Theme Base Marks Distribution (D-01)

Sl. No.	Theme	Units	Marks
1.	Number System	Real Numbers	04
2.	Algebra	Pair of Linear Equations in Two Variables	26
		Arithmetic Progression	
		Polynomials	
		Quadratic Equations	
3.	Trigonometry	Introduction to trigonomety	09
		Some applications of trigonometry	
4.	Coordinate geomety	Coordinate geomety	05
5.	Stats	Statistics	09
		Probability	
6.	Geometry	Triangles	17
		Circles	
		Constructions	
7.	Mensuration	Areas related to circles	10
		Surface areas & volumes	

Weightage to cognitive level (D-02)

Cognitive level	Percentage	Marks
Remembering	15%	12
Understanding	55%	44
Application	25%	20
Skill	5%	04

Types of Questions (D-03)

Sl.No.	Types of Questions	Number	Marks
1.	Multiple choice questions (MCQ)	08	08
2.	1 Marks short answers	08	08
3.	2 Marks short answers	08	16
4.	3 Marks questions	09	27
5.	4 Marks questions	04	16
6.	5 Marks questions	01	05

Questions based on level (D-04)

Sl.No.	Level	%	Marks
1.	Easy	30	24
2.	Average	50	40
3.	Difficult	20	16
4.	Total	100	80

CONTENTS

Sl. No.	Name of chapter	Topic Name	Expected Marks	Page No.
1.	A.P	Finding sum of A.P	2	01-02
		Finding sum of A.P*	2	
2.	Pair of linear equations	Solve x & y *	2	03-09
		System of linear equations (MCQ)	1	
3.	Probability	Find the probability *	1+2	10-13
4.	Real numbers	Proving irrational numbers*	2 or 3	14-18
		Finding HCF and product of prime factors	1 1	
5.	Areas rel.to circles	Formula & Problem (additional)	2 to 3	19-21
6.	Polynomials	Degree, zeroes of polynomials	1+2+3	22-27
7.	Coordinate geometry	Formula & Problem (additional)	1+1+2	28-30
8.	Surface area & volumes	Formulas & Problem (additional)	1+1+2+3	31-33
9.	Circles*	Theorems**& MCQ, 1 mark Q's	1+1+3	34-37
10.	Statistics*	Finding Mean or median or mode*	3	38-42
11.	Triangles	Theorems *	4 or 5	43-47
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ARITHMETIC PROGRESSION

2 Mark questions

1. Find the sum of an A.P 1, 3, 5, ……. Up to 50 terms.

Solution: Given data here a=1 d=3-1 n=50

We are going to find S_{50} d=2

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

$S_{50}=\frac{50}{2}\{2x1+(50-1)2\}$

$=25\{2+(49)2\}$

$=25x100$

$=2500.$

2. Find the sum of 5+10+15+---------- up to 25 terms.

Solution: Given data here a=5 d=10-5 n=25

We are going to find S_{25} d=5

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

$S_{25}=\frac{25}{2}\{2x5+(25-1)5\}$

$=\frac{25}{2}\{10+(24)5\}$

$=\frac{25}{2}x\ (10+120)$

$\frac{25}{2}\ (130)$

$= 25 \times 65$

$= 1625$

3. Find the sum of first 30 terms of an A.P 225, 220, 215…..

Solution: Given data here a=225, d=220-225 n=30

We are going to find S_{30} d= -5

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

$S_{30}=\frac{30}{2}\{2x225+(30-1)(-5)\}$

$=15\{450+(29)(-5)\}$

$=15x(450-145)$

$=4575.$

4. Find the sum of first 10 terms of an A.P 2, 4, 6, …….

Solution: Given data here a=2, d=4-2 n=10

We are going to find S_{10} d=2

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

$S_{10}=\frac{10}{2}\{2x2+(10-1)2\}$

$=5\{4+(9)2\}$

$=5x22$

$=110.$

5. Find the sum of 20 terms of an A.P 5, 8, 11, ……

Solution: Given data here a=5, d=8-5 n=20

We are going to find S_{20} d=3

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

$S_{20}=\frac{20}{2}\{2\times5+(20-1)3\}$

$=10\{10+57\}$

$=10x67$

$=670.$

6. Find the sum of all odd numbers from 1 to 100.

Solution: odd numbers are 1, 3, 5, ……99

Given data here a=1 d=3-1 n=?

d=2 we should find n using a_n formula.

$a_n=a+(n-1)d$

$99=1+(n-1)2$

$98=2n-2$

$2n=100$ therefore $n=50$

We are going to find S_{50}

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

$S_{50}=\frac{50}{2}\{2x1+(50-1)2\}$

$=25\{2+(49)2\}$

$=25x100$

$=2500.$

For practice: Solve the following equations

7. Find the sum of all even numbers which are between 0 to 30.
8. Find the sum of 2, 6, 10, ……. Up to 100 terms.
9. Find the sum of all numbers which are divisible by 7 up to 50 terms.
10. Find the sum of 3+7+11+-------- up to 35 terms.
11. Find the sum of first 60 natural numbers.
12. Find the sum of first 40 terms of 9, 12, 15, …….

PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

2 Mark questions

1. Solve: x+y=5 & 2x-y=4.

Solution: two equations are

x+y=5 ---------(1) multiply by 2

2x-y=4 --------(2)

We get 2x+2y=10

2x-y=4

After subtraction 3y=6

y=2

Put y value in any one equation we get x

Equation one becomes x+2=5

x=5-2

x=3

2. Solve: 3x-y=5 & 5x-2y=8.

Solution: two equations are

3x-y=5 ---------(1) multiply by 5

5x-2y=8 --------(2) multiply by 3

We get 15x-5y=25

15x-6y=24

After subtraction **y=1**

Put y value in any one equation we get x

Equation one becomes 3x-(1)=5

3x=5+1

3x=6

x=2

3. Solve: x+2y=10 & x-y=1.

Solution: two equations are

x+2y=10 ---------(1)

x-y=1 --------(2)

We get x+2y=10

x-y=1

After subtraction 3y=9

y=3

Put y value in any one equation we get x

Equation one becomes x+2(3)=10

x=10-6

x=4

4. Solve: 2x-y=1 & x+3y=11.

Solution: two equations are

2x-y=1 ---------(1) multiply by 1

x+3y=11 --------(2) multiply by 2

We get 2x-y=1

2x+6y=22

After subtraction **y=3**

Put y value in any one equation we get x

Equation one becomes 2x-3=1

2x=1+3

2x=4

x=2

5. Is the following pair of linear equations consistent? Justify your answer.
2ax + by = a, 4ax + 2by – 2a = 0; a, b≠ 0

Solution:

Yes,

Here, $\frac{a_1}{a_2} = \frac{2a}{4a} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{b}{2b} = \frac{1}{2}$, $\frac{c_1}{c_2} = \frac{-a}{-2a} = \frac{1}{2}$

$\because$ $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\therefore$ The given system of equations is consistent.

6. For all real values of c, the pair of equations

x – 2y = 8, 5x + 10y = c

have a unique solution. Justify whether it is true or false.

