ or $x = -3$	
10.	(a) A 2-digit number is such that the product of digits is 8. When 18 is subtracted from the number, the digits interchange their places. Find the number. **OR** (b) The difference of squares of two numbers is 180. The square of the smaller number is 8 times the greater number. Find the two numbers.	
Value Point	(a) Let the two-digit number be $10x + y$, where x = tens digit, y = units digit. Given: $xy = 8$ and $10x + y – 18 = 10y + x$ Solving the equations: $x = 4$ and $y = 2$ So, the number is 42. **OR** (b) Let the larger number = x and smaller number = y Given: $x^2 - y^2 = 180$ and $y^2 = 8x$ Solving the equations: $x = 18$ and $y = 12$	

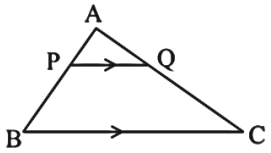
Chapter 5–Arithmetic Progressions

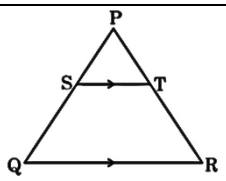
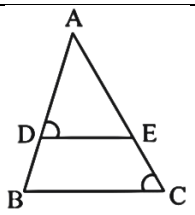
	1-MARK QUESTIONS	
1.	If n^{th} term of an A.P. is 5n – 6, then its common difference is: (A) –6 (B) 5n (C) 5 (D) 6	
Appropriate Option	(C) 5	
2.	The 20^{th} term of the A.P. : $10\sqrt{2}, 6\sqrt{2}, 2\sqrt{2},\ldots$ is: (A) $-76 + 10\sqrt{2}$ (B) $-62\sqrt{2}$ (C) $-66\sqrt{2}$ (D) $86\sqrt{2}$	
Appropriate Option	(C) $-66\sqrt{2}$	
3.	In an A.P., $a_n - a_{n-4} = 32$. Its common difference is: (A) –8 (B) 8 (C) 4n (D) 4	
Appropriate Option	(B) 8	
4.	The sum of three terms in A.P. is 30. If the greatest term is 13, then the common difference is: (A) 2 (B) 3 (C) –2 (D) –3	**For visually impaired candidates**
Appropriate Option	(B) 3	
5.	The 8^{th} term from the end of the A.P. 3, 7, 11, 15, …, 143 is: (A) 135 (B) 125 (C) 115 (D) 111	**For visually impaired candidates**
Appropriate Option	(B) 125	
6.	If the first term of an A.P. is ‘a’ and its commond difference is ‘b’, then its 10^{th} term is: (A) a + 10b (B) 10a + b (C) a + 9b (D) 9a + b	**Comptt.**
Appropriate Option	(C) a + 9b	
7.	The next term of the A.P. $\sqrt{5}, \sqrt{20}, \sqrt{45}, \ldots$ is: (A) $\sqrt{60}$ (B) $4\sqrt{5}$ (C) $\sqrt{75}$ (D) $\sqrt{125}$	**Comptt.**
Appropriate Option	(B) $4\sqrt{5}$	

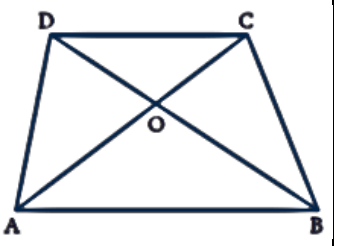
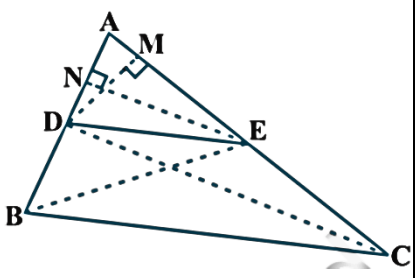
8.	The 20th term of the A.P. – 4, – 7, −10, – 13, … is: (A) 53 (B) 56 (C) −61 (D) −64	**Comptt.**
Appropriate Option	(C) −61	
9.	The next term of the A.P. $\sqrt{7}$, $\sqrt{28}$, $\sqrt{63}$, … is: (A) $\sqrt{81}$ (B) $\sqrt{126}$ (C) $\sqrt{112}$ (D) $5\sqrt{7}$	**Comptt.**
Appropriate Option	(C) $\sqrt{112}$	
	3-MARKS QUESTIONS	
10.	(A) Find the sum of the A.P. 7, $10\frac{1}{2}$, 14, …, 84. **OR** (B) If the sum of the first n terms of an A.P. is given by $S_n = \frac{n}{2}(2n + 8)$. Then, find its first term and common difference. Hence, find its 15th term.	
Value Point	(A) In the given AP, first term = 7 and common difference = 3.5 and nth term = 84. Using the formula for nth term, we get n = 23 Now, S_{23} = 1046.5 **OR** (B) $S_n = \frac{n}{2}(2n + 8) = n(n + 4)$ a_1 = 5, d = 4, a_{15} = 33	
11.	Find the middle term(s) of the A.P. 9, 15, 21,…, 243.	**For visually impaired candidates**
Value Point	Find n using the nth term formula, we get n = 40 So, middle terms are 20th and 21st terms. a_{20} = 123 and a_{21} = 129	
	4-MARKS QUESTIONS	
12.	In a charming village, there is a street called 'Maplewood Avenue', where the houses are numbered from 1 to 49. A community group has decided to undertake a green renovation project, aiming to install solar panels on the houses. They have a few questions before they begin the project.	**Comptt.**

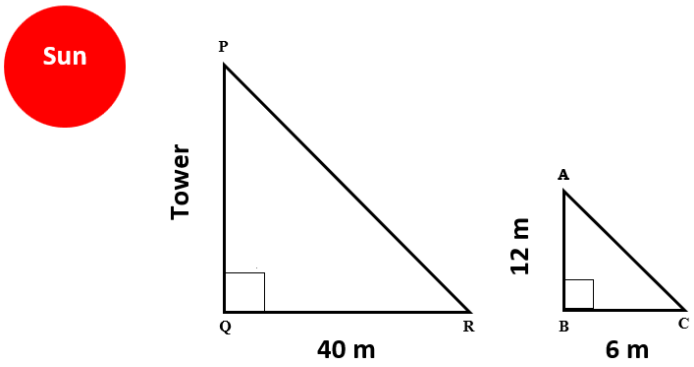
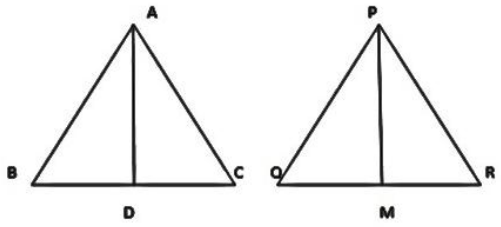
	 (i) How many houses are there on 'Maplewood Avenue'? **1** (ii) The house numbers follow an Arithmetic Progression. What is the first term of the A.P. and the common difference? **1** (iii) (a) If the group wanted to calculate the sum of all house numbers from 1 to 49, how much would that be? **2** **OR** (b) What is the sum of the house numbers between 15 and 30? **2**	
Value Point	(i) 49 (ii) First term = 1, common difference = 1 (iii) (a) S49 = 1225 **OR** (iv) (b) First term = 15, last term = 30, n = 16 S = $= \frac{n}{2}(a + l)$ = 360	

Chapter 6 – Triangles

	1-MARK QUESTIONS	
1.	In Δ ABC, PQ ∥ BC. It is given that AP = 2.4 cm, PB = 3.6 cm and BC = 5.4 cm. PQ is equal to:  (A) 2.7 cm (B) 1.8 cm (C) 3.6 cm (D) 2.16 cm	
Appropriate Option	(D) 2.16 cm	
2.	If △ABC ~ △PQR, PQ = 3AB and BC = 2 cm, then QR is equal to: (A) 2 cm (B) 6 cm (C) $\frac{2}{3}$ cm (D) 12 cm	**For visually impaired candidates**
Appropriate Option	(B) 6 cm	
3.	Line ST is drawn parallel to the base QR of △PQR, meeting PQ at S and PR at T. If $\frac{PQ}{QS} = 3$ and TR = 3 cm, then the length of PT is: (A) 9 cm (B) 12 cm (C) 6 cm (D) 3 cm	**For visually impaired candidates**
Appropriate Option	(C) 6 cm	
4.	There is one Assertion (A) and one Reason (R). Choose the correct answer of these questions from the four options (A), (B), (C) and (D) given below: (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A). (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of the assertion (A). (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true. **Assertion (A):** In a △ABC, D and E are points on the sies AB and AC respectively such that DE ∥ BC, then $\frac{AD}{DB} = \frac{AE}{EC}$. **Reason (R):** If a line is drawn parallel to one side of a triangle, intersecting the other two sides, then it divides the two sides in the same ratio.	**For visually impaired candidates**
Appropriate Option	(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A).	

5.	In the given figure, in △PQR, ST ∥ QR. If PS = 16 mm and PQ = 40 mm, then PT : TR is:  (A) 2 : 3 (B) 3 : 2 (C) 2 : 5 (D) 5 : 2	**Comptt.**
Appropriate Option	(A) 2 : 3	
6.	Which of the following is an incorrect statement? (A) Two congruent triangles are also similar. (B) A square and a rhombus are not similar. (C) Two triangles are similar if their corresponding sides are proportional. (D) Two polygons are similar if and only if their corresonding sides are in proportion.	**Comptt.**
Appropriate Option	(D) Two polygons are similar if and only if their corresonding sides are in proportion.	
7.	There is one Assertion (A) and one Reason (R). Choose the correct answer of these questions from the four options (A), (B), (C) and (D) given below: (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A). (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of the assertion (A). (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true. **Assesrtion (A):** If two triangles are equiangular, then they are similar. **Reason (R):** If two triangles are similar, then they are congruent.	**Comptt.**
Appropriate Option	(c) Assertion (A) is true but reason (R) is false.	
	2-MARKS QUESTIONS	
8.	In the given figure ∠ADE = ∠ACB and $\frac{AD}{DB} = \frac{AE}{EC}$. Prove that △ABC is an isosceles triangle.  	
Value Point	$\frac{AD}{DB} = \frac{AE}{EC}$ By converse of BPT, DE ∥ BC ∠ADE = ∠ABC (corresponding angles) ∠ADE = ∠ACB (given) ∠ABC = ∠ACB AB = BC (sides opposite to equal angles) Hence proved.	

