Class X

MATHEMATICS

Weightage and distribution of marks over different dimensions of the question shall be as follows:-

A. Weightage to content units

S.No.	Content Units	Marks
1.	Number systems	04
2.	Algebra	20
3.	Trignometry	12
4.	Coordinate Geometry	08
5.	Geometry	16
6.	Mensuration	10
7.	Statistics & Probability	10
	Total	**80**

B. Weightage to forms of questions

S. No.	Forms of Questions	Marks for each question	No. of Questions	Total Marks
1.	Very short answer type questions (VSA)	01	10	10
2.	Short answer questions-1 (SAI)	02	05	10
3.	Short answer questions-2 (SAII)	03	10	30
4.	Long answer questions (LA)	06	05	30
	Total		**30**	**80**

C. Scheme of Options

All questions are compulsory. There is no overall choice in the question paper. However, internal choice has been provided in any one question out of 05 questions of 02 marks each, any three questions out of 10 questions of 03 marks each and any two questions out of 05 questions of 06 marks each.

D. Weightage to difficulty level of Questions

S. No.	Estimated difficulty level of questions	Percentage of marks
1.	Easy	15
2.	Average	70
3.	Difficult	15

BLUE PRINT FOR CLASS - X

Time : 3 hours Mathematics M.M. 80

Unit	Topics	No. of Questions with marks				Total
		1	2	3	6	
Number System	Number System	1	–	1	–	2(4)
Algebra	Polynomial	1	1	1	–	3(6)
	Linear Equations	–	–	1	–	1(3)
	Quadretic Equations	1	–	–	1	2(7)
	Arithmatic Progression	1	–	1	–	2(4)
Trignometry	Trig. Ratios & Identities	1	1	1	–	3(6)
	Height & Distance	–	–	–	1	1(6)
Coordinate Geom.	Coordinate Geometry	–	1	2	–	3(8)
Geometry	Triangles	1	1	–	1*	2(3)
	Circles	1	–	1	1*	3(10)
	Constructions	–	–	1		1(3)
Mensuration	Area of plane figure	1	–	1	–	2(4)
	Surface area & Volume	_	_	_	1	1(6)
Statistics	Statistics	–	–	–	1	1(6)
Probability	Probability	2	1	–	–	3(4)
	Total	**10**	**5**	**10**	**5**	**30(80)**

Questions with marks

1 marks 10 questions = 10

2 marks 5 questions = 10

3 marks 10 questions = 30

6 marks 5 questions = 30

Interanl Assesment = 20

Grand total = 100

*** With alternate**

Figure outside brackets : Ques. No.s

Figure inside brackets : Marks

Chapter-1

Real Numbers
Key points

1. Euclid's division lemma :-
For given positive integers 'a' and 'b'; there exist unique whole numbers 'q' and 'r' satisfying the relation a = bq+r, $0 \le r < b$.

2. Euclid's division algorithms :-
HCF of any two positive integers a and b, With a>b is obtained as follows :-
Step 1 : Apply Euclide's division lemma to a and b to find q and r such that
$$a = bq + r \cdot 0 \le r < b$$
Step 2 : If r = 0, HCF (a, b) = b if $r \neq 0$, apply Euclid's lemma to b & r.

3. The Fundamental Theorem of Arithmetic :-
Every composite number can be expressed (factorized) as a product of primes and this factorization is unique, apart from the order in which the prime factors occur.

4. Let $x = \frac{p}{q}$, $q \neq 0$ be a rational number, such that the prime factorization of 'q' is of the form $2^m 5^n$, where m, n are non-negative integers. Then x has a decimal expansion which is terminating.

5. Let $x = \frac{p}{q}$, $q \neq 0$ be a rational number, such that the prime factorization of q is not of the form $2^m 5^n$, where m, n are non-negative integers. Then x has a decimal expansion which is non-terminating repeating.

6. $\sqrt{p}$ is irrational, where p is a prime. A number is called irrational if it can not be written in the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$.

Chapter-1

Real Numbers
Questions

1 mark questions :-

Q. 1 State whether $\frac{6}{300}$ has terminating or non-terminating repeating (recurring) decimal expansion.

Q. 2 If LCM (52, 182) = 364, write HCF (52, 182).

Q. 3 Write two rational numbers between $\frac{1}{2}$ and $\frac{2}{3}$.

Q. 4 If a and b are two prime numbers, write their LCM.

Q. 5 State whether 3×7×17×19+17 is a prime number or composite number.

Q. 6 If HCF (24, 60) = 12., write LCM (24, 60).

Q. 7 State Fundamental Theorem of the Arithmetic.

Q. 8 State whether $\frac{123}{2^3 \times 3 \times 5^2}$ has terminating or non-terminating recurring decimal expansion.

Q. 9 Write HCF of 11 and 17.

Q. 10 Write two irrational numbers between 1 and 2.

2 marks questions (★ Question under HOTS) :-

Q. 11 Using Euclid's division algorithm, find HCF of 75 and 160.

Q. 12 Decimal Expansion of two real numbers is given as (i) 0.20 200 2000 . . . . . (ii) 3.333 . . . . . State whether they are rational or irrational numbers.

Q. 13★ An army group of 308 members is to march behind an army band of 24 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of column in which they can march?

Q. 14 Using Euclid's division algorithm, find HCF of 135 and 225.

Q. 15 Find HCF of 105, 120 and 150.

Q. 16 Find the largest number which divides 245 and 1029 leaving remainder 5 in each case.

Q. 17 Find the greatest number which divides 285 and 1249 leaving remainders 9 and 7, respectively.

Q. 18★ Two brands of chocolates are available in pack of 24 and 15 respectively. If I need to buy an equal number of chocolates of both kinds, what is the least number of boxes of each kind I would need to buy?

Q. 19 Find HCF and LCM of 96 and 240.

Q. 20 Write two irrational numbers whose sum is rational.

3 marks questions (★ question under HOTS) :-

Q. 21 Show that $2-\sqrt{3}$ is an irrational number.

Q. 22 Show that $\sqrt{3}$ is an irrational number.

Q. 23 Check whether 4^n can end with the digit 0 for any natural number n.

Q. 24 Show that $3\sqrt{5}$ is an irrational number.

Q. 25★ Show that $\sqrt{2}+\sqrt{3}$ is an irrational number.

Q. 26 Show that any positive odd integer is of the form 4q+1 or $4q+3$, where q is some positive integer.

Q. 27 The length, breadth and height of a room are 8 m 25 cm, 6 m 75 cm and 4 m 50 cm, respectively. Determine the longest rod which can measure the three dimensions of the room exactly.

Q. 28 Show that $3+\sqrt{5}$ is an irrational number.

Q. 29 Find the largest number that will divide 398, 436 and 540 leaving remainders 7, 11 and 13 respectively.

Q. 30 Show that $7\sqrt{2}-3$ is an irrational number.

Chapter-1
Answers

1. Terminating

2. 26

3. $\frac{1}{2} < \frac{p}{q} < \frac{2}{3}$ but $q \# 0$

4. a × b

5. Coprime number

6. 120

8. Terminating

9. 1

10. Non-terminating recurring decimal

11. 5

12. (i) Irrational (ii) rational

13. 4

14. 45

15. HCF = 15

16. 16

17. 138

18. 5 boxes of first kind and 8 of second kind

19. HCF = 48, LCM = 480

20. $\left(2+\sqrt{3}\right)$ and $\left(2-\sqrt{3}\right)$ such other real numbers also

23. No.

27. 75 cm

29. 17

Chapter-2

Polynomials
Key points

1. Polynomials of degrees 1, 2 and 3 are called linear, quadratic and cubic polynomials respectively.

2. A quadratic polynomial in x with real coefficients is of the form $ax^2 + bx + c$, where a, b, c are real numbers with $a \neq 0$.

3. The zeroes of a polynomial p(x) are precisely the x - coordinates of the points where the graph of $y = p(x)$ intersects the x-axis i.e. x = a is a zero of polynomial p(x) if p(a) = 0.

4. A polynomial can have at most the same number of zeros as the degree of polynomial.

5. For quadratic polynomial $ax^2 + bx + c$ $\quad (a \neq 0)$

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

   Product of roots = $\frac{c}{a}$

6. The division algorithm states that given any polynomial p(x) and polynomial g(x), there are polynomials q(x) and r(x) such that :-

   $p(x) = g(x).q(x) + r(x),\ g(x) \neq 0$

   wether r(x) = 0 or degree of $r(x) <$ degree of g(x)

Chapter-2

Polynomials
Questions

1 mark questions (* Question are under HOTS) :-

Q. 1 Write the degree of the polynomial $x^2 - 2x + x^3 - x^2 + 7$.

Q. 2 Is x = –1, a zero of the polynomial $x^2 - 2x - 1$?

Q. 3 Write the coefficient of x in quadratic polynomial $x^2 - 5x + 6$.

Q. 4 Write the sum of zeros of quadratic polynomial $x^2 - 10x + 16$.

Q. 5★ Write the value of k for which the sum of zeros of the polynomials $x^2 + kx + 3$ is 4.

Q. 6 Write the product of zeroes of the quadratic polynomial $2x^2 - 5x + 3$.

Q. 7 Write the quadratic polynomial, the product and the sum of whose zeros are –6 and –1 respectively.

Q. 8 If x = –2 is a zero of the polynomial $x^2 - 2x - 8$. Write a factor of the given polynomial.

Q. 9 Write the zero of the polynomial 2x+3.

Q. 10 The graph of y = f(x) is shown in the figure 1.
Write the number of zeroes of f(x).

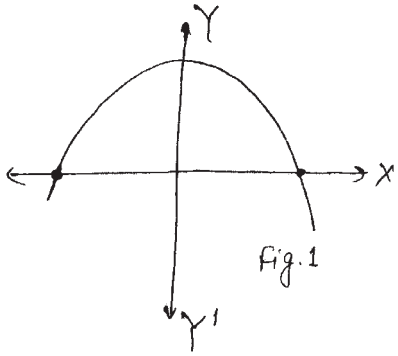


Fig. 1

Q. 11★ Write the value of k for which the product of zeroes of the polynomials $2x^2 + 11x - 2k$ is 5.

Q. 12★ Write the sum of zeroes of quadratic polynomial $2x^2 - 8$.

2 marks questions (* Question 21-23 under HOTS) :-

Q. 13 Find the zeroes of the polynomial $2x^2 - 8x + 6$.

Q. 14 Find the zeroes of the polynomial $2x^2 - 9$.

Q. 15 If the zeroes of a polynomial are –2 and 3, find the polynomial.

Q. 16 Find the polynomial whose zeroes are $\frac{1}{2}$ and $\frac{-3}{7}$.

Q. 17 Find the remainder when polynomial $3x^2 - x^3 - 3x + 5$ is divided by the polynomial $x - x^2 - 1$.

Q. 18 Find the polynomial whose zeroes are $3+\sqrt{2}$ and $3-\sqrt{2}$.

Q. 19 Find the polynomial whose zeroes are $\sqrt{5}$ and $-\sqrt{5}$.

Q. 20 Find the zeroes of the polynomial $25x^2 - 15x + 2$.

Q. 21★ Find the zeroes of the quadratic polynomial $x^2 + 4\sqrt{2}x + 6$.

Q. 22★ Find the zeroes of the quadratic polynomial $x^2 + 6\sqrt{6}x + 48$.

Q. 23★ Find the quadratic polynomial whose zeroes are $\frac{5\sqrt{3}}{2}$ and $\frac{1}{3\sqrt{3}}$.

3 marks questions (* Question are under HOTS) :-

Q. 24 Using division algorithm check whether the polynomial $g(x) = x^2 + x + 3$, is a factor of the polynomial $p(x) = x^4 + x^3 - 2x^2 - 5x - 12$.

Q. 25 Using division algorithm, find quotient q(x) and remainder r(x) if f(x) is divided by g(x).
$f(x) = x^3 - x^2 + 4x - 8$; $g(x) = x + 3$

Q. 26★ If (x+a), is a factor of the polynomials $x^2 + lx + m$ and $x^2 + nx + k$ then prove that $a = \frac{m-k}{l-n}$

Q. 27 Find all the zeroes of the polynomial $3x^4 - 15x^3 + 17x^2 + 5x - 6$ if two zeroes of this polynomial are $\frac{1}{\sqrt{3}}$ and $-\frac{1}{\sqrt{3}}$.

Q. 28 On dividing $2x^3 + 4x^2 + 5x + 7$ by a polynomial g(x), the quotient and remainder are 2x and 7–5x respectively, find g(x).

Q. 29★ If polynomial $x^4 + x^3 + 6x^2 + ax + b$ is exactly divisible by another polynomial $x^2 + 1$, find the value of a and b.

Q. 30 Find all the zeroes of the polynomial $x^4 + x^3 - 7x^2 - 5x + 10$ if two of its zeroes are $\sqrt{5}$ and $-\sqrt{5}$.

Q. 31 Find the zeroes of the polynomial $3x^2 - 27$ and verify the relationship between the zeroes and the co-efficients.

Q. 32★ Find the zeroes of the polynomial $7x^2 + 2\sqrt{14}x + 2$ and verify the relationship between the zeroes and the co-efficients.

Chapter-2
Answers

1. 3
2. No
3. –5
4. 10
5. –4
6. $\frac{3}{2}$
7. $x^2 + x - 6$
8. x+2
9. $-\frac{3}{2}$
10. 2
11. –5
12. 0
13. 3 and 1
14. $\frac{3}{\sqrt{2}}$ and $\frac{-3}{\sqrt{2}}$
15. $x^2 - x - 6$
16. $14x^2 - x - 3$
17. 3
18. $x^2 - 6x + 5$
19. $x^2 - 5$
20. $\frac{1}{5}$ and $\frac{2}{5}$
21. $-\sqrt{2}$ and $-3\sqrt{2}$
22. $-2\sqrt{6}$ and $-4\sqrt{6}$
23. $6\sqrt{3}x^2 - 47x + 5\sqrt{3}$
24. Yes
25. $q(x) = x^2 - 4x + 16$, $r(x) = -56$
27. $\frac{1}{\sqrt{3}}$, $\frac{-1}{\sqrt{3}}$, 2 and 3

Q. 28 $x^2 + 2x + 5$

29. a = 1, b = 5
30. x = –2, 1, $-\sqrt{5}$ and $\sqrt{5}$
31. 3 and –3
32. $\frac{-\sqrt{2}}{7}$ and $\frac{-\sqrt{2}}{7}$

Chapter-3

Pair of Linear Equation in Two Variable
Key points

1. The most general form of a pair of linear equations is :- $\begin{matrix} a_1x+b_1y+c_1=0 \\ a_2x\pm b_2y+c_2=0 \end{matrix}$

   Where $a_1,\ a_2,\ b_1,\ b_2,\ c_1\ \ c_2$ are real numbers and $a_1^2+b_1^2\neq 0,\ a_2^2+b_2^2\neq 0$

2. The graph of a pair of linear equations in two variables is represented by two lines :-
   (i) If the lines intersect at a point, the pair of equations is consistent. The point of intersection gives the unique solution of the equations.
   (ii) If the lines coincide, then there are infinitely many solutions. The pair of equations is consistent. Each point on the line will be a solution.
   (iii) If the lines are parallel, the pair of linear equations has no solution. The pair of linear equations is inconsistent.

3. If a pair of linear equations is given by $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$

   (i) $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}\Rightarrow$ the pair of linear equations is consistent. (Unique solution)

   (ii) $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}\Rightarrow$ the pair of linear equations is inconsistent (No solution)

   (iii) $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}\Rightarrow$ the pair of linear equations is dependent & consistent (Infinitely many solutions).

Chapter-3

Pair of Linear Equation in Two Variable
Questions

1 mark questions :-

Q. 1 Is the pair of linear equations consistent :- $x + y = 3$; $3x - 2y = 4$.

Q. 2 Find out whether the lines representing the following pair of linear equations are parallel or coincide :-
$6x - 3y + 10 = 0$; $2x - y + 9 = 0$

Q. 3 Write the value of k for which the following pair of linear equations has unique solution :-
$x + ky + 6 = 0$; $2x + 3y + 8 = 0$

Q. 4 Write the value of k for which the following pair of linear equations has no solution :-
$4x + y = 11$
$kx + 3y = 5$

Q. 5 Write the value of k for which the system of equations have infinite solutions :-
$2x - 3y + 10 = 0$; $3x - ky + 15 = 0$.

Q. 6 Does (2, –3) lie on the linear equation $3x - 2y + 5 = 0$.

Q. 7 For what value of k, the pair of linear equations $2x + ky = 1$, $x - 3y = -3$ has unique solution.

Q. 8 Is the following pair of linear equations consistent?
$8x + 5y = 9$; $16x + 10y = 15$

Q. 9 Write the value of k for which the pair of linear equations $5x + 2y = k$, $10x + 4y = 3$ has infinitely many solutions.

Q. 10 Does (–1, 2) lies on the linear equation $2x + y = 0$?

2 marks questions (★ Question under HOTS) :-

Q. 11 Solve for x and y :-
$3x - 5y + 1 = 0$; $x - y + 1 = 0$

Q. 12 For what value of m, the system of equations $mx + 3y = m - 3$, $12x + my = m$ will have no solution.

Q. 13 Find the value of k for which the following system of equations have infinitely many solutions :-

$$x+(k+1)y=4$$
$$(k+1)x+9y=5k+2$$

Q. 14 Sum of two numbers is 35. If their difference is 13, find the numbers.

Q. 15★ Obtain the condition of the following system of linear equations to have a unique solution :-

$ax+by+c=0$; $lx+my+n=0$

Q. 16 The sum of two numbers is 8. If their sum is four times their difference, find the numbers.

Q. 17★ Find the value of k for which the following system of equations have infinitely many solution :-

$2x+3y=k$, $(k-1)x+(k+2)y=3k$

Q. 18 For what value of k, the system of linear equations $x+2y=5$, $3x+ky+15=0$ has
(i) a unique solution (ii) no solution

Q. 19 Solve for x and y :

$2x-y=2$, $3y-4x+2=0$

Q. 20 A father is three times as old as his son. After 12 years, he will be twice as old as his son. Find the present ages of the father and the son.

3 marks questions (★ Question under HOTS) :-

Q. 21 Show graphically that the system of linear equations $5x-y=14$; $x-2y=1$ has a unique solution. Write the coodinates where line $x-2y=1$ intersect the X-axis.

Q. 22 Solve the following system of linear equations graphically :-

$2x-y=4$; $x+y+1=0$

Find the points where the lines meet X-axis

Q. 23 Show graphically that the system of equations $3x-y=2$; $6x-2y=4$ has infinitely many solutions.

Q. 24 Solve for x and y :-

$\frac{1}{2x}-\frac{1}{y}=-1$; $\frac{1}{x}+\frac{1}{2y}=8$ where x; $y\neq 0$

Q. 25 Solve for x and y :-

$\frac{6}{x+y}-\frac{7}{x-y}=3$; $\frac{1}{2(x+y)}=\frac{1}{3(x-y)}$, where $x+y\neq 0$ and $x-y\neq 0$.

Q. 26 Solve for x and y :-

$\frac{x}{a}+\frac{y}{b}=2$; $ax-by=a^2-b^2$

Q. 27 Find the values of p and q for which the following system of equations has infinitely many solutions :-

$2x+3y=7$; $(p+q)x+(2p-q)y=21$.

Q. 28 Amit and Sumit have certain number of oranges. Amit says to Sumit, "If you give me 10 of your oranges, I will have twice the number of oranges left with you." Sumit replies, "if you give me 10 of your oranges, I will have the same number of oranges as left with you." Find the number of oranges with Amit and Sumit separately.

Q. 29 The sum of digits of a two digit number is 15. The number obtained by reversing the order of digits of the given number exceeds the given number by 9. Find the given number.

Q. 30 If 2 is added to the numerator of a fraction, it reduces to $\frac{1}{2}$ and if 1 is subtracted from the denominator, it reduces to $\frac{1}{3}$. Find the fraction.

Q. 31 I am three times as old as my son. Five years later, I shall be two and a half times as old as my son. How old am I and how did is my son?

Q. 32 A part of monthly hostle charges in a college are fixed and the remaining depend of the number of days one has taken food in the mess. When a student 'A' takes food for 20 days he has to pay Rs 1300 as hostle charges whereas a student 'B', who takes for 25 days, pays Rs 1500 as hostle charges. Find the fixed charges and the cost of food per day.

Q. 33 The sum of a two digit number and the number formed by inter changing its digits is 110. If 20 is subtracted from the original number, the new number is 4 more than 4 times the sum of the digits in the original number. Find the original number.

Q. 34★ Solve the following system of equations in x and y :-

$(a-b)x+(a+b)y=a^2-2ab-b^2$

$(a+b)(x+y)=a^2+b^2$

Q. 35★ 8 men and 12 women can finish a piece of work in 10 days while 6 men and 8 women can finish it in 14 days. Find the times taken by one man alone and that by one woman alone to finish the work.

Q. 36★ Draw the graphs of the equations :-

$x+3y=6$; $2x-3y=12$ and hence find the value of a if $3x+2y=3+a$.

Find the area of the triangle formed by these lines with Y=axis.

Chapter-3

Answers

1. Yes
2. Parallel lines
3. $K \neq \frac{3}{2}$ (all real number except $\frac{3}{2}$)
4. K = 12
5. K = $\frac{-9}{2}$
6. No
7. $K \neq -6$ (all real numbers except –6)
8. No
9. $k = \frac{3}{2}$
10. Yes
11. x = –2, y = –1
12. m = –6
13. k = 2
14. 24 &11
15. $am \neq bl$
16. 5 and 3
17. k = 7
18. (i) $k \neq 6$ (ii) $k = 6$
19. x = 2, y = 2
20. Father's age = 36 years
    Son's age = 12 years
21. They intersect at a single point (3, 1)
    $x - axis \Rightarrow (1, 0)$
22. Solution (1, –2) i.e. x = 1, y = –2
    points (–1, 0) & (2, 0)
23. The graphs of two equations are coincident.
24. $x = \frac{1}{6}, \ y = \frac{1}{4}$
25. $x = \frac{-5}{4}, \ y = \frac{-1}{4}$
26. x = a, y = b
27. p = 5, q = 1
28. Amit has 70 oranges and Sumit has 50 oranges.
29. Number is 78
30. $\frac{3}{10}$
31. My present age is 45 years and my son's present age is 15 years.
32. Fixed hostle charges = Rs 500
    Cost of food per day = Rs 40
33. 64
34. x = a+b, $y = \frac{-2ab}{a+b}$
35. Man can finish the work alone in 140 days while woman alone in 280 days.
36. a = 15
    area = 18 sq. units.

Chapter-4

Arithmetic Progressions
Key points

1. **SEQUENCE** : - A set of numbers arranged in some definite order and formed according to some rules is called a sequence.

2. **PROGRESSION** :- The sequence that follows a certain pattern is called a progression.

3. **ARITHMETIC PROGRESSION** :- A sequence, in which the difference obtained by subtracting from any term its preceding term is consistent throughout, is called an arithmetic sequence or arithmetic progression (A. P.). The general form of an A.P. is a, a+d, a+2d, ...

4. **GENERAL TERM** :- If 'a' is first term and 'd' is common difference in an A.P. then n^{th} term (general term) is given by $an = a + (n-1)d$.

5. **SUM OF n TERMS OF AN A.P.** :- Sum of first n terms of an A.P. is given by :-

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

where, a : first term, d: common difference.

If l is the last term of a finite A.P., then the sum is given by $S_n = \frac{n}{2}\{a + l\}$.

6. (i) If a_n is given, then common deference d = $a_n - a_{n-1}$.

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

(iii) If a sequence has n terms, its r^{th} term from the end = its $(n-r+1)^{th}$ term from the beginning.

(iv) If a, b, c are in A.P., then $b = \frac{a+c}{2}$.