Solution:

Here, $\frac{a_1}{a_2} = \frac{1}{5}$, $\frac{b_1}{b_2} = \frac{-2}{+10} = \frac{-1}{5}$, $\frac{c_1}{c_2} = \frac{8}{c}$

Since $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

So, for all real values of c, the given pair of equations have a unique solution.

$\therefore$ The given statement is true.

7. Does the following pair of equations represent a pair of coincident lines? Justify your answer.

$\frac{x}{2} + y + \frac{2}{5} = 0, 4x + 8y + \frac{5}{16} = 0.$

Solution:

Here, $a = \frac{1}{2}$, $b_1 = 1$, $c_1 = \frac{2}{5}$ and $a_2 = 4$, $b_2 = 8$, $c_2 = \frac{5}{16}$

$$\frac{a_1}{a_2} = \frac{\frac{1}{2}}{4} = \frac{1}{8}, \quad \frac{b_1}{b_2} = \frac{1}{8}, \quad \frac{c_1}{c_2} = \frac{\frac{2}{5}}{\frac{5}{16}} = \frac{32}{25}$$

$\because \quad \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\therefore$ The given system does not represent a pair of coincident lines.

8. If x = a, y = b is the solution of the pair of equation x – y = 2 and x + y = 4, then find the value of a and b.

Solution:

x – y = 2 … (i)

x + y = 4 … (ii)

On adding (i) and (ii), we get 2x = 6 or x = 3

From (i), 3 – y ⇒ 2 = y = 1

a = 3, b = 1.

On comparing the ratios a_1/a_2, b_1/b_2, and, c_1/c_2 find out whether the following pair of linear equations consistent or inconsistent. is consistent or inconsistent.

9. $\frac{3}{2}x + \frac{5}{3}y = 7 \quad 9x - 10y = 14$

Solution:

We have, $\frac{3}{2}x + \frac{5}{3}y = 7$ … (i)

$9x - 10y = 14$ … (ii)

Here, $a_1 = \frac{3}{2}$, $b_1 = \frac{5}{3}$, $c_1 = 7$

$a_2 = 9$, $b_2 = -10$, $c_2 = 14$

Thus, $\frac{a_1}{a_2} = \frac{3}{2 \times 9} = \frac{1}{6}$, $\frac{b_1}{b_2} = \frac{5}{3 \times (-10)} = -\frac{1}{6}$

Hence, $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$. So, it has unique solution and it is consistent.

10. 2x+3y=5 & x+2y=3

Solution: let two equations be 2x+3y=5 ---------(1)

& x+2y=3 ---------(2)

By elimination method,

Multiple 2 to equation (2) & 1 to equation (1)

We get 2x+3y=5

2x+4y=6

-y=-1

Y=1

Put this y value in any one equation we get x value. Equation (2) becomes

x+2y=3

X+2(1)=3

X+2=3

X=1

11. X+5y= 9 & 4x+y= 2

Solution: let two equations be x+5y=9 ---------(1)

& 4x+y= -2---------(2)

By elimination method,

Multiple 1 to equation (2) & 4 to equation (1)

We get 4x+20y= 36

4x+y= -2

19y=38

Y=2

Put this y value in any one equation we get x value.

Equation (1) becomes x+5y=9

X+5(2)=9

X+10=9

X=1

12. 7x+3y=20 & x+y=4

Solution: let two equations be 7x+3y=20---------(1)

& x+y=4---------(2)

By elimination method,

Multiple 7 to equation (2) & 1 to equation (1)
We get 7x+3y=20

7x+7y=28
-4y=-8
Y=2

Put this y value in any one equation we get x value.
Equation (2) becomes x+y=4
X+2=4
X=4-2
X=2

13. X+4y=-5 & x+y=1

Solution: let two equations be X+4y=-5 ---------(1)

& x+y=1---------(2)

By elimination method, Subtract both

We get x+4y=-5
x+y=1
3y=-6
Y=-2

Put this y value in any one equation we get x value.
Equation (2) becomes x+y=1
X-2=1
X=1+2
X=3

14. 3x+y=6 & x-3y=-8.

Solution: let two equations be 3x+y=6 ---------(1)

& x-3y=-8---------(2)

By elimination method, Multiple 3 to equation (2) & 1 to equation (1)

We get 3x+y=6

3x-9y=-24

10y=30

Y=3

Put this y value in any one equation we get x value.

Equation (2) becomes x-3y=-8

X-3(3)=-8

X-9=-8

X=1

15. 4x-2y=6 & 2x-5y=-1.

Solution: let two equations be 4x-2y=6 ---------(1)

& 2x-5y=-1---------(2)

By elimination method,

Multiple 2 to equation (2) & 1 to equation (1)

We get 4x-2y=6

4x-10y=-2

8y=8

Y=1

Put this y value in any one equation we get x value.

Equation (2) becomes 2x-5(1)=-1

2X-5=-1

2X=4

X=2

For practice: Solve the following equations

1. X+3y=11 & 3x+2y=5. (answer x= -1 & y=4)
2. 5x+2y=12 & x-3y=-1. (answer x= 2 & y=1)
3. 3x+4y=2 & x+3y=4. (answer x= -2 & y=2)
4. X+3y=-2 & 3x+y=2. (answer x= 1 & y=-1)
5. X-2y=-9 & 7x+y=12. (answer x= 1 & y=5)
6. X+4y=-5 & 2x+5y=-4. (answer x= 3 & y=-2)
7. 3x+y= -9 & 5x+2y= -16. (answer x= -2 & y=-3)

System Of Linear Equations In Two Variables:

$a_1x+b_1y+c_1= 0$

$a_2x+b_2y+c_2= 0$

Consistent
System of equation has solution.

- Unique solution: $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ or $a_1b_2-a_2b_1=0$ (Equation represents intersecting lines)
- Infinite solution: $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$ (Equation represents coincident lines)

Inconsistent
System of equation has no solution.

$\frac{a_1}{a_2}=\frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

(Equation represents parallel disjoint lines)

PROBABILITY

I. 2 & 3 Marks questions

1. Cards marked with number 3,4,5,....50 are placed in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the selected card bears a perfect square number.

   Solution:

   Total possible outcomes when one card is drawn = 48 When the number on drawn card is a perfect square, total favorable cases are 4, 9, 16, 25, 36,49, i.e. = 6

   $$\textbf{P(perfect square number)} = \frac{\textbf{Number of total possible outcomes}}{\textbf{Number of favourable outcomes}} = \frac{6}{48} = \frac{1}{8}$$

2. A card is drawn at random from a well shuffled pack of 52 playing cards. Find theprobability of getting neither a red card nor a queen.

   Solution:

   Number of total possible outcomes when one card is drawn = 52 Number of favourable outcomes when card is neither red nor queen = 28

   $$\textbf{Required probability} = \frac{\textbf{Favourable outcomes}}{\textbf{Total possible outcomes}} = \frac{28}{52} = \frac{7}{13}$$

3. 20 tickets, on which numbers 1 to 20 are written, are mixed thoroughly and then a ticket is drawn at random out of them. Find the probability that the number on the drawn ticket is a multiple of 3 or 7.