9.	(a) Prove that diagonals of a trapezium divide each other proportionally. **OR** (b) S is a point on the side QR of a △PQR such that ∠PSR = ∠QPR. Prove that $PR^2 = QR \times SR$.	**For visually impaired candidates**
Value Point	(a) In trapezium ABCD, AB ‖ CD. Diagonals AC and BD meet at O.  ∠AOB = ∠COD (vertical angles) ∠ABO = ∠CDO (alternate interior angles) So, △AOB ~ △COD (AA similarity) Therefore, corresponding sides are proportional: $\frac{OA}{OB} = \frac{OC}{OD}$ (b)	
	5-MARKS QUESTIONS	
10.	**(A)** If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio. **OR** **(B)** In a Δ ABC, P and Q are points on AB and AC respectively such that PQ ‖ BC. Prove that the median AD, drawn from A to BC, bisects PQ.	
Value Point	(A) **Given:** In triangle ABC in which a line parallel to side BC intersects other two sides AB and AC at D and E respectively (see Fig.).  **To prove:** $\frac{AD}{DB} = \frac{AE}{EC}$ **Construction:** Let us join BE and CD and then draw DM ⊥ AC and EN ⊥ AB. **Proof:** $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{AD}{DB}$ (1) $\frac{ar(\Delta ADE)}{ar(\Delta CDE)} = \frac{AE}{EC}$ (2) Δ BDE and DEC are on the same base DE and between the same parallels BC and DE. So, ar(ΔBDE) = ar(ΔDEC) (3) From (1), (2) and (3) we have $\frac{AD}{DB} = \frac{AE}{EC}$ Hence proved.	
11.	Raghu is trying to find the height of a tower near his house, using the properties of similar triangles. The height of Raghu's house is 12 m. When Raghu's house casts a shadow 6 m long on the ground, the tower casts a shadow 40 m long on the ground. At the same time, the house of his friend Ramesh casts 12 m long shadow on the ground.	

	Based on the above information, answer the following: (i) What is the height of the tower? (ii) What is the height of Ramesh's house? (iii) (a) When the tower casts a shadow of 60 m long, what will be the length of shadow of Ramesh's house? **OR** (iii) (b) When the tower casts a shadow of 48 m long, what will be the length of shadow of Raghu's house?	
Value Point	 (i) Clearly, △PQR ~ △ABC (AA similarity) $\frac{PQ}{AB} = \frac{QR}{BC}$ ⇒ PQ = 80 Therefore, the height of the tower is 80 meters. (ii) Similarly, height of Ramesh's house is 24 meters. (iii) (a) Given: Length of tower's shadow = 60 m (QR) $\frac{80}{24} = \frac{60}{x}$ ⇒ x = 18 m (iii) (b) $\frac{80}{12} = \frac{48}{y}$ ⇒ y = 7.2 m	
12.	If AD and PM are medians of triangles ABC and PQR respectively, where △ ABC ~ △ PQR, then prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.	**Comptt.**
Value Point	 △ABC~△PQR (Given) Therefore, $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$ and ∠A=∠P, $\angle B = \angle Q$, $\angle C = \angle R$ $\frac{AB}{PQ} = \frac{2BD}{2QM}$ (as AD and PM are the medians) $\frac{AB}{PQ} = \frac{BD}{QM}$ ……..(1) In △ABD and △PQM $\angle B = \angle Q$ $\frac{AB}{PQ} = \frac{BD}{QM}$ (from (1)) Therefore, △ABD~△PQM (SAS similarity rule)	

	So, $\frac{AB}{PQ} = \frac{AD}{PM}$ (cpst) Hence proved.	

Chapter 7–Coordinate Geometry

	1-MARK QUESTIONS	
1.	The distance between the points $(-6, 9)$ and $(2, 7)$ is: (A) $2\sqrt{17}$ (B) $4\sqrt{17}$ (C) $2\sqrt{5}$ (D) $2\sqrt{15}$	
Appropriate Option	(A) $2\sqrt{17}$	
2.	The distance between the points $(2, -7)$ and $(-2, -1)$ is: (A) 10 (B) $2\sqrt{13}$ (C) 8 (D) $4\sqrt{13}$	
Appropriate Option	(B) $2\sqrt{13}$	
3.	The distance of point P(3, 4) from the *x*-axis is: (A) 3 units (B) 4 units (C) 5 units (D) 7 units	**For visually impaired candidates**
Appropriate Option	(B) 4 units	
4.	The ratio in wich the line segment joining the points A$(-4, 8)$ and B$(5, -10)$ is divided by the point P$(-2, 4)$ is: (A) 1 : 3 (B) 3 : 4 (C) 2 : 7 (D) 2 : 5	**For visually impaired candidates**
Appropriate Option	(C) 2 : 7	
5.	If the point $(3, \frac{3}{4})$ is the mid-point of the line segment joining the points (k, 0) and $(7, \frac{3}{2})$, then the value of 'k' is: (A) -1 (B) 1 (C) $\frac{3}{2}$ (D) 5	**Comptt.**
Appropriate Option	(A) -1	
6.	If $(\frac{1}{2}, 6)$ is the mid-point of the line segment joining $(-5, k)$ and $(6, 3)$, then the value of 'k' is: (A) 0 (B) 3 (C) $\frac{9}{2}$ (D) 9	**Comptt.**
Appropriate Option	(D) 9	

	2-MARKS QUESTIONS	
7.	Point P(x, 0) divides the line segment joining the points (2, 8), and $(-3, -5)$ in a certain ratio. Find the ratio and hence find the value of x.	
Value Point	Let P divide AB in the ratio m : n. Using the section formula for the y-coordinate, we have $$\frac{m(-5)+n(8)}{m+n}=0$$ $$\frac{m}{n}=\frac{8}{5}$$ Ratio $$\text{m : n = 8 : 5}$$ Using the section formula for the x-coordinate, we have $$\frac{8(-3)+5(2)}{8+5}=x$$ $$-\frac{14}{13}=x$$ So, the required point is $(-\frac{14}{13}, 0)$	
8.	Find the ratio in which point P$(-1, m)$ divides the line segment joining the points A(2, 5) and B$(-5, -2)$. Hence, find the value of m.	
Value Point	Let P divide AB in the ratio k : 1 Using section formula for x-coordinate, we have $$\frac{k(-5)+2}{k+1}=-1$$ $$\frac{3}{4}=k$$ So, AP : PB = 3 : 4 Using section formula for y-coordinate, we have $$\frac{\frac{3}{4}(-2)+5}{\frac{3}{4}+1}=m$$ $$2=m$$	
9.	Find the ratio in which the segment joining the points $(2, -5)$ and (5, 3) is divided by x-axis. Also, find coordinates of the point on x-axis.	
Value Point	Let P divide AB in the ratio m : n. Using the section formula for the y-coordinate, we have	

	$$\frac{m(3)+n(-5)}{m+n}=0$$ $$\frac{m}{n}=\frac{5}{3}$$ Ratio m : n = 5 : 3 Using the section formula for the x-coordinate, we have $$\frac{5(5)+3(2)}{5+3}=x$$ $$\frac{31}{8}=x$$ So, the required point is $(\frac{31}{8}, 0)$	
10.	(a) Find the coordinates of the point which divides the join of $(-1, 7)$ and $(4, -3)$ in the ratio 2 : 3. **OR** (b) Using distance formula, prove that the points A(3, 1), B(6, 4) and C(8, 6) are collinear.	**Comptt.**
Value Point	**OR** (a) AB = $\sqrt{(6-3)^2+(4-1)^2}=3\sqrt{2}$ BC = $\sqrt{(8-6)^2+(6-4)^2}=2\sqrt{2}$ AC = $\sqrt{(8-3)^2+(6-1)^2}=5\sqrt{2}$ Clearly, AB + BC = AC So, A, B and C are collinear points.	
11.	(a) Find the values of 'a' for which the distance between the points P(1, 2) and Q$(-2, a)$ is 5 units. **OR** (b) Find the coordinates of the point which divides the join of $(4, -3)$ and $(8, -5)$ in the ratio 3 : 1.	**Comptt.**
Value Point	(a) $\sqrt{(-2-1)^2+(a-2)^2}=5$ a = 6 or a = -2 **OR** (b) Let the required point be P (x, y) (x, y) = $(\frac{3(8)+1(4)}{3+1}, \frac{3(-5)+1(-3)}{3+1})=(7, -\frac{9}{2})$	

	3-MARKS QUESTIONS	
12.	**(A)** If points A(−5, *y*), B(2, −2), C(8, 4) and D(*x*, 5) taken in order, form a parallelogram ABCD, then find the values of *x* and *y*. Hence, find lengths of sides of the parallelogram. **OR** **(B)** A(6, −3), B(0, 5) and C(−2, 1) are vertices of △ABC. Points P(3, 1) and Q(2, −1) lie on sides AB and AC respectively. Check whether $\frac{AP}{PB} = \frac{AQ}{QC}$.	
Value Point	(A) The diagonals of a parallelogram bisect each other. So, $\left(\frac{-5+8}{2}, \frac{y+4}{2}\right) = \left(\frac{2+x}{2}, \frac{-2+5}{2}\right)$ $x = 1, y = -1$ (B) Clearly, P and Q are the mid-points of AB and AC respectively. Therefore, $\frac{AP}{PB} = \frac{AQ}{QC} = 1$.	
13.	(a) Prove that P(3, −3), Q(5, −2), R(6, 0) and S(4, −1) are the vertices of a rhombus PQRS. Also, find if it is a square or not. **OR** (b) Find the ratio in which the point (−5, p) divides the line segment joining (−7, −2) and (−4, 5). Hence, find the value of p.	**For visually impaired candidates**
Value Point	(a) Using distance formula, we have PQ = QR = RS = PS = $\sqrt{5}$. So, PQRS is a rhombus. PR ≠ QS, therefore, PQRS is not a square. **OR** (b) Let P(−5, p) divide A(−7, −2) and B(−4, 5) in the ratio m : n. Using the section formula for the x-coordinate, we have $\frac{m(-4)+n(-7)}{m+n} = -5$ Ratio m : n = 2 : 1 Using the section formula for the y-coordinate, we have $\frac{2(5)+1(-2)}{2+1} = p$ $\frac{8}{3} = p$	