Chapter-4

Arithmetic Progressions
Questions

1 mark question (Question No. 16 to 20 are under HOTS) :-

Q. 1 Write 17^{th} term of the A.P. 3, 7, 11, ...

Q. 2 n^{th} term of a sequence is $3-5n$. Is it A.P.?

Q. 3 If n^{th} term of an A.P. is 2n+5, write the common difference of this A.P.

Q. 4 Which term of –3, 1. 5, ... is 69?

Q. 5 If 3, 2k+3, 9 are in A.P., then write the value of 'k'.

Q. 6 Is –10, a term of 28, 25, 22, ...?

Q. 7 Write first term and common difference of the A.P. 3.3, 3.1, 2.9, ...

Q. 8 Write n^{th} term of –5, 1, 7, ...

Q. 9 The first term of an A.P. is 9 and fifth term is 14. Write common difference of the A.P.

Q. 10 Write first four terms of an A.P. Whose second term is –4 and common difference is –1.

Q. 11 Which term of 11, 8, 5, ... is –16?

Q. 12 Is $5\frac{1}{5}, 5\frac{2}{5}, 5\frac{3}{5}, \ldots\ldots$ A.P.? If yes, write the common difference.

Q. 13 Write an A.P., whose n^{th} term is 5n – 7.

Q. 14 Write the sum of three terms of the A.P. 3, 7, 11, ...

Q. 15 Write the sum of first 10 natural numbers.

Q. 16 The sum of 6^{th} and 7^{th} term of an A.P. is 39 and common difference is 3. Write its 6^{th} term.

Q. 17 The sum of 3 numbers in A.P. is 30. If the greatest number is 13, write common difference.

Q. 18 Write 11^{th} term from the end of the A.P.

3, 7, 11, 15, ..., 143.

Q. 19 For what value of 'x' the numbers $\frac{1}{2x}, \frac{1}{x}, \frac{x+1}{2x}$ are in A.P.? $(x \neq 0)$

Q. 20 Write the sum of first 10 odd natural numbers.

2 marks questions (Question no. 36 to 40 under HOTS)

Q. 21 How many terms of A.P. 22, 20, 18, ... should be taken so that their sum is zero?

Q. 22 Find the sum of odd positive integers less than 199.

Q. 23 How many two digits numbers between 3 and 102 are divisible by 6?

Q. 24 If 7 times the 7^{th} term is equal to 11 times the 11^{th} term of an A.P. Find its 18^{th} term.

Q. 25 Which term of A.P. 13, 21, 29, ... will be 48 less than its 19^{th} term?

Q. 26 Find the A.P. whose 3^{rd} term is –13 and 6^{th} term is +2.

Q. 27 Find the A.P., whose 5^{th} term is 23 and 9^{th} term is 43.

Q. 28 The angles of a triangle are in A.P. If the smallest angle is one fifth the sum of other two angles. Find the angles.

Q. 29 Aditi saved Rs. 500 in the first month of a year and then increased her monthly savings by Rs. 50. If in the n^{th} month, her monthly savings become Rs 1000. Find the value of 'n'.

Q. 30 The sum of first n terms of an A.P. is $2n^2 + n$. Find n^{th} term and common deference of the A.P.

Q. 31 Which term of the A.P. 38, 35, 32, ... is the first negative term.

Q. 32 The sum of 3^{rd} and 7^{th} terms of an A.P. is 14 and the sum of 5^{th} and 9^{th} terms is 34. Find the first term and common difference of the A.P.

Q. 33 Find the A.P. whose second term is 10 and the 6^{th} term exceeds the 4^{th} term by 12.

Q. 34 Sarthak starts a game and scores 100 points in the first attempt and he increases the points by 5 in each attempt. How many points will he score in the 30^{th} attempt.

Q. 35 If $-9, -14, -19, -24, - - - - -$ is an A.P. , then find $a_{30} - a_{20}$.

Q. 36 Find the 19^{th} and 20^{th} terms of the sequence defined by $\begin{cases} n^2, \text{ when } n \text{ is even} \\ n^{2+1}, \text{ when } n \text{ is odd} \end{cases}$.

Q. 37 The fourth term of an A.P. is equal to 3 times the first term and the seventh term exceeds twice the third term by 1. Find the first term and the common difference of the A.P.

Q. 38 Find an A.P. of 8 terms whose first term is $\frac{1}{2}$ and last term is $\frac{17}{6}$.

Q. 39 For an A.P. $a_1, a_2, a_3, \ldots\ldots$, if $\frac{a_4}{a_7} = \frac{2}{3}$, then find $\frac{a_6}{a_8}$.

Q. 40 2^{nd}, 31^{st} and last terms of an A.P. are $\frac{31}{4}$, $\frac{1}{2}$ and $-\frac{13}{2}$ respectively. Find the number of terms in the A.P.

3 marks questions (Question no. 56 to 60 under HOTS)

Q. 41 Find the sum of the first 30 terms of an A.P., whose n^{th} term is 2–3n.

Q. 42 Find the sum of A.P. :-

$$6+10+14+\ldots\ldots+102?$$

Q. 43 If m^{th} and n^{th} terms of an A.P. are $\frac{1}{n}$ and $\frac{1}{m}$ respectively, then find the sum of mn terms.

Q. 44 Find the sum of all the three digits numbers each of which leaves the remainders 3 when divided by 5.

Q. 45 A picnic group consists of students whose ages are in A.P., the common difference being 3 months. If the youngest student is just 7 years old and the sum of ages of all the students is 250 years. Find the number of students in the group.

Q. 46 If n^{th} term of an A.P. is 4, common deference is 2 and sum of n terms is –14, then find first term and numbers of terms.

Q. 47 The sum of first six terms of an A.P. is 42. The ratio of the 10^{th} term to the 30^{th} term is 1:3. Find first term and 11^{th} term of the A.P.

Q. 48 The sum of n terms of two A.P's. are in the ratio $3n+8 : 7n+15$. Find the ratio of their 12^{th} terms.

Q. 49 The sum of three numbers in A.P. is 24 and their product is 440. Find the numbers.

Q. 50 The sum of first 16 terms of an A.P. is 528 and sum of next 16 terms is 1552. Find the first term and common difference of the A.P.

Q. 51 Find the number of terms of the A.P. 57, 54, 51, ... so that their sum is 570. Explain the double answer.

Q. 52 If the sum of first 20 terms of an A.P. is one third of the sum of next 20 terms. If first term is 1, then find the sum of first 30 terms.

Q. 53. The digits of a three digit positive number are in A.P. and the sum of digits is 15. On subtracting 594 from the number the digits are inter changed, find the numbers.

Q. 54 The sum of first 8 terms of an A.P. is 140 and sum of first 24 terms is 996. Find the A.P.

Q. 55 If m^{th}, n^{th} and r^{th} terms of an A.P. are x, y and z respectively, then prove that :-

$$m(y-z)+n(z-x)+r(x-y)=0$$

Q. 56 The sum of 5^{th} and 9^{th} terms of an A.P. is 8 and their product is 15. Find the sum of first 20 terms of the A.P.

Q. 57 If the m^{th} term of an A.P. is x and n^{th} terme is y. Show that the sum of its m+n terms is :-

$$\frac{m+n}{2}\left\{x+y+\frac{x-y}{m-n}\right\}$$

Q. 58 Balls one arranged in rows to form an equilateral triangle. The first row consists of one ball, the second of two balls, and so on. If 669 more balls are added, then all the balls can be arranged in the shape of a square and each of its sides then contains 8 balls less than each side of the triangles. Determine the initial number of balls.

Q. 59 If the roots of the equation $a(b-c)x^2+b(c-a)x+c(a-b)=0$ are equal, then show that $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.

Q. 60 If the sum of m terms of an A.P. is n and the sum of n terms is m, then show that sum of (m+n) terms is – (m+n).

Chapter-4

Answers

1. 67
2. Yes
3. 2
4. 19^{th} term
5. $k = \frac{3}{2}$
6. No
7. first term = 3.3, common difference = –0.2
8. 6n –11
9. $\frac{5}{4}$
10. –3, –4, –5, –6.
11. 10^{th} term
12. Yes, $d = \frac{1}{5}$
13. –2, 3, 8, ...
14. 15, 19, 23
15. 55
16. 18
17. 3
18. 103
19. x = 2

2-. 100

21. 23
22. 9801
23. 15
24. 0
25. 13^{th} term
26. –23, –18, –13, - - -
27. 3, 8, 13 - - -
28. 30°, 60° and 90°
29. n =11
30. n^{th} term = 4n–1
common differnece = 4
31. 14^{th} term {Hint $a_n < 0$}
32. First term = –13
common difference = 5
33. 4, 10, 16, 22, - - -
34. 245
35. –50
36. 363 and 400
37. first term = 3
common difference = 2
38. $\frac{1}{2}, \frac{5}{6}, \frac{7}{6}, ---$

39. $\frac{4}{5}$ (Hint : $\frac{a+3d}{a+6d} = \frac{2}{3}$)

40. 59

41. –1335

42. 1350

43. $\frac{1}{2}(mn+1)$

44. 990 90

45. 25 students

46. a = –8, total term = 7

47. a = 2
11^{th} term = 22

48. 7:16

49. 5, 8, 11

50. first term = 3
common difference = 4

51. 19 or 20 (20^{th} term is zero)

52. 450

53. 852

54. 7, 10, 13, - - -

55. (Hint : $a_n = a+(n-1)d$)

56. 115, 45, $\{d = \pm\frac{1}{2}\}$

58. 1540 balls

Chapter-5

Quadratic Equation
Key points

1. The equation $ax^2+bx+c=0$, $a\neq 0$ is the standard form of a quadratic equation, where a, b, c are real numbers.

2. A real numbers α is said to be a root of the quadratic equation $ax^2+bx+c=0$. If $9\alpha^2+b\alpha+c=0$, the zeroes of the quadratic polynomial ax^2+bx+c and the roots of the quadratic equation $ax^2+bx+c=0$ are the same.

3. If we can factorize $ax^2+bx+c=0$, $a\neq 0$ into a product of two linear factors, then the roots of the quadratic equation $ax^2+bx+c=0$ can be found by equating each factors to zero.

4. A quadratic equation can also be solved by the method of completing the square.

5. A quadratic formula : The roots of a quadratic equation $ax^2+bx+c=0$ are given by $\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ provided that $b^2-4ac\geq o$.

6. A quadratic equation $ax^2+bx+c=0$ has :-
   (i) Two distinct and real roots if $b^2-4ac>0$
   (ii) Two equal and real roots, if $b^2-4ac=0$
   (iii) Two roots are not real, if $b^2-4ac<0$

Chapter-5

Quadratic Equations
Questions

1 mark questions (Question No. 9 t0 11 under HOTS) :-

Q. 1 State whether the following equations are quadratic equations :-

(i) $7x = 2x^2$

(ii) $x + \frac{1}{x} = x$

(iii) $x(x-2) = x^2 + 7$

(iv) $x + \frac{12}{x} = 7$

Q. 2 Write the discriminants of each of the following :-

(i) $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$

(ii) $x^2 - \frac{1}{3}x + \frac{3}{2} = 0$

(iii) $x^2 - \frac{1}{2}x - 4 = 0$

Q. 3 Write the natural of roots of following equations :-

(i) $\frac{4}{3}x^2 - 2x + \frac{3}{4} = 0$

(ii) $8x^2 + 4\sqrt{3}x + 3 = 0$

Q. 4 One of the roots of the equation $2x^2 - 5x + k = 0$ is 3. Find the value of k.

Q. 5 The sum of roots of a quadratic equations is 13 and product of its roots is 36. Write the quadratic equation.

Q. 6 Find the value of k for which the quadratic equation $x^2 - kx + 4 = 0$ has real and equal roots.

Q. 7 For what value of P, the given equation has real roots :-

(i) $Px^2 + 4x + 1 = 0$

(ii) $2x^2 + px + 3 = 0$

Q. 8 Represent the following statements in the form of an equation :-
(i) The sum of squares of two consecutive even numbers is 100.

(ii) 10 is divided into two parts such that the sum of their reciprocals is $\frac{5}{12}$.

(iii) The sum of reciprocals of Rehman's age 3 years ago and 5 years from now is $\frac{1}{3}$.

Q. 9 Write discriminants of the quadratic equation $\sqrt{3}x^2 - 2\sqrt{2}(x+1) - 2\sqrt{2} = 0$

Q. 10 State whether roots of quadratic equation $3a^2x^2 + 8abx + 4b^2 = 0$ are real or not.

Q. 11 Some students arranged a picnic, the budget for food was Rs. 240. Because four students of group failed to go. The cost of food for each student increased by Rs. 5 frame quadratic equation for above statement.

2 marks questions (Question No. 22 to 25 under HOTS) :-

Q. 12 If one of the roots of $2x^2 + 3x + k = 0$ is $\frac{1}{2}$ find the value of k and other root.

Q. 13 Solve following equations by using factorization method :-
(i) $(2y+3)^2 = 81$

(ii) $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$

Q. 14 Solve following equation by using quadratic formula :-
(i) $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

(ii) $(3x+a)(3x+b) = ab$

Q. 15 Find roots of following equation by completing square :-
(i) $2x^2 - 5x + 3 = 0$

(ii) $2x^2 + x - 4 = 0$

Q. 16 A two digit number is such that the product of its digit is 35. When 18 is added to the number, the digit interchanges their places. Find the numbers.

Q. 17 Find the value of k so that the following equation has equal roots :-

$$2x^2 - (k-2)x + 1 = 0$$

Q. 18 The sum of squares of three consecutive numbers is 149. Find the numbers.

Q. 19 The product of two consecutive multiples of 5 is 500. Find the numbers.

Q. 20 The two numbers differ by 3 and their product is 504. Find the numbers.

Q. 21 If x = 2 is a common root of the equation $px^2 + px + 3 = 0$ and $x^2 + x + q = 0$. Find $\frac{q}{p}$.

Q. 22 Find the value of α such that the quadratic equation $(\alpha - 12)x^2 + 2(\alpha - 12)x + 2 = 0$ has equal roots.

Q. 23 The difference of squares of two natural number is 45. The square of the small number is four times the larger number. Find the numbers.

Q. 24 Thirty six years hence the age of a man will be square of what he was thirty six years ago. What is his present age?

Q. 25 If the roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal than prove that $2b = a + c$.

6 marks questions (Questions no. 35 to 39 under HOTS)

Q. 26 The denominator of a fraction exceeds the numberator by 2. If 3 is added to each of them the new fraction exceeds the original by $3/20$. Find the original fraction.

Q. 27 The diagonal of a rectangular field is 60 meters more than its shorter side. If the larger side is 30 meters more than shorter side. Find the area of the field.

Q. 28 The perimeter of a right triangle is 60 units and hypotenuse is 25 units. Find the other two sides of the triangle.

Q. 29 By increasing the list price of a book by Rs 10, A person can buy 10 less books for Rs. 1200. Find the original price of the book.

Q. 30 A Shtabdi train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore. The average speed of the Shatabdi train is 11km/h more that of the passenger train. Find the average speed of the two trains.

Q. 31 A motor boat whose speed is 15 km/h in still water goes 30 km down stream and comes back in a total time of 4 hours and 30 minutes. Find the speed of the stream.

Q. 32 An aeroplane left 30 minutes late than its scheduled time and in order to reach its destination 1500 km away in time, it has to increase its speed by 250 km/h from its usual speed. Determine its usual speed of the aeroplane.

Q. 33 A two digit number is five times the sum of its digits and is also equal to 5 more than twice the product of its digits. Find the numbers.

Q. 34 If denominator of a fraction is one more than twice the numerator and the sum of the fraction and its reciprocal is $2\frac{16}{21}$. Find the fraction.

Q. 35 The hypotenuse of a right angle triangle is $3\sqrt{10}cm$. If the smaller side is tripled and longer side is doubled its new hypotenuse will be $9\sqrt{5}cm$. How long is each side?

Q. 36 Seven years ago, Varun's age was five times the squares of Swati's age. Three years hence Swati's age will be two fifth of Varun's age. Find their present ages.

Q. 37 A person on attempting to arrange the chairs for a function in the form of a square found that 4 chairs were left over. When he increased the size of the square by one chair. He found that he was short of 25 chairs. Find the number of chairs.

Q. 38 Two pipes running together can fill a tank in $2\frac{8}{11}$ minutes. If one pipe takes 1 minute more than the other to fill the tank. Find the time in which each pipe would fill the tank.

Q. 39 A takes 10 days less than the time taken by B to finish a piece of work. If both A and B together can finish the work in 12 days. Find the time taken by B to finish the work.

Chapter-5

Answers

1. (i) Yes (ii) No (iii) No (iv) Yes

2. (i) 32 (ii) $\frac{-53}{9}$ (iii) $\frac{65}{4}$

3. (i) Real and equal (b) Not real

4. K = –3

5. $x^2 - 13x + 36 = 0$

6. k = 4

7. (i) $p \le n$ (ii) $p \ge 2\sqrt{6}$ or $p \le 2\sqrt{16}$

8. (i) $x^2 + x - 1.2 = 0$
   (ii) $x^2 - 10x + 20 = 0$
   (iii) $x^2 - 4x - 21 = 0$

9. 104

10. Real roots

11. $x^2 - 4x - 192 = 0$

12. k = –2

13. (i) 3, –6 (ii) 5, $\frac{5}{2}$

14. (i) $-\sqrt{2}$, $\frac{-5}{\sqrt{2}}$ (ii) 0, $\frac{-(a+b)}{3}$

15. (i) $\frac{3}{2}$, 1 (ii) $\frac{-1 \pm \sqrt{33}}{3}$

16. 5, 7

17. $k = 2\left(1 \pm \sqrt{2}\right)$

18. numbers = 6, 7, 8

19. 20, 25

20. 21, 24

21. $\frac{q}{p} = 12$

22. $\alpha = 14$

23. 9, 16

24. Present age 45 years

26. fraction $\frac{3}{5}$

27. 10800 sq. meters (L = 120, B = 90)

28. Sides of triangles are 15, 20, 25

29. Price of the Book = Rs 30

30. Speed of Shtabdi train = 44 km/h
    Speed of Passanger train = 33 km/h

31. Speed of stream = 5 km/h

32. Usual speed of the aeroplane 750 k/h

33. Number = 45

34. fraction = $\frac{3}{7}$

35. sides of triangles = 3, 9, $3\sqrt{10}$

36. Varun's Age = 27 years
    Swati's Age = 9 years

37. 200 chairs

38. Faster pipe = 5 minutes, slower pipe = 6 mimutes.

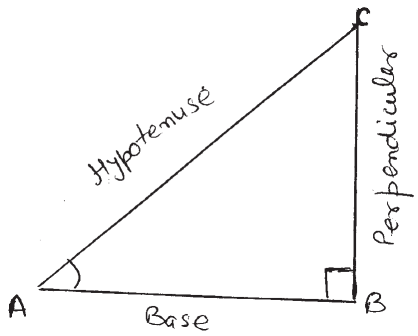
39. 30 day

Chapter-6

Trigonometry
Key points

1. TRIGONOMETRICAL RATIOS :-

In ΔABC, $\angle B = 90^\circ$, for angle 'A'



$$S\text{in}\,A = \frac{perpendicular}{Hypotenuse}$$

$$CosA = \frac{Base}{Hypotenuse}$$

$$\tan A = \frac{Perpendiculor}{Base}$$

$$CotA = \frac{Base}{Perpendicular}$$

$$S\text{ec}\,A = \frac{Hypotenuse}{Base} \qquad Co\sec A = \frac{Hypotenuse}{Perpendicular}$$

2. RECIPROCAL RELATIONS :-

$$\sin\theta = \frac{1}{\cos ec\theta}, \qquad \cos ec\theta = \frac{1}{\sin\theta}$$

$$\cos\theta = \frac{1}{\sec\theta}, \qquad \sec\theta = \frac{1}{\cos\theta}$$

$$\tan\theta = \frac{1}{\cot\theta}, \qquad \cot\theta = \frac{1}{\tan\theta}$$

3. QUOTIENT RELATIONS :-

$$\tan\theta = \frac{\sin\theta}{\cos\theta}, \quad \cot\theta = \frac{\cos\theta}{\sin\theta}$$

4. IDENTITIES :-

$$\sin^2\theta + \cos^2\theta = 1 \Rightarrow \sin^2\theta = 1 - \cos^2\theta \ \ and \ \ \cos^2\theta = 1 - \sin^2\theta$$

1 $\tan^2$ $\sec^2$ $\tan^2$ $\sec^2$ -1 *and* $\sec^2$ $-\tan^2$ 1

1 $\cot^2$ $\cos ec^2$ $\cot^2$ $\cos ec^2$ -1 *and* $\cos ec^2$ $-\cot^2$ 1

5. TRIGONOMETRIC RATIOS OF SOME SPECIFIC ANGLES :-

$\angle A$	0°	30°	45°	60°	90°
sin A	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos A	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan A	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	not defined
cosec A	not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
sec A	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	not defined
cot A	not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

6. TRIGONOMETRIC RATIOS OF COMPLEMENTARY ANGLES :-

$$\sin\left(90^\circ - \theta\right) = \cos\theta$$

$$\cos\left(90^\circ - \theta\right) = \sin\theta$$

$$\tan\left(90^\circ - \theta\right) = \cot\theta$$

$$co\,\mathrm{t}\left(90^\circ - \theta\right) = \tan\theta$$

$$\sec\left(90^\circ - \theta\right) = \cos ec\theta$$

$$\cos ec\left(90^\circ - \theta\right) = \sec\theta$$

7. Line of sight :- The line of sight is the line drawn from the eye of an observer to the point in the object viewed by the observer.

8. Angle of elevation :- The angle of elevation is the angle formed by the line of sight with the horizontal when it is above the horizontal level i.e. the case when we raise our head to look at the object.

9. Angle of depression :- The angle of depression is the angle formed by the line of sight with the horizontal when it is below the horizontal i.e. case when we lower our head to look at the object.

Chapter-6

Trigonometric Questions

1 mark questions

Q. 1 Write the value of $\sin 62^\circ \sin 28^\circ - \cos 62^\circ \cos 28^\circ$

Q. 2 Write $\cot A$ in terms of sin A.

Q. 3 Express $\sec 79^\circ + \cot 61^\circ$ in terms of trigonometrical ratios of angles between 0° and 45°.

Q. 4 If $3\tan\theta = 4$, then write the value of $\tan\theta + \cot\theta$.

Q. 5 If $\sin\theta - \cos\theta = 0$, $0^\circ < \theta < 90^\circ$, then write the value of $'\theta'$.

Q. 6 If $'\theta'$, then write the value of $\sin\theta + \cos 2\theta$.

Q. 7 Write the value of $\sin^2 74^\circ + \sin^2 16^\circ$.

Q. 8 In ΔABC, $\angle B = 90^\circ$ and $\sin C = \frac{4}{5}$, what is the value of cos A?

Q. 9 If A and B are acute angles and $\sin A = \cos B$, than write the value of A+B.

Q. 10 Write the value of $\tan^2 30^\circ + \sec^2 45^\circ$.

Q. 11 Write the value of $9\cos ec^2 62^\circ - 9\tan^2 28^\circ$.

Q. 12 If $\sin\theta = \frac{1}{2}$, write the value of $\sin\theta - \cos ec\theta$.

Q. 13 What is the value of $\cos^2 49^\circ - \sin^2 41^\circ$?

Q. 14 If $\theta = 45^\circ$, then what is the value of $2\cos ec^2\theta + 3\sec^2\theta$?

Q. 15 Write the value of $\sin(90^\circ - \theta)\cos\theta + \cos(90^\circ - \theta).\sin\theta$

Q. 16 If $\tan\left(3x-15^\circ\right)=1$, than write the value of 'x'.

Q. 17 In ΔABC, write $\tan\dfrac{A+B}{2}$ in terms of angle 'C'.

Q. 18 If $\theta=30^\circ$, then write the value of $1-\tan^2 2\theta$.

Q. 19 If $\tan\theta+\cot\theta=3$, then what is the value of $\tan^2\theta+\cot^2\theta$?

Q 20 Write the value of $\cot\left(35^\circ+\theta\right)-\tan\left(55^\circ-\theta\right)$

2 marks questions (Question 36 to 40 under HOTS)

Q. 21 If $\sin 2\theta=\cos\left(\theta-36\right)^\circ$, 2θ and $\left(\theta-36^\circ\right)$ are acute angles. Find the value of 'θ'.

Q. 22 If $\tan\left(32^\circ+\theta\right)=\cot\theta$, θ and $\left(32^\circ+\theta\right)$ are acute angles, find the value of 'θ'.

Q. 23 If $\sin\left(A+B\right)=1$ and $\cos\left(A-B\right)=\dfrac{\sqrt{3}}{2}$, $0^\circ\le\left(A+B\right)\le 90^\circ$, A > B, then find the values of A and B.