   Solution:

   When one ticket is drawn, total possible cases are 20.

   Favourable cases when the number is a multiple of 3 or 7 are 3, 6, 9,12,15, 18, 7,14, i.e. 8 cases.

   $$\textbf{Required probability} = \frac{\textbf{Number of favourable cases}}{\textbf{Total number of possible cases}} = \frac{\mathbf{8}}{\mathbf{20}} = \frac{\mathbf{2}}{\mathbf{5}}$$

4. 4. In a single throw of a pair of different dice, what is the probability of getting A. a prime number on each dice? B. a total of 9 or 11?

   Solution:

   Total possible cases when two dice are thrown together = 6 x 6 = 36 Favourable cases when both numbers are prime are (2, 2), (2, 3), (2, 5), (3, 2), (3, 3),(3, 5), (5, 2), (5, 3), (5,5), i.e. 9 outcomes

   $$\textbf{P (a prime number on each dice)} = \frac{\textbf{Favourable cases}}{\textbf{Total cases}} = \frac{\mathbf{9}}{\mathbf{36}} = \frac{\mathbf{1}}{\mathbf{4}}$$

5. Two different dice are thrown together. Find the probability of:

1. getting a number greater than 3 on each die.
2. getting a total of 6 or 7 of the numbers on two dice

Solution:

1. When two dice are thrown together total possible outcomes = 6 X 6 = 36 Favorable outcomes when both dice have number more than 3 are (4, 4), (4, 5),(4, 6), (5, 4), (5, 5), (5, 6), (6,4), (6,5), (6, 6), i.e. 9 outcomes.

$$\textbf{P(a number greater than 3 on each due)} = \frac{\textbf{Number of favourable outcomes}}{\textbf{Number of total possible outcomes}}$$

2. Favorable outcomes when sum of the numbers appearing on the dice is 6 or 7 are, i.e. (1,5), (1, 6), (2,4), (2,5), (3,3), (3,4), (4, 2), (4, 3), (5,1), (5,2), (6,1), outcomes. P(a total of 6 or 7) =11/36

6. Three different coins are tossed together. Find the probability of getting

1. exactly two heads
2. at least two heads
3. at least two tails.

Solution:

Possible outcomes when three coins are tossed HHH, HHT, HTT, TTT, THH, TTH, HTH, THT

1. Number of exactly two heads are HHT, HTH and THH. P(exactly two heads) = 3/8
2. In case of at least two heads, outcomes are HHT, HTH, THH and HHH. P(at least two heads) = 4/8=1/2
3. In case of at least two tails, outcomes are TTH, THT, HTT and TTT. P(at least two tails) = 4/8=1/2

7. From a pack of 52 playing cards, Jacks, Queens and Kings of red colour are removed. From the remaining, a card is drawn at random. Find the probability that drawn card is:

1. a black king.
2. a card of red colour.
3. a card of black colour.

Solution:

Removed red colour cards = 3×2 = 6

Remaining cards = 52 – 6 = 46

1. Number of black kings = 2

   P(a black king) = 2/46=1/23

2. Number of red colour cards = 26

Remaining red colour cards = 26 – 6 = 20

P(a card of red colour) = 20/46=10/23

3. Number of black cards = 26

   P(a black colour card) =26/46=13/23

8. There are 100 cards in a bag on which numbers from 1 to 100 are written. A card is taken out from the bag at random. Find the probability that the number on the selected card:

   1. is divisible by 9 and is a perfect square.

   2. is a prime number greater than 80.

   Solution:

   Total possible cases = 100

   1. Favourable cases when number is a perfect square and is divisible by 9 are 9, 36 and 81.

   So, number of favourable cases = 3.

$$\textbf{Required probability} = \frac{\textbf{Number of favourable cases}}{\textbf{Total possible cases}} = \frac{3}{100}$$

   2. Favourable cases the prime numbers greater than 80 are 83, 89 and 97 So, number of favourable cases = 3

$$\textbf{Required probability} = \frac{\textbf{Number of favourable cases}}{\textbf{Total possible cases}} = \frac{3}{100}$$

9. A game consist of tossing a one-rupee coin 3 times and nothing the outcome each time. Ramesh will win the game if all the show the tosses same result, (i.e. either all three heads or all three tails) and loses the game otherwise. Find the probability that Ramesh will lose the game.

   Solution:

   When three coins are tossed together, then total outcomes are HHH, HHT, HTT, TTT, TTH, THH, HTH, THT Total possible cases = 8

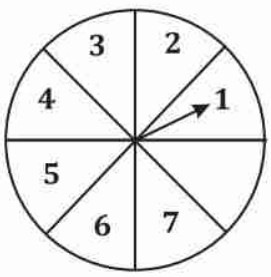
   Favourable cases to win the game are HHH or TTT, i.e. two cases.

$$\textbf{P (Ramesh will win the game)} = \frac{\textbf{Number of favourable cases}}{\textbf{Total possible cases}} = \frac{2}{8} = \frac{1}{4}$$

   Required probability = P(Ramesh will loose the game) = 1 -1/4=3/4.

10. 10. A game of chance consists of spinning an arrow on a circular board, divided into 8 equal parts, which comes to rest pointing at one of the numbers 1,2,3,..., 8 which are equally likely outcomes. What is the probability that the arrow will point at

    1. an odd number
    2. a number greater than 3
    3. a number less than 9.



Solution:

1. Total possible outcomes when the arrow points at one of the numbers are 8. Favourable outcomes when the required number is odd are 1, 3, 5, 7, i.e. 4 outcomes.

$$\therefore \textbf{P(an odd number)} = \frac{\textbf{Favourable outcomes}}{\textbf{Total possible outcomes}} = \frac{4}{8} = \frac{1}{2}$$

2. Favourable outcomes when the required number is more than 3 are 4,5,6,7, 8, i.e. 5 outcomes.

$$\textbf{P(a number is more than 3)} = \frac{\textbf{Favourable outcomes}}{\textbf{Total possible outcome}} = \frac{5}{8}$$

3. Favourable outcomes when the required number is less than 9 are 1,2,3,4,5,6,7,8 i.e 8 outcomes.

$$\textbf{P(number is less than 9)} = \frac{\textbf{Favourable outcomes}}{\textbf{Total possible outcomes}} = \frac{8}{8} = 1$$

Practice:

11. A number JC is selected at random from the numbers 1,2,3 and 4. Another number y is selected at random from the numbers 1, 4, 9 and 16. Find the probability that product of JC and y is less than 16.
12. A number x is selected at random from the numbers 1,4,9,16 and another numbery is selected at random from the numbers 1, 2, 3, 4. Find the probability that the value of xy is more than 16.
13. A letter of english alphabet is chosen at random. Determine the probability that the chosen letter is a consonant.
14. Two different dice are tossed together. Find the probability that the product of the two numbers on the top of the dice is 6.
15. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes. Find the probability that the arrow will point at any factor of 8.
16. Two different dice are rolled together. Find the probability of getting:
    1. the sum of numbers on two dice to be 5.
    2. even numbers on both dice.
17. The probability of selecting a red ball at random from a jar that contains only red, blue and orange balls is 1/4. The probability of selecting a blue ball at random from the same jar is 1/3. If the jar contains 10 orange balls, find the total number of balls in the jar.
8. A game consists of tossing a one-rupee coin three times and noting its outcome each time. Find the probability of getting
    1. three heads.
    2. at least two tails.
19. A bag contains 25 cards numbered from 1 to 25. A card is drawn at random from the bag. Find the probability that the number on the drawn card is:
    1. divisible by 3 or 5.
    2. a perfect square number.
20. Rahim tosses two different coins simultaneously. Find the probability of getting at least one tail.