14.	If the point Q(0, 1) is equidistant from points P(5, −3) and R(x, 6), then find the value/s of x. Also, find the distance QR and PR.	**Comptt.**
Value Point	$QP^2 = QR^2$ $x^2 + 25 = 41$ $x = 4$ or -4 When x = 4, QR = $\sqrt{41}$, PR = $\sqrt{82}$ When x = −4, QR = $\sqrt{41}$, PR = $9\sqrt{2}$	
15.	If the point dividing the line segment joining the points A(3, 4) and B(k, 6) in the ratio 1 : 2, lies on the line x + y −10 = 0, then find the value of 'k'.	**Comptt.**
Value Point	Let P(x, y) divides AB in the ratio m : n and P lies on x + y −10 = 0, therefore, P($\frac{k+6}{3}, \frac{14}{3}$) and $\frac{k+6}{3} + \frac{14}{3} - 10 = 0 \Rightarrow k = 10$	

Chapter 8–Introduction to Trigonometry

	1-MARK QUESTIONS	
1.	If $\sec\theta - \tan\theta = 2$, then $\sec\theta + \tan\theta$ is equal to: (A) $\frac{1}{2}$ (B) $\sqrt{2}$ (C) $\frac{1}{\sqrt{2}}$ (D) 2	
Appropriate Option	(A) $\frac{1}{2}$	
2.	If $\sin A = \frac{2}{3}$, then $\cos A$ is equal to: (A) $\frac{3}{2}$ (B) $\frac{\sqrt{5}}{3}$ (C) $\frac{1}{3}$ (D) $\frac{1}{\sqrt{3}}$	
Appropriate Option	(B) $\frac{\sqrt{5}}{3}$	
3.	If $\tan A = \frac{1}{2}$, then $\sin A$ is equal to: (A) $\frac{2}{\sqrt{5}}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{1}{\sqrt{5}}$ (D) 1	
Appropriate Option	(C) $\frac{1}{\sqrt{5}}$	
4.	If $\sqrt{2}\sin\theta = 1$, then $\cot\theta \times \text{cosec}\theta$ is equal to: (A) $\frac{1}{\sqrt{2}}$ (B) $\frac{1}{2\sqrt{2}}$ (C) $\sqrt{2}$ (D) $\frac{1}{2}$	
Appropriate Option	(C) $\sqrt{2}$	
5.	The value of $\frac{1-\tan^2 45^o}{1+\tan^2 45^o}$ is equal to the value of: (A) $\tan 30^o$ (B) $\tan 60^o$ (C) $\tan 90^o$ (D) $\tan 0^o$	**Comptt.**
Appropriate Option	(D) $\tan 0^o$	

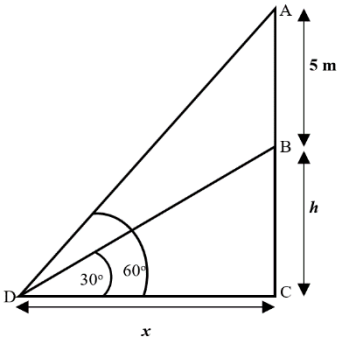
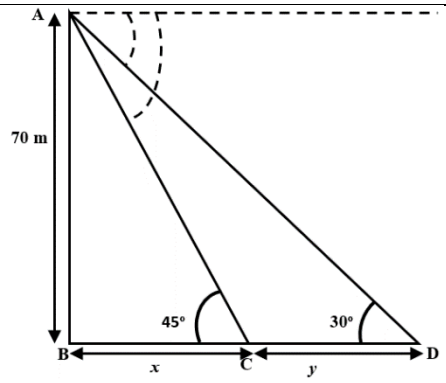
6.	If $x\tan 45^o \cos 60^o = \sqrt{3}\sin 60^o \cot 60^o$, then the value of x is: (A) 1 (B) $\frac{1}{\sqrt{3}}$ (C) $\sqrt{3}$ (D) $\frac{\sqrt{3}}{2}$	**Comptt.**
Appropriate Option	(C) $\sqrt{3}$	
7.	If $k\sin 30^o = \sqrt{2}\sin 45^o \tan 45^o$, then the value of 'k' is: (A) 0 (B) 1 (C) $\frac{1}{2}$ (D) 2	**Comptt.**
Appropriate Option	(D) 2	
8.	The value of $\frac{\sin^2 90^o + \cos^2 0^o}{\sin^2 30^o + \cos^2 30^o}$ is: (A) 1 (B) 0 (C) 2 (D) 4	**Comptt.**
Appropriate Option	(C) 2	
	2-MARKS QUESTIONS	
9.	If $3\cot A = 4$, then determine the value of $\cos^2 A - \sin^2 A$.	**Comptt.**
Value Point	$\cot A = \frac{4}{3}$, $\sin A = \frac{3}{5}$, $\cos A = \frac{4}{5}$ $\cos^2 A - \sin^2 A = \frac{7}{25}$	
	3-MARKS QUESTIONS	
10.	(a) Evaluate: $\frac{2}{3}\left(\cos^4 30^o - \sin^4 45^o\right) - 3\left(\sin^2 60^o - \sec^2 45^o\right) + \frac{1}{4}\cot^2 30^o$ **OR** (b) Prove that: $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{1 - 2\cos^2 A}$	**For visually impaired candidates**
Value Point	(a) $\frac{2}{3}(\cos^4 30^o - \sin^4 45^o) - 3(\sin^2 60^o - \sec^2 45^o) + \frac{1}{4}\cot^2 30^o$ $= \frac{2}{3}\left(\left(\frac{\sqrt{3}}{2}\right)^4 - \left(\frac{1}{\sqrt{2}}\right)^4\right) - 3\left(\left(\frac{\sqrt{3}}{2}\right)^2 - (\sqrt{2})^2\right) + \frac{1}{4}(\sqrt{3})^2$	

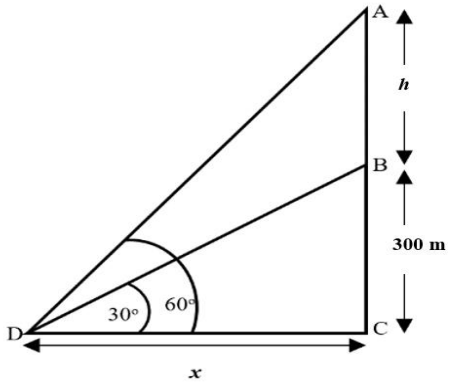
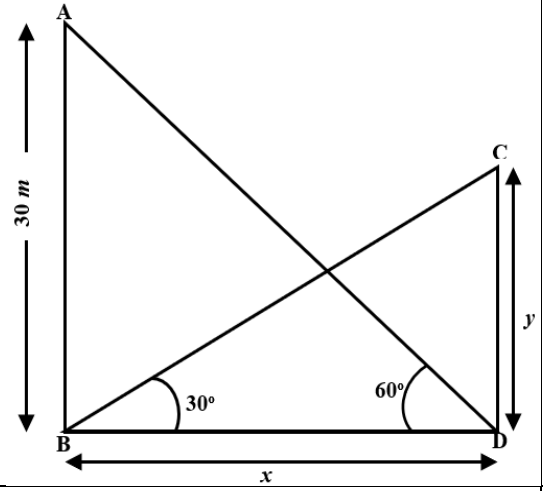
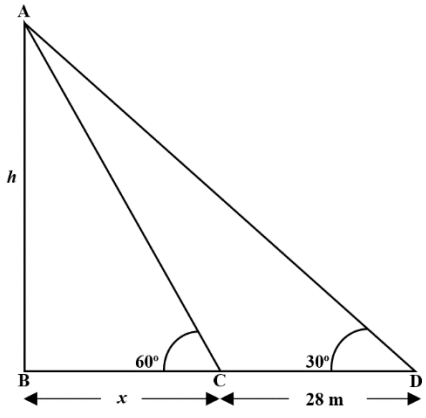
	$= \frac{2}{3}\left(\frac{9}{16} - \frac{1}{4}\right) - 3\left(\frac{3}{4} - 2\right) + \frac{1}{4}(3)$ $= \frac{113}{24}$ **OR** (b) $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A}$ $= \frac{(\sin A + \cos A)^2 + (\sin A - \cos A)^2}{\sin^2 A - \cos^2 A}$ $= \frac{2}{1 - \cos^2 A - \cos^2 A}$ $= \frac{2}{1 - 2\cos^2 A}$	
11.	Prove that: $$\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$$	**Comptt.**
Value Point	$\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta}$ $= \frac{\sin\theta\,(1 - 2\sin^2\theta)}{\cos\theta\,(2\cos^2\theta - 1)}$ $= \frac{\sin\theta\,(1 - 2\sin^2\theta)}{\cos\theta\,(1 - 2\sin^2\theta)}$ $= \tan\theta$	
12.	Prove that: $$\frac{1 + \tan^2 A}{1 + \cot^2 A} = \left(\frac{1 - \tan A}{1 - \cot A}\right)^2$$	**Comptt.**
Value Point	$RHS: \left(\frac{1 - \tan A}{1 - \cot A}\right)^2$ $\left(\frac{\cos A - \sin A}{\sin A - \cos A}\right)^2 \left(\frac{\sin A}{\cos A}\right)^2 = \tan^2 A$ $LHS: \frac{1 + \tan^2 A}{1 + \cot^2 A}$ $\frac{\sec^2 A}{\operatorname{cosec}^2 A} = \frac{\sin^2 A}{\cos^2 A} = \tan^2 A$ LHS = RHS	