Q. 24 If $\theta=30^\circ$, then find the value of $\dfrac{1-\tan^2\theta}{1+\tan^2\theta}$

Q. 25 If $\tan\theta=\sqrt{2}-1$, then find the value of $\dfrac{2\tan\theta}{1+\tan^2\theta}$.

Q. 26 If $\theta=30^\circ$, then verify : $\cos 3\theta=4\cos^3\theta-\cos\theta$.

Q. 27 Simplify : $\tan^2 60^\circ+4\cos^2 45^\circ+3\sec^2 30^\circ+5\cos^2 90^\circ$

Q. 28 Find the value of :-

$$\frac{\sin 62^\circ}{\cos 28^\circ}+2.\frac{\tan 73^\circ}{\cot 17^\circ}-\frac{2\sin 28^\circ.\sec 62^\circ}{7\sec^2 32^\circ-7\cot^2 58^\circ}.$$

Q. 29 Find the value of $\dfrac{11}{7}\dfrac{\sin 70^\circ}{\cos 20^\circ}-\dfrac{4}{7}\dfrac{\cos 53^\circ.\cos ec 37^\circ}{\tan 15^\circ.\tan 35^\circ\tan 55^\circ\tan 75^\circ}$

Q. 30 Find the value of :- $\frac{3\left(\sin^2 74^\circ + \sin^2 16^\circ\right)}{4\sin 62^\circ.\sec 28^\circ} + \frac{3\left(\tan^2 28^\circ - \cos ec^2 62^\circ\right)}{\tan 25^\circ.\tan 35^\circ \tan 55^\circ \tan 65^\circ}$

Q. 31 If $4\cot\theta = 3$. Find the value of :- $\frac{3\cos\theta + 4\sin\theta}{5\cos\theta - 3\sin\theta}$

Q. 32 If $\sin\theta + \sin^2\theta = 1$, then find the value of $\cos^2\theta + \cos^4\theta$.

Q. 33 Prove that $\sec^4\theta - \sec^2\theta = \tan^2\theta + \tan^4\theta$.

Q. 34 Find the value of $\frac{\cos ec^2\left(90^\circ - \theta\right) - \tan^2\theta}{4\left(\cos^2 40^\circ + \cos^2 50^\circ\right)} - \frac{2\tan^2 30^\circ.\sec^2 52^\circ.\sin^2 38^\circ}{\cos ec^2 70^\circ - \tan^2 20^\circ}$

Q. 35 If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \frac{1}{\sqrt{3}}$, $0^\circ \le (A+B) \le 90^\circ$, A > B, then find the value of $\cos(A-B)$.

Q. 36 If $\tan(A+B) = \sin A\cos B + \cos A\sin B$, then find the value of $\sin 75^\circ$.

Q. 37 If $2\sin\left(3x - 15^\circ\right) = \sqrt{3}$, then find the value of $\sin^2\left(2x + 10^\circ\right) + \tan^2\left(x + 5^\circ\right)$.

Q. 38 If $x = m\sin\alpha.\cos\beta$, $y = m\sin\alpha\sin\beta$ and $z = m\cos\alpha$, then prove that $x^2 + y^2 + z^2 = m^2$.

Q. 39 Find the value of $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \sin^2 20^\circ + ... + \sin^2 85^\circ$.

Q. 40 In ΔMNR, $\angle N = 90^\circ$, $MN = 8cm$, $RN = MN = 7cm$, find the value of sin R, tan R and sec M.

3 marks questions (Question no. 56 to 60 under HOTS)

Q. 41 If $\cos\theta - \sin = \sqrt{2}\sin\theta$, then prove that $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$.

Q. 42 Prove that $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cot A$

Q. 43 If $\sec\theta = m + \frac{1}{4m}$ then prove that $\sec\theta + \tan\theta = 2m$ or $\frac{1}{2m}$.

Q. 44 Prove that $\sqrt{\frac{\sec\theta+1}{\sec\theta-1}}+\sqrt{\frac{\sec\theta-1}{\sec\theta+1}}=2\operatorname{cosec}\theta.$

Q. 45 If $\operatorname{cosec}\theta-\cot\theta=3$, then prove that $\sin\theta=\frac{3}{5}$.

Q. 46 Prove that :-

$$\left(1+\frac{1}{\tan^2\theta}\right)\left(1+\frac{1}{\cot^2\theta}\right)=\frac{1}{\sin^2\theta-\sin^4\theta}$$

Q. 47 If $a\sin A=b\cos A$ and a $\sin^3 A+b\cos^3 A=\sin A\cos A$, then prove that $a^2+b^2=1$.

Q. 48 Prove that :- $\frac{\cot A-\cos A}{\cot A+\cos A}=\frac{\operatorname{cosec}A-1}{\operatorname{cosec}A+1}$

Q. 49 Prove that :- $\left(\sin\theta+\operatorname{cosec}\theta\right)^2+\left(\cos\theta+\sec\theta\right)^2=\tan^2\theta+\cot^2\theta+7$

Q. 50 Prove that :- $\left(1+\cot A-\operatorname{cosec}A\right)\left(1+\tan A+\sec A\right)=2$

Q. 51 Prove that :- $2\left(\sin^6 A+\cos^6 A\right)-3\left(\sin^4 A+\cos^4 A\right)+1=0$

Q. 52 Prove that :- $\cos^8\theta-\sin^8\theta=\left(\cos^2\theta-\sin^2\theta\right)\left(1-2\sin^2\theta.\cos^2\theta\right)$

Q. 53 Find the value of

$$\tan\left(90^\circ-\theta\right)\cot\theta-\sec\left(90^\circ-\theta\right)\operatorname{cosec}\theta+\frac{3\left(\cot^2 27^\circ-\sec^2 63^\circ\right)}{\cot 26^\circ\cot 41^\circ\cot 45^\circ\cot 49^\circ\cot 64^\circ}-$$

$$\frac{2\sec 24^\circ.\sin 66^\circ}{\sin^2 62^\circ+\sin^2 28^\circ}+3\tan^2 45^\circ$$

Q. 54 Prove that :- $\frac{1}{\operatorname{cosec}A-\cot A}-\frac{1}{\sin A}=\frac{1}{\sin A}-\frac{1}{\operatorname{cosec}A+\cot A}$

Q. 55 Prove that :- $\frac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1}=\frac{1+\sin\theta}{\cos\theta}$

Q. 56 If $\cos ec\theta - \sin\theta = m^3$ and $\sec\theta - \cos\theta = n^3$, then prove that $m^4n^2 + m^2n^4 = 1$.

Q. 57 Is $\cos^2\alpha - \sin^2\alpha = \tan^2\beta$, then prove that $\cos\beta = \frac{1}{\sqrt{2}\cos\alpha}$.

Q. 58 If $m = \tan\theta + \sin\theta$ and $n = \tan\theta - \sin\theta$, then prove that $m^2 - n^2 = 4\sqrt{m.n}$.

Q. 59 If $\sin\theta + \sin^2\theta = 1$, then prove that :-
$\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta + 2\cos^4\theta + \cos^2\theta - 2 = \sin^2\theta$

Q. 60 If $\sin\theta - \cos\theta = m$ and $\cos ec\theta + \sec\theta = n$ then prove that $n^2\left(1-m^2\right)^2 = 4\left(2-m^2\right)$.

6 marks questions (Question no. 76 to 80 under HOTS)

Q. 61 From a point on the ground the angles of elevation of the bottom and the top of a water tank kept at the top of 30 m high building are $45°$ and $60°$ respectively. Find the height of the water tank.

Q. 62 A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle $60°$ with the ground. The distance from the foot of the tree to the point where the top touches the ground is 2m. Find total height of the tree.

Q. 63 The shadow of a tower standing on a level ground is found to be 60m shorter when the sun's altitude is $60°$ than when it is $30°$, find the height of the tower.

Q. 64 The angles of elevation of the top of a pole, from two points A and B at distances of 'a' and 'b' respectively from the base and in the same straight line with it, are complementary. Prove that the height of the pole is $\sqrt{ab}$.

Q. 65 The angles of elevation of a cloud from a point 30m above a lake is $30°$ and the angle of depression of its reflection in the lake is $60°$. Find the height of the cloud above th lake.

Q. 66 The angles of elevation of a bird from a point on the ground is $60°$, after 50 seconds flight, the elevation changes to $30°$. If the bird is flying at the height of $500\sqrt{3}m$. Find the speed of the bird.

Q. 67 If the angle of elevation of a bird from a point metres above a Jake is α and the angle of depression of its reflection in the lake is β. Prove that the distance of the bird from the point of observation is $\frac{2a\sec\alpha}{\tan\beta - \tan\alpha}$.

Q. 68 The angle of elevation of the top of a 12m tall building from a point A on the ground is 30°. A flag is hoisted at the top of the building and the angle of elevation of the flag staff from A is 45°. Find the length of flag staff and the distance of the building from A.

Q. 69 The angles of depression of the top and bottom of a 10m tall building from the top of a tower are 30° and 45° respectively. Find the height of opposite house.

Q. 70 From a window (60m high above the ground) of a house in a street, the angles of elevation and depression of the top and the foot of an other house opposite side of street are 60° and 45° respectively. Find the height of the opposite house.

Q. 71 A man on the deck of a ship, 18 m above water level, observes that the angle of elevation and depression respectively of the top and bottom of a cliff are 60° and 30°. Find the distance of the cliff from the ship and height of the cliff.

Q. 72 A flight pole 4m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point 'A' on the ground is 60° and the angle of depression of the point 'A' from the top of the tower is 45°. Find the height of the tower.

Q. 73 A man, on a cliff, observes a boat at an angle of depression of 30° which is approaching the shore to the point 'A' on the immediately beneath the observer with a uniform speed, 12 minutes later, the angle of depression of the boat is found to be 60°. Find the time taken by the boat to reach the shore.

Q. 74 A person standing on the bank of a river observes that the angle subtended by a tree on the opposite bank, is 60°, when he retires 30 metres from the bank, he finds the angle to be 30°. Find the breadth of the river and height of the tree.

Q. 75 An aeroplane at an altitude of 100m observes the angles of depression of opposite points on the two banks of a river to be 30° and 45°. Find the width of the river.

Q. 76 A round balloon of radius 'r' subtends an angle Q at the eye of the observer while the angle of elevation of its centre is α. Prove that the height of the centre of the balloon is $r \sin\alpha \cos ec\frac{\theta}{2}$.

Q. 77 A ladder rests against a wall at an angle α to the horizontal. Its foot is pulled away from the wall through a distance m, so that it slides a distance n down the wall making an angle β with horizontal, show that :- $\frac{m}{n} = \frac{\cos\beta - \cos\alpha}{\sin\alpha - \sin\beta}$.

Q. 78 From an aeroplane vertically above a straight horizontal plane, the angle of depression of two consecutive kilometer stones on the opposite sides of the aeroplane are found to be θ and ϕ. Show that the height of the aeroplane is $\frac{\tan\theta.\tan\phi}{\tan\theta+\tan\phi}$.

Q. 79 At the foot of the mountain the elevation of its summit is $45°$. After ascending 1000 metres towards the mountain at an inclination of $30°$, the elevation is $60°$. Calculate the height of the mountain.

Q. 80 At a point P on level grounds, the angle of elevation of a vertical tower is found to be such that its tangent is $\frac{3}{4}$. On walking 192 metres away from P the tangent of the angle is $\frac{5}{12}$. Find the height of the tower.

Chapter-6

Answers

1. 0
2. $\frac{\sqrt{1-\sin^2 A}}{\sin A}$
3. $\cos ec 11^\circ + \tan 29^\circ$
4. $\frac{25}{12}$
5. $\theta = 45^\circ$
6. 1
7. 1
8. $\frac{4}{5}$
9. 90°
10. $\frac{7}{3}$
11. 9
12. $-\frac{3}{2}$
13. 0
14. 10
15. 1
16. $x = 20^\circ$
17. $\cot\frac{c}{2}$
18. –2
19. 7
20. 0
21. $\theta = 42^\circ$
22. $\theta = 29^\circ$
23. $A = 60^\circ$, $B = 30^\circ$
24. $\frac{1}{2}$
25. $\frac{1}{\sqrt{2}}$
26. (Hint :- If $\theta = 30^\circ$, then $3\theta = 90^\circ$)
27. 9
28. $\frac{19}{7}$
29. 1
30. $-\frac{9}{4}$
31. $\frac{25}{3}$
32. 1
33. (Hint : $\sec^2\theta = 1 + \tan^2\theta$)

34. $\frac{-5}{12}$

35. $\frac{\sqrt{3}}{2}$

36. $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (Hint : $A=45^\circ$, $B=30^\circ$ or $A=30^\circ$, $B=45^\circ$)

37. $\frac{13}{12}$

39. $\frac{17}{2}$

40. $\sin R=\frac{8}{17}$

$\tan R=\frac{8}{15}$

$\sec R=\frac{17}{8}$

53. –3

56. (Hint : $m=\left(\frac{\cos^2\theta}{\sin\theta}\right)^{1/3}$

$n=\left(\frac{\sin^2\theta}{\cos\theta}\right)^{1/3}$)

58. (Hint : $m+n=2\tan\theta$

$m-n=2\sin\theta$)

59. (Hint : $\sin\theta=\cos^2\theta$

use

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

60. (Hint : $1-m^2=2\sin\theta\cos\theta$

$n^2=\frac{1+2\sin\theta\cos\theta}{\sin^2\theta.\cos^2\theta}$)

61. $30\left(\sqrt{3}-1\right)m$

62. $2\left(2+\sqrt{3}\right)m$

63. $30\sqrt{3}m$

65. 60 m

66. 20 m/sec.

68. $12\left(\sqrt{3}-1\right)m$, $12\sqrt{3}m$

69. $5\left(3+\sqrt{3}\right)m$, $5\left(3+\sqrt{3}\right)m$

70. $60\left(\sqrt{3}+1\right)m$

71. $18\sqrt{3}m$, 72 m\

72. $2\left(\sqrt{3}+1\right)m$

73. 18 min.

74. 15 m, $15\sqrt{3}m$

75. $100\left(\sqrt{3}+1\right)m$

79. 1366 m

80. 180 m

Chapter-7

Coordinate Geometry
Key points

1. The length of a line segment joining A & B is the distance between two points $A(x_1, y_1)$ & $B(x_2, y_2)$ which is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

2. The distance of a point P (x, y) from the origin is $\sqrt{x^2 + y^2}$. The distance of P from x=axis is y units & from y-axis is x units.

3. The coordinates of the point P (x, y) which divides the line segment joining the points $A(x_1, y_1)$ & $B(x_2, y_2)$ in the ratio $m_1 : m_2$ are $\left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$ (we can take ratio as K : 1, $k = \frac{m_1}{m_2}$)

4. The mid-points of the line segment joining the points $P(x_1, y_1)$ & $Q(x_2, y_2)$ $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

5. The area of the triangle formed by the points $(x_1, y_1)(x_2.y_2)$ & (x_3, y_3) is the numericals value of the expression $\frac{1}{2}\left[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right]$.

6. If the above mentioned three points are collinear then we cannot draw a triangle, so the area will be zero, i.e. $x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) = 0$.

Chapter-7

Coordinate Geometry
Questions

1 mark questions (★ questions are under HOTS)

Q. 1 Write the value of k if distance between (k, 3) & (4, 5) is $\sqrt{5}$.

Q. 2 Write the value of a & b if (2, –3) is the mid point of the segment joining (2, a) & (b, –1).

Q. 3 Is the area of the triangle joining points (1, 4), (2, 3) & (–2, –11) zero?

Q. 4 (5, 5), (3, 3) & (–2, –11) are the coordinates of the vertices of a triangle. Write the coordinates of the centroid.

Q. 5 Which points are collinear :-
A (4, –11), B (–4, 7), C (4, 5), D (4, 0), E (–4, –3), F (0, 0).

Q. 6 Point A (3, –4) lies on circle of radius 5 cm with centre at origin. Write the coordinates of the other end of the diameter whose one end is A.

Q. 7 P (0, –2) & Q (0, 3) are two points Write the measure of PQ.

Q. 8 What is the relation between x & y if (3, 5) & (7, 1) are equidistant from T (x, y).

Q. 9 Write the relation between the vertices of a triangle with zero area.

Q. 10★ Is the point (5, –7) lie on a circle whose centre is at origin & radius $5\sqrt{2}$ units?

Q. 11★ A line is drawn through P(4, 6) parallel to x-axis. What is the distance of this line from x-axis.

Q. 12★ P is a point on the perpendicular bisector of AB. What is the relation between P, A & B?

2 marks questions (★ questions are under HOTS)

Q. 13 Find the coordinates of a point on y-axis equidistant from the points (2, –2) & (–4, 2).

Q. 14 PQ is a line segment where coordinates of P & Q are (–4, 5) & (5, 2) respectively. Find the

coordinates of a point R on PQ such that PR = 2 QR.

Q. 15 DMN is an equilateral triangle with D (0, 0) & M $\left(3,\sqrt{3}\right)$. Find coordinates of N.

Q. 16 P is a point on x=axis & Q (–1., 5) is a point such that PQ = 13. Find the coordinates of P.

Q. 17 Find value of x if PQ = PR & P (0, 2), Q (3, x) & R (x, 5) are three points.

Q. 18 Find the ratio in which the line segment joining (5, –3) & (–4, 6) is divided by x=axis.

Q. 19 Show that the mid point of the line joining (5, 7) & (3, 9) is also the mid point of the line joining (8, 6) & (0, 10).

Q. 20. In what ratio does the point $\left(\frac{1}{2},\ 6\right)$ divide the line segment joining the points (3, 5), (–7, 9)

Q. 21 Find the coordinates of a point R such that $\frac{PR}{RQ}=\frac{3}{4}$ where coordinates of P are (–2, 1)& that of Q are (3, –2).

Q. 22 One end of a diameter of a circle is at (0, 3) & the centre is (–1, 5). Find the coordinates of the other end of this diameter.

Q. 23 Find value of x if P(x, x) is equidistant from A (–1, 2) & B (–2, +1).

Q. 24 Find the area of the ΔABC whose vertices are A (–1, 2), B (–1, –2) & C (2, 1).

Q. 25★ If (–1, 3), (1, –1) & (5, 1) are the vertices of a triangle. Find the length of median through first vertices.

Q. 26★ Find the coordinates of point Q, R & S on P T such that $PQ:QR:RS:ST=1:1:1:1$ & coordinates of P & T are (–3, –2) & (1, 4) respectively.

3 marks questions (* questions are under HOTS)

Q. 27. Find the value of y such that $ar\left(\Delta LMN\right)=12$ & coordinates of the vertices are L (1, 2), M (3, y) & N (5, 2).

Q. 28 The three coordinates of a parallelogram PQRS are P (–3, 1), Q (1, 1) & R (3, 3) find the coordinates of S.

Q. 29 If A (–3, 2), B (x, y) & C (1, 4) are the vertices of an isosceles triangle with AB = BC. Show that $2x + y = 1$.

Q. 30 Prove that the figure obtained on joining the mid points of parallelogram PQRS, is a rectangle where P (1, 0), Q (5, 3), R (2, 7) & 5 (–2, 4).

Q. 31 Find the length of the perpendicular from X (0, 6) on YZ, where coordinates of Y & Z are (–5, –3) & (–11, 3).

Q. 32 Find the coordinates of the ciracumcentre of the triangle whose vertices are (0, 0), (8, 0) & (0, 6). Also find the circumradius.

Q. 33 If the point (6, 4) divides the line segment joining L (8, 5) & M (a, f) in the ratio 2 : 5. Find the values of a & b and also find the coordinates of the mid point of LM.

Q. 34 If the coordinates of two adjacent vertices of a parallelogram are (3, 2) & (–1, 0) & the diagonals cut each other at (2, –5). Find the coordinates of the other two vertices of the parallelogram.

Q. 35 In what ratio, the line joining (1, 3) & (2, 7) is divided by $3x + y = 9$.

Q. 36 The join of D (–4, 0) & E (0, 6) is divided by D_1 (p, 2) and $E_1\left(\frac{-4}{3}, q\right)$ in three equal parts. Find the values of p & q.

Q. 37 For what value of C the centroid of the triangle with vertices P (1, a), Q (2, f) & $R(C^2, -3)$ lie on y-axis.

Q. 38 If the vertex P of a ΔPQR is (–1, 2) & the mid points of PQ & PR are (–1, 0) & $\left(\frac{1}{2}, \frac{3}{2}\right)$. Find the coordinates of Q & R.

Q. 39★ Length of line segment is $\sqrt{34}$ units. If one end is at (4, 2) & the ordinate of the second end is 5. Show that its abscissa is ether –1 of 9.

Q. 40★ (6, –10), (–8, 14) & (–4, –2) are the coordinates of the mid points of a triangle. Find the coordinates of the vertices of the triangle.

Q. 41★ If the point P (p, q) is equidistant from the points $A(a+b,\ b-a)$ & $B(a-b,\ a+b)$. Prove that $bp = aq$.

Q. 42★ P (–2, 2) Q (q, 8), R (6, r) are the coordinates of three concyclic points whose centre is at (2, 5). Find possible values of q & r.

Q. 43★ If the area of the quadrilateral PQRS is zero, where P (1, –2), Q (–5, 6), R (7, –4) & S (h, –2) are the vertices, show that h = 5.

Q. 44★ If coordinates of the vertices of the quadrilateral are L (6, 3), M (–3, 5), N (4, –2) & P (x, 3x). Find the value of x if $ar(\Delta LMN) = 2ar(\Delta PMN)$.

Q. 45★ P (–1, 5), Q (3, 1) & R (5, 7) are the coordinates of the vertices of ΔPQR with area 16 square units. S, T & U are the mid points of QR, RP & PQ. Find the ratio $\frac{ar(\Delta PQR)}{ar(\Delta STU)}$.

Chapter-7

Answers

1. k = 3, 5
2. a = –5, b = 2
3. 9 sq. units
4. (2, –1)
5. A, C, D
6. (–3, 4)
7. 5 units
8. x – y = 2
9. Vertices will be collinear
10. No
11. 6 units
12. PA = PB
13. $\left(0, \frac{3}{2}\right)$
14. (2, 3)
15. $\left(0, 2\sqrt{3}\right)$ or $\left(3, -\sqrt{3}\right)$
16. (11, 0), (–13, 0)
17. x = 1
18. $k = \frac{5}{4}$
20. $k = \frac{1}{3}$
21. $\left(\frac{1}{7}, \frac{-2}{7}\right)$
22. (–2, 7)
23. (0, 0)
24. 6 units
25. 5 units
26. $Q\left(-2, \frac{-1}{2}\right)$, $R(-1, 1)$, $S\left(0, \frac{5}{2}\right)$
27. y = 4
28. (–1, 3)
31. 10 units
32. r = 5, centre (4, 3)
33. Mind point of $LM = \left(\frac{9}{2}, \frac{13}{4}\right)$
34. C (1, –12), D (5, –10)
35. $k = \frac{3}{4}$
36. $P = \frac{-8}{3}$, q = 4
37. $c = \sqrt{3}$
38. Q (–1, –2), R (2, 1)
40. (10, –26), (2, 6), (–18, 22)
42. q = 6 or –2 & r = 8, 2
44. $x = \frac{11}{8}$
45. 4 : 1

Chapter-6

Triangles
Key points

1. **Similar triangles** :-

Two triangles are said to be similar if their corresponding angles are equal and their corresponding sides are proportional.

2. Criteria for Similarity :-

In ΔABC and ΔDEF

(i) $\Delta ABC \sim \Delta DEF$ when $\angle A = \angle D$, $\angle B = \angle E$ and $\angle C = \angle F$

(ii) SAS similarity :- $\Delta ABC \sim \Delta DEF$ when $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ and $\angle A = \angle D$

(iii) SSS similarity :- $\Delta ABC \sim \Delta DEF$ $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

3. **The proofs of the following theorems can be asked in the examination :-**

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

(ii) The ratio of the area of two similar triangles is equal to the square of the ratio of their corresponding sides.

(iii) Pythagoras Theorem :- In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

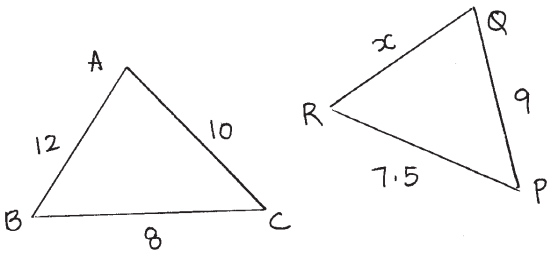
(iv) Converse of Pythagoras Theorem :- In a triangle, If the square of one side is equal to the sum of the squares of the other two sides then the angle opposite to the first side is a right angle.

Chapter-6

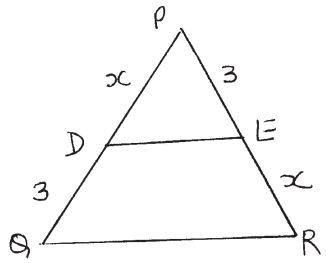
Triangles
Questions

1 mark questions (Question No. 17 to18 are under HOTS)

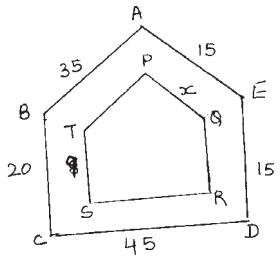
Q. 1 In figure if $\Delta ABC \sim \Delta PQR$ then find x.