REAL NUMBERS

Proving irrational number: 2 or 3 Marks

1. **Prove that $\sqrt{2}$ is an irrational number.**

Solution: Let us assume that $\sqrt{2}$ is a rational number.

So it can be expressed in the form p/q where p, q are co-prime integers and $q \neq 0$

$\sqrt{2} = p/q$

Here p and q are coprime numbers and $q \neq 0$

Solving

$\sqrt{2} = p/q$

On squaring both the sides we get,

$\Rightarrow 2 = (p/q)^2$

$\Rightarrow 2q^2 = p^2$.....(1)

$p^2/2 = q^2$

So 2 divides p and p is a multiple of 2.

$\Rightarrow p = 2m$

$\Rightarrow p^2 = 4m^2$ .....(2)

From equations (1) and (2), we get,

$2q^2 = 4m^2$

$\Rightarrow q^2 = 2m^2$

$\Rightarrow q^2$ is a multiple of 2

$\Rightarrow$ q is a multiple of 2

Hence, p, q have a common factor 2. This contradicts our assumption that they are co-primes. Therefore, p/q is not a rational number

$\sqrt{2}$ is an irrational number.

2. **Prove that $\sqrt{3}$ is an irrational number.**

Solution: Let us assume to the contrary that $\sqrt{3}$ is a rational number.

It can be expressed in the form of p/q

where p and q are co-primes and $q \neq 0$.

$\Rightarrow \sqrt{3} = p/q$

$\Rightarrow 3 = p^2/q^2$ (Squaring on both the sides)

$\Rightarrow 3q^2 = p^2$.....(1)

It means that 3 divides p^2 and also 3 divides p because each factor should appear two times for the square to exist.

So we have $p = 3r$

where r is some integer.

$\Rightarrow p^2 = 9r^2$.....(2)

from equation (1) and (2)

$\Rightarrow 3q^2 = 9r^2$

$\Rightarrow q^2 = 3r^2$

We note that the left hand side of this equation is even, while the right hand side of this equation is odd, which is a contradiction. Therefore there exists no rational number r such that $r^2=3$.

Hence the root of 3 is an irrational number.

3 **Prove that$4-5\sqrt{3}$ is an irrational number.**

Solution: Let us assume that $4 - 5\sqrt{3}$ is a rational number with p and q as co-prime integer and $q \neq 0$

$\Rightarrow 4 - 5\sqrt{3} = p / q$

$\Rightarrow 5\sqrt{3} = 4 - p / q$

$\Rightarrow \sqrt{3} = (4q - p) / 5q$

$\Rightarrow (4q - p) / 5q$ is a rational number

However, $\sqrt{3}$ is in irrational number

This leads to a contradiction that $4 - 5\sqrt{3}$ is a rational number.

4. **Prove that$4-5\sqrt{3}$ is an irrational number.**

Solution: Let assume that $5-2\sqrt{3}$ is rational.

Therefore it can be expressed in the form of $\frac{p}{q}$, where p and q are integers and $q\neq0$

Therefore we can write $5-2\sqrt{3}=\frac{p}{q}$

$2\sqrt{3}=5-\frac{p}{q}$

$\Rightarrow \sqrt{3}=\frac{5q-p}{2q}$

$\frac{5q-p}{2q}$ is a rational number as p and q are integers. This contradicts the fact that $\sqrt{3}$ is irrational,

so our assumption is incorrect. Therefore $5-2\sqrt{3}$ is irrational.

5. **Prove that $\frac{1}{\sqrt{3}}$ is an irrational number.**

Solution: let as assume to the contrary that $1/\surd3$ is rational number

$1/\surd3= P/Q$ { where p and Q are co-prime and Q not equal to 0}

$\surd3\ P = Q\ .1$

$\surd3 = Q/P$

$\surd3$ = Irrational number

Q/P =Rational

Irrational not equal to rational this is a contradiction has arisen by the wrong assumption because of our incorrect assumption that $1/\surd3$ is rational. hence, $1/\surd3$ is irrational.

For practice: Solve the following equations

6. Prove that$7\sqrt{5}$ is an irrational number.
7. Prove that $5/\sqrt{3}$ is an irrational number.
8. Prove that $2\sqrt{5}$ is an irrational number.
9. Prove that $\frac{2}{5-\sqrt{2}}$ is an irrational number.
10. Prove that $5\frac{1}{\sqrt{7}}$ is an irrational number.
11. Prove that $\frac{\sqrt{7}}{2}$ is an irrational number.
12. Prove that $3-\sqrt{2}$ is an irrational number.

HCF(Highest Common Factor) & LCM (Least Common Multiple)

Find the LCM and HCF of the following pairs of integers and verify that LCM x HCF = Product of the two numbers:

(i) 26 and 91 (ii) 510 and 92 (iii) 336 and 54

(i) By prime factorisation, we get:

$26 = 2 \times 13$

$91 = 7 \times 13$

$\therefore$ HCF of 26 and 91 = 13

and LCM of 26 and 91 $= 2 \times 7 \times 13$

$= 182$

Now, HCF x LCM $= 182 \times 13 = 2366$ ... (i)

Product of numbers = $26 \times 91 = 2366$ ... (ii)

From (i) and (ii), we get :

HCF x LCM = Product of number

Hence, verified.

(ii) By prime factorisation, we get:

$510 = 2 \times 3 \times 5 \times 17$

$92 = 2 \times 2 \times 23$

$\therefore$ HCF of 510 and 92 =2

and LCM of 510 and 92

$= 2^2 \times 3 \times 5 \times 17 \times 23 = 23460$

Now, HCF x LCM = 2 x23460 = 46920 ... (i)

Product of numbers

= 510x 92= 46920 ... (ii)

From (i) and (ii), we get :

LCM x HCF = Product of numbers

Hence, verified.

(iii) By prime factorisation, we get:

336 =2 x 2 x 2 x 2 x 3 x 7

54 =2 x 3 x 3 x 3

∴ HCF of 336 and 54 = 2 x 3 = 6

and LCM of 336 and 54 = $2^4 x 3^3 x 7$

= 3024

Now, LCM x HCF = 3024 x 6 = 18144... (i)

Product of numbers

= 336x 54 = 18144... (ii)

From (i) and (ii), we get:

LCM x HCF = Product of number

Hence, verified.