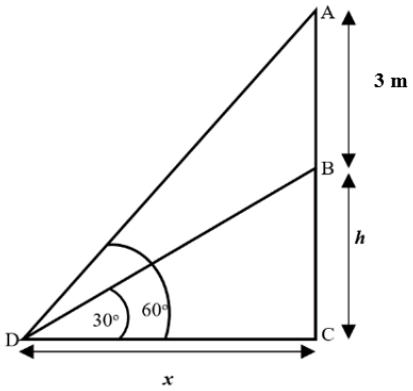
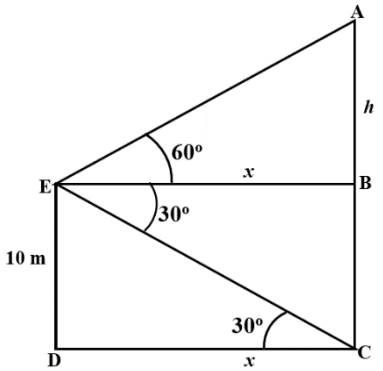
13.	Prove that: $$\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A$$	**Comptt.**
Value Point	$\sqrt{\frac{1+\sin A}{1-\sin A}}$ $\sqrt{\frac{1+\sin A}{1-\sin A}} \times \sqrt{\frac{1+\sin A}{1+\sin A}}$ $\sqrt{\frac{(1+\sin A)^2}{1-\sin^2 A}}$ $\frac{1+\sin A}{\cos A}$ $\sec A + \tan A$	
	4-MARKS QUESTIONS	
14.	A teacher asked his students to draw a right triangle ABC with AB = 8 cm, ∠B = 90^o and BC = 15 cm. Based on the above, answer the following: (i) Evaluate $\left(\sin^2 A - \cos^2 A\right)$ (ii) Evaluate $\left(\frac{1}{\cos^2 A} - \frac{1}{\cot^2 A}\right)$ (iii) (a) Evaluate $\frac{2}{1+\tan^2 A}$ and prove that it is equal to 2sin AcosA. **OR** (iii) (b) Evaluate: $\frac{\tan^2 A - \sec^2 A}{\cot^2 A - \operatorname{cosec}^2 A}$	**For visually impaired candidates**
Value Point	AB = 8 cm, ∠B = 90^o and BC = 15 cm. Using Pythagoras theorem, AC = 17 cm (i) sin A = $\frac{15}{17}$, cos A = $\frac{8}{17}$, tan A = $\frac{15}{8}$, cosec A = $\frac{17}{15}$, sec A = $\frac{17}{8}$, cot A = $\frac{8}{15}$ $\left(\sin^2 A - \cos^2 A\right) = \frac{161}{289}$ (ii) $\left(\frac{1}{\cos^2 A} - \frac{1}{\cot^2 A}\right) = \left(\sec^2 A - \tan^2 A\right) = 1$	

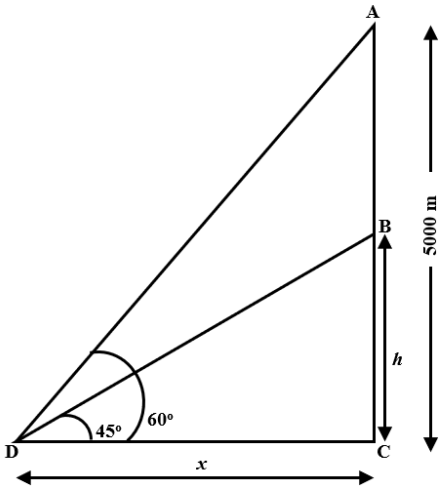
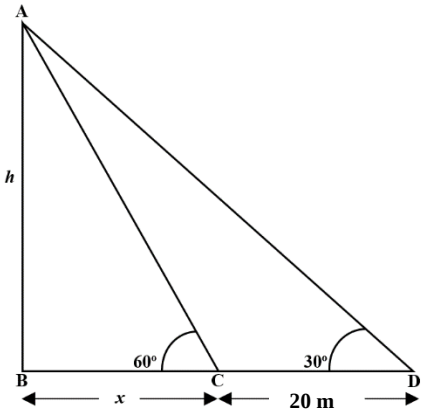
	(iii) (a) $\frac{2}{1+\tan^2 A} = 2\cos^2 A = \frac{128}{289}$ (iv) $2\sin A\cos A = 2\left(\frac{15}{17}\right)\left(\frac{8}{17}\right) = \frac{240}{289}$ (v) So, $\frac{2}{1+\tan^2 A} \neq 2\sin A\cos A$ (vi) $\frac{\tan^2 A - \sec^2 A}{\cot^2 A - \operatorname{cosec}^2 A} = \frac{-(-\tan^2 A + \sec^2 A)}{-(-\cot^2 A + \operatorname{cosec}^2 A)} = \frac{-1}{-1} = 1$	

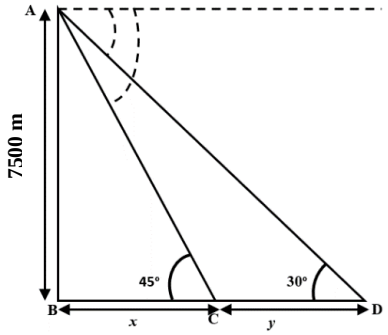
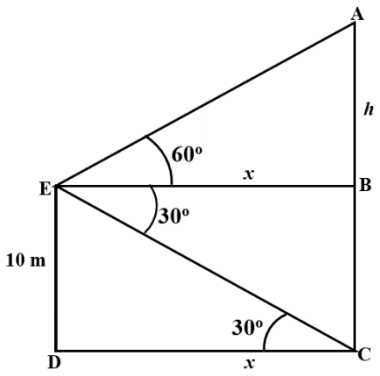
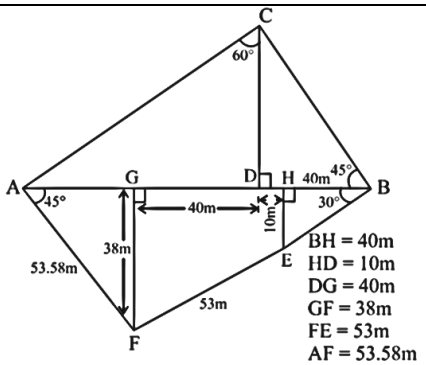
Chapter 9–Some Applications of Trigonometry

	5-MARKS QUESTIONS	
1.	From a point on the ground, the angle of elevation of the top of a pedestal is 30º and that of the top of the flagstaff fixed on the pedestal is 60º. If the length of the flagstaff is 5 m, then find the height of the pedestal and its distance from the point of observation on ground. (Use $\sqrt{3}$ = 1.73)	
Value Point	In △BCD, $\frac{BC}{DC} = \tan 30^o$ x = $\sqrt{3}$h……..(1) In △ACD, $\frac{AC}{DC} = \tan 60^o$ h + 5 = $\sqrt{3}$x……..(2) From (1) and (2), we get h = 2.5 and x = 4.325 So, the height of the pedestal **2.5 m** and its distance from the point of observation on ground is **4.325 m**. 	
2.	As observed from the top of a 70 m high lighthouse from the sea level, the angles of depression of two ships are 30º and 45º. If one ship is exactly behind the other on the same sides of the lighthouse, find the distance between the two ships. (Use $\sqrt{3}$ = 1.73)	
Value Point	 In △ ABC, $\frac{AB}{BC} = \tan 45^o$ x = 70……..(1) In △ ABD, $\frac{AB}{BD} = \tan 30^o$ $\frac{70}{70+y} = \frac{1}{\sqrt{3}}$ y = 70($\sqrt{3} - 1$) = 51.1 So, the distance between the two ships is **51.1 m.**	
3.	The angle of elevation of the top of a tower, 300 m high, from a point on the ground is observed as 30º. At an instant a hot air balloon passes vertically above the tower and at that instant its angle of elevation from same point on the ground is 60º. Find height of the balloon from the ground and distance of tower from point of observation. (Use $\sqrt{3}$ = 1.73)	

Value Point	In △BCD, $\frac{BC}{DC} = \tan 30^o$ x = 300√3……..(1) In △ACD, $\frac{AC}{DC} = \tan 60^o$ h + 300 = √3x……..(2) From (1) and (2), we get h = 600 and x = 519 The height of the balloon from the ground is **900 m** and the distance of the tower from the point of observation is **519 m**. 	
4.	The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 30 m high, find the height of the building and distance between the building and the tower. (Use √3 = 1.73)	
Value Point	In △ABD, $\frac{AB}{BD} = \tan 60^o$ 30 = √3x……..(1) In △CBD, $\frac{CD}{BD} = \tan 30^o$ x = √3y……..(2) From (1) and (2), we get y = 10 and x = 10√3 = 17.3 So, the height of the building is **10 m** and distance between the building and the tower is **17.3 m**. 	
5.	From a point on the ground, the angle of elevation of the top of a tree observed by a person is 60°. When moved back by 28 m, in the same line, the angle of elevation from another point on ground becomes 30°. Find the height of the tree and its distance from the initial point. (Use √3 = 1.73)	
Value Point	In △ABC, $\frac{AB}{BC} = \tan 60^o$ h = √3x……..(1) In △ABD, $\frac{AB}{BD} = \tan 30^o$ x + 28 = √3h……..(2) From (1) and (2), we get x = 14 and h = 14√3 = 24.22 So, the height of the tree is **24.22 m** and its distance from the initial point is **14 m**. 	
6.	A statue 3 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle	

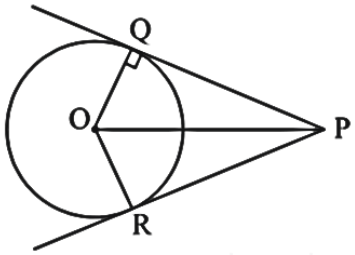
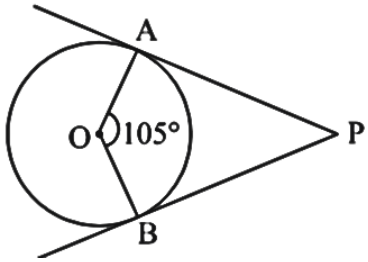
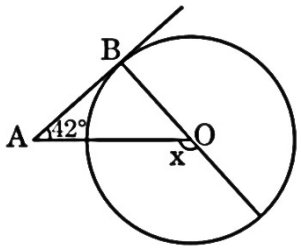
	of elevation of the top of the pedestal is 30°. Find the height of the pedestal and its distance from the point of observatin on ground. (Use $\sqrt{3}$ = 1.73)	
Value Point	In △BCD, $\frac{BC}{DC} = \tan 30^o$ x = $\sqrt{3}$h……..(1) In △ACD, $\frac{AC}{DC} = \tan 60^o$ h + 3 = $\sqrt{3}$x……..(2) From (1) and (2), we get h = 1.5 and x = 2.595 So, the height of the pedestal **1.5 m** and its distance from the point of observation on ground is **2.595 m**.  	
7.	A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30°. Calculate the distance of the hill from the ship and the height of the hill.	**For visually impaired candidates**
Value Point	In △ECD, $\frac{ED}{DC} = \tan 30^o$ x = 10$\sqrt{3}$……..(1) In △ABE, $\frac{AB}{BE} = \tan 60^o$ h = $\sqrt{3}$x……..(2) From (1) and (2), we get h = 30 and x = 10$\sqrt{3}$ So, the distance of the hill from the ship is **10$\sqrt{3}$ m** and the height of the hill is **40 m**.  	
8.	(a) An aeroplane when flying at a height of 5000 m above the ground passes vertically above another aeroplane at an instant when the angles of elvation of the two planes from a point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. [Use $\sqrt{3}$ = 1.73] **OR** (b) A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60°. From a point 20 m away from this point on the same bank, the angle of elevation of the top of the tower is 30°. Find the height of the tower and the width of the canal. [Use $\sqrt{3}$ = 1.73]	**Comptt.**