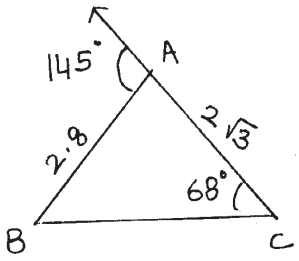
Q. 2 In figure $DE \parallel QR$ what is the value of 'x'?

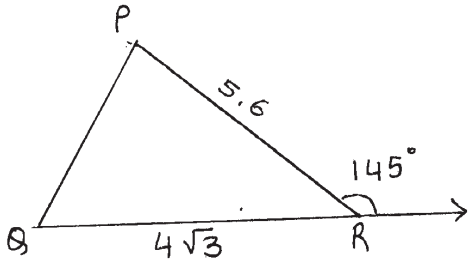


Q. 3 Polygon $ABCDE \sim$ Polygon PQRST, what is the value of x?

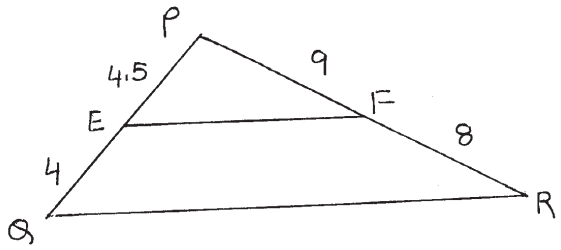


Q. 4 In the given figure, find the value of $\angle Q$.



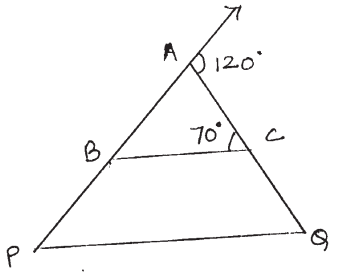


Q. 5 In the figure, state whether $EF \parallel QR$?



Q. 6 The corresponding sides of two similar triangles are in the ratio 5 : 8. What is the ratio of their corresponding area?

Q. 7 In the following figure if $\Delta ABC \sim \Delta APQ$ then what is the measure of $\angle P$?



Q. 8 If the length of altitude of the equilateral triangle is $5\sqrt{3}cm$ then what is the length of its side?

Q. 9 In ΔABC, AB =4 cm, BC = 8 cm and $AC = 4\sqrt{3}cm$ then what is the value of $\angle A$?

Q. 10 ΔABC and ΔDEF are equiangular triangles. If $EF = \frac{1}{3}BC$ then what is the ratio of the areas of two triangles?

Q. 11 If the three sides of a triangles are a, $\sqrt{3}a$, $2a$, then what is the measure of angle opposite to the longest side?

Q. 12 What is the length of the diagonal of the square of side 5 cm?

Q. 13 Two poles of height 6 m and 11 m are fixed on the ground. The distance between their tops is 13 m. How far are the poles from each other?

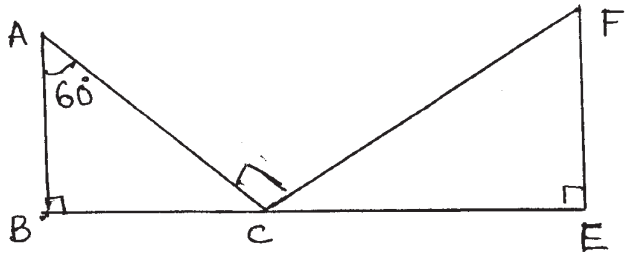
Q. 14 In the semicircle, two chords AB and BC are of length 6 cm and 8 cm. What is the measure of the diameter AC of the circle?

Q. 15 In ΔABC, AB = BC, $\angle B = 90^\circ$ and AC = 8 cm. What is the length of AB?

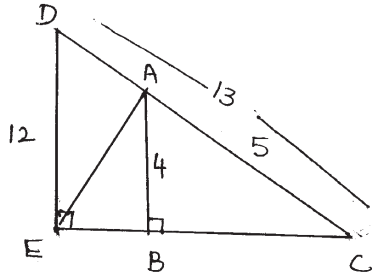
Q. 16 In two triangles ΔABC and ΔXYZ if $\angle B = \angle Y$ and $\frac{AB}{XY} = \frac{BC}{YZ}$ then what is the value of

$\frac{XZ}{YZ}$?

Q. 17 In the figure, is $\Delta ABC \sim \Delta CEF$?

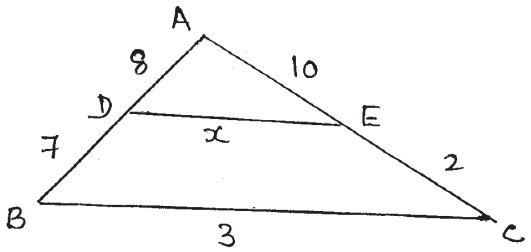


Q. 18 In the following figure what is the length of AE?



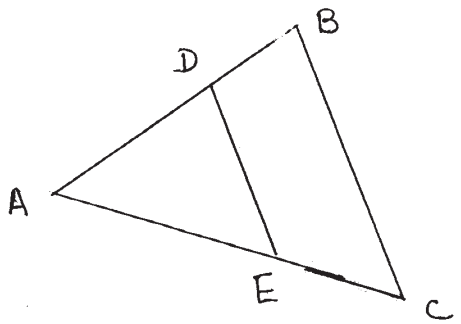
2 marks questions (Question no. 35 to 37 are under HOTS)

Q. 19 In the figure, find x.

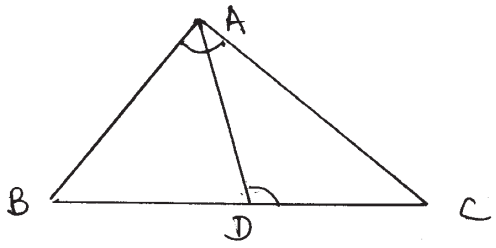


Q. 20 In ΔABC, $\angle B = 90^\circ$, $BC = \sqrt{3}(AB)$ then prove that AC = 2 AB.

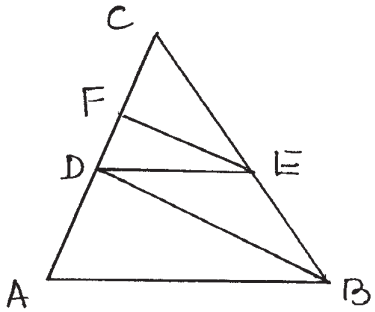
Q. 21 In the following figure $DE \parallel BC$ and $\frac{AD}{DB} = \frac{3}{5}$. If AC = 5.6 cm then find AE.



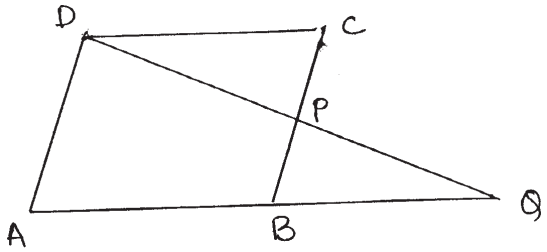
Q. 22 In the figure, D is a point on the side BC of ΔABC such that $\angle ADC$ and $\angle BAC$ are equal prove that $CA^2 = DC \times BC$.



Q. 23 In the figure $AB \| DE$ and $BD \| EF$. Prove that $CD^2 = CF \times CA$.

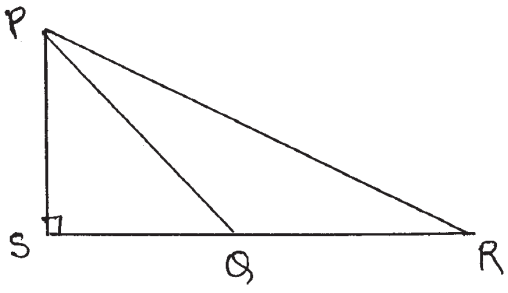


Q. 24 In the following figure, ABCD is the parallelogram. Prove that $\frac{DP}{PQ} = \frac{DC}{BQ}$.



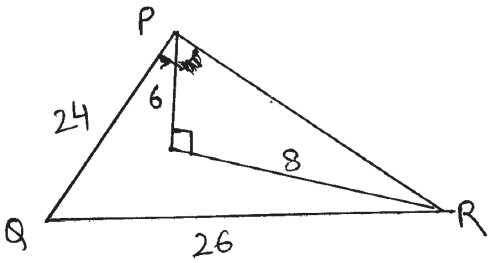
Q. 25 PR and QS intersect each other at the point O. If $PS \| QR$ then prove that $\Delta POS \sim \Delta ROQ$.

Q. 26 In the figure $\angle S = 90^\circ$, PQ = 10 cm, QS = 6 cm and PR = 17 cm. Calculate the length RQ.



Q. 27 The areas of two similar triangles ΔABC and ΔPQR in the ratio 25 : 9. If BC = 4.5 cm, find the length of QR.

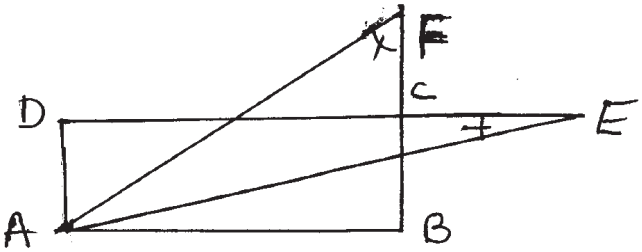
Q. 28. What is the measure of $\angle QPR$?



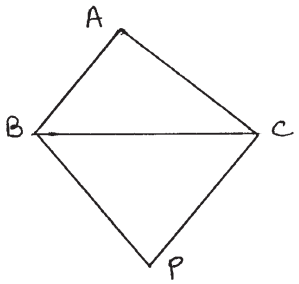
Q. 29 In a quadrilateral ABCD, $\angle B = 90^\circ$. Also $\angle ACD = 90^\circ$, prove that $AD^2 = AB^2 + BD^2 + CD^2$.

Q. 30 ABCF is a square. Similar triangles ACD and ABE are constructed on AC and AB. Find the ratio between the areas of ΔACD and ΔABE.

Q. 31 ABCD is a rectangle. ΔADE and ΔABF are two triangles such that $\angle E = \angle F$ as shown in the figure. Prove that $AD \times AF = AE \times AB$.



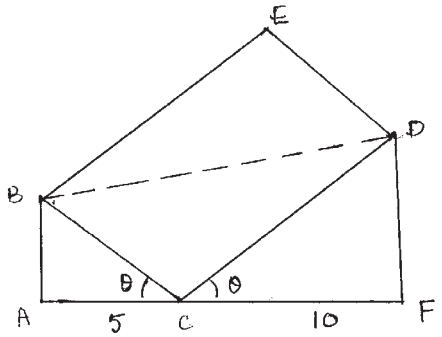
Q. 32 In the figure $\Delta ABC \sim \Delta PBC$. Prove that ΔABP is an isosceles triangle.



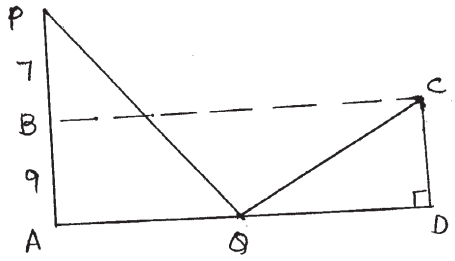
Q. 33 In ΔABC, $DE \parallel BC$. If DE = 4 cm, BC = 8 cm and $ar(\Delta ABC) = 80cm^2$ then find $ar(\Delta ADE)$.

Q. 34 In ΔABC, AB = AC. P is a point on the side BC such that $PM \perp AB$ and $PN \perp AC$. Prove that $\frac{BM}{CN} = \frac{MP}{NP}$.

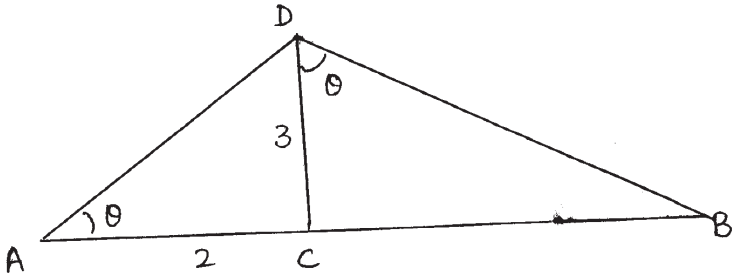
Q. 35 In the given figure, find the length of the diagonal of rectangle BCDE.



Q. 36 In the figure ABCD is a rectangle such that AB = 9 cm, BC = 24 cm, BP = 7 cm and Q is the midpoint of AD. Show that $\angle PQC$ is a right angle.



Q. 37 In the given figure find AB if $DC \perp AB$, CD = 3 cm, and AC = 2 cm.



3 marks questions (Question No. 45 - 48 are under HOTS)

Q. 38 In ΔABC, $AD \perp BC$, prove that $AC^2 = AB^2 + BC^2 - 2BC \times BD$.

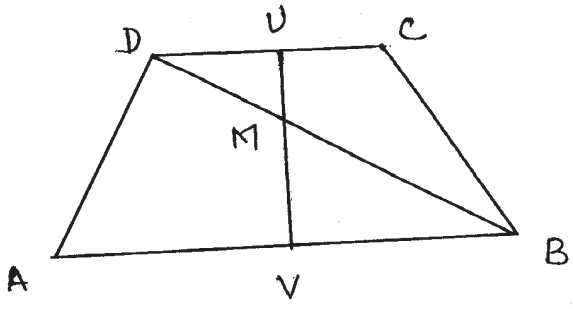
Q. 39 ABCD is a rhombus, prove that $4AB^2 = AC^2 + BD^2$
Hence find the length of the second diagonal whose side is 5 cm and one of the diagonal is 6 cm.

Q. 40 In a ΔABC, P divides the sides AB such that AP : PB = 1 : 3. Q is a point on AC such that $PQ \| BC$. Find the ratio of the areas of ΔAPQ and trapezium BPQC.

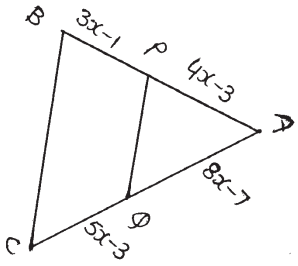
Q. 41 In figure $AB \| DC$, prove that :-

(i) $\Delta DMU \sim \Delta BMV$

(ii) $DM \times BV = BM \times DU$



Q. 42 In the following figure $PQ \| BC$. Find the value of x.

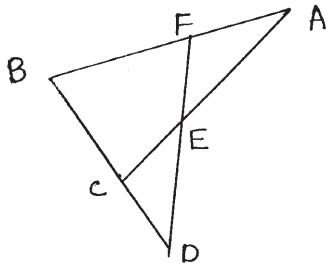


Q. 43 Prove that the equilateral triangles described on the two sides of a right angled triangle are together equal to the equilateral triangle on the hypotenuse in terms of their areas.

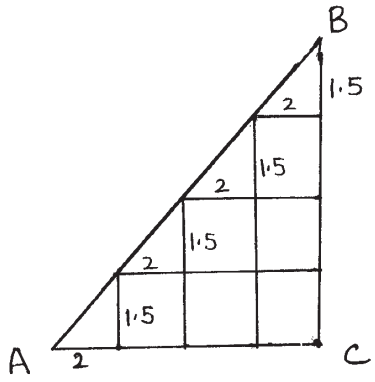
Q. 44 In ΔABC, D and E are the points on the side AB and AC respectively such that AB = 6 cm, AD = 2.4 cm , AE = 3.8 cm and EC = 5.7 cm. Prove the $DE \| BC$ and hence find $\frac{ar(\Delta ADE)}{ar(\Delta ABC)}$.

Q. 45 In quadrilateral ABCD, $\angle A + \angle D = 90^\circ$. Prove that $AC^2 + BD^2 = AD^2 + BC^2$.

Q. 46 In figure $\angle AEF = \angle AFE$ and E is the midpoint of CA. Prove that $BD \times CE = BF \times CD$.



Q. 47 In the given figure, find the length AB.



Q. 48 In ΔABC, AD is a median, X is a point on AD such that AX : XD = 2 : 3 Ray BX intersect AC in Y. Prove that CY = 3 AY.

6 marks questions

Q. 49 In a right angled triangle, prove that the square of the hypotenuse is equal to the sum of the squares of the other two sides.
Using the above result prove the following :-
If ΔABC is an isosceles right triangle, right angled at C, then square of hypotenuse

is equal to the twice the square of any other side.

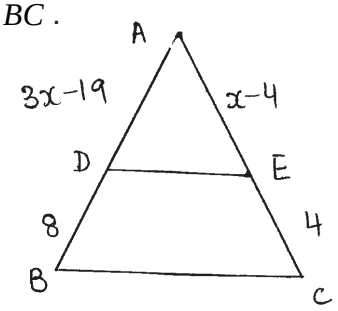
Q. 50 Prove that if a line is drawn parallel to one side of a triangle, it divides the other two sides proportionally.
Using the above, prove that the diagonals of a trapezium cut each other in the same ratio.

Q. 51 Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

Using the above find : - $\frac{AD}{AB}$ if in ΔABC, D is a point on AB and E is a point on BC such that $DE \| AC$ and area of $\Delta DBE = \frac{1}{3}$ area of ΔABC.

Q. 52 Prove that in a right angled triangle the area of the square formed on the hypotenuse is equal to the sum of the areas of the squares formed on the other two sides.
Using the above result, find the length of the altitude AD of an isosceles triangle ABD, with AB = AC and sides 2a, 2a, a.

Q. 53 Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided by this line in the same ratio.
Using above find the value of x in figure if $DE \| BC$.



Q. 54 Prove that in a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite to the first side is a right angle.
Using above determine whether the triangle having sides (a – 1) cm, $2\sqrt{a}cm$, (a + 1) cm is right angled triangle.

Q. 55 Prove that the ratio of the areas of two similar triangle is equal to the ratio of the squares of their corresponding sides.
Using above find the following :-
The area of the two similar triangles are $16cm^2$ and $25cm^2$ respectively. If the altitude of the first triangle is 3.6 cm, find the corresponding altitude of the other.

Chapter-6

Answers

1. 6 cm
2. x = 3
3. 21
4. 68°
5. Yes
6. 25 : 64
7. 50°
8. 10 cm
9. 90°
10. 9 : 1
11. 90°
12. $5\sqrt{2}cm$
13. 12 m
14. 10 cm
15. $4\sqrt{2}cm$
16. $\frac{AC}{BC}$
17. (Hint : $\angle ACB = 30^\circ$)
18. $2\sqrt{5}$
19. $\Delta ADE \sim \Delta ACB$
    $\therefore x = 2$
21. 2.1 cm
26. 9 cm
27. 2.7 cm
28. 90°
30. 2 : 1
33. $20\ cm^2$
35. $5\sqrt{10}$
37. 6.5 cm
39. 8 cm
40. 1 : 15
42. x = 1
44. 4 : 25
45. (Hint : produce AB, DC to meet in E & $\angle E = 90^\circ$)
46. (Hint : Draw $DG \parallel DF$ meeting AB in a point say G)
47. AB = 10
48. (Hint : Through D, draw a line parallel to BX) intresecting AC in a point, Say Z.
52. $\frac{\sqrt{15}}{2}a$
53. x = 11 cm

Chapter

Cricle
Key points

1. Tangent to a circle : It is a line that intersects the circle at only one point.

2. There is only one tangent at a point of the circle.

The proofs of the following theorems can be asked in the examination :-

(i) The tangent at any point of a circle is perpendicular to the radius through the point of contact.

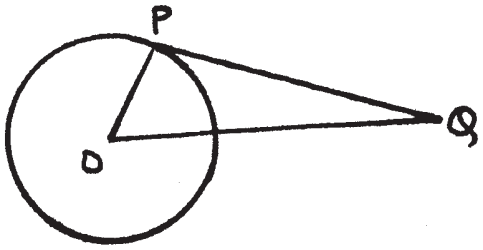
(ii) The lengths of tangents drawn from an external point to a circle are equal.

Chapter

Cricle
Questions

1 mark questions (Question No. 9 - 11 are under HOTS)

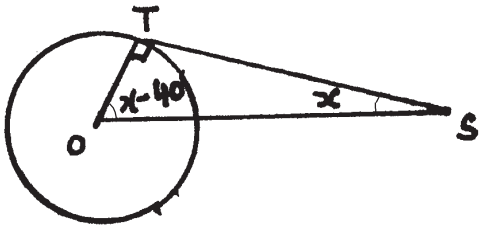
Q. 1 In figure PQ is a tangent to a circle with centre O. What is the measure of $\angle OPQ$?



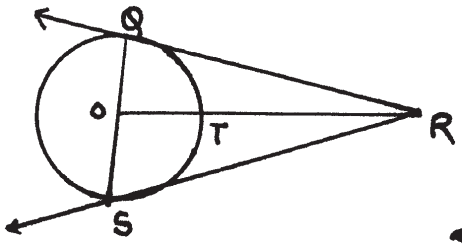
Q. 2 PQ and PR are the tangents form the external point P. If the sum of the lengths of PQ and PR is 12.4 cm, what is the length of PR?

Q. 3 The length of a tangent PQ, from the external point P is 24 cm. If the distance of the point P, from the centre is 25 cm. What is the diameter of the circle?

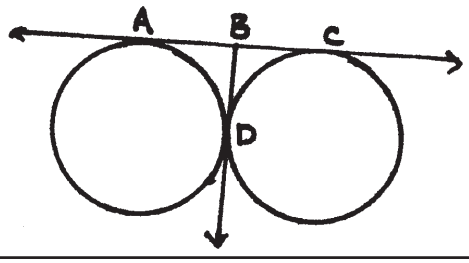
Q. 4 In figure what is the value of 'x'?



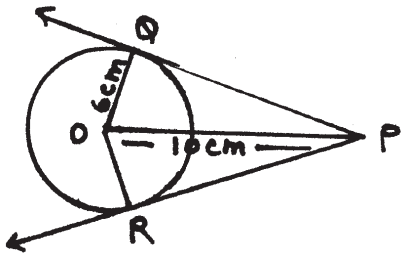
Q. 5 In figure if SQ = 6 cm and QR = 4 cm then what is the length of TR?



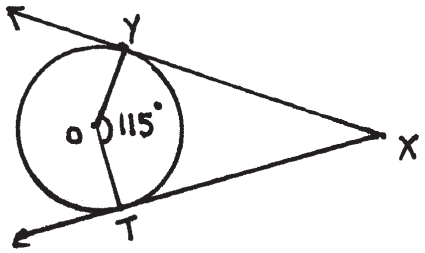
Q. 6 In figure if AC = 9 cm then what is the measure of BD?



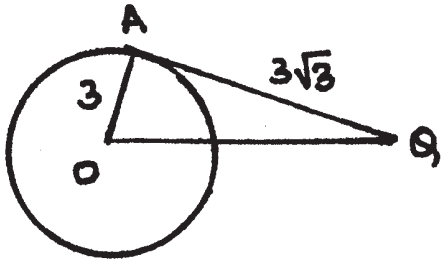
Q. 7 In the figure, what is the perimeter of the quadratic PQOR?



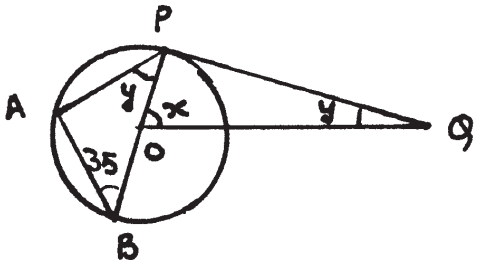
Q. 8 In the figure what is the measure $\angle YXT$?



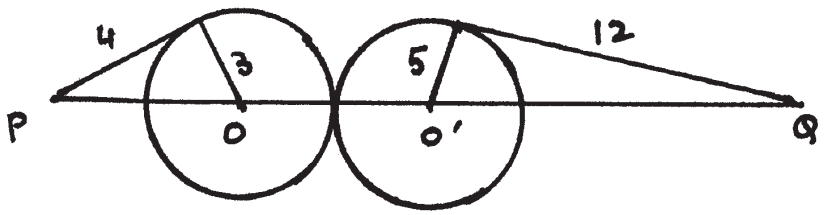
Q. 9 IN the figure what is the measure of $\angle Q$?



Q. 10 If PQ is a tangent to a circle with centre O, then what is the degree of x?



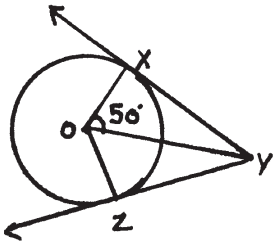
Q. 11 In the figure find PQ.