Find the product of prime factors for the following numbers

i)140 ii) 156 iii) 3825 iv)5005 v)7429

solution:

i)140

2 | 140
2 | 70
5 | 35
7

ii) 156

2 | 156
2 | 78
3 | 39
13

ii)

5 | 5005
7 | 1001
11 | 143
13

v)

17 | 7429
19 | 437
23

140= 2x2x5x7

156= 2x2x3x13

5005=5x7x11x13

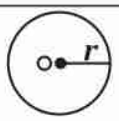
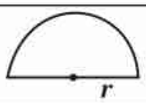
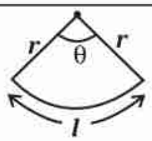
7429=17x19x23

AREAS RELATED TO CIRCLES

Areas related to circle: 2 or 3 Marks questions.

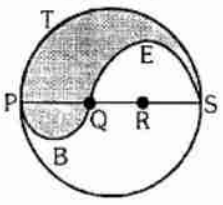
Concept to remember:

TABLE FOR AREA AND PERIMETER

Figures	Area	Perimeter	
Circle 	πr^2 *or* $\frac{\pi d^2}{4}$	$2\pi r$ *or* πd	***r : radius*** ***d : diameter*** $\pi = \frac{22}{7}$ or 3.14
Semicircle 	$\frac{\pi r^2}{2}$	$\pi r + 2r$	
Quadrant 	$\frac{\pi r^2}{4}$	$\frac{\pi r}{2} + 2r$	
Ring 	$\pi(R + r)\ (R - r)$	$2\pi R$ *(Outer circumference)* $2\pi r$ (Inner circum-ference)	***R : Radius of bigger circle*** ***r : Radius of smaller circle***
Sector 	*(i)* $\frac{\theta}{360} \times \pi r^2$ *(ii)* $\frac{1}{2} lr$	$\frac{\theta}{360} \times 2\pi r + 2r$	***r : Radius of circle*** ***l : length of arc***
Segment 	$\frac{\theta}{360} \pi r^2 - \frac{1}{2} r^2 \sin\theta$	$\frac{\pi r\theta}{180} + 2r \sin\frac{\theta}{2}$	θ ***: angle subtended by arc at centre***

Problems

1. PQRS is a diameter of a circle of radius 6cm. The lengths PQ,QR and RS are equal. Semicircles are drawn on PQ and QS as diameters, as shown in the figure. Find the perimeter (in cm) of the shaded region.



Solution:

Radius OS = 6 cm

∴ Diameter PS = 12 cm

∵ PQ, QR and RS, three parts of the diameter are equal.

∴ PQ = QR = RS = 4 cm

and QS = 2 × 4 = 8 cm

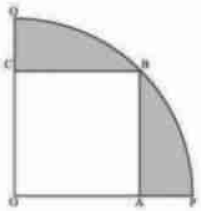
∴ Required perimeter

$= \text{arc}\,\widehat{PS} + \text{arc}\,\widehat{QS} + \text{arc}\,\widehat{PQ}$

$= \pi \times 6 + \pi \times 4 + \pi \times 2$

$= 6\pi \times 4\pi + 2\pi = 12\pi$ cm

2. In Figure, a square OABC is inscribed in a quadrant OPBQ of a circle. If OA = 20 cm, find the area of the shaded region. (Use $\pi = 3.14$).



Solution:

Diagonal of the square (OB) = $\sqrt{side^2 + side^2}$ (OB) = $\sqrt{20^2 + 20^2}$

$\therefore r = 20\sqrt{2}$ cm ...[Side of square, OA = 20 cm

$\therefore \theta = 90°$

ar(Shaded region) = ar(Quad. Sector) – ar(Square)

$= \frac{\theta}{360} \pi r^2 - (Side)^2$

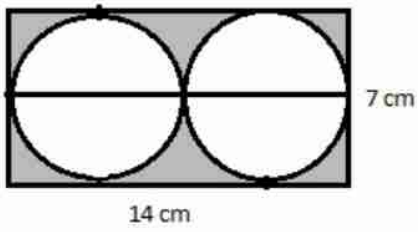
$= \frac{1}{4} \pi r^2 - (20)^2$

$= \frac{1}{4} \times 3.14 \times (20\sqrt{2})^2 - 400$

$= \frac{314}{400} \times 400 \times 2 - 400$

$= 628 - 400 = 228 \text{ cm}^2$

3. Two circular pieces of equal radii and maximum area, touching each other are cut out from a rectangular card board of dimensions 14 cm × 7 cm. Find the area of the remaining card board. [Use $\pi = 22/7$].



Here r = 72 cm, L = 14 cm, B = 7 cm

Area of the remaining card board

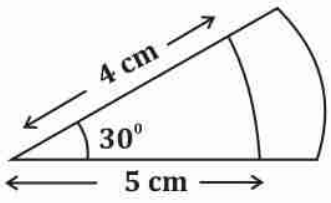
= ar(rectangle) – 2(area of circle)

$= L \times B - 2\pi r^2)$

$= 14 \times 7 - 2 \times 22/7 \times 72 \times 72$

$= 98 - 77 = 21 \text{ cm}^2$

4. In Figure , find the area of the shaded region.



Solution:

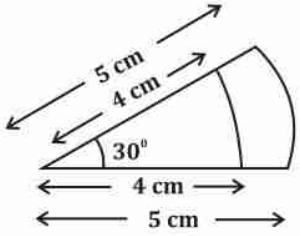
Area of shaded region

$= \frac{30}{360} (\pi \times 5^2 - \pi \times 4^2)$

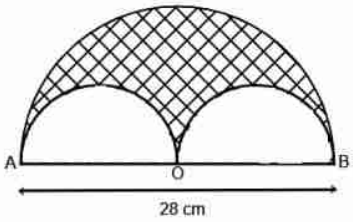
$= \frac{1}{12} \pi (25 - 16)$

$= \frac{1}{12} \times \frac{22}{7} \times 9$

$= \frac{33}{14} = 2.36$ sq. cm



5. In Figure, a semi-circle is drawn with O as centre and AB as diameter. Semi-circles are drawn with AO and A OB as diameters. If AB = 28 m, find the perimeter of the shaded region. [Use $\pi = 22/7$)



Solution:

R (Radius) = OA = $\frac{28}{2}$ = 14 cm

r (radius) = $\frac{OA}{2} = \frac{14}{2}$ = 7 cm

$\therefore$ Perimeter of the shaded region

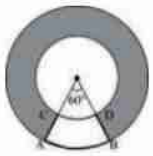
$= \pi R + \pi r + \pi r \Rightarrow \pi (R + r + r)$

$= \frac{22}{7} (14 + 7 + 7)$

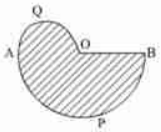
$= \frac{22}{7} \times 28 = 88$ cm

For practice:

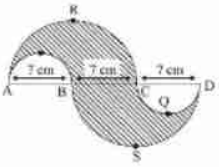
6. 6. In Figure, two concentric circles with centre O, have radii 21 cm and 42 cm. If $\angle AOB = 60°$, find the area of the shaded region. (Use $\pi = 22/7$].



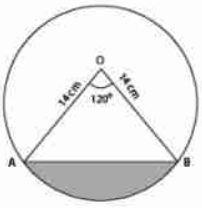
7. In Figure, APB and AQO are semi-circles, and AO = OB. If the peri-meter of al the figure is 40 cm, find the area of the shaded region. [Use $\pi = 22/7$].