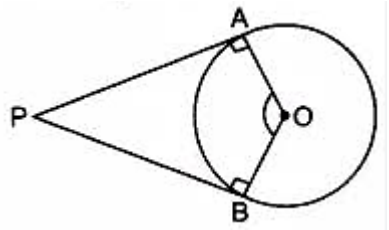
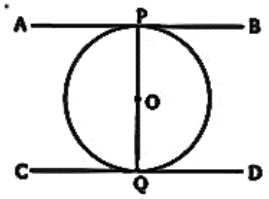
Value Point	(a) In △BCD, $\frac{BC}{DC} = \tan 45^o$ x = h……..(1) In △ ACD, $\frac{AC}{DC} = \tan 60^o$ $\frac{5000}{x} = \frac{\sqrt{3}}{1}$ h = $\frac{5000}{\sqrt{3}} = 2886.75$ (using (1)) So, the vertical distance between the aeroplanes at that instant is **2886.75 m**.  **OR** (b) In △ABC, $\frac{AB}{BC} = \tan 60^o$ h = $\sqrt{3}$x……..(1) In △ABD, $\frac{AB}{BD} = \tan 30^o$ $\frac{h}{x+20} = \frac{1}{\sqrt{3}}$ $\sqrt{3}$h = x + 20 3x = x + 20 (using (1)) x = 10 and h = 17.3 So, the height of the tower is **17.3 m** and the width of the canal is **10 m**.  	
9.	(a) The angles of depression of two ships from an aeroplane flying at a height of 7,500 m are 30° and 45°. If both the ships are in the same line and on the same side of the aeroplane such that one ship is exactly behind the other, find the distance between the ships. (Use $\sqrt{3}$ = 1.73) **OR** (b) A man standing on the deck of a ship which is 10 m above the water level, observes the angle of elevation of the tip of a hill as 60° and the angle of depression of the base of the hill as 30°. Calculate the distance of the hill from the ship, and the height of the hill.	**Comptt.**

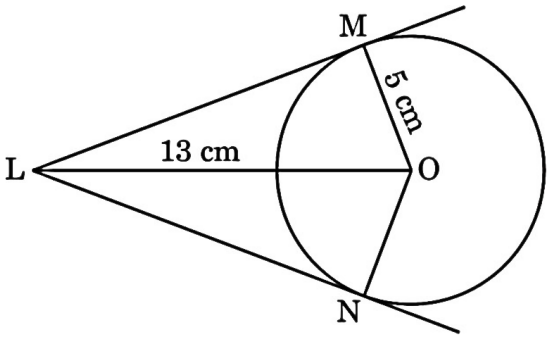
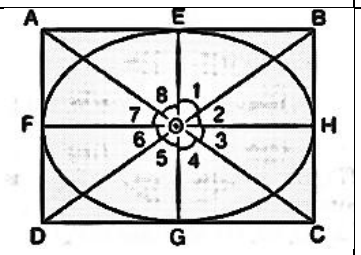
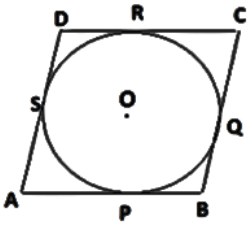
Value Point	(a) In △ ABC, $\frac{AB}{BC} = \tan 45^o$ x = 7500……..(1) In △ ABD, $\frac{AB}{BD} = \tan 30^o$ $\frac{7500}{x+y} = \frac{1}{\sqrt{3}}$ $\frac{7500}{7500+y} = \frac{1}{\sqrt{3}}$ $7500(\sqrt{3}-1) = y$ 5475 = y So, the distance between the ships **5475 m**.  **OR**	
	(b) In △ECD, $\frac{ED}{DC} = \tan 30^o$ $x = 10\sqrt{3}$……..(1) In △ABE, $\frac{AB}{BE} = \tan 60^o$ $h = \sqrt{3}x$……..(2) From (1) and (2), we get h = 30 and $x = 10\sqrt{3}$ So, the distance of the hill from the ship is **$10\sqrt{3}$ m** and the height of the hill is **40 m**.  	
	4-MARKS QUESTIONS	
10.	Rahim and Nadeem are two friends whose plots are adjacent to each other. Rahim's son made a drawing of the plots with necessary details.  It is decided that Rahim will fence the triangular plot ABC and Nadeem will fence along the sides AF, FE and BE. Observe the diagram carefully and answer the following questions: (Use $\sqrt{2}$ = 1.41 and $\sqrt{3}$ = 1.73) (i) Find length BC. **1** (ii) Find length AG. **1** (iii) (a) Calculate perimeter of ABC. **2**	

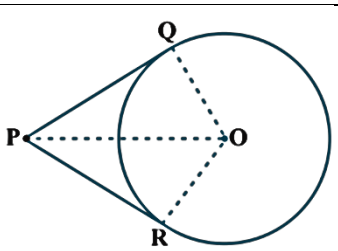
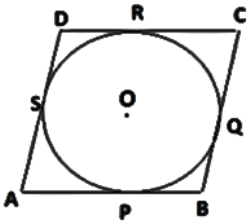
	OR (iii) (b) Calculate length of (AF + FE + EB).	
Value Point	(i) $\cos 45° = \frac{50}{BC} \Rightarrow BC = 50 \times 1{\cdot}41 = 70{\cdot}5$ m (ii) $\tan 45° = \frac{38}{AG} \Rightarrow AG = 38$ m (iii) (a) $\sin 60° = \frac{78}{AC} \Rightarrow AC = 89{\cdot}96$ m Perimeter of $\Delta ABC = 70{\cdot}5 + 89{\cdot}96 + 38 + 50 + 40 = 288{\cdot}46$ m **OR** (b) $\cos 30° = \frac{40}{BE} \Rightarrow BE = 46{\cdot}13$ m $AF + FE + EB = 53{\cdot}58 + 53 + 46{\cdot}13 = 152{\cdot}71$ m	

Chapter 10 - Circles

	1-MARK QUESTIONS	
1.	PQ and PR are tangents to the circle of radius 3 cm and centre O. If length of each tangent is 4 cm, then perimeter of △OQP is:  (A) 5 cm (B) 12 cm (C) 9 cm (D) 8 cm	
Appropriate Option	(B) 12 cm	
2.	PA and PB are tangents to a circle with centre O. If ∠AOB = 105°, then ∠OAP + ∠APB is equal to:  (A) 75° (B) 175° (C) 180° (D) 165°	
Appropriate Option	(D) 165°	
3.	If PA and PB are two tangents to the circle with centre O such that ∠APB = 50°, then ∠OAB is equal to: (A) 25° (B) 30° (C) 40° (D) 50°	**For visually impaired candidates**
Appropriate Option	(A) 25°	
4.	In the given figure, AB is a tangent to the circle with centre O. If ∠BAO = 42°, then the value of x is:  	**Comptt.**

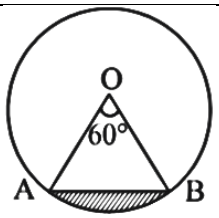
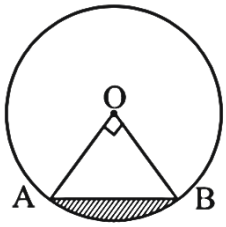
	(A) 42^o (B) 38^o (C) 48^o (D) 132^o	
Appropriate Option	(D) 132^o	
5.	The distance between two parallel tangents to a circle of radius 3.5 cm is: (A) 3.5 cm (B) 14 cm (C) 1.75 cm (D) 7 cm	**Comptt.**
Appropriate Option	(D) 7 cm	
6.	The degree measure of the angle at the centre of a semicircle is: (A) 90^o (B) 60^o (C) 120^o (D) 180^o	**Comptt.**
Appropriate Option	(D) 180^o	
	2-MARKS QUESTIONS	
7.	**(A)** Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre. **OR** **(B)** Prove that the tangents drawn at the ends of a diameter of a circle are parallel.	
Value Point	(A) **Given:** From the figure, PA and PB are tangents drawn from an external point P to the circle with center O. **To prove:** ∠APB + ∠BOA = 180° **Proof:** In quadrilateral OAPB, ∠APB + ∠PBO+∠BOA + ∠OAP = 360° ∠APB +90° + ∠BOA + 90° = 360° ∠APB + ∠BOA = 360°-180° ∠APB + ∠BOA = 180° Hence, proved.  **OR** (B) Let PQ be the diameter of a circle with center O. AB and CD are two tangents drawn to the circle at P and Q respectively. We have, OP ⊥AB and OQ ⊥ CD ∠BPO = ∠CQO = 90° Therefore, AB ∥ CD [Transversal PQ makes equal interior alternate angles] 	

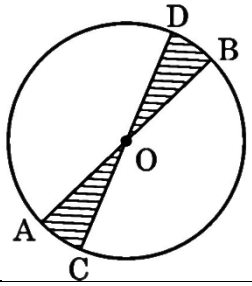
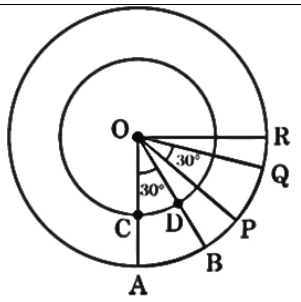
8.	In the given figure, from a point L which is at a distance of 13 cm from the centre O of a circle of radius 5 cm, the pair of tangents LM and LN are drawn to the circle. Find the perimeter of the quadrilateral LMON.  	**Comptt.**
Value Point	In △LOM, we have LM = $\sqrt{13^2 - 5^2} = 12$ cm As LM = LN = 12 cm Perimeter of quadrilateral LMON = LM + LN + OM + ON = 34 cm	
	3-MARKS QUESTIONS	
9.	Prove that the opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.	
Value Point	**Given:** A circle with centre O is inscribed in a quadrilateral ABCD quadrilateral ABCD  In △AEO and △AFO OE = OF ∠OEA = ∠OFA = 90° OA = OA △AEO ≅ △AFO (SAS congruency) ∠7 = ∠8 ... (i) (CPCT) Similarly, ∠1 = ∠2 ...(ii) ∠3 = ∠4...(iii) ∠5= ∠6 ...(iv) ∠1+ ∠2+ ∠3+ ∠4+ ∠5+ ∠6 +∠7 + ∠8 = 360°(angle around a point is 360°) 2∠1 +2∠8 +2∠4 +2∠5 = 360° ∠1+ ∠8+ ∠4+ ∠5 = 180° (∠1+∠8) +(∠4+ ∠5) = 180° ∠AOB+∠COD = 180° Hence Proved.	
10.	Prove that the parallelogram circumscribing a circle is a rhombus.	
Value Point	**Given:** ABCD is a parallelogram and a circle touch all four sides AB, BC, CD and DA.  **To prove:** ABCD is a rhombus. **Proof:** Tangents drawn from a common point to a circle are equal, so AP = AS…….(1) BP = BQ…….(2) CR = CQ…….(3) DR = DS…….(4)	