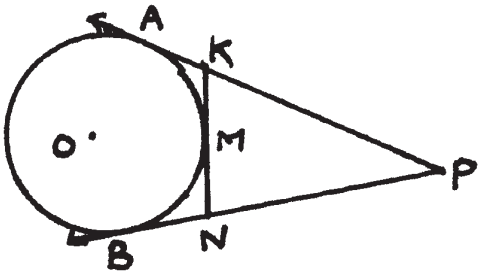
2 marks questions (Question No. 17 - 20 are under HOTS)

Q. 12 PT and TQ are the tangents from the external point T. If $\angle OPQ = 30^\circ$ then find the measure of $\angle TQP$.

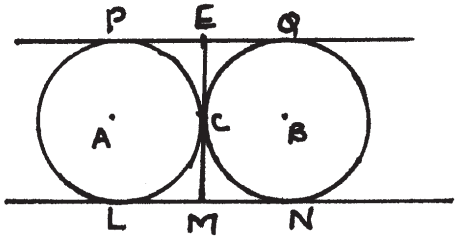
Q. 13 In the following figure find $\angle XYZ$.



Q. 14 In the adjoining figure PA and PB are tangents from P to the cricle with centre O. Prove that $KN = AK + BN$.



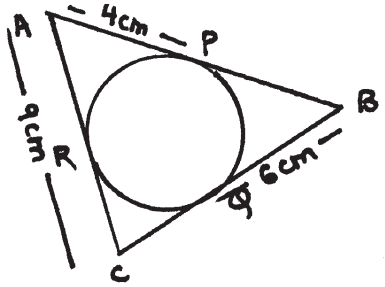
Q. 15 In the given figure, two circles touch each other externally at C. Prove that the common tangent EM bisects common tangent LN.



Q. 16 Prove that in two concentric circles the chord of the larger circle which touches the smaller circle is bisected at the point of contact.

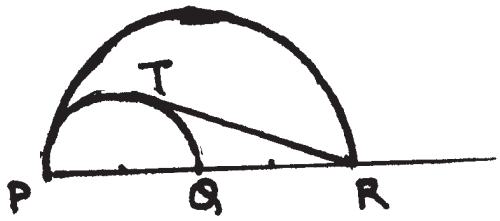
Q. 17 The length of tangent to a circle of radius 3 cm from an external point P is of 15 cm. Find the distance of P from the nearest point of the circle.

Q. 18 In figure if AP = 4 cm, BQ = 6 cm and AC = 9 cm then find the perimeter of ΔABC.



Q. 19 A circle touches all the four sides of a quadrilateral ABCD. Whose sides AB = 6.5 cm, BC = 7.3 cm and AD = 4.2 cm, find CD.

Q. 20 In the adjoining figure, if PQ = QR = 14 cm then what is the length of the tangent RT?

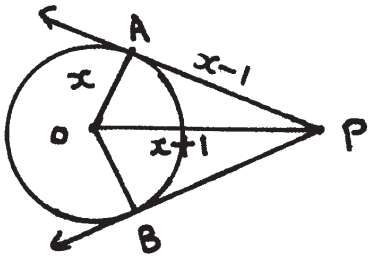


2 marks questions (Question No. 17 - 20 are under HOTS)

Q. 21 ΔABC is an isosecles triangle with AC = BC. The encircle of ΔABC touches the sides BC, CA and AB at point P, Q and R respectively. Prove that R is the mid point of AB.

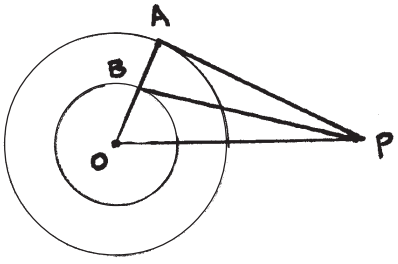
Q. 22 Two tangents PA and PB are drawn to a circle from an external point P. Prove that the sum of three sides of ΔPAB is equal to twice the length of tangents from the external point?

Q. 23 In the following figure find the value of x.

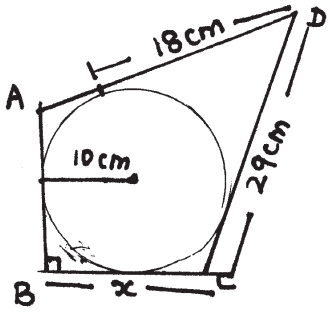


Q. 24 QR is tangent to the circle whose centre is P. If $QA \| RP$ and AB is the diameter then prove that RB is a tangent to the circle.

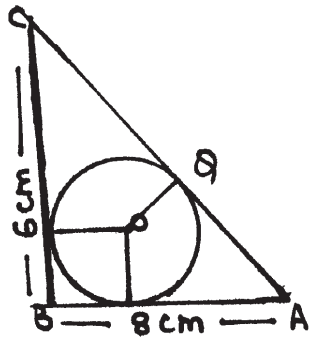
Q. 25 Two concentric circle with centre O are of radii 6 cm and 3 cm. From an external point P, tangents PA and PB are drawn to these circles as shown in the figure. If AP = 10 cm, find BP.



Q. 26 In the adjoining figure, find the value of 'x'.



Q. 27 In the adjoining figure, ABC is a right angled triangle with AB = 8 cm and BC = 6 cm. A circle with centre O has been inscribed inside the triangle. Find the value of OQ.

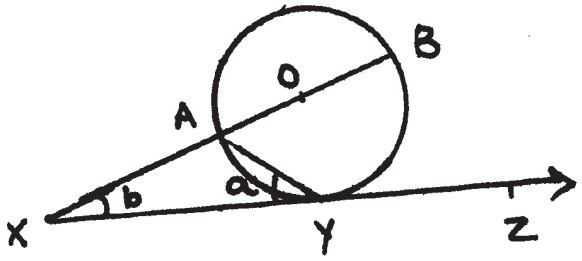


Q. 28 Three tangents are drawn to a circle with centre O in such a way that two of them are parallel to each other and the third tangent intersect them at point P and Q respectively. Prove that $\angle POQ = 90^\circ$.

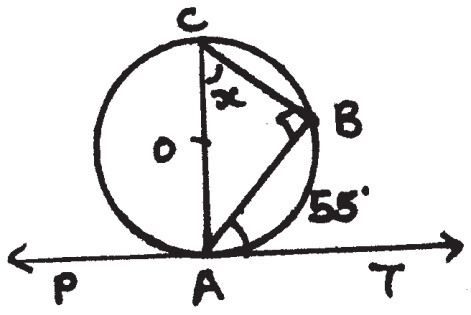
Q. 29 In a right triangle ABC, a circle with side AB as diameter is drawn to intersect the hypotenuse AC in P. Prove that PB = PC.

6 marks questions

Q. 30 Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.
Using the above result, prove the following:-
In the figure XZ touches the circle with centre O at Y. Diameter BA when produced meets XZ at X. Given $\angle BXY = b$, $\angle AYX = a$, then prove that $b^\circ + 2a^\circ = 90^\circ$.

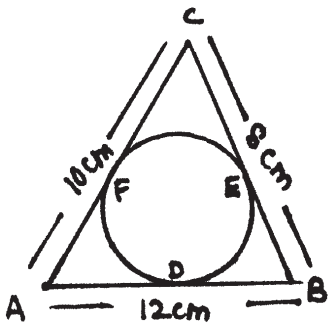


Q. 31 Prove that the tangent, at any point of a circle is perpendicular to the radius through the point of contact.
Using the above result find the value of x in the adjoining figure if PAT is a tangent line to a circle & $\angle BAT = 55^\circ$.



Q. 32 Prove that the lengths of tangents, drawn from an external point to a circle are equal. Use the above result in the following :-

A circle is inscribed in a ΔABC having sides 8 cm, 10 cm and 12 cm as shown in the figure. Find AD, BE and CF.



Chapter

Answers

1. 90°
2. 6.2 cm
3. 7 cm
4. 65°
5. 2 cm
6. 4.5 cm
7. 28 cm
8. 65°
9. 30°
10. 35°
11. 26
12. 60°
13. 80°
17. 9 cm
18. 30 cm
19. 5 cm (Hint : AB + CD = AD + BC)
20. $14\sqrt{2}\ cm$
23. x = 3
25. $\sqrt{127}\ cm$
26. 21 cm
27. 2 cm
31. x = 55
32. 7 cm, 5 cm, 3 cm

Chapter

Constructions
Key points

1. Construction should be neat and clean and as per scale given in question.

2. Steps of construction should be provided only to those questions where it is mentioned.

Chapter

Constructions
Questions

3 marks questions

Q. 1 Draw a line segment 14 cm long and find a point which divideds it in the 4 : 3. Also write the steps of construction.

Q. 2 Divide a 8 cm long line segment in the ratio 1 : 3. Also write the steps of construction.

Q. 3 Draw a line segment AB = 6.5 cm and find the point 'x' on it which divides it in the ratio 1 : 4. By actual measurement find $\frac{AX}{BX}$.

Q. 4 Draw a line segment AB = 9 cm and locate a point C on AB such that $4 \times AC = 5 \times BC$.

Q. 5 Construct a circle C (0, 3). Take a point P at a distance of 6.5 cm from the centre. Construct the tangents to the circle from point P. Also write the steps of construction.

Q. 6 Mark a point P outside a circle C (0, 2.4) such that OP = 5 cm. Draw two tangents PA and PB to the circle from point P. Also write the steps of construction.

Q. 7 Draw a line segment BC = 7.5 cm. Find the point P on BC such that BP : PC = 2 : 3. Measure the length of BP and PC. Also write the steps of construction.

Q. 8 Construct a triangle $AB'C'$ similar to given ΔABC such that each of its sides is $\frac{2}{3}rd$ of the corresponding sides of the ΔABC. It is given that AB = 6 cm, BC = 5 cm and AC = 6 cm. Also write the steps of construction.

Q. 9 Construct a triangle $X'YZ'$ similar to given triangle XZY with its sides $1\frac{1}{2}$ times that of the corresponding sides of a ΔXYZ. If is given that XY = 5 cm, YX = 7.4 cm and $\angle XYZ = 74^\circ$. Also write the steps of constructions.

Q. 10 Construct an isosecles triangle with base 7 cm and vertical angle 120°. Construct a triangle similar to given triangle with its corresponding sides being $\frac{4}{3}$ times those of given triangle.

Q. 11 Construct a triangle $A'BC'$ similar to given ΔABC with its sides equal to $\frac{1}{3}rd$ of its corresponding sides. It is given that $\angle B = 90^\circ$, AB = 6 cm and BC = 8 cm.

Q. 12 Draw ΔABC with BC = 8 cm, $\angle ABC = 45^\circ$ and $\angle BAC = 105^\circ$. Then construct a triangle

whose sides are $\frac{2}{3}$ times the corresponding sides of the ΔABC.

Q. 13 Draw two tangents from the end points of diameter if the radius of the circle is 3 cm. Are these tangents parallel? Give reason.

Q. 14 Construct ΔPQR in which PQ = 7 cm, $\angle Q = 50^\circ$ and altitude RM to PQ is equal to 4.5 cm. Construct a $\Delta P'QR'$ similar to ΔPQR having each of its side $\frac{2}{3}rd$ of the corresponding sides of ΔPQR. Also write the steps of construction.

Q. 15 Construct a ΔPQR in which PQ = 6 cm, $\angle Q = 70^\circ$ and altitude PS = 4 cm. Also construct a $\Delta PBC \sim \Delta PQR$ such that each side of ΔPBC is 1.8 times that of the corresponding sides of ΔPQR.

Q. 16 Draw a circle C (0, 2.5) P and Q are points on the circle such that $\angle POQ = 120^\circ$. Construct tangents to the circle at P and Q to meet at a point R. Write measure $\angle PRQ$. What is the value of $\angle POQ + \angle PRQ$?

Q. 17 Draw a circle with centre D and radius 3 cm. Draw two tangent segments XY and XY' from an exterior point X such that $\angle YXY' = 45^\circ$. Also write the steps of constructions.

Q. 18 Construct an equilateral triangle PQR with side 6 cm. Construct another triangle $\Delta P'QR' \sim \Delta PQR$ such that $\frac{PQ}{P'Q} = \frac{1}{2}$. Is $\Delta P'QR'$ an equilateral triangle?

Q. 19 Draw a circle of radius 4.2 cm. Extend the diameter to both the sides to the points P and Q such that each point is at a distance of 7 cm from the centre. Draw the tangent to the circle from these two points P and Q?

Q. 20 Draw a line segment AB = 9 cm. With A and B as centres draw circles of radius 5 cm and 3 cm respectively. Construct tangent to each circle from the centre of the other circle.

Q. 21 Draw ΔABC with BC = 6 cm, AB = 5 cm and $\angle ABC = 45^\circ$. Construct $\Delta A'B'C$ similar to ΔABC whose sides are $1\frac{1}{2}$ times the corresponding sides of the ΔABC.

Answers

13. Yes

16. $60^\circ, 80^\circ$

18. Yes

Chapter-11

Mensuration
Areas Related to Circles
Key points

1. Area of circle of radius r is πr^2 sq. units.

2. Circumference of a circle of radius r is $2\pi r$ Units.

3. Length of arc of a sector of angle $\theta = \frac{2\pi r \times \theta}{360^\circ} = \frac{\pi r \theta}{180^\circ}$.

4. Area of sector of a circle of angle $\theta = \frac{\pi r^2}{360^\circ} \times \theta$.

5. Area of minor segment = Area of sector OAB – area of ΔOAB.

$$= \frac{\pi r^2 \theta}{360^\circ} - \frac{1}{2} \times 2r \frac{\cos\theta}{2} r \frac{\sin\theta}{2} \qquad (\text{for } \theta \neq 30^\circ)$$

$$= \frac{\pi r 2\theta}{360^\circ} - \frac{1}{2} r^2 \sin\theta \qquad (\text{for } \theta \neq 120^\circ)$$

6. Area of major segment = πr^2 – area of minor segment.

7. Perimeter of a sector = $2r +$ length of arc of the sector.

Chapter-12

Mensuration (Continued)
Surface Areas and Volumes
Key points

1. Total surface area of cube of side a units = $6a^2$ units.

2. Volume of cube of side a units = a^3 cubic units.

3. Total surface area of cuboid of dimensions $l, b \& h = 2(l \times b + b \times h + h \times 1)$ square units.

4. Volume of cuboid of cylinder of dimensions $l, b \& h = l \times b \times h$ cubic units.

5. Curved surface area of cylinder of radius r & height $h = 2\pi rh$ square units.

6. Total surface area of cylinder of radius r & height $h = 2\pi r(r + h)$ square units.

7. Volume of cylinder of radius r & height $h = \pi r^2 h$ cubic units.

8. Curved surface area of cone of radius r height h & slant height $1 = \pi rl$ square units where $l = \sqrt{r^2 + h^2}$.

9. Total surface area of cone = $\pi r(l + r)$ sq. units.

10. Volume of cone = $\frac{1}{3}\pi r^2 h$

11. Total curved surface area of sphere of radius r units = $4\pi r^2$ sq. units.

12. Curved surface area of hemisphere of radius r units $2\pi r^2$ sq. units.

13. Total surface area of hemisphere of radius r units = $3\pi r^2$ sq. units.

14. Volume of sphere of radius r units $\frac{4}{3}\pi r^3$ cubic units.

15. Volume of hemisphere of radius r units $\frac{2}{3}\pi r^3$ cubic units.

16. Curved surface area of frustum = $\pi l(r+R)$ sq. units, where l slant height of frustum & radii of circular ends are r & R.

17. Total surface area of frustum = $\pi l(r+R)+\pi\left(r^2+R^2\right)$ sq. units.

18. Volume of Frustum = $\frac{1}{3}\pi h(r^2+R^2+rR)$ cubic units.

Chapter-11 & 12

Mensuration

1 mark questions (★ Question under HOTS) :-

Q. 1 The plastic string with a small ball of a toy is moving to & fro making an angle of 80° at a particular instant if length of arc is 8.8 cm, find length of string.

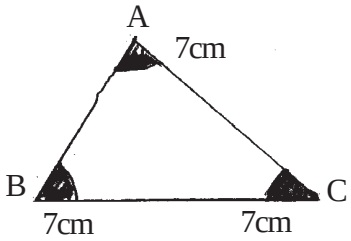
Q. 2 A triangle is formed taking base as diameter of a semicircle of radius 13 cm. Length of perpendicular from vertex of the triangle to the base is 5 cm. Write the area of the triangle.

Q. 3 The numerical difference between circumference & diameter is 45 cm. What is the radius of the circle?

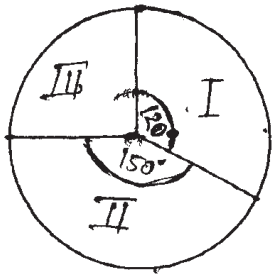
Q. 4 From each vertex of a trapezium a sector of radius 7 cm has been cut off. Write the total area cut off.

Q. 5 If an arc forms 90° at the centre O of the circle. What is the ratios of its length to the circumference of the circle.

Q. 6 Find the shaded region if radius of each sector is 7 cm.

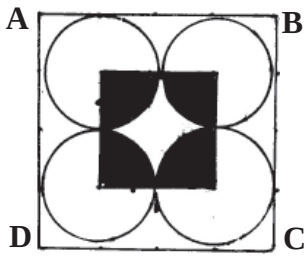


Q. 7 Write the ratio of the areas of two sectors I & III.



Q. 8 How many cubes of side 3 cm can be cut from a cuboid measuring $15cm \times 12cm \times 6cm$.

Q. 9 Write the area of the shaded portion if radius of each circle is 7 cm and ABCD is a square.



Q. 10 Volume of two solid spheres are in the ratio 125: 64. Write their radii if the sum of their radii is 45 cm.

Q. 11 The largest sphere is carved out of a cube of side 7 cm. Write the volume of sphere in π.

Q. 12 Curved surface area of a solid cylinder is one-third of its total surface area. Write h if r is 3.5 cm.

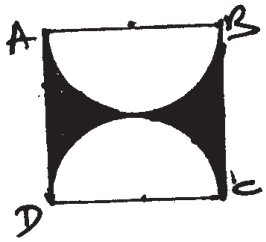
Q. 13 The circumference of the circular top of a hemispherical bowl is 132 cm. Write the radius of the bowl.

Q. 14 The radii & heights of a cone, a hemisphere and cylinder are same. Write the ratio of the volumes of the three.

Q. 15 The volume of a cone is $1570cm^3$ & the area of the base is $314cm^2$. Write its height.

Q. 16 What is maximum volume of a cone that can be carved out of a solid hemisphere of radius 'r'.

Q. 17 If side of the square is 20 cm. Write the area of the shaded region.



Q. 18★ In the above figure write perimeter of the shaded region.

Q. 19★ A rectangular sheet of paper $66cm \times 18cm$ is rolled along its length & a cylinder is formed. Write the curved surface area of the cylinder.

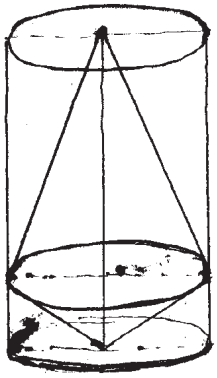
Q. 20★ The curved surface area of one cone is twice that of the other cone. The slant height of the later is twice that of the former. Give the ratio of their radii.

Q. 21★ The sum of the radius of the base & the height of a solid cylinder is 20 cm. If total surface area is $660m^2$. Write the circumference of the base of cylinder.

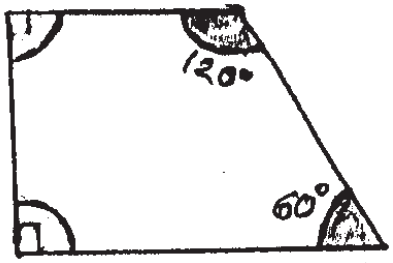
Q. 22★ Curved surface area of a right circular cylinder is obtained on multiplying volume by Q. Write the value of Q.

Q. 23★ A sphere of maximum volume is cut out from a solid hemisphere of radius r. What will be the ratio of the volume of hemisphere to that of the sphere.

Q. 24★ The height of the cylinder in the figure is h. Two cones are formed as shown with heights $\frac{3h}{4}$ & $\frac{1h}{4}$. Write the ratio of the volume of figure cone to the smaller cone.

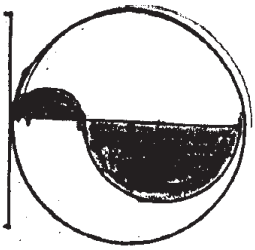


Q.25★ If the area of four sectors having same radius is 616 square cm. What is the radius?

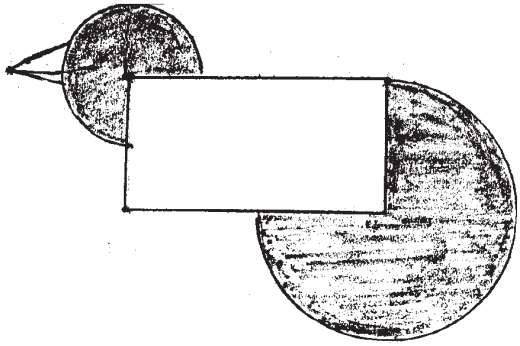


3 marks questions (* questions are under HOTS)

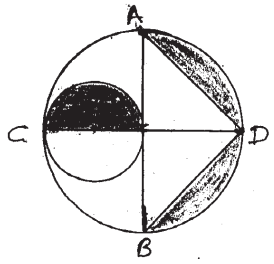
Q. 26 Find the area of shaded if radius of biggest circle is 14 cm.



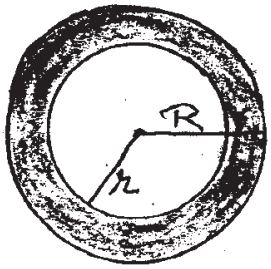
Q. 27 Anushka made a figure using mathematical shapes. Find the shaded region to be pointed red, if length of rectangle is 14 cm & breadth is 7 cm & both the sectors have radii half of the corresponding dimension.



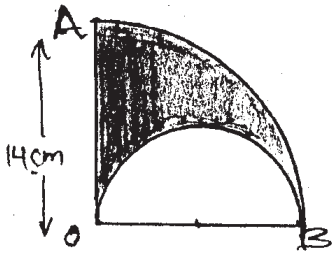
Q. 28 AB & CD are two perpendicular diameters & CD = 8 cm. Find the shaded region.



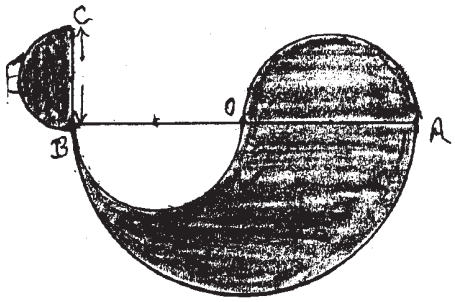
Q. 29 The area of the shaded region in the following figure is equal to the sum of area of two other circles of radii 3 cm & 4 cm. If R = 13 cm. Find 'r'.



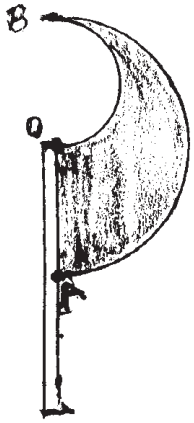
Q. 30 If AOB is a quadrant of a circle of radius 14 cm. Find the area of shaded region.



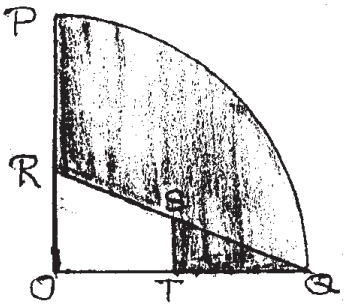
Q. 31 Priyal made a duck with sky blue glaze paper as shown. Find the area pasted by glaze paper if $2CB = BO = OA = 5.6cm$.



Q. 32 Abhishek wants to make a sickel (Hansia) with card-board & will paste it on a stick. Find how much card-board is required if OA = 7 cm and O is at equidistant from A & B?



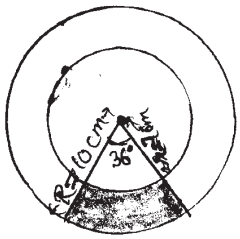
Q. 33 POQ is a quadrant with radius 12 cm. In ΔROQ, RO = 5 cm, S & T are mid points of RQ & OQ respectively. Find the shaded area.