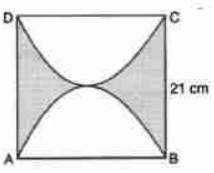
8. In Figure, APB and CCD are semi-circles of diameter 7 cm each, while ARC and a BSD are semi-circles of diameter 14 cm each. Find the perimeter of the shaded region. [Use $\pi = 227$].



9. Find the area of the minor segment of a circle of radius 14 cm, when its central angle is 60°.



10. Find the perimeter of the D shaded region in Figure, if ABCD is a square of side 14 cm and APB and CPD are semicircles. [Use $\pi = 22/7$].



POLYNOMIALS

Multiple Choice Questions

1. The degree of polynomial is $x + 2$

   (a) 2 (b) 1 (c) 3 (d) 4

2. The degree of a quadratic polynomial is

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

3. The degree of a bi-quadratic polynomial

   (a) 0 (b) 2 (c) 4 (d) 1

4. The standard form of a linear polynomial.

   (a) $ax + c$ (b) $ax^2 + c$ (c) $ax^2 + bx + c = 0$ (d) $ax^3 + bx^2 + cx + d = 0$

5. The standard form of a quadratic equation.

   (a) $ax^2 + bx + c = 0$ (b) $ax + c = 0$ (c) $ax^2 + c = 0$ (d) $ax^3 + bx + c = 0$

6. A polynomial of degree 3 is called

   (a) a linear polynomial (b) a quadratic polynomial

   (c) a cubic polynomial (d) a bi quadratic polynomial

7. The value of $p(x) = x2 - 3x - 4x = -1$

   (a) 1 (b) –4 (c) 0 (d) –3

8. The degree of the polynomial $x4 + x3$ is

   (a) 2 (b) 3 (c) 5 (d) 4

9. The number of zeroes of linear polynomial at most is

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

10. The degree of polynomial $(x+2)(x+1)$ is

    (a) 1 (b) 3 (c) 4 (d) 2

11. The degree of a zero polynomial is

(a) not defined (b) 1 (c) 2 (d) 3

12. The zeroes of the polynomial x3 –4x are

(a) 0, ± 2 (b) 0, ± 1 (c) 0, ± 3 (d) 0, 0

13. The zeroes of the polynomials, t2 – 15 are.

(a) ± 15 (b) ± 5 (c) ± 3 (d) ±3

14. Dividend is equal to.

(a) divisor × quotient + remainder (b) divisor × quotient

(c) divisor × quotient – remainder (d) divisor × quotient × remainde

Ans: (a) divisor × quotient + remainder

16. What is the co-efficient of the first term of the quotient when 2x2 + 2x +1 is divided by x + 2?

(a) 1 (b) 2 (c) 3 (d) –2

17. The zeroes of the polynomial x2 – 3x – 4 are

(a) 4, – 1 (b) 4, 1 (c) –4, 1 (d) – 4, –1

Answers

1-b	2-c	3-c	4-a	5-a	6-c	7-c
8-d	9-b	10-d	11-a	12-a	13-a	14-a
15-d	16-b	17-a				

1 Marks short answers

1. Write the degree of the polynomials $p(x)=x^2+2x-5$.
   A: The degree of the polynomial is 2
2. How many solutions does a cubic polynomial has/have?
   A: cubic polynomial has 3 solutions
3. Form a quadratic polynomial whose zeroes are $3+\sqrt{2}$ and $3-\sqrt{2}$.
   A: Sum of zeroes,
   $S = (3+\sqrt{2}) + (3-\sqrt{2}) = 6$
   Product of zeroes,
   $P = (3+\sqrt{2}) \times (3-\sqrt{2}) = (3)^2 - (\sqrt{2})^2 = 9 - 2 = 7$
   Quadratic polynomial $= x^2 - Sx + P = x^2 - 6x + 7$
4. Find a quadratic polynomial, the sum and product of whose zeroes are 0 and $-\sqrt{2}$ respectively.
   A: Quadratic polynomial is
   x^2 – (Sum of zeroes) x + (Product of zeroes)
   $= x^2 - (0)x + (-\sqrt{2})$
   $= x^2 - \sqrt{2}$
5. If the sum of zeroes of the quadratic polynomial $3x^2 - kx + 6$ is 3, then find the value of k.
   A:Here a = 3, b = -k, c = 6
   Sum of the zeroes, $(\alpha + \beta) = -b/a = 3$ .....(given)
   $\Rightarrow -(-k)/3 = 3$
   $\Rightarrow k = 9$
6. Find the zeroes of the polynomial $p(x)=x^2-3$
   A: We have $p(x)=x^2-3$, then $x^2=3 \Rightarrow x = \pm\sqrt{3}$

2 Marks short answers

1. Find the zeroes of the polynomial $p(x)=x^2-15x+50$.
   A: We have $p(x) = x^2-15x+50$
   $x^2-10x-5x+50$
   $x(x-10)-5(x-10)$
   $(x-10)=0$ or $(x-5)=0$
   $X=10$ or $x=5$

2. Verify whether (x – 2) is a factor of f (x) = $x^3 - 3x^2 + 6x - 20$ by using factor theorem.

A: Let $p(x)=x^3-3x^2+4x+4$ and

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

$\Rightarrow x-2=0 \Rightarrow x=2$

If g(x) is a factor of p(x), then p(2) should be equal to zero.

$p(2)=x^3-3x^2+4x+4$

$=23-3(2)2+4(2)+4$

$=8-12+8+4$

$=8\ p(2) \neq 0$

Therefore, $(x-2)$ is not a factor of x^3-3x^2+4x+4

3. Find the value of k of the polynomial $p(x)=2x^2-6x+k$ such that the sum of zeroes of it is equal to half of the product of their zeroes.

A: for a quadratic $ax^2 + bx + c = 0$

so we know sum of roots = -b /a

product of roots = c/a

let roots of the eq $x^2 - x - k(2x - 1) \Rightarrow x^2 - x - 2kx + k \Rightarrow x^2 - (1 - 2k)x + k$

be x, y

so given x+ y = 0

so (1 - 2k)/1 = 0

$\Rightarrow k = ½$

Finding the quadratic polynomial when sum and product of zeroes are given then verification: 3 Mark questions.

Sum of zeroes $= (\alpha+\beta)=\frac{-coefficient\ of\ x}{coefficient\ of\ x^2} = \frac{-b}{a}$

product of zeroes $= (\alpha+\beta)=\frac{-constant\ term}{coefficient\ of\ x^2} = \frac{c}{a}$

Find the quadratic polynomial whose sum and product are given below then verify it.