	Adding above equations, we get AB + CD = AD + BC But AB = CD and AD = BC (opposite sides of a parallelogram) Therefore, AB = BC = CD = AD Hence proved.	
	5-MARKS QUESTIONS	
11.	(a) Prove that the lengths of two tangents drawn from an external point to a circle are equal. **OR** (b) If all the sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.	
Value Point	(a) **Given:** A circle with centre O, a point P lying outside the circle and two tangents PQ, PR on the circle from P (see Fig.) **To prove:** PQ = PR.  **Construction:** Join OP, OQ and OR. **Proof:** In triangles OQP and ORP OQ = OR (Radii of the same circle) OP = OP (Common) ∠ OQP = ∠ ORP (each 90°) Therefore, Δ OQP ≅ Δ ORP (RHS) This gives PQ = PR (CPCT) **OR** (b) **Given:** ABCD is a parallelogram and a circle touch all four sides AB, BC, CD and DA. **To prove:** ABCD is a rhombus. **Proof:** Tangents drawn from a common point to a circle are equal, so  AP = AS…….(1) BP = BQ…….(2) CR = CQ…….(3) DR = DS…….(4) Adding above equations, we get AB + CD = AD + BC But AB = CD and AD = BC (opposite sides of a parallelogram) Therefore, AB = BC = CD = AD Hence proved.	

Chapter 11 – Areas Related to Circles

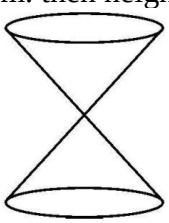
	1-MARK QUESTIONS	
1.	The length of arc subtending an angle of 210^o at the centre of the circle, is $\frac{44}{3}$ cm. The radius of the circle is: (A) $2\sqrt{2}$ cm (B) 4 cm (C) 8 cm (D) $\frac{1}{4}$ cm	
Appropriate Option	(B) 4 cm	
2.	The perimeter of a quadrant of a circle of radius 7 cm, is: (A) 18 cm (B) 11 cm (C) 22 cm (D) 25 cm	
Appropriate Option	(D) 25 cm	
3.	An arc of length 22 cm subtends an angle of x^o at the centre of the circle. If radius of circle is 36 cm, the value of x: (A) 35 (B) 40 (C) 60 (D) 30	
Appropriate Option	(A) 35	
4.	An arc of length 'l' subtends an angle of 15^o at the centre of the circle of radius 8.4 cm. The value of l is: (A) 22 cm (B) 2.2 cm (C) 9.24 cm (D) 4.2 cm	
Appropriate Option	(B) 2.2 cm	
5.	OAB is sector of a circle with centre O and radius 7 cm. If length of arc $\overset{\frown}{AB} = \frac{22}{7}$ cm, then $\angle AOB$ is equal to: (A) $\left(\frac{180}{7}\right)^o$ (B) 45^o (C) 60^o (D) 30^o	
Appropriate Option	(A) $\left(\frac{180}{7}\right)^o$	
6.	The area of a sector of a circle with radius 7 cm, when the angle of the sector is 60^o, is: (A) $\frac{22}{3}$ sq cm (B) $\frac{77}{3}$ sq cm (C) $\frac{44}{3}$ sq cm (D) $\frac{132}{3}$ sq cm	**Comptt.**
Appropriate Option	(B) $\frac{77}{3}$ sq cm	

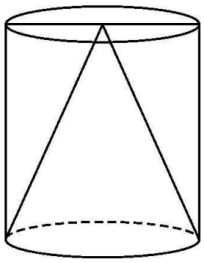
7.	There is one Assertion (A) and one Reason (R). Choose the correct answer of these questions from the four options (A), (B), (C) and (D) given below: (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A). (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of the assertion (A). (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true. **Assertion (A):** Area of a sector of a circle with radius r and angle with degree measure θ is $\frac{\theta}{360} \times 2\pi r$. **Reason (R):** Area of a segment of a circle = Area of the corresponding sector − Area of the corresponding triangle.	**Comptt.**
Appropriate Option	(d) Assertion (A) is false but reason (R) is true.	
8.	The degree measure of the angle at the centre of a semicircle is: (A) 90^o (B) 60^o (C) 120^o (D) 180^o	**Comptt.**
Appropriate Option	(D) 180^o	
9.	The degree measure of the angle at the centre of a qudrant of a circle is: (A) 30^o (B) 60^o (C) 90^o (D) 180^o	**Comptt.**
Appropriate Option	(C) 90^o	
	3-MARKS QUESTIONS	
10.	A chord of a circle of radius 10 cm subtends an angle of 60^o at the centre O. Find the area of the shaded region. (Use $\sqrt{3}$ = 1.73, $\sqrt{2}$ = 1.41 and π = 3.14) 	
Value Point	Here, r = 10 cm and $\theta = 60^o$ Area of the minor sector = $\frac{\theta}{360} \times \pi r^2$ = 52.333 cm² Area of equilateral △ OAB = 43.25 cm² Area of the shaded region = 52.333 − 43.25 = 9.08 cm² (approx)	
11.	A chord of a circle of radius 14 cm subtends an angle of 90^o at the centre O. Find the perimeter of the shaded region. (Use $\sqrt{2}$ = 1.41) 	

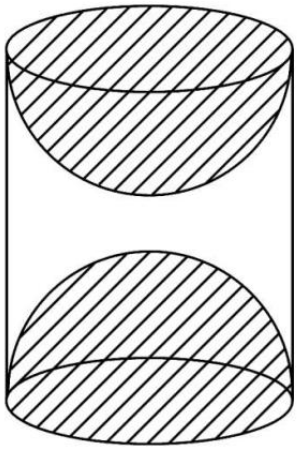
Value Point	Here, r = 14 cm and $\theta = 90^o$ In right $\triangle OAB$, AB = $14\sqrt{2}$ cm = 19.74 cm Length of the minor arc AB = $\frac{\theta}{360} \times 2\pi r$ = 21.98 cm Perimeter of the shaded region = 21.98 + 19.74 = 41.72 cm	
12.	AB and CD are diameters of a circle with centre O and radius 7 cm. If $\angle BOD = 30^o$, then find the area and perimeter of the shaded region.  	
Value Point	Area of the shaded region = $2 \times \frac{30}{360} \times \pi(7)^2 = 25.67$ cm^2 Perimeter of the shaded region = OA + OB + OC + OD + $2\times \frac{30}{360} \times 2\pi(7)$ = 35.33 cm	
13.	(a) The length of the minute-hand of a clock is 14 cm. Find the area swept by this minute-hand in 5 minutes. **OR** (b) To warn ships for underwater rocks, a lighthouse throws a red coloured light over a sector of central angle 80^o up to a distance of 16.5 km. Find the area of the sea over which the ships are warned.	**Comptt.**
Value Point	(a) Angle swept by minute-hand in 5 minutes = $5\times6^\circ=30^\circ$ Here, r = 14 cm, and $\theta = 30^o$ Therefore, area swept by the minute hand in 5 minutes = $\frac{\theta}{360} \times \pi r^2$ = 51.33 cm^2 **OR** (b) Here, r = 16.5 km, and $\theta = 80^o$ Area of the sea over which the ships are warned = $\frac{\theta}{360} \times \pi r^2$ = 189.97 km^2	
	4-MARKS QUESTIONS	
14.	A farmer has put up a decorative windmill in his farm in which there are eight blades of equal width and equally placed in circular arrangement. A circular wire goes through them.   	

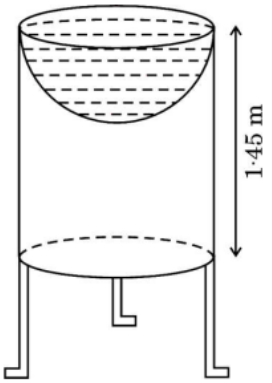
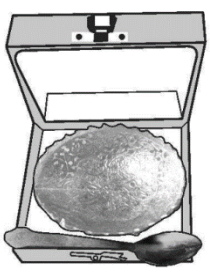
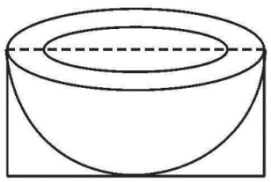
	The diagram shows two blades OAB and OPQ in a quarter circle with centre O. ∠AOB = ∠POQ = 30°, OA = 28 cm, OC = 21 cm. O is the centre of both the circles. (i) Determine the measure of ∠BOP. (ii) Find the length of arc CD. (iii) (a) Find the area of region CABD. **OR** (iii) (b) Find perimeter of region CABD.	
Value Point	(i) ∠BOP = $45^o - 30^o = 15^o$ (ii) Find the length of arc CD = $\frac{30}{360} \times 2\pi(21)$ = 11 cm (iii) (a) area of region CABD = $\frac{30}{360} \times \pi(28)^2 - \frac{30}{360} \times \pi(21)^2$ = 89.83 cm^2 **OR** (iii) (b) perimeter of region CABD = CA + DB + $l_{\text{arc CD}} + l_{\text{arc AB}}$ = 7 + 7 + 11 + 14.67 = 34.67 cm	
15.	Deepak has to cut the circular pizza into 8 equal slices such that all 8 of them get a slice. The pizza is 35 cm in diameter. Using the information, answer the following questions: (i) How many times will he have to make cut along the diameter to make 8 slices? (ii) What is the radius of each sector type slice? (iii) (a) Find the area of each slice of pizza. **OR** (iii) (b) Find the area of a slice, if only four equal pieces are cut.	**For visually impaired candidates**
Value Point	(i) 4 cuts (ii) Radius of each sector type slice = 17.5 cm (iii) (a) area of each slice of pizza = $\frac{45}{360} \times \pi(17.5)^2$ =120.31 cm^2 **OR** (iii) (b) area of each slice when four equal pieces are cut = $\frac{90}{360} \times \pi(17.5)^2$ = 240.63 cm^2	