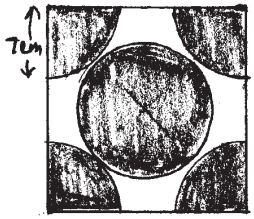


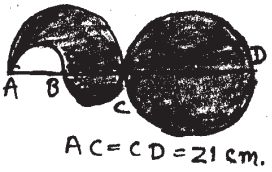
Q. 34 The area of a circle inscribed in an equilateral triangle, is 154 sq. cm. Find perimeter of the triangle.

Q. 35 Find the shaded area of one of these figures.

R = 10cm
r = 7cm



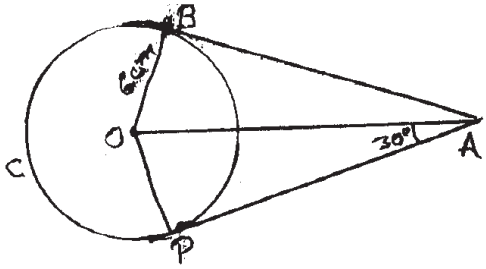




Q. 36 The radii of two circles are 19 cm & 9 cm. Find the circumference & radius of a circle which has its circumference equal to the sum of the circumferences of the two circles.

Q. 37 The sum of radii of two circles is 24 cm & difference of circumferences is 88 m. Find the circumferences.

Q. 38 Amit made a model of atta Chakki as shown in figure. The circle is the rim of the belt PABCP, moving around the rim & a big nail A. Find the length of belt which is in contact with the rim.



Q. 39 The radii of the front & rear wheels of a tractor are 30 cm & 1.2 cm respectively. Find the ratio between the no. of revolutions taken by rear wheel and front wheel to cover the distance in 1 hour, if the speed of the tractor is 24 km/hr.

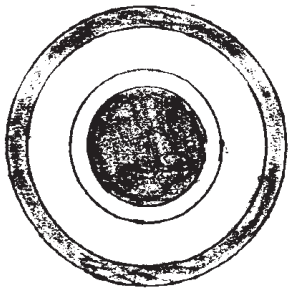
Q. 40 Shashi spread a table cloth of radius 112 cm on a table with circular top such that 49 cm of the cloth is hanging all around. Find the cost she will pay to polish the top of the table at the rate of Rs 200 per square metre.

Q. 41. Three crayons fixed one to each of the three corners of a triangle of sides 14 cm, & 50 cm with 7 cm long string. Three students Krishna, Madhu & Usha one at each vertex starts shading

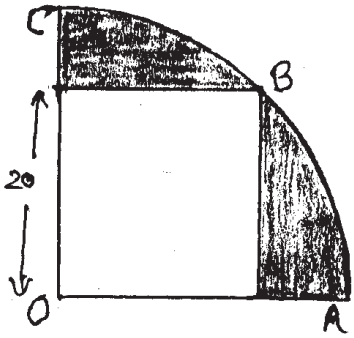
using crayon. How much area is left unshaded? (Assuming that the tip of the crayon is always perpendicular to the plane)

Q. 42 The measure of the minor are of a circle is $\frac{1}{5}th$ of the measure of the corresponding major arc. The radius of the circle is 21 cm. Find the area of the sector corresponding to the major arc.

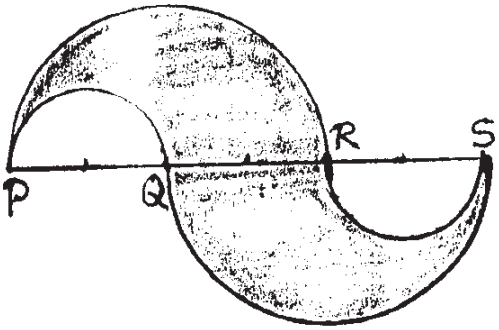
Q. 43 If the radii of these four concentric circles shown in figure are 3 cm, 4 cm, 12 cm & 13 cm respectively. Find the shaded area.



Q. 44★ Find the shaded area if side of square is 20 cm.



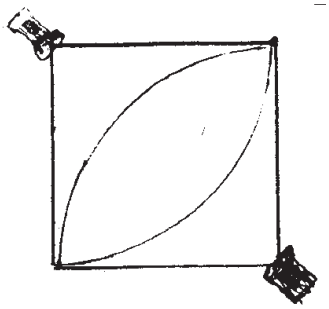
Q. 45★ Find the area of the shaded region when $PQ = QR = RS = 14cm$.



(Student can find perimeter of this figure also.)

Q. 46★ Dhruv builds a circular swimming pool of radius 5 m inside a circular garden of radius 12 m. In order to compensate the area covered due to the construction of pool, he extents the radius by 'r' metre keeping the garden still circular. Find 'r'.

Q. 47★ A small torch can spread its light over a sector of angle 90° up to a distance of 14 cm. Kunal put two torches of same type at opposite vertices of a square of side 14 cm as shown in figure. Find the area which get light from both sides.



Q. 48★ Find the area of the largest triangle inscribed in a semi-circle of radius 8 cm.

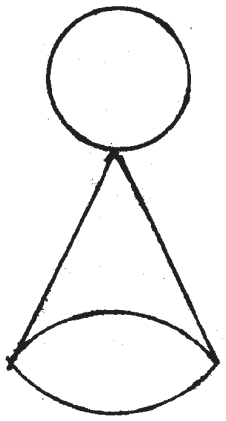
Q. 49★ A semi circular region & a square region have equal perimeters. The area of the square region exceeds that of the semicircular region by $4m^2$. Find the perimeter & areas of the two regions.

6 marks questions (★ are under HOTS)

Q. 50 Find the ratio of outside & inside curved surface areas of a hollow cylindrical metallic pipe 14 cm long if the difference between the two radii is $\frac{1}{2}cm$. The pipe is made of $99cm^3$ metal.

Q. 51 A student Kartikai, developed a model of a hut. He made a cylinder of radius 6 cm, & height 6 cm and attached a hemisphere of radius 7 cm at its top. He left an open area for door on the cylinder of length 4 cm & breadth 3 cm. Find the surface area of the hut.

Q. 52 Dinesh, a civil engineer constructed shape on the entrance of a building as shown in the figure. The radius of sphere is 15 m. The height & radius of cone are 90 cm & 30 cm respectively. Find the slant height of cone and cost of construction at the rate Rs 3 per cm^3. (Use $\sqrt{10} = 3.16$)



Q. 53 A cylindrical piece of wax of radius 2.8 cm & height 2 cm is placed in a metallic hemispherical bowl of diameter 7 cm. If the wax melts into the bowl, will the bowl overflow. If yes, how much wax overflows. If not, how much more can be accomodated..

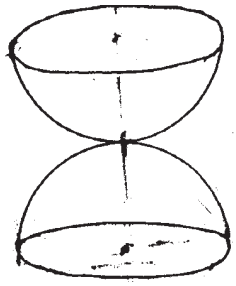
Q. 54 A vessel is in the form of an inverted cone. Its height is 8 cm & radius of the top, which is open, is 5 cm. It is filled with water up to the brim. When solid balls of metal of radius $\frac{1}{2}cm$ are dropped into the vessel, one fourth of the water flows out. Find the number of balls dropped into the vessel.

Q. 55 Water flows at the rate of 10m/minute from a circular pipe of diameter $\frac{1}{2}cm$. How much time will it take to fill a vessel which is an inverted cone of radius 20 cm & height 24 cm.

Q. 56 Water is flowing, through a circular pipe of internal diameter 2 cm into a cylindrical tank of base radius 40 cm, at the rate of 7m/second. Find the rise in water level in half on hour.

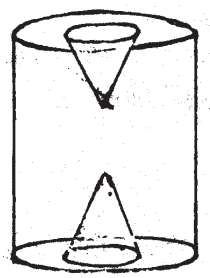
Q. 57 A solid spherical ball of the of metal is divided into two hemispheres and joined as shown in the figure. This solid is placed in a cylindrical tub, full of water in such a way that the whole solid is sub merged in water. The radius & height of cylindrical tub are 4 cm & 5 cm respectively. The

radius of spherical ball is 3 cm. Find the volume of water left in the cylindrical tub.



Q. 58 A metallic toy is made in the form of a hemisphere surmounted by a right cone whose circular base coincides with the plane surface of the hemisphere. The radius of the cone is 3.5 m & its volumes is $\frac{2}{3}rd$ of the hemisphere. Calculate the height of cone & the surface area of the toy.

Q. 59 The height of a solid cylinder is 15 cm & diameter 7 cm. Two equal conical holes of radius 3 cm & height 4 cm are cut off as shown in figure. Find the volume and surface area of remaining solid.



Q. 60 The capacity of an ice-cream container is 4 litre. This is to be served to the guests in cups of inverted frustum shape of upper & lower radii 3.5 cm, 2.1 cm and height 4.2 cm. How many containers (approximately) are required for a gathering of 150 people.

Q. 61 A solid spherical ball of copper of radius 5 cm has been melted to form two paper weights of conical shape of equal heights 4 cm, but the radius of one is double of the other. Find the radii of the two paper weights.

Q. 62 The circular ends of a bucket are 20 cm & 14 cm. Its height is 48 cm. Find the ratio of total surface area of the two cones generated by taking both the circular ends as base one by one.

Q. 63 The slant height of right circular cone is 10 cm & its height is 8 cm. It is cut by a plane parallel to its base passing through the mid point of the height. Find ratio of the volumes of two parts.

Q. 64 A spherical ball of copper is melted & made into smaller balls of half the radius of the original. How many such balls can be made? Also find the ratio of total surface area of all the similar balls to that of the original one.

Q. 65 A plane is drawn parallel to the base of a right circular cone so that it divides the cone into two parts of equal surfaces. In what ratio the plane divideds the height of the cone?

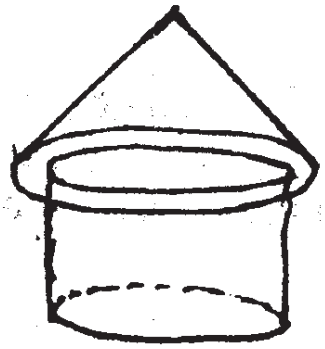
Q. 66 A cone of height H is cut by a parallel plane at a distance $\frac{H}{3}$ from the base. Find the percent

age of volume of the frustum produced, of the original cone.

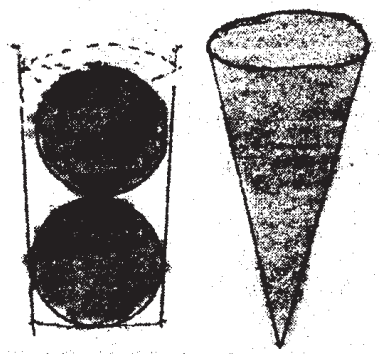
Q. 67★ The upper portion of a right circular cone of height h is cut off by a plane parallel to the base & is removed. If the curved surface area of remainder be $\frac{3}{4}$ of curved surface of the whole cone. Find how height is the cutting plane from the base of cone.

Q. 68★ An oil tanker, cylindrical in shape, having diameter 2 m & length 4.2 m supplies oil to the two places in the ratio 3 : 2. One of the two places has a rectangular vessel having base area $3.96m^2$ & the other has a cylindrical vessel having diameter 2m. Find the level of oil in each of the two vessels.

Q. 69★ Ashok wants to cover his circular wheat granary with a fibre sheet to make it air tight so that no open space is left uncovered as shown in the figure. Cone is of height 4 m & base radius 3 m. The radius & height of cylindrical wall of fibre sheet are 2m & 1m. Find the total area of fibre sheet required to built such cover.

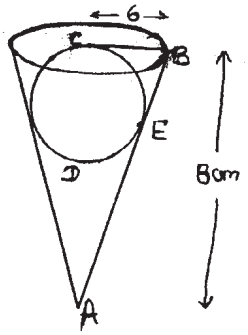


Q. 70★ Tosh & Akul went to an ice-cream parlour. Tosh orders double scoop ice-cream & Akul for softy cone as shown in figure . The height of softy cone is 12cm & internal radius is $\frac{5}{2}cm$ The radius of scoops 2½ cm. Who got more quantity of ice-cream & by how much if ice-cream in the softy cone is up to the brim.

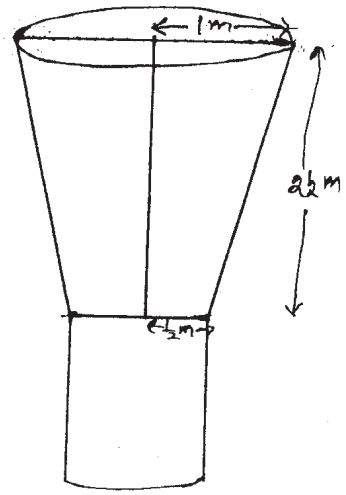


Q. 71★ A bucket is of capacity $48510\ cm^3$. The radii of two circular ends are 28 cm & 7 cm. Find the height of bucket & cost of metal required to make the bucket at the rate of Rs 1 per sq. cm. Find the cost of milk at the rate of Rs 20 per litre. (In this question if we replace radii by perimeters 176 cm & 44cm then solve this problem. Answer will be the same).

Q. 72★ A conical vessel of radius 6 cm & height 8 cm is completely filled with water. A solid sphere is immersed into it & its size is such that when it touches the sides, it is just immersed. Find the quantity of water overflows?



Q. 73★ Two maths teachers observed six pillars to support shades of metro-station at Kashmiri-Gate which are of the shape as given in the figure. One of them said that the approximately.. height & radius of cylindrical portion are 1m & $\frac{1}{2}m$ respectively. The total height of the pillar is approximately. $3\frac{1}{2}m$ & the radius of the upper part is 1m. She asked the other teacher how much money is required to construct one such pillar if the current rate of construction is Rs. 3000 per cubic metre.



Q. 74★ An orange contains juice about 15% of its volume. Find approximately how many dozen oranges are required for a gathering of 50 people if each guest is to be served with 250 ml juice. Assuming that radius of each orange is 3.5 cm.

Chapter- 11 & 12

Answers

1. r = 6.3 cm
2. 65 sq. cm
3. r = 21 cm
4. $154cm^2$
5. 1 : 4
6. 77 sq. cm
7. 4 : 3
8. 40
9. 154 sq. cm
10. r = 25 cm, 20 cm
11. $\frac{343}{6}\pi$
12. $h = \frac{3.5}{2}cm$
13. r = 21 cm
14. 1 : 2 : 3
15. h = 15 cm
16. $\frac{1}{3}\pi r^3 cm^3$ when h = r
17. $\frac{600}{7}cm^2$
18. $P = \frac{720}{7}cm$
19. $1188cm^2$
20. 4 : 1
21. c = 33 cm
22. $Q = \frac{2}{r}$
23. 4 : 1
24. 3 : 1
25. 14 cm
26. 192.5 sq. cm
27. $\frac{735}{16}\pi$ sq. cm
28. $\frac{108}{7}$ sq. cm
29. r = 12 cm
30. 77 sq. cm
31. 52.36 sq. cm
32. $\frac{231}{4}$ sq. cm
33. 90.6 appr.
34. $42\sqrt{3}cm$
35. 5.1π sq. cm, 308 sq. cm, 519.75 sq. cm
36. 176 cm

37. $38\pi cm$

38. 25.1cm

39. 1 : 4

40. Rs 249.48

41. 259 sq. cm

42. 1155 sq. cm

43. 137π sq. cm

44. $\frac{1600}{7}m^2$

45. 462 sq. cm

46. r = 1 m

47. 112 sq. cm

48. 64 sq. cm

49. 36 cm, $81cm^2$, $77cm^2$

50. Radii = 2.5 cm, 2 cm
Ratio = 5 : 4

51. 563.14 sq. cm (Hint : Total area = $2\pi r^2 + 2\pi rh + \pi(R^2 - r^2) - L \times B$)

52. Slant height = 94.8 cm
Cost Rs. 2,97000

53. No, $39.55cm^3$

54. 100 balls

55. 51 min 12 sec.

56. 787.5 cm

57. $138.29cm^3$

58. $\frac{14}{3}cm$, $\frac{36}{6}cm$, 141.17 sq. cm

59. $502.07cm^3$, $444.71cm^2$
(Hint :- Total surface area = $2\pi rh - 2\pi rl + 2\pi(R^2 - r^2)$)

60. 4 containers

61. 5 cm, 10 cm

62. 45 : 28

63. 8 : 7

64. 8, 2 : 1

65. $1:\sqrt{2}$

66. 70.37%

67. Equal to the height of the cone

68. 2m, 1.68m

69. Tosh, 52.38 cm^3

71. Height = 45 cm, Cost = Rs 56116

72. 113.14 cub cm (Hint :- AB = 10 cm. Use $AD \times AC = AE^2$)

73. Rs 16110

74. 39 dozen

Chapter-13

Statistics

Key points

1. The mean for grouped data can be found by :-

(i) The direct method = $\overline{X} = \frac{\sum fixi}{\sum fi}$

(ii) The assumed mean method = $\overline{X} = a + \frac{\sum fidi}{\sum fi}$

(iii) The step deviation method = $\overline{X} = a + \left[\frac{\sum fidi}{\sum fi}\right] \times h$

2. The mode for the grouped data can be found by using the formula :-

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

l = lower limit of the model class

f_1 = frequency of the model class

f_0 = frequency of the proceeding class of the model class

f_2 = frequency of the succeeding class of the model class

h = size of the class interval.

Model class – Class interval with highest frequency

3. The median for the grouped data can be found by using the formula :-

Median = $l + \left[\frac{n/2 - Cf}{f}\right] \times h$

l = lower limit of the median class.

n = number of observations

Cf = Cumulative frequency of class interval preceeding the median class.

f = frequency of median class

h = class size.

4. Imperical Formula :-

Mode = 3 median – 2 mean

5. Cumulative frequency Curve or An Ogive :-

(i) Ogive is the graphical representation of the cumulative frequency distribution.

(ii) Less than type Ogive :-

* Construct a cumulative frequency table

* Mark the upper class limit on the x=axis

(iii) More then type Ogive :-

* Construct a frequency table

* Mark the lower class limit on the x-axis

(iv) To obtain the median of frequency distribution from the graph :-

* Locate point of intersection of

Less than type Ogive and more than type Ogive :-

* Draw a perpendicular from this point to x-axis.

* The point at which it cuts the x-axis gives us the median.

Chapter-13

Statistics
Questions

1 mark questions

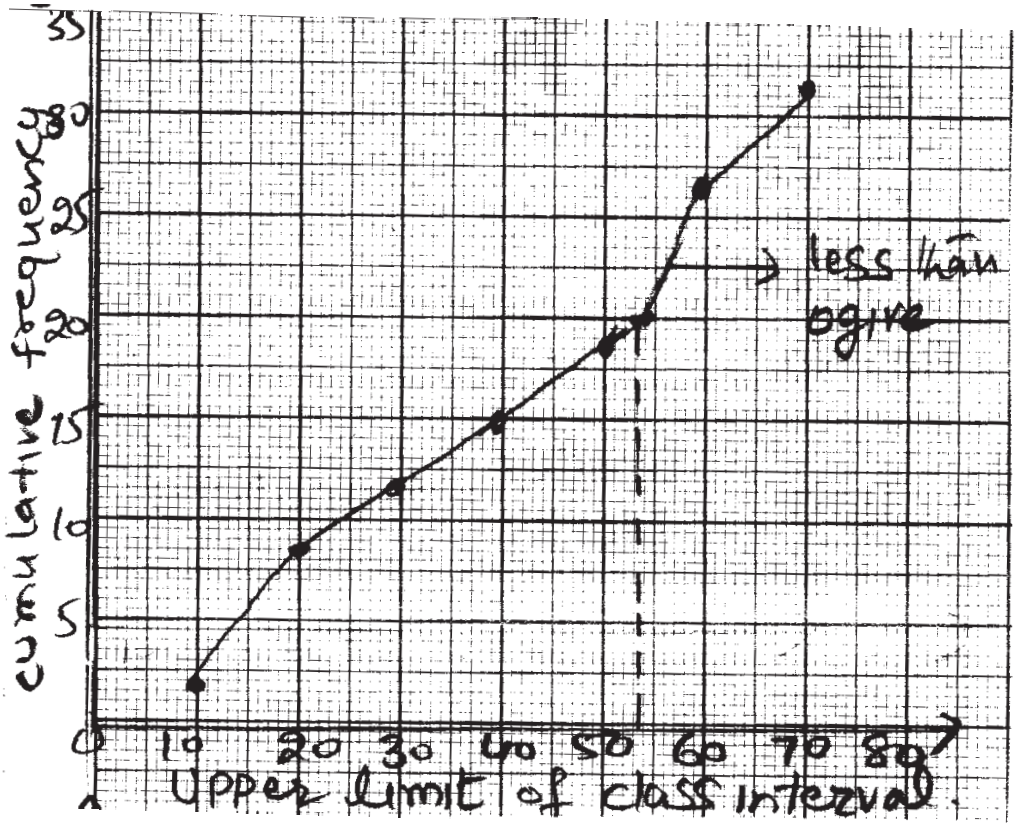
Q. 1 Write an empirical relationship between the three central tendency.

Q. 2 Which measure of control tendency is given by the x-coordinate of the point of intersection of the 'more than Ogive' and 'less than Ogive'.

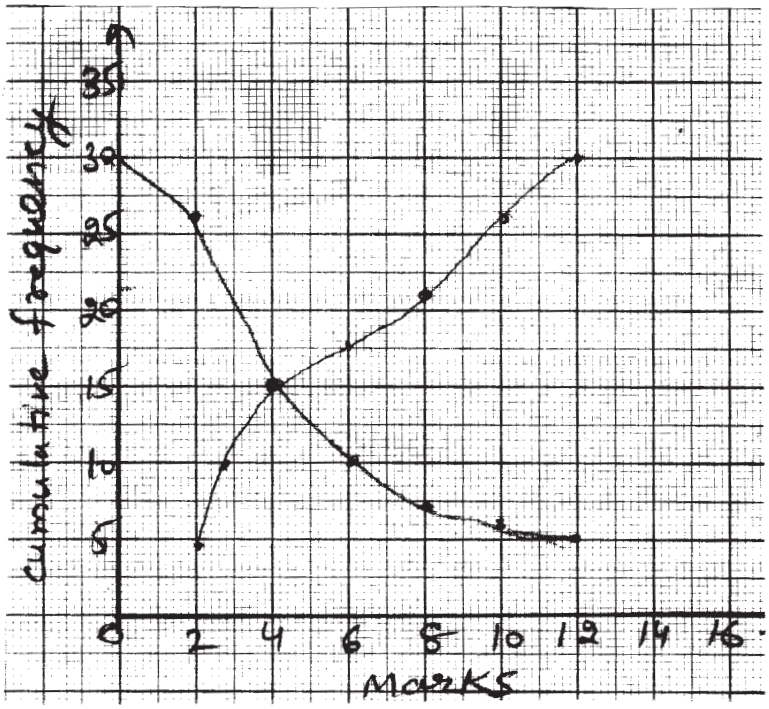
Q. 3 Find median and mode of the following distribution :-
2, 3, 6, 0, 1, 4, 8, 2, 5

Q. 4 Find the median, if Mean = 100 and Mode = 112

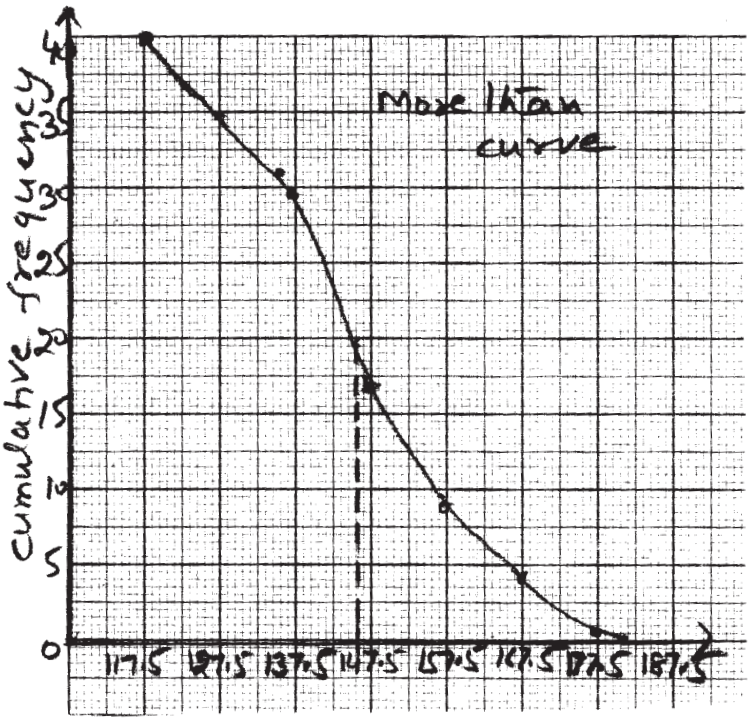
Q. 5 A student draw a cumulative frequency curve for the marks obtained by 40 students of a class as shown in figure. Find the median marks obtained by the students.