1. Sum is 1 and product is -3

   Solution: we have sum $(\alpha+\beta)= 1$ and product $\alpha\beta = -3$

   We know x^2-sum x + product

   x^2-1x - 3

   This is the required quadratic polynomial

   Verification: x^2-1x - 3

   a=1, b=-1 and c=-3

   sum $(\alpha+\beta)=\frac{-b}{a} = \frac{-(-1)}{1} = 1$ and -3 and product $\alpha\beta = \frac{c}{a} = \frac{-3}{1}$

   Thus the sum and product of this zeroes are same

2. Sum is -3 and product is 4

   Solution: we have sum $(\alpha+\beta)= -3$ and product $\alpha\beta = 4$

   We know x^2-sum x + product

   x^2-(-3)x + 4

   x^2+3x + 4

   This is the required quadratic polynomial

   Verification: x^2+3x + 4 a=1, b=3 and c=4

   sum $(\alpha+\beta)=\frac{-b}{a} = \frac{-3}{1} = -3$ and 4 and product $\alpha\beta = \frac{c}{a} = \frac{4}{1}$

   Thus the sum and product of this zeroes are same

3. Sum is 2 and product is -7

   Solution: we have sum $(\alpha+\beta)= 2$ and product $\alpha\beta = -7$

   We know x^2-sum x + product

   x^2-2x -7

   This is the required quadratic polynomial

   Verification: x^2-2x -7 a=1, b=-2 and c=-7

   sum $(\alpha+\beta)=\frac{-b}{a} = \frac{-(-2)}{1} = 2$ and -7 and product $\alpha\beta = \frac{c}{a} = \frac{-7}{1}$

   Thus the sum and product of this zeroes are same

4. Sum is 2 and product is -3

Solution: we have sum $(\alpha+\beta)= 2$ and product $\alpha\beta = -3$

We know x^2-sum x + product

x^2-2x-3

This is the required quadratic polynomial

Verification: x^2-2x-3 $a=1, b=-2$ and $c=-3$

sum $(\alpha+\beta)=\frac{-b}{a}$ and product $\alpha\beta=\frac{c}{a}$

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

$=2$ and -3

Thus the sum and product of this zeroes are same

5. Sum is $\frac{2}{3}$ and product is $\frac{2}{9}$

Solution: we have sum $(\alpha+\beta)=\frac{2}{3}$ and product $\alpha\beta=\frac{2}{9}$

We know x^2-sum x + product

$x^2-\frac{2}{3}x+\frac{2}{9}$

This is the required quadratic polynomial

Verification: $x^2-\frac{2}{3}x+\frac{2}{9}$ $a=1, b=\frac{2}{3}$ and $c=\frac{2}{9}$

sum $(\alpha+\beta)=\frac{-b}{a}$ and product $\alpha\beta=\frac{c}{a}$

$=\frac{-(-\frac{2}{3})}{1}$ $=\frac{\frac{2}{9}}{1}$

$=\frac{2}{3}$ and $\frac{2}{9}$

Lets try:

1. Sum -5 and product 7.
2. Sum 3 and product -8.
3. Sum $-\frac{3}{7}$ and product $\frac{5}{8}$.
4. Sum 4 and product -12.
5. Sum -2 and product $\frac{5}{3}$

CO-ORDINATE GEOMETRY

1. Distance of the point P (a, b) from the origin is

   A) $\sqrt{a^2+b^2}$ B) $\sqrt{a^2-b^2}$ C) $\sqrt{a-b}$ D) $\sqrt{a+b}$

   Ans: A) $\boldsymbol{\sqrt{a^2+b^2}}$

2. The distance of the point P (x, y) from the origin is

   A) $\sqrt{x^2-y^2}$ B) $\sqrt{x^2+y^2}$ C) x^2-y^2 D) x^2+y^2

   Ans: B) $\sqrt{x^2+y^2}$

3. Write the distance of the point (4, 3) from *x* – axis.

   Ans: 3

4. Write the co-ordinates of P if it divides the line segment joining the points A (x_1, y_1) and (x_2, y_2) internally in the ratio $m_1:m_2$,

   Ans: $P(x, y) = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$

5. Find the coordinates of the mid-point of the line joining the points (x_1, Y_1) and x_2, y^2).

   Ans: mid-point $= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

6. Find the distance between the points P (2, 3) and Q (4, 1) using distance formula.

   Here, $x_1 = 2,\ y_1 = 3,\ x_2 = 4\ and\ y_2 = 1$

   W.K.T, $PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

   $= \sqrt{(4-2)^2 + (1-3)^2}$

   $= \sqrt{(2)^2 + (-2)^2} = \sqrt{4+4} = \sqrt{8}$

   $= \sqrt{4 \times 2} = 2\sqrt{2}$ units.

7. Find the distance between origin and the point (4, 3).

Ans: Here, x = 4 and y = 3

w.k.t, Distance formula = $\sqrt{x^2 + y^2}$

$= \sqrt{4^2 + 3^2}$

$= \sqrt{16 + 9} \quad = \sqrt{25}$

$= 5$ units.

Try these

1. Find the distance between origin and the point (−8,15).
2. Find the distance between the points A(2, 6) and B(5, 10) by using distance formula.
3. Find the distance between the points (−5, 7) and (−1, 3).
4. Find the distance between the co-ordinates of the points (2, 4) and (8, 12) by using distance formula.
5. Find the distance between the points A (8,−3) and B (0,9).
6. Find the distance between the points A(3, 1) and B(6, 2) by using distance formula.
7. Find the distance between the points A (6,5) and B(4,4).

Section formula

8. Find the coordinates of the mid-point of the line segment joining the points P (3, 4) and Q(5, 6) by using 'mid-point' formula.

Sol^n: Here, $x_1 = 3$, $y_1 = 4$, $x_2 = 5$ and $y_2 = 6$

w.k.t, mid-point formula (x,y) = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= \left(\frac{3 + 5}{2}, \frac{4 + 6}{2}\right)$

$= \left(\frac{\cancel{8}^{4}}{\cancel{2}_{1}}, \frac{\cancel{10}^{5}}{\cancel{2}_{1}}\right)$

$(x, y) = (4, 5)$

Try these

1. Find the coordinates of the mid-point of the line segment joining the points (2, 3) and (4, 7).
2. Find the coordinates of mid-point of the line segment joining the points (0,−1) and (2,1).
3. Find the coordinates of mid-point of the line segment joining the points (2,1) and (0,3).
4. Find the coordinates of mid-point of the line segment joining the points (0,−1) and (0,3).

9. Find in what ratio the point P (-4, 6) divides the line segment joining the points A(-6, 10) and B (3,-8)

Sol^{n}: : Here, $x = -4, y = 6,\ x_1 = -6,\ y_1 = 10,\ x_2 = 3\ and\ y_2 = -8$

$$\text{W.K.T, } P(x,\ y) = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$$

$$(-4,\ 6) = \left(\frac{3m_1 - 6\,m_2}{m_1 + m_2}, \frac{-8m_1 + 10m_2}{m_1 + m_2}\right)$$

Equating 'x' coordinates, we get,

OR

$$-4 = \frac{3m_1 - 6\,m_2}{m_1 + m_2}$$

$$-4(m_1 + m_2) = 3m_1 - 6\,m_2$$

$$-4m_1 - 4m_2 = 3m_1 - 6\,m_2$$

$$6m_2 - 4m_2 = 3m_1 + 4m_1$$

$$2m_2 = 7m_1$$

$$\frac{m_1}{m_2} = \frac{2}{7}$$

$$\therefore\ \boldsymbol{m_1 : m_2 = 2 : 7}$$

Equating 'y' coordinates, we get, $6 = \frac{-8m_1 + 10m_2}{m_1 + m_2}$

$$6(m_1 + m_2) = -8m_1 + 10\,m_2$$

$$6m_1 + 8m_1 = 10m_2 - 6m_2$$

$$14m_1 = 4m_2$$

$$\frac{m_1}{m_2} = \frac{4^{2}}{\cancel{14}_{7}} = \frac{2}{7}$$

$$\therefore\ \boldsymbol{m_1 : m_2 = 2 : 7}$$

Try these

1. In what ratio does the point (−2,3) divide the line segment joining the point (−3,5) and (4,−9).
2. Find the ratio in which the point (-1, k) divides the line joining The points (-3, 10) and (6, -8) and also find 'k'.
3. If the point P(6, 2) divides the line segment joining A(6, 5) and B(4, y) in the ratio 3 : 1 then find the value of y ?