Chapter 12 – Surface Areas and Volumes

	1-MARK QUESTIONS	
1.	Two right circular cylinders of equal volumes have their heights in the ratio 1 : 2. The ratio of their radii is: (A) $\sqrt{2} : 1$ (B) 1 : 2 (C) 1 : 4 (D) $1 : \sqrt{2}$	
Appropriate Option	(A) $\sqrt{2} : 1$	
2.	The curved surface area of a cone with base radius 7 cm, is 550 cm^2. The slant height of the cone is: (A) 25 cm (B) 14 cm (C) 20 cm (D) 24 cm	
Appropriate Option	(A) 25 cm	
3.	The largest possible cone is just fitted inside a hollow cube of edge 25 cm. The radius of the base of the cone is: (A) 5 cm (B) 12.5 cm (C) 25 cm (D) 10 cm	
Appropriate Option	(B) 12.5 cm	
4.	There is one Assertion (A) and one Reason (R). Choose the correct answer of these questions from the four options (A), (B), (C) and (D) given below : (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A). (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of the assertion (A). (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true. **Assertion (A):** When a hemisphere of same radius (r) is carved out from one side of the a solid wooden cylinder, the total surface area of remaining solid is increased is $2\pi r^2$. **Reason (R):** Curved surface area of hemisphere is $2\pi r^2$.	
Appropriate Option	(d) Assertion (A) is false but reason (R) is true.	
5.	Two identical cones are joined as shown in the figure. If radius of base is 4 cm and slant height of the cone is 6 cm. then height of the solid is:  (A) 8 cm (B) $4\sqrt{5}$ cm (C) $2\sqrt{5}$ cm (D) 12 cm	

Appropriate Option	(B) $4\sqrt{5}$ cm	
6.	The volume of air in a hollow cylinder is 450 cm^3. A cone of same height and radius as that of cylinder is kept inside it. The volume of empty space in the cylinder is:  (A) 225 cm^3 (B) 150 cm^3 (C) 250 cm^3 (D) 300 cm^3	
Appropriate Option	(D) 300 cm^3	
7.	The total surface area of a solid hemisphere of radius 7 cm is: (A) 98 π cm^3 (B) 196 π cm^3 (C) 147 π cm^3 (D) 174 π cm^3	**For visually impaired candidates**
Appropriate Option	(C) 147 π cm^3	
	3-MARKS QUESTIONS	
8.	(a) A spherical glass vessel has a cylindrical neck 7 cm long and 8 cm in diameter. The radius of spherical part is 10 cm. Find the volume of the vessel. **OR** (b) From each end of a solid cylinder of height 20 cm and base radius 7 cm, a cone of base radius 2.1 cm and height 5 cm is scooped out. Find the volume of the remaining solid.	
Value Point	(a) The total volume is the sum of the volume of the cylinder and the volume of the sphere: $V_{total} = V_c + V_s$ $V_{total} = 112\,\pi + \frac{4000\pi}{3}$ $V_{total} = \frac{4336\pi}{3}\,cm^3$ **OR** (b) $V_{remaining} = V_{cylinder} - V_{removed}$ $V_{remaining} = 980\pi - 14.7\,\pi$ $V_{remaining} = 965.3\,\pi\,cm^3$	
	5-MARKS QUESTIONS	
9.	(a) A hemispherical bowl of internal diameter 42 cm contains a liquid. This liquid is to be filled in cylindrical bottles of radius 3 cm and height 8 cm. How many bottles are required to empty the bowl? **OR**	**For visually impaired candiates**

	(b) A solid is composed of cylinder with hemispherical ends. If the total height of the solid is 16.2 cm and the diameter of the cylinder is 4.2 cm, find the volume and total surface area of solid. $\left[\pi = \frac{22}{7}\right]$	
Value Point	(a) Number of bottle required = $\frac{\text{Volume of hemispherical bowl}}{\text{Volume of one cylindrical bottle}}$ Number of bottle required = $\frac{6174\pi}{72\pi}$ = 85.75 We need 86 bottles to contain all the liquid. **OR** (b) $V_{total} = V_{cylinder} + 2 \times V_{hemisphere}$ $V_{total} = 158.4 + 54.72 = 213.12\ cm^2$	
10.	A tent is in the shape of a cylinder surmounted by a conical top of same radius. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of ₹ 500 per m^2.	**Comptt.**
Value Point	Total Area = $CSA_{cylinder} + CSA_{cone}$ Total Area = 26.4 + 17.6 = 44 m^2 Cost = Total Area x Rate = 44 m^2 x ₹ 500 per m^2 = ₹22000	
11.	A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the figure. If the height of the cylinder is 10 cm, and its base is of radius is 3.5 cm, find the total surface area of the article. 	**Comptt.**
Value Point	TSA = $CSA_{cylinder} + 2 \times CSA_{hemisphere}$ TSA = 220 + 154 = 374 cm^2	
12.	Sukriti made a bird-bath for her garden in the shape of a hollow cylinder with a hemispherical depression at one end as shown in the figure. The height of the cylinder is 1.45 m and its radius is 30 cm. Find the total surface area of the bird-bath.	**Comptt.**

		
Value Point	TSA of bird bath = $CSA_{cylinder}$ + $CSA_{hemisphere}$ TSA of bird bath = 33000 cm^2 = 3.3 m^2	
	4-MARKS QUESTIONS	
13.	Playing in a ball pool is good entertainment for kids. Suhana bought 600 new balls of diameter 7 cm to fill in the pool for her kids. The cuboidal box containing 600 balls has dimensions 42 cm × 91 cm × 50 cm (l × b x h).  Based on above information, answer the following questions: (i) Find the volume of one ball. **1** (ii) 10 balls are painted with neon colours. Determine the area of painted surface. **1** (iii) (a) Find the volume of empty space in the box. **2** **OR** (iii) (b) The lowermost layer of the balls covers the base of the box edge to edge when balls are placed evenly adjacent to each other. (A) How much area is covered by one ball? (B) How many balls are there in lowermost layer? **2**	
Value Point	(i) Volume of one ball = 179.67 cm^3 (ii) Area of painted surface = 10 x CSA of one ball = 1540 cm^2 (iii) (a) Volume of empty space in the box = Volume of box – Volume of 600 balls Volume of empty space in the box = 191100 – 107800 = 83300 cm^2 **OR** (iii) (A) Area covered by one ball = 7 x 7 = 49 cm^2 (B) Number of balls in lowermost layer = $\frac{\text{Area of base of box}}{\text{Area covered by one ball}}$ = 78	
14.	A hemispherical bowl is packed in a cuboidal box. The bowl just fits in the box. Inner radius of the bowl is 10 cm. Outer radius of the bowl is 10.5 cm.   Based on the above, answer the following questions: (i) Find the dimesnions of the cuboidal box. (ii) Find the total outer surface area of the box. (iii) (a) Find the difference between the capacity of the bowl and the volume of the box. (use π = 3.14)	

		OR	
	(iii)	(b) The inner surface of the bowl and the thickness is to be painted. Find the area to be painted.	
Value Point	(i)	Dimensions of the cuboidal box are 21 cm x 21 cm x 10.5 cm**.**	
	(ii)	Total Surface Area of the Box = $2(lb+bh+hl) = 1764\ cm^2$	
	(iii)	(a) Difference between capacity = $Volume_{box} – Volume_{hemisphere} = 2537.17\ cm^3$	
		OR	
	(iii)	(b) Area to be painted = $2\pi r^2 + \pi R^2 – \pi r^2 = 660.185\ cm^2$	

Chapter 13–Statistics

<table>
<tr><td></td><td>1-MARK QUESTIONS</td><td></td></tr>
<tr><td>1.</td><td>There is one Assertion (A) and one Reason (R). Choose the correct answer of these questions from the four options (A), (B), (C) and (D) given below:
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A).
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of the assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.
Assertion (A): Median marks of students in a class test is 16. It means half of the class got marks less than 16.
Reason (R): Median divides the distribution in two equal parts.</td><td></td></tr>
<tr><td>Appropriate Option</td><td>(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A).</td><td></td></tr>
<tr><td>2.</td><td>For the following distribution:
<table><tr><td>Class</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td><td>40 – 50</td></tr><tr><td>Frequency</td><td>10</td><td>12</td><td>15</td><td>20</td><td>9</td></tr></table>The sum of lower limits of the median class and modal class is:
(A) 30 (B) 50
(C) 40 (D) 60</td><td>For visually impaired candidates</td></tr>
<tr><td>Appropriate Option</td><td>(B) 50</td><td></td></tr>
<tr><td>3.</td><td>There is one Assertion (A) and one Reason (R). Choose the correct answer of these questions from the four options (A), (B), (C) and (D) given below:
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A).
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of the assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.
Assertion (A): If the difference of the mode and median of a data is 24, then the difference of the median and mean is 12.
Reason (R): Mode = 3 Mean – 2 Median</td><td>For visually impaired candidates</td></tr>
<tr><td>Appropriate Option</td><td>(c) Assertion (A) is true but reason (R) is false.</td><td></td></tr>
<tr><td>4.</td><td>The empirical relationship between the three measures of central tendency is:
(A) 3 Median = Mode + 2 Mean (B) 3 Median = Mode – 2 Mean
(C) 3 Mode = Median + 2 Mean (D) 3 Mean = Mode – 2 Median</td><td>Comptt.</td></tr>
<tr><td>Appropriate Option</td><td>(A) 3 Median = Mode + 2 Mean</td><td></td></tr>
</table>

5. The formula: $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$, where symbols have their usual meanings, is used to calculate: **Comptt.**

(A) Mean of grouped data (B) Median of grouped data

(C) Mode of grouped data (D) Range of grouped data

Appropriate Option (C) Mode of grouped data

6. In a grouped frequency distribution, it is assumed that the frequency of each class interval is centered around its: **Comptt.**

(A) Lower limit (B) Upper limit

(C) Mid-point (D) None of the above

Appropriate Option (C) Mid-point

3-MARKS QUESTIONS

7. The following table shows the marks obtained by 110 students of class X in a school during a particular academic session. Find the mode the distribution. **Comptt.**

Marks Obtained :	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Number of Students :	21	25	30	24	10