Q. 6 What is the value of the median of the data using the graph in figure of less than Ogive and more than Ogive.



Q. 7 What is the value of the median of the data using the graph in figure of more than Ogive.



6 marks questions (Questions No. 19 to 21 under HOTS)

Q. 8 The following table shows the daily wages of 25 workers.

Daily wages :	100-150	150-200	200-250	250-300	300-350
No. of workers :	5	2	12	3	3

Find the mean and median by a suitable method.

Q. 9 Consider the following distribution which shows weekly allowance of 30 children of a locality.

Weekly Allowance :	100-120	120-140	140-160	160-180	180-200
No. of children :	2	6	9	x	3

Find the value of x, mean and median

Q. 10 The mean of the following distribution is 50. Find missing frequency x and y. Sum of frequencies is 120.

Class Intervals :	0-20	20-40	40-60	60-80	80-100
Frequency :	17	x	32	y	19

Q. 11 Find the mean and the mode of the following frequency distribution :-

Class interval :	10-19	20-29	30-39	40-49	50-59	60-69
Frequency :	5	9	10	8	.5	3

Q. 12 Find the mean of the following data :-

Marks :	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of students :	7	17	40	91	97	100

Q. 13 Find the missing frequency of the following data if its mode is Rs 240.

Expenditure :	0-100	100-200	200-300	300-400	400-500
No. of families :	140	230	270	x	150

Q. 14 Find the median and the mode for the following table, which shows number of person for different age group :-

Age Group :	0-20	20-40	40-60	60-80	80-100	Total
No. of person :	17	28	32	24	19	120

Q. 15 Calculate median and modal age of following distribution :-

Age :	<20	<25	<30	<35	<40	<45	<50	<55	<60
No. of person :	2	6	24	45	78	89	92	98	100

Q. 16 If median of the distribution given below is 28.5. Find the value of x any y. Total frequency is 56.

Class intervals:	0-10	10-20	20-30	30-40	40-50	50-60
frequency :	5	x	20	15	y	5

Q. 17 Find the mean, median and mode of the following distribution :-

No. of class :	0	1	2	3	4	5
N. of matches:	2	4	7	6	8	3

Q. 18 Calculate mean, median and mode for following distribution :-

Class Intervals:	0-10	10-20	20-30	30-40	40-50	50-60
Frequency :	2	6	9	7	4	2

Q. 19 The following distribution gives the marks of 45 students in a test :-

Marks :	0-20	20-40	40-60	60-80	80-100
No. of students :	10	20	8	5	3

Convert the above distribution to a less than type cumulative frequency distribution and draw its Ogive.

Q. 20 Draw an Ogive for the distribution given below

Class Interval :	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency :	4	4	7	20	12	8	5

Also find the median from your Ogive so drawn.

Q. 21 The following observations relate to the marks obtained out of 100 by 50 students in a certain examination.

Marks Obtained :	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students :	6	7	9	10	8	7	3

(i) Draw less than type cumulative frequency distribution curve and its Ogive.

(ii) Draw more than type cumulative frequency distribution and its Ogive.

(iii) Obtain the median from the graph and verify the result by using the median formula.

Chapter-13

Answers

1. Mode = 3, Median – 2 mean

2. Median

3. Median = 3, Mode = 2

4. Median = 104

5. Median = 54

6. Median = 4

7. Median = 146.75

8. Mean = 219. Median = 245.8 appr.

9. Mean = 144, Median = 144.4

10. x = 28, y = 24

11. Mean = 26.3, Mode = 33

12. Mean = 29.8

13. x = 210

14. Mean = 60, Mode = 46.6

15. Median = 39.35, Mode = 43.5

16. x = 6, y = 5

17. Mean = 2.43, Median = 3, Mode = 4

18. Mean = 28.6, Median = 27.7,
    Mode = 28

19. Draw Ogive

20. Draw Ogive

21. Draw Less than Ogive
    More than Ogive
    Median = 43

Chapter-14

Probability
Key points

1. The theoretical probability of an event E written as P (E).

$$P(E) = \frac{Numbers\ of\ outcomes\ favourable\ to\ E}{Number\ of\ all\ possible\ outcomes\ of\ the\ Experiment}$$

2. The sum of the probability of all the elementary events of an experiment is 1.

3. The probability of a sure event is 1 and probability of an impossible event is 0.

4. If E is an event, in general, it is true that for an event E.

$$P(E) + P(\overline{E}) = 1$$

5. From the definition of the probability P(E) the numerator is always less than or equal to the denominator. There fore $0 \le P(E) \le 1$.

Chapter-14

Probability
Questions

1mark questions (Question No. 21 to 25 under HOTS)

Q. 1 What is the probability of a sure event.

Q. 2 Which of the following statement have equally likely outcomes.
(i) A dice is rolled once, the probability of prime and composite numbers.
(ii) A coin is tossed, the probability of head and tail.
(iii) A dice is rolled once, the probability of getting numbers more than two.
(iv) One card is taken out of well shuffled pack of card, probability of getting a red card.

Q. 3 Write the sample space for following events :-
(i) Two coins are tossed once, write the sample space for possible outcomes.
(ii) Three coins are tossed once, write the sample space for possible outcomes.
(iii) From a group of 3 boys and 2 girls. If we select one child, write the sample space.

Q. 4 What is the probability of an equally likely outcomes?

Q. 5 Is probability of an event –1.3, or 1.3?

Q. 6 If $P(\overline{E}) = 0.32$ write P(E).

Q. 7 If probability of success is 52%. What is the probability of failure?

Q. 8 A bag contain 3 red and 4 white balls. Write the probability of getting a blue ball.

Q. 9 If E is an event such that P(E) = $\frac{3}{5}$, write $P(\overline{E})$.

Q. 10 A bag contain 14 Yellow and 12 Red marbles. What is the probability that a child takes out one marble at random?
(i) A Red marble
(ii) A Black marble

Q. 11 A game of chance of a spinning wheel has number 1 to 10. What is the probability of getting a number more than six, when wheel comes to rest.

Q. 12 A teacher made a group of 4 students. Write the probability, that group will have 2 girls and 2 boys.

Q. 13 In a bag, there are some ribbons and every fourth ribbon is black. Write the probability of getting a ribbon other than black.

Q. 14 During IPL cricket Tournament, A match is played between Delhi Dare Devils and Knight Riders. If probability of Dare Devils winning the match is 0.579. Write the probability of Knight Riders winning the match.

Q. 15 Only face cards are well shuffled. A card is drawn at random. Write the probability of getting a queen. (A'S are not included in face cards)

Q. 16 A CD bag contain 60 VCD's and DVD's. If probability of getting a DVD at random is $\frac{2}{3}$. Write the probability of getting a VCD.

Q. 17 Two dice are rolled once. Write the probability of getting a duplet.

Q. 18 In a family of two children, write the probability of at least one boy.

Q. 19 What is the probability of getting a vowel at random out of box containing cards of English vowels.

Q. 20 A box contain 12 coloured candles equal numbers of red, green and blue. Write the probability of getting a candle other than red.

Q. 21 A garden has different plants. Every sixth plant is a rose plant. A child plucks a flower, write the probability of getting a flower other than rose.

Q. 22 A bank ATM has 2000 notes of Rs 500 and 3000 notes of Rs 1000. Write the probability, if a person withdraws Rs 1000 and he get Rs 1000 note.

Q. 23 A bank ATM has notes of denomination 100, 500, 1000 in equal numbers. What is the probability of getting a note of Rs. 1000.

Q. 24 Two dice are rolled once. Write the probability of getting sum of numbers more than second multiple of 7.

Q. 25 Two dice are rolled once. Write the probability of getting numbers, whose product is a perfect square?

2 marks questions (Questions No. 36 to 40 under HOTS)

Q. 26 Two dice are rolled simultaneously. Find the probability that the sum is more than 10.

Q. 27 Find the probability of having 53 Mondays in a leap year.

Q. 28 A box contain 15 red and 10 green pens :-
(i) Find probability of drawing a green pen at random.
(ii) If 5 more green pens are put in the box, find the probability of drawing a red pen.

Q. 29 a box contain cards marked with the number 2 to 101. One card is drawn at random. Find the probability of getting a card with numbers :-
(i) Number less than 15

(ii) A number which is a perfect square.

Q. 30 A box contain 90 discs, which are numbered from 1 to 90. If one disc is drawn at random from the box. Find the probability that it has been :-
(i) Two digit number
(ii) A number divisible by 5

Q. 31 Two dice are thrown once. What is the probability that 5 will not come either time.

Q. 32 A carton consists of 100 pens, out of which 65 are good one, 15 have minor defects and remaining have major defects. What is the probability that :-
(i) A man will pick up a good pen
(ii) A man will pick up a pen with major defects.

Q. 33 A natural number is chosen at random from among the first 200 natural numbers. Find the probability that the number so chosen is divisible by 7.

Q. 34 One Dozen rotten mangoes were mixed with four dozen of good mangoes, but 10 rotten man goes were identified and thrown away. Find the probability that Ritu takes one mango and she got a good mango.

Q. 35 All cards of hearts were taken out of a well shuffled pack of cards and then a card is drawn at random. Find the probability of getting :-
(i) black queen
(ii) A face card.
(A'S are not included in face cards)

Q. 36 A bag contain some black balls and some white ball. If probability of white balls is doubled the black ball, determine the number of white balls, if total numbers of balls in the bag are 60.

Q. 37 A bag contains 12 balls out of which x are black :-
(i) If one ball is drawn at random from the box, what is the probability, that it will be a black ball.
(ii) If 6 more black balls are put in the box. The probability of drawing a black ball is now double of what it was before. Find x.

Q. 38 A bag contain 5 red balls and some blue balls. If probability of drawing a blue ball is three times that of a red ball, find the numbers of blue balls.

Q. 39 A box contain some ball pens and some gel pens. If probability of a ball pen is half of the gel pen and number of gel pen is 50. Find the total number of pen and probability of a ball pen.

Q. 40 A bag contain x numbers of black marbles and some white marbles and number of white marbles are 2 more than half of the black marbles. If total numbers of marbles are 14, find the probability of a black and also a white marble.

Chapter-14

Answers

1. One

2. (i) Yes (ii) Yes (iii) No (iv) Yes

3. (i) (HH, HT, TH, TT)
(ii) (HHH, HHT, HTH, THH, HTT, THT, TTH, TTT)
(iii) $(B_1, B_2, B_3, G_1, G_2)$

4. $\frac{1}{2}$

5. No

6. P(E) = 0.68

7. $\frac{48}{100}$, 48%

8. 0

9. $P(\overline{E}) = \frac{2}{5}$

10. (i) $6/13$ (b) 0

11. $\frac{4}{10}$, $2/5$

12. $1/2$

13. $3/4$

14. 0.421

15. $1/3$

16. $1/3$

17. $1/6$

18. $2/3$

19. $5/26$

20. $2/3$

21. $\frac{5}{6}$

22. $3/5$

23. $1/3$

24. 0

25. $2/9$

26. $1/12$

27. $2/7$

28. (i) $2/5$ (ii) $1/2$

29. (i) $13/100$ (ii) $9/100$

30. (i) $9/10$ (ii) $1/5$

31. $25/36$

32. (i) $65/100$ (ii) $\frac{20}{100}, \frac{1}{5}$

33. $7/50$

34. $24/25$

35. (i) $2/39$ (ii) $9/39$

36. W = 40, B = 20

37. (i) $x/12$ (ii) x = 3

38. 15

39. T= 75, P(BP) = $\frac{1}{3}$

40. x = 8

P(black ball) = $\frac{4}{7}$

P(White ball) = $\frac{3}{7}$

SAMPLE PAPER - I

Time : 3 hours **MM : 80**

General Instructions :-

(i) All questions are compulsory.

(ii) The question paper consists of thirty questions divided into 4 sections – A, B, C and D. Section A comprises of ten questions of 01 mark each, Section B comprises of five questions of 02 marks each, Section C comprises of ten questions of 03 marks each and Section D comprises of five questions of 06 marks each.

(iii) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

(iv) There is no overall choice. However, internal choice has been provided in one question of 02 marks each, three questions of 03 marks each and two questions of 06 marks each. You have to attempt only one of the alternatives in all such questions.

(v) In question on construction, drawings should be neat and exactly as per the given measurements.

(vi) Use of calculators is not permitted.

SECTION - A

Q. 1 If one of the roots of the quadratic equation $2x^2 + px - 4 = 0$ is 4, write value of P.

Q. 2 Write 11^{th} term of the A.P. 4, 7, 10, - - - - - -

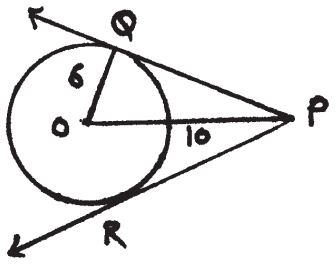
Q. 3 Is $\frac{24}{192}$ a non-terminating decimal expansion?

Q. 4 Write the zero of a polynomial $3x + 7$.

Q. 5 Write the empirical relationship between the three measures of central tendency.

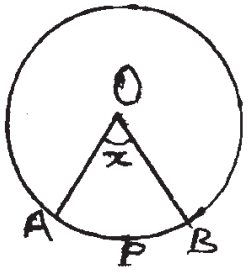
Q. 6 Write the value of $\frac{7}{4}\cos ec^2 73^\circ - \frac{7}{4}\tan^2 17^\circ$.

Q. 7 In the figure, what is the length of PR?

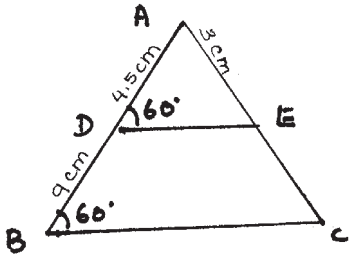


Q. 8 Only face cards, excluding black Jacks are well shuffled. A card is drawn at random, write the probability of getting a red king.

Q. 9 If $ar\left(\text{sec}_1 OAPB\right)=\frac{7}{36}$ of the area of the circle. Find x.



Q. 10 In the figure, what is the length of EC.



SECTION - B

Q. 11 If $\sec\left(32^\circ+\theta\right)=\text{cos}ec\theta$, θ and $\left(32^\circ+\theta\right)$ are acute angles, find the value of θ.

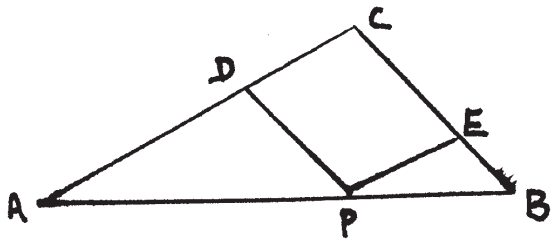
Q. 12 Two dice are thrown once, find the probability of getting numbers having sum more than 11.

OR

A bag contain cards of numbers between 0 to 20. Find the probability of getting a card at random with perfect cube.

Q. 13 If $\left(x-a\right)$ is a factor of the polynomial x^3-ax^2-2a+3, find the value of a.

Q. 14 In figure $PD \| BC$ and $\frac{AD}{DC}=\frac{CE}{BE}$. Prove the PDCE is a parallelogram.



Q. 15 Find the sum of A.P. : $10+14+18+-----+106$

SECTION - C

Q. 16 Show that $3-\sqrt{5}$ is an irrational number.

Q. 17 Prove that $\frac{1+\cos\theta}{1-\cos\theta} = (\operatorname{cosec}\theta + \cot\theta)^2$

OR

If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then prove that :-

$\cos\theta - \sin\theta = \sqrt{2}\sin\theta$

Q. 18 Find all the zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 2$, it is given that two of the zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

Q. 19 Solve graphically the pair of linear equations $x - 2y - 4 = 0$; $x + 3y + 1 = 0$. Also find the coordinates of the vertices of the triangle formed by these lines with X=axis.

Q. 20 If 6^{th} term of an A.P. is –10 and 10^{th} term is –26, find the sum of first 15 terms?

OR

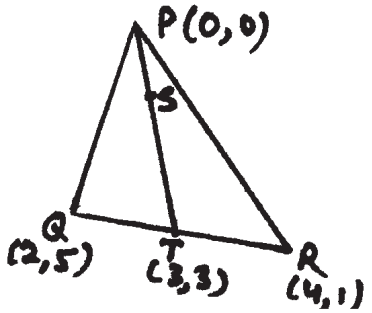
Which term of A.P. 5, 9, 13, - - - - will be 32 more then its 13^{th} term?

Q. 21 Prove that points A (0, 13), B (–13, 0). C (5, 12) & D (12, –5) are on a circle whose centre is origin & hence find radius of this circle.

OR

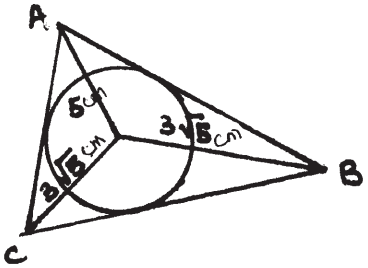
Find p if segment with end points (p, –4) & (4, 3) is bisected by the line x+3y=2.

Q. 22 PT is a median of a ΔPQR & S is a point on PT such that $PS = \frac{1}{4}\sqrt{18}$. Find the coordinates of S.

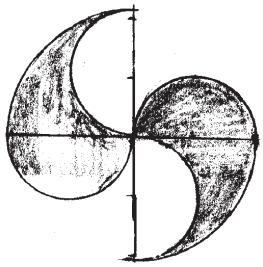


Q. 23 Construct a ΔABC with side AC = 7.2 cm, $\angle B = 45^\circ$ and $\angle A = 105^\circ$. Construct another $\Delta B'AC' \sim \Delta ABC$ whose sides are $\frac{2}{3}$ times of the corresponding sides of given ΔABC.

Q. 24 In the figure the radius of the circle is 3 cm. Find the perimeter of ΔABC.



Q. 25 Find the shaded region if diameter of each semicircle is 6.3 cm.



SECTION - D

Q. 26 The length of rectangle exceeds its width by 8 cm. The area of the rectangle is 240 sq. Find the perimeter of the rectangle.

OR

A train travels a distance of 300 km at a uniform speed. If speed of the train is increased by 5 km/h, the journey would have taken two hours less. Find the initial uniform speed of train.

Q. 27 If a line is drawn parallel to one side of a triangle, to intersect the other two sides in distinct points, prove that the other two sides are divided in the same ratio.
Using the above, prove the following :-
In ΔABC, $DE \| BC$ and $BD = CE$. Prove that ΔABC is an isosceles triangle.

Q. 28 The angles of depression of the top and bottom of a pole, as seen from the top of 50 metres high tower, are 30° and 60° respectively. Find the height of the pole.

OR

From the top of a tower, the angles of depression of two consecutive kilometre stones due west are found to be 30° and 45°. Calculate the height of the tower.

Q. 29 The weekly income of 100 families has been given below. Construct cumulative frequency an Ogive :-
(i) More than type
(ii) Less than type.
Also find from the graph the median of the data.

Income	Number of families
0 - 1000	8
1000 - 20000	14
2000 - 3000	36
3000 - 4000	27
4000 - 5000	9
5000 - 6000	6

Q. 30 A cylindrical container of radius 6 cm and height 15 cm is full with ice-cream. The whole ice-cream has to be distributed to 10 children in equal cones with hemispherical tops. If height of conical position is four times the radius of base, find the radius of the ice-cream cone

MARKING SCHEME
Expected Answers/ Value Point

1. –7 — 1

2. 34 — 1

3. No — 1

4. $-7/3$ — 1

5. Mode = 3, Median –2 mean — 1

6. $7/4$ — 1

7. 8 cm — 1

8. $\frac{1}{10}$ — 1

9. 70° — 1

10 6 cm — 1

11. $Sec(32^\circ + \theta) = C\,os\,ec\theta = Sec(90^\circ - \theta)$ — 1

$\therefore 32^2 + \theta = 90^\circ - \theta$ — ½

$\theta = 29^\circ$ — ½

12. Sample space for total more than 11 (66) i.e. possible out come = 1 — 1, ½

Probability = $\frac{1}{36}$ — ½

OR

Total out come = 19 — ½

possible out come = (1, 8) = 2 — ½

Probability = $2/19$ — 1

13. $\because (x-a)$ is a factor of $x^3 - ax^2 - 2a + 3$

$\therefore a^3 - a.a^2 - 2a + 3 = 0$ — 1

$-2a + 3 = 0$ — ½

$a = 3/2$ ½

14. $\because PD \| BC \quad \therefore \frac{AD}{DC} = \frac{AP}{PB} ------I$ ½

But given that $\frac{AD}{DC} = \frac{CE}{BE} ------II$

fome (i) or (ii) $\frac{AP}{PB} = \frac{CE}{BE}$ ½

or $\frac{PB}{AP} = \frac{BE}{CE} \Rightarrow PE \| AC$ ½

Hence PDCE is a parellelogram. ½

15. a = 10, d = 4 $a_n = 10 + (n-1)4 = 106$ 1

$\therefore n = 25$ ½,½

$Sn = \frac{n}{2}[a+l] = \frac{25}{2}[10+106]$ = 1450

16. Let us assum that $3-\sqrt{5}$ is rational

$\therefore x = 3-\sqrt{5}$ where x is rational ½

$\therefore \sqrt{5} = 3-x -------i$ ½

As x is rational, 3–x is also rational. But $\sqrt{5}$ is irrational ½

$\therefore (i)$ represents contridiction 1

$\therefore$ x is not rational.

i.e. $3-\sqrt{5}$ is irrational. ½

17. LHS = $\frac{1+\cos\theta}{1-\cos\theta} \times \frac{1+\cos\theta}{1+\cos\theta}$ ½

= $\frac{1+\cos^2\theta+2\cos\theta}{1-\cos^2\theta}$ ½

= $\frac{1}{\sin^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} + \frac{2\cos\theta}{\sin^2\theta}$ ½

= $\cos ec^2\theta + \cot^2\theta + 2\cos ec\theta.\cot\theta$ 1

= $(\cos ec\theta + \cot\theta)^2 = R.H.S.$ ½

OR

$\cos\theta+\sin\theta=\sqrt{2}\cos\theta----(i)$

Squaring both side we get ½

$\cos^2\theta+\sin^2\theta+2\cos\theta\sin\theta=2\cos^2\theta$ 1

$2\cos\theta.\sin\theta=2\cos^2\theta-\cos^2\theta-\sin^2\theta$

$2\cos\theta.\sin\theta=\cos^2\theta-\sin^2\theta----(ii)$

Dividing (ii) by (i)

$\therefore\dfrac{\cos^2\theta-\sin^2\theta}{\cos\theta+\sin\theta}=\dfrac{2\cos\theta.\sin\theta}{\sqrt{2}\cos\theta}$ 1

$\cos\theta-\sin\theta=\sqrt{2}\sin\theta$ ½

18. Since $\sqrt{2}$ and $-\sqrt{2}$ are two zeros so $\left(x+\sqrt{2}\right)$ & $\left(x-\sqrt{2}\right)$ are factors

i.e. $\left(x^2-x\right)$ is a factor. ½

$\therefore 2x^4-3x^3-3x^2+6x-2 = 2x^2\left(x^2-2\right)-3x\left(x^2-2\right)+1\left(x^2-2\right)$ 1

$=\left(x^2-2\right)\left(2x^2-3x+1\right)$

$=\left(x+\sqrt{2}\right)\left(x-\sqrt{2}\right)(2x-1)(x-1)$ 1

$\therefore$ All zeros are $\sqrt{2}$, $-\sqrt{2}$, 1, $\dfrac{1}{2}$ ½

19. Drawing its graphs of lines correctly and correct pt of intersection (2, –1) 2

points where lines intersect x-axis (4, 0), (–1, 0) ½

Coordinates of vertex of (4, 0), (–1, 0), (–2. 1) ½

20. $a_6=a+5d=-10$, $a+9d=-26$ 1

$4d=-16$

d = –4 ½

$\therefore\quad a=-10+20=10$ ½

$S_{15}=\dfrac{15}{2}\left[20+(15-1)\times-4\right]=-270$ 1

OR

Let n^{th} term is 32 more than 13^{th} term

$\therefore\quad t_n=5+(n-1)4=5+(13-1)4+32$ 2

$(n-1)\times4=80$ ½

x = 21 ½

21. If 0 (0, 0) is centre of circle

$OA = \sqrt{(0-0)^2 + (13-0)^2} = 13$ ½

$OB = \sqrt{(-13-0)^2 + (0-0)^2} = 13$ ½

$OC = \sqrt{(5-0)^2 + (12-0)^2} = 13$ ½

$OD = \sqrt{(12-0)^2 + (-5-0)^2} = 13$ ½

$\therefore$ Points A, B, C, D lies on circle ½

radius = 13 units ½

OR

Let point at which bifercate is (x, y)