Value Point

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

l = 40 (lower limit of modal class)
f_1= 30 (frequency of modal class)
f_0 = 25 (frequency of previous class)
f_2 = 24 (frequency of next class)
h = 20 (class width)
Substitute the above values in the formula, we get
Mode = 49.09 marks

8. Following frequency distribution shows the ages of girls of a city at the time of their marriage. If modal age of the data is 24 years, find the mission frequency 'x'. **Comptt.**

Age (in years) :	18 – 23	23 – 28	28 – 33	33 – 38	38 – 43	43 – 48
Number of girls :	160	170	x	50	38	10

Value Point

Modal age = **24 years**
So **modal class = 23–28**, and its frequency = **170**
l = 170 (lower limit of modal class)
f_1= 170 (frequency of modal class)
f_0 = 160 (frequency of previous class)
f_2 = x (frequency of next class)
h = 5 (class width)
Substitute these values in the formula of mode
Mode = $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$
we get x = 130

5-MARKS QUESTIONS

9. Find 'mean' and 'mode' of the following data:

Class	15-20	20-25	25-30	30-35	35-40	40-45
Frequency	6	16	17	4	5	2

Value Point

Class	**f**	**x**	**fx**
15–20	6	17.5	105
20–25	16	22.5	360
25–30	17	27.5	467.5
30–35	4	32.5	130
35–40	5	37.5	187.5
40–45	2	42.5	85

Mean = $\frac{1335}{50} = 26.7$

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

l = 25 (lower limit of modal class)
f_1= 17 (frequency of modal class)
f_0 = 16 (frequency of previous class)
f_2 = 4 (frequency of next class)
h = 5 (class width)
Substitute the above values in the formula, we get

Mode = 25.36

10. Find 'median' and 'mode' of the following data:

Class	100-105	105-110	110-115	115-120	120-125	125-130
Frequency	6	8	10	4	9	3

Value Point

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

l = 110 (lower limit of modal class)
f_1= 10 (frequency of modal class)
f_0 = 8 (frequency of previous class)
f_2 = 4 (frequency of next class)
h = 5 (class width)
Substitute the above values in the formula, we get

Mode = 111.25

Class	**f**	**cf**
100-105	6	6
105-110	8	14
110-115	10	24
115-120	4	28
120-125	9	37
125-130	3	40

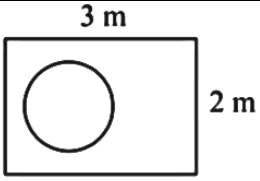
	l = 110 (lower limit of median class) f = 10 (frequency of median class) cf = 14 (cf of previous class) h = 5 (class width) Substitute the above values in the formula of median, we get Median = $l + \frac{\frac{N}{2} - cf}{f} \times$ h Median = 113	
11.	Find 'mean' and 'mode' of the following data: **Class** | 20-25 | 25-30 | 30-35 | 35-40 | 40-45 | 45-50 **Frequency** | 9 | 8 | 11 | 13 | 4 | 5	
Value Point	**Class** | **f** | **x** | **fx** 20-25 | 9 | 22.5 | 202.5 25-30 | 8 | 27.5 | 220.0 30-35 | 11 | 32.5 | 357.5 35-40 | 13 | 37.5 | 487.5 40-45 | 4 | 42.5 | 170.0 45-50 | 5 | 47.5 | 237.5 Mean = = $\frac{1675}{50} = 33.5$ Mode = $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times$ h l = 35 (lower limit of modal class) f_1= 13 (frequency of modal class) f_0 = 11 (frequency of previous class) f_2 = 4 (frequency of next class) h = 5 (class width) Substitute the above values in the formula, we get Mode = 35.91	
12.	Find the mode and the mean of the following frequency distribution: **Class** | 0 – 8 | 8 – 16 | 16 – 24 | 24 – 32 | 32 – 40 **Frequency** | 6 | 7 | 10 | 8 | 9	**For visually impaired candidates**
Value Point	Mode = $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times$ h l = 16 (lower limit of modal class) f_1= 10 (frequency of modal class) f_0 = 7 (frequency of previous class) f_2 = 8 (frequency of next class) h = 8 (class width) Substitute the above values in the formula, we get Mode = 20.8	

Class	f	x	fx
0–8	6	4	24
8–16	7	12	84
16–24	10	20	200
24–32	8	28	224
32–40	9	36	324

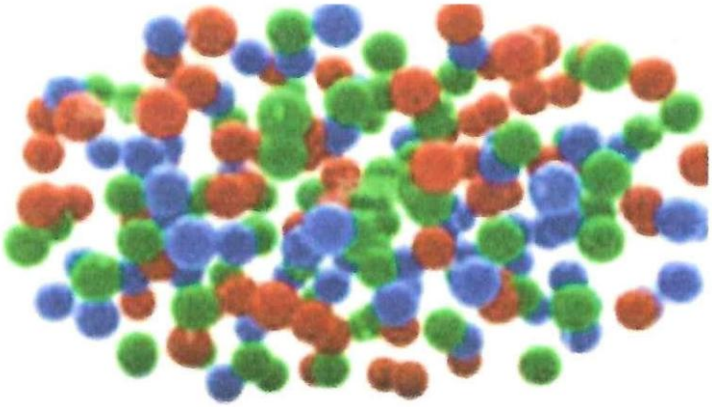
Mean = $\frac{856}{40} = 21.4$

Chapter 14–Probability

	1-MARK QUESTIONS	
1.	Three coins are tossed together. The probability that only one coin shows tail, is: (A) $\frac{1}{2}$ (B) $\frac{3}{8}$ (C) $\frac{7}{8}$ (D) 1	
Appropriate Option	(B) $\frac{3}{8}$	
2.	A card is drawn at random from a well shuffled deck of 52 playing cards. The probability that drawn card shows number '9' is: (A) $\frac{1}{26}$ (B) $\frac{4}{13}$ (C) $\frac{1}{52}$ (D) $\frac{1}{13}$	
Appropriate Option	(D) $\frac{1}{13}$	
3.	There is one Assertion (A) and one Reason (R). Choose the correct answer of these questions from the four options (A), (B), (C) and (D) given below : (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A). (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of the assertion (A). (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true. **Assertion (A):** If E is an event such that P(E) = $\frac{1}{999}$, then P($\overline{E}$) = $\frac{1}{0.001}$. **Reason (R):** P(E) + P($\overline{E}$) = 1 .	
Appropriate Option	(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the assertion (A).	
4.	Two dice are rolled together. The probability that at lease one of them shows a six, is: (A) $\frac{12}{36}$ (B) $\frac{5}{36}$ (C) $\frac{11}{36}$ (D) $\frac{6}{36}$	
Appropriate Option	(C) $\frac{11}{36}$	

5.	Two different coins are tossed together. The probability of getting exactly one tail is: (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) 1	**Comptt.**
Appropriate Option	(B) $\frac{1}{2}$	
6.	A fair die is thrown once. The probability of getting an even number less than 3 is: (A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) 0	**Comptt.**
Appropriate Option	(A) $\frac{1}{6}$	
7.	The probability of the happening of an event is 'p' and the probability of non-happening of the same event is 'q'. The relation between 'p' and 'q' is: (A) p + q + 1 = 0 (B) p = q – 1 (C) p + q = 1 (D) p =1, q =1	**Comptt.**
Appropriate Option	(C) p + q = 1	
8.	A fair die is thrown once. The probability of getting a prime number less than 5 is: (A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) 1	**Comptt.**
Appropriate Option	(B) $\frac{1}{3}$	
	2-MARKS QUESTIONS	
9.	(A) A coin is dropped at random on the rectangular region shown in the figure. What is the probability that it will land inside the circle with radius 0.7 m?  **OR** (B) A die is thrown twice. What is the probability that (i) difference between two numbers obtained is 3? (ii) sum of the numbers obtained is 8?	
Value Point	(A) Required Probability $= \frac{\text{Area of Circle}}{\text{Area of rectangle}} = 0.257$ **OR**	

	(B) (i) Total outcomes = 36, Favourable Outcomes = 6 { (1, 4), (4, 1), (2, 5), (5, 2), (3, 6), (6, 3)} Required Probability = $\frac{6}{36} = \frac{1}{6}$ (ii) Total outcomes = 36, Favourable Outcomes = 5 {(2, 6), (3, 5), (4, 4), (5, 3), (6, 2)} Required Probability = $\frac{5}{36}$	
10.	(a) A card is drawn at random from a pack of 50 cards numbered 1 to 50. Find the probability of drawing a number which is a perfect square. **OR** (b) A piggy bank contains fifty ₹ 1 coins, hundred ₹ 2 coins and one hundred and fifty ₹ 5 coins. If it is equally likely any one of the coins will fall out when the bank is turned upside down, find the probability that ₹ 2 coin has not fallen out, when the bank is turned upside down.	**For visually impaired candidates**
Value Point	(a) Total outcomes = 50, Favourable Outcomes = 7 {1, 4, 9, 16, 25, 36, 49} Required Probability = $\frac{7}{50}$ **OR** (b) Total outcomes = 50 + 100 + 150 = 300, Favourable Outcomes = 200 Required Probability = $\frac{200}{300} = \frac{2}{3}$	
11.	A die is thrown twice. Find the probability that 5 will come up at leaset once.	**For visually impaired candidates**
Value Point	Total Outcomes = 36, Favourable Outcomes = 11 Required Probability = $\frac{11}{36}$	
	4-MARKS QUESTIONS	
12.	Aarav and Ashima are brother and sister and on Ashima's birthday, Aarav gifts her a bag filled with 8 red toffees, 10 green toffees and 6 blue toffees. Ashima decides to randomly draw a toffee from the bag. Shw wants to find the chances of picking a toffee of specific colour and asks the following questions:	

	 (i) What is the probability of getting a green toffee? **1** (ii) What is the probability of getting a blue toffee? **1** (iii) (a) What is the probability of getting a non-red toffee? **2** **OR** (b) What is the probability of getting a red or a green toffee? **2**	
Value Point	Total Outcomes = 8 +10 + 6 = 24 (i) P(Green toffee) = $\frac{10}{24} = \frac{5}{12}$ (ii) P(Blue toffee) = $\frac{6}{24} = \frac{1}{4}$ (iii) (a) P(non-red toffee) = $1 - \frac{8}{24} = \frac{16}{24} = \frac{2}{3}$ **OR** (iii) (b) P(red or green toffee) = $\frac{8+10}{24} = \frac{3}{4}$	