$x = \frac{P+4}{2}$, $y = \frac{-4+3}{2}$ 1

This point lies on $x + 3y = 2$

$\left(\frac{P+4}{2}\right) + 3\left(\frac{-1}{2}\right) = 2$ 1

$P + 4 - 3 = 4 \Rightarrow P = 3$ 1

22. $PT = \sqrt{3^2 + 3^2} = \sqrt{18}$ ½

$\because$ $PS = \frac{1}{4}\sqrt{18} = \frac{1}{4}PT$ ½

$\therefore$ S devides PT in the ratio 1 : 3 ½

$\therefore$ coordinate of $S = \left(\frac{0+3}{1+3}, \frac{0+3}{1+3}\right)$ 1

$= \left(\frac{3}{4}, \frac{3}{4}\right)$ ½

23. Constructing ΔABC correctly 1½

Constructing $\Delta B'AC'$ correctly 1½

24. Let D, E, F are point of contact at BC, BA & CA.

$\therefore$ $CF = BE = CD = DB = \sqrt{\left(3\sqrt{5}\right)^2 - 3^2} = \sqrt{36} = 6$ 2

$AF = AC = \sqrt{(5)^2 - (3)^2} = \sqrt{16} = 4$ ½

$\therefore$ $AB + BC + CA = 4 + 6 + 6 + 6 + 6 + 4 = 32cm$ ½

(May also take tangents)

25. Shaded area = area of (2quadrent–2 secmicricles+2semicircls)

$= 2\left(\frac{\pi R^2}{4}\right) - 2\left(\frac{\pi r^2}{2}\right) + 2\left(\frac{\pi r^2}{2}\right)$ 2

$= \frac{\pi R^2}{2} = \frac{1}{2} \times \frac{22}{7} \times 6.3 \times 6.3$ ½

$= 62.37 cm^2$ ½

26. Let width = x cm, $\therefore$ Length = x+8 cm 2

Area = $x(x+8) = 240$ 1

$x^2 + 8x - 240 = 0$

$x^2 + 20x - 12x - 240 = 0$

$x(x+20) - 12(x+20) = 0$ 1

$(x+20)(x-12) = 0$ 1

$\therefore$ x = 12 1

$\therefore\ l = 12 + 8 = 20cm,\ b = 12cm$

Perimeter = $2(l+b) = 64cm$

OR

Let initial speed = x km/h 2

$\frac{300}{x} - \frac{300}{x+5} = 2$ 1

$300(x+5) - 300x = 2(x+5)x$

$2x^2 + 10x + 1500 = 0$ 1

$x^2 + 5x + 750 = 0$

$x^2 + 30x - 25x + 750 = 0$ 1

$(x+30)(x-25) = 0$

x = 25 or –30 1

$\therefore$ Initial speed = 25 km/h

27. Correct figure, Given, To prove, construction. correct proof ½x4=2

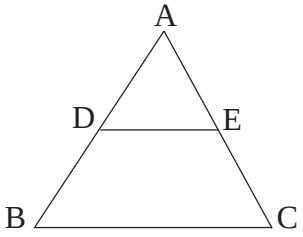
$\because\ DE \parallel BC$

$\therefore\ \frac{AD}{BD} = \frac{AE}{CE}$ 1

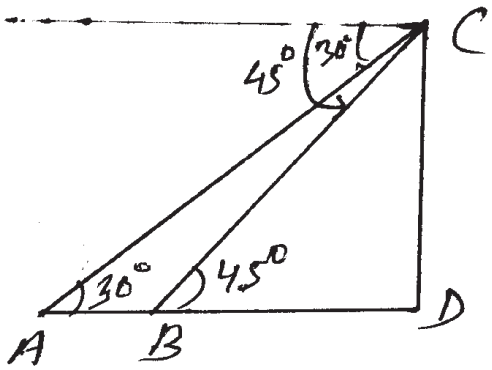
$\because$ BD = CE ---------(i) ½

$\therefore$ AD = AE ---------(ii)

From (i) & (ii) $AB = AC \Rightarrow$ Isoscales Δ ½



28. AB = 1000 m
Let CD = x m is minar



In ΔBCD, $\tan 45^\circ = \frac{CD}{BD}$ 2

$\therefore BD = x$

Now in rt ΔACD, $\tan 30^\circ = \frac{CD}{AD}$ 2

$\frac{1}{\sqrt{3}} = \frac{x}{x+1000}$ 1

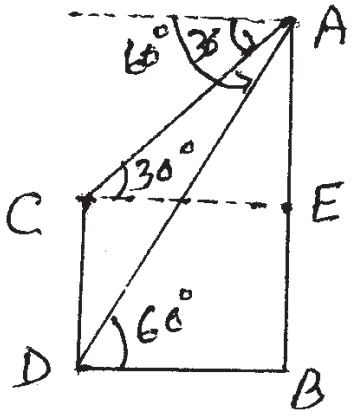
$\left(\sqrt{3}-1\right)x = 1000$

$x = \frac{1000}{\sqrt{3}-1}$ 1

$x = 500\left(\sqrt{3}+1\right)m$

OR

AB is minar & CD is pole 1
Let CD = x, AB = 50 m (given)
AE = 50 – x



In rt ΔABD, $\tan 60^\circ = \frac{AB}{BD}$ 2

$\sqrt{3} = \frac{50}{BD} \quad \therefore \quad BD = \frac{50}{\sqrt{3}}$

In rt ΔACE, $\tan 30^\circ = \frac{AE}{CE}$

$\frac{1}{\sqrt{3}} = \frac{50-x}{50/\sqrt{3}}$ 2

$\frac{50}{\sqrt{3}} = 50\sqrt{3} - \sqrt{3}x \Rightarrow 50 = 150 - 3x$ 1

$\therefore \quad x = \frac{100}{\sqrt{3}}$ ½

29. Drawing "more than Ogive" correctly 2
Drawing "less than Ogive" correctly 2
Finding point of intersection ½
Drawing $\perp$ on x-axis from pt of intersetions ½
Finding median = 2777 1

30. Ice-cream in Cylindrical container = $\pi(6)^2 \times 15cm^3$ 2

Volume of one ice-cream cone =

$\frac{1}{3}\pi r^2.(4r)+\frac{2}{3}\pi r^3$ 2

$\therefore \quad 10\times\frac{1}{3}6\pi r^3 = \pi.(6)^2 \times 15$ 1

$r^3 = \frac{6\times 6\times 15}{10\times 2}$

$r^3 = 3\times 3\times 3$ ½

r = 3 cm ½

C.B.S.E.
MATHEMATICS - 2008

Time : 3 hours **MM :- 80**

General Instructions :-

(i) All questions are compulsory.

(ii) The question paper consists of thirty questions divided into 4 sections – A, B, C and D. Section A comprises of ten questions of 01 mark each, Section B comprises of five questions of 02 marks each, Section C comprises of ten questions of 03 marks each and Section D comprises of five questions of 06 marks each.

(iii) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

(iv) There is no overall choice. However, internal choice has been provided in one question of 02 marks each, three questions of 03 marks each and two questions of 06 marks each. You have to attempt only one of the alternatives in all such questions.

(v) In question on construction, drawings should be neat and exactly as per the given measurements.

(vi) Use of calculators is not permitted.

SECTION - A

Question number 1 to 10 carry 1 mark each

Q. 1 If $\frac{p}{q}$ is a rational number $(q \neq 0)$, what is condition on q so that the decimal representation of $\frac{p}{q}$ is terminating?

Q. 2 Write the zeroes of the polynomial $x^2 + 2x + 1$.

Q. 3 Find the value of k so that following system of equations has no solution :-

$3x - y - 5 = 0$; $6x - 2y - k = 0$

Q. 4 The n^{th} term of an A.P. is $7 - 4n$. Find its common difference.

Q. 5 In figure 1, AD = 4 cm, BD = 3 cm and CB = 12 cm, find $\cot\theta$.

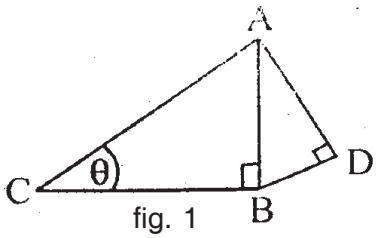


fig. 1

Q. 6 In figure 2, P and Q are points on the sides AB and AC respectively of ΔABC such that AP= 3.5 cm, PB = 7 cm, AQ = 3 cm and QC = 6 cm. If PQ = 4.5 cm, find BC.

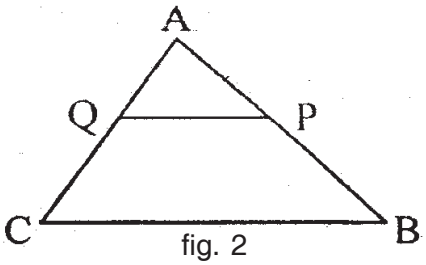


fig. 2

Q. 7 In figure 3, PQ = 24 cm. QR = 26 cm, $\angle PAR = 90^\circ$, PA = 6 cm and AR = 8 cm. Find $\angle QPR$.

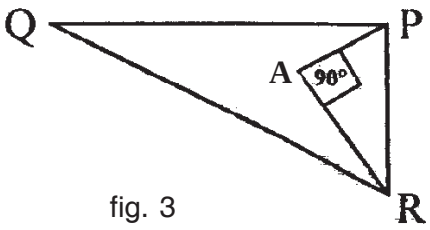


fig. 3

Q. 8 In figure 4, O is the centre of a circle. The area of sector OAPB is $\frac{5}{18}$ of the area of the circle . Find x.

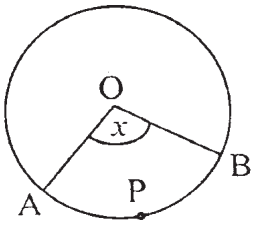


fig. 4

Q. 9 Which measure of central tendency is given by the x-coordinate of the point of intersection of the "more than ogive" and "less than ogive"?

Q. 10 From a well shuffled pack of cards, a card is drawn at random. Find the probability of getting a black queen.

SECTION - B

Question number 11 to 15 carry 2 marks each.

Q. 11 Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the co-efficients of the polynomial.

Q. 12 Without using the trigonometric tables, evaluate the following :-

$$\frac{11}{7}\frac{\sin 70^\circ}{\cos 20^\circ} - \frac{4}{7}\frac{\cos 53^\circ \cos ec 37^\circ}{\tan 15^\circ \tan 35^\circ \tan 55^\circ \tan 75^\circ}$$

Q. 13 For what value of p, are the points (2, 1), (p, –1) and (–1, 3) collinear?

Q. 14 ABC is an isosceles triangle, in which AB = AC, circumscribed about a circle. Show that BC is bisected at the point of contact.

OR

In figure 5, a circle is inscribed in a quadrilateral ABCD in which $\angle B = 90^\circ$. If AD = 23 cm, AB = 29 cm and DS = 5 cm, find the radius (r) of the circle.

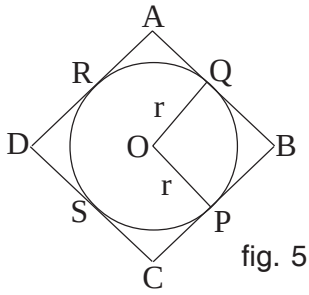


fig. 5

Q. 15 A die is thrown once. Find the probability of getting :-

(i) a prime number

(ii) a number divisible by 2

SECTION - C

Question numbers 16 to 25 carry 3 marks each.

Q. 16 Show that $5 - 2\sqrt{3}$ is an irrational number.

Q. 17 Find the roots of the following equation :-

$$\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30};\ x \neq -4,\ 7$$

Q. 18 Represent the following system of linear equations graphically. From the graph, find the points where the lines intersect y-axis.

$3x + y - 5 = 0$; $2x - y - 5 = 0$

Q. 19 The sum of n terms of an A.P is $5n^2 - 3n$. Find the A.P. Hence, find its $10^{th}\, term$

Q. 20 Prove that :- $\dfrac{\cot A - \cos A}{\cot A + \cos A} = \dfrac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$

OR

Prove that :- $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

Q. 21 Determine the ratio in which the line $3x + 4y - 9 = 0$ divides the line-segment joining the points (1, 3) and (2, 7).

Q. 22 Construct a ΔABC in which AB = 6.5 cm, $\angle B = 60^\circ$ and $BC = 5.5cm$. Also construct a triangle AB'C' similar to ΔABC, whose each side is $\dfrac{3}{2}$ times the corresponding side of the ΔABC.

Q. 23 If the diagonals of a quadrilateral divide each other proportionally, prove that it is a trapezium.

OR

Two $\Delta's$ ABC and DBC are on the same base BC and on the same side of BC in which $\angle A = \angle D = 90^\circ$. If CA and BD meet each other at E, show that AE.EC = BE.ED.

Q. 24 If the distances of P(x, y) from the points A(3, 6) and B(–3, 4) are equal, prove that $3x + y = 5$.

Q. 25 In figure 6, find the perimeter of shaded region where ADC, AEB and BFC are semicircles on diameters AC, AB and BC respectively.

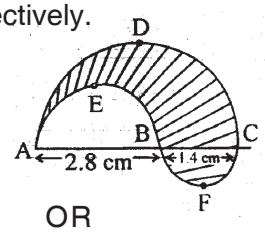


fig. 6

OR

Find the area of the shaded region in figure 7, where ABCD is a square of side 14 cm.

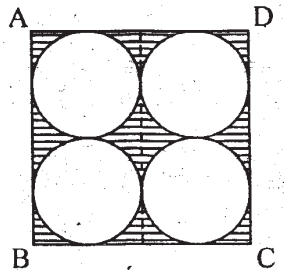


fig. 7

SECTION - D

Question numbers 26 to 30 carry 6 marks each.

Q. 26 In a class test, the sum of the marks obtained by P in Mathematics and Science is 28. Had he got 3 more marks 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

The sum of the areas of two squares is $640m^2$. If the difference in their perimeters be 64 m, find the sides of the two squares.

Q. 27 A statue 1.46 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 45°. Find the height of the pedestal (use $\sqrt{3}=1.73$).

Q. 28 Prove that the ratio of the areas of two similar triangles is equal to the ratio of squares of their corresponding sides.

Using the above result, prove the following :-

In a ΔABC, XY is parallel to BC and it divides ΔABC into two parts of equal area. Prove that $\frac{BX}{AB}=\frac{\sqrt{2}-1}{\sqrt{2}}$.

Q. 29 A gulab jamun, when ready for eating, contains sugar syrup of about 30% of its volume. Find approximately how much syrup would be found in 45 such gulab jamuns, each shaped like a cylinder with two hemisperical ends, if the complete length of each of them is 5 cm and its diameter is 2.8 cm.

OR

A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of ice-cream. This ice-cream is to be filled into cones of height 12 cm and diameter 6 cm,

having a hemispherical shape on the top. Find the number of such cones which can be filled with ice-cream.

Q. 30 A survey regarding the heights (in cm) of girls of Class X of a school was conducted and the following data was obtained:

Height in cm :	120-130	130-140	140-150	150-160	160-170	Total
No. of girls :	2	8	12	20	8	50

Find the mean, median and mode of the above data.

ANSWERS

1. Factors of q = $2^m \times 5^n$

2. –1

3. $k \neq 10$

4. $d = -4$

5. $12/5$

6. 13.5 cm

7. $\angle QPR = 90^\circ$

8. 100°

9. Median

10. $\frac{1}{26}$

11. Zeros $3/2$, $\frac{1}{2}$

12. 1

13. P = 5

14. Or 11 cm

15. (i) $\frac{1}{2}$ (ii) $\frac{1}{2}$

17. 1, 2

18. (0, 5), (0, –5)

19. 2, 12, 22. - - - -
10^{th} term is 92

21. 6 : 25 (external)

25. 13.2 cm or 42 cm^2

26. Maths = 9, Science = 19
Or 24 m, 8m

27. 2 m

28. 338.18 cm^3 Or
10 cones

30. Mean = 149.8
Median = 151.5
Mode = 154.0

PRACTICE PAPER - I

Time : 3 hours **MM : 80**

General Instructions :-

(i) All questions are compulsory.

(ii) The question paper consists of thirty questions divided into 4 sections – A, B, C and D. Section A comprises of ten questions of 01 mark each, Section B comprises of five questions of 02 marks each, Section C comprises of ten questions of 03 marks each and Section D comprises of five questions of 06 marks each.

(iii) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.

(iv) There is no overall choice. However, internal choice has been provided in one question of 02 marks each, three questions of 03 marks each and two questions of 06 marks each. You have to attempt only one of the alternatives in all such questions.

(v) In question on construction, drawings should be neat and exactly as per the given measurements.

(vi) Use of calculators is not permitted.

SECTION - A

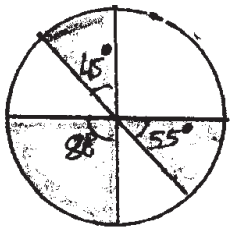
Q. 1 Given that HCF (75, 175) = 25, write LCM (75, 175).

Q. 2 Write the value of $\sec(90^\circ - \theta).\cos ec\theta - \tan(90^\circ - \theta).\cot\theta$.

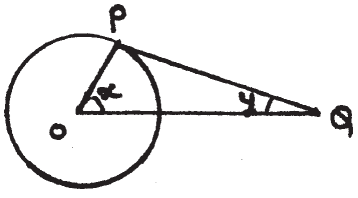
Q. 3 Is $\frac{99}{2^3 \times 3^2 \times 5^2}$ a terminating decimal expansion?

Q. 4 Sum and product of a quadratic equation are 8 and 15 respectively, write the equation.

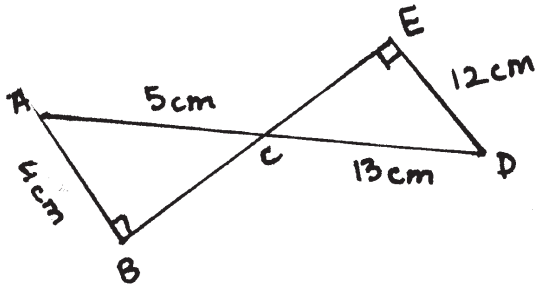
Q. 5 Write the shaded area if r = 7 cm.



Q. 6 If PQ is a tangent to a circle with centre O, then what is the value of x+y?



Q. 7 In the adjoining figure, what is the length of BE?



Q. 8 If n^{th} term of an A.P. is $5-2n$, write the common difference of the A.P.

Q. 9 If E is an event such that $P(E)=\frac{2}{7}$, write $P(\overline{E})$.

Q. 10 A bag contain red, blue and green balls in the ratio 2 : 3 : 4. Find the probability of getting a blue ball at random.

SECTION - B

Q. 11 If the polynomial $3x^3-4x^2-5x+k$ is exactly divisible by $3x-1$, find the value of k.

Q. 12 Find the value of :- $\frac{4\left(\cos^2 78^\circ+\cos^2 12^\circ\right)}{3\tan 35^\circ \tan 55^\circ}+\frac{2\left(\tan^2 62^\circ-\cos ec^2 28^\circ\right)}{\sin 63^\circ.\sec 27^\circ}-3\tan^2 30^\circ \sin 71^\circ.\sec 19^\circ$

Q. 13 Find the ratio in which the points (–3, p) divides the line segment joining (–5, –4) & (–2, 3). Hence find p.

OR

In ΔDEF, $\angle D=90^\circ$. Find the value of k if coordinates of D, E & F are (4, 3), (6, –2) & (k, –3) respectively.

Q. 14 In a flower bed every third plant is a rose plant. A child plucks a flower, find the probability of the plucked flower other than rose.

Q. 15 Prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal.

SECTION - C

Q. 16 Show that $2\sqrt{3}$ is an irrational number.

Q. 17 On dividing the polynomial $3x^3-4x^2-3x+25$ by a polynomial g(x), the quotient and the remainder were (3x + 5) and 5, respectively. Find g(x).

Q. 18 Draw the graphs of the pair of linear equations $3x+y-12=0$; $x-3y+6=0$. Find the area of triangle formed by given lines with x-axis.

OR

Solve the following equations for x and y

$$\frac{11}{x}-\frac{7}{y}=1, \quad (x\neq 0,\ y\neq 0)$$

$$\frac{9}{x}-\frac{4}{y}=6$$

Q. 19 If $Sn=3n^2+2n$ of an A.P., find n^{th} term and common difference of the A.P.

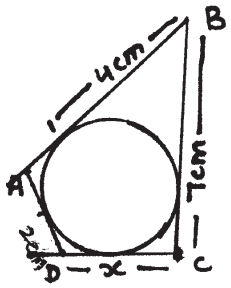
Q. 20 Prove that :- $\frac{\cot\theta}{1-\tan\theta}+\frac{\tan\theta}{1-\cot\theta}=1+\sec\theta.\cos ec\theta$

OR

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

Q. 21 D is a point on y-axis such that its distance from E(0, –1) is 10 units &from F(3, 5) is 5 units. Find the coordinates of D.

Q. 22 In the following figure find the value x.



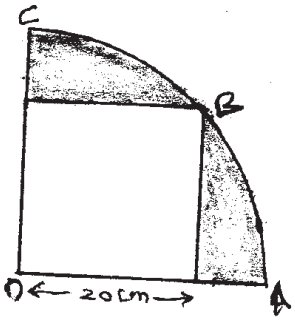
Q. 23 The coordinates of the vertices of a triangle are (2, –3), (3, 2) & (l, m). If the centroid of the triangle lies on the origin. Show that $l=m=1$.

OR

If A(–3, 2), B(x, y) & C(1, 4) are the vertices of an isoscles triangle with AB = BC, show that $2x+y=1$

Q. 24 Draw a circle with centre O and radius 3 cm. From an external point P, construct two tangent PA and PB to the circle such that $PA\perp PB$. Which kind of quadrilateral is AOBP?

Q. 25 Find the shaded area if the side of the square is 20 cm.



SECTION -D

Q. 26 The sum of numerator and denominator of certain fraction is 12. If one is added to the numerator and one is subtracted from the denominator, the fraction reduces to 1, find the fraction.

OR

A motor boat, whose speed is 18 km/h in still water, takes 1 hour more to go 24 km upstream than to return down stream to the same spot. Find the speed of the stream.

Q. 27 If a cone is cut from a sphere with height equal to three fourth of the diameter of the sphere. Find the ratio of volume of cone so formed to the volume of the sphere. (Assuming the axis of cone is along the axis of sphere.)

OR

A utensil in the form of a bucket is of capacity $\frac{24464}{7} cm^3$. The radii of two circular ends are 10 cm & 3 cm. Find the height of bucket & cost of metal required to make the bucket at the rate of Rs 10 per 10 sq. cm.

Q. 28 A man, standing on the deck of a ship which is 10 m above water level, observe 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°. Find the distance of the hill from the ship and height of the hill.

Q. 29 In a right angled triangle, prove that the square on the hypotenuse is equal to the sum of the squares on the other two sides.

Use the above for the following :-

In ΔABC, $AD \perp BC$ and BD = 3CD. Prove that :-

$2AB^2 = 2AC^2 + BC^2$.

Q. 30 The mean of the following frequency table is 53. But the frequency f_1 and f_2 are missing frequencies. Find the missing frequencies.

Age (in years)	:	0-20	20-40	40-60	60-80	80-100	Total
No. of people	:	15	f_1	21	f_2	17	100

ANSWERS

1. 525
2. 1
3. Yes
4. $x^2 - 8x + 15 = 0$
5. $77 cm^2$
6. 90°
7. 8 cm
8. –2
9. $\frac{5}{7}$
10. $\frac{1}{3}$
11. k = 2
12. $-\frac{5}{3}$
13. 2 : 1, $p = \frac{2}{3}$

    OR

    k = –11
14. $\frac{2}{3}$
15. $g(x) = x^2 - 3x + 4$
18. 15 square units

    OR

    $x = \frac{1}{2}$, $y = \frac{1}{3}$
19. $6n - 1$, d = 6
21. (0, 9)
22. 5
25. $\frac{1600}{7} cm^2$
26. $\frac{5}{7}$ or 6 km/ hr
27. $\frac{9}{12}$ or Height = 24 cm, Rs. 1049.71
28. $10\sqrt{3} m$, 40 m
30. $f_1 = 18$, $f_2 = 29$