10. Find the coordinates of the point on the line segment joining the points A (−1, 7) and B(4,−3) which divides AB internally in the ratio 2 : 3.

Ans: Here, $x_1 = -1, y_1 = 7,\ x_2 = 4,\ y_2 = -3\ and\ m_1 : m_2 = 2 : 3$

$$\text{W.K.T, } P(x,\ y) = \left(\frac{2\text{ x }4 + 3\text{ x }-1}{2+3}, \frac{2\text{ x }-3 + 3\text{ x }7}{2+3}\right)$$

$$= \left(\frac{8-3}{5},\ \frac{-6 + 21}{5}\right)$$

$$= \left(\frac{\cancel{5}^{1}}{\cancel{5}_{1}},\ \frac{\cancel{15}^{3}}{\cancel{5}_{1}}\right)$$

$$P(x,\ y) = (\,1,\ 3\,)$$

SURFACE AREA AND VOLUME

All Formula

Cuboid :

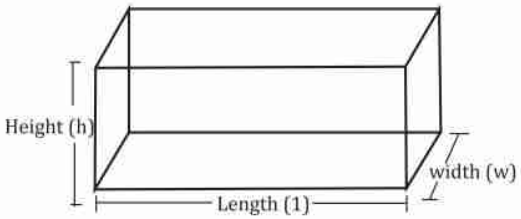
Lateral surface area = LSA = 2h (l + b)

Total surface area = TSA = 2 (lb + bh+ lh)

Volume = lbh.

Area of four walls of a room = 2h (l + b)

Diagonals of cuboid = $\sqrt{l^2 + b^2 + h^2}$



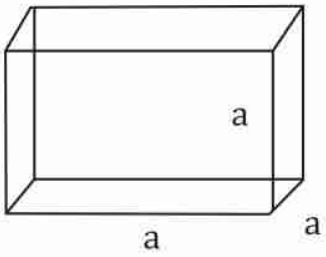
Cube :

Lateral surface area = LSA = $4a^2$

Total surface area = TSA = $6a^2$

Volume = a^3 (a is edge of cube)

Diagonal of cube = $\sqrt{3}$ a.



Cylinder :

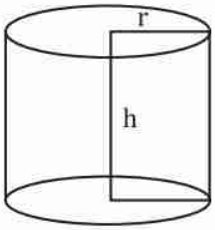
Right circular cylinder

LSA (or) CSA = $2\pi rh$

TSA = $2\pi rh + 2\pi r^2$ (or)

TSA = $2\pi r (r + h)$

Volume = $\pi r^2 h$.



Hollow cylinder.

Thickness of cylinder = R –r.

Area of cross section = $\pi (R^2 - r^2)$

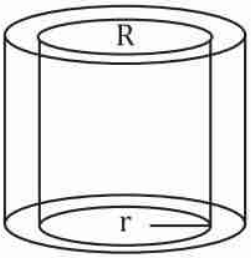
External CSA = $2\pi Rh$

Internal CSA = $2\pi rh$.

TSA = External CSA + Internal CSA +area of two ends.

$= 2\pi Rh + 2\pi rh + 2\pi (R^2 - r^2)$

Volume = $\pi (R^2 - r^2) h$.



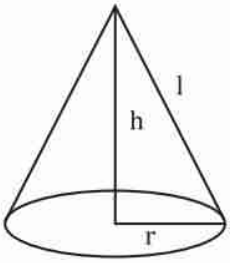
Right circular cone :

CSA (or) LSA = πrl

TSA = $\pi r (r + l)$

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

Slant height = $\sqrt{h^2 + r^2}$.

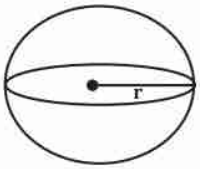


Sphere:

CSA = $4\pi r^2$

TSA = $4\pi r^2$

Volume = $\frac{4}{3}\pi r^3$.

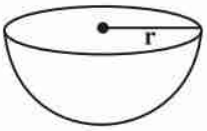


Hemisphere :

Volume = $\frac{2}{3}\pi r^3$.

CSA = $2\pi r^2$

TSA = $3\pi r$



SURFACE AREA AND VOLUME			
SOLIDS	**C S A**	**T S A**	**VOLUME**
CYLINDER 	$2\pi rh$	$2\pi r\ (r + h)$	$\pi r^2 h$.
CONE 	πrl	$\pi r\ (r + l)$	$\frac{1}{3}\ \pi\ r^2\ h$
SPHERE 	$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\ \pi r^3$
HEMISPHERE 	$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\ \pi r^3$
CUBE 	$4a^2$	$6a^2$	a^3
CUBOID 	2h (l + b)	2 (lb + bh+ lh)	lbh.

TOTAL SURFACE OF COMBINATIONS

$2\pi rh + 2\ (2\ r^2)$

$\pi rl + 2\pi r^2$

$2\ \pi rh + 2\pi r^2$

$6l^2 + 2\pi r^2 - \pi r^2$

Important points

Area of combination of solids is the sum of areas of visible faces.

- Volume of combination of solids is the sum of its constituent solids.
- A solid is converted from one shape in to another, their volumes remain same.

Multiple choice questions.

1. If the area of the circular base of a cylinder is 22 cm^2 and its height is 10 cm , then the volume of the cylinder is

   A) 2200 cm^2 B) 2200 cm^2 C) 220 cm^2 D) 220 cm^2

2. A solid formed on revolving a side of a rectangle is

   A) Cuboid B) Cylinder C) Sphere D) Rightcircular cone

3. A Constituent solids in the given combination of solid figure are

   A] cylinder , cone B] Cylinder , cone , hemisphere

   C] Cylinder , cone , sphere D] cube , cone , hemisphere

4. The ratio of areas of two spheres with the ratio of their radii 2:3 is

   A] 2:3 B] 3:2 C] 4:9 D] 16:9

5. The solid which is having only one surface is

   A] Sphere B] Hemisphere C] Cylinder D] Cone

6. A toy is in the form of a cone mounted on a hemisphere of same radius . The total surface area of the toy is

   A) $\pi rl+2\pi r^2$ B) $\pi rl+\pi r^2$ C)2 $\pi rl+\pi r^2$ D) $2\pi rl+2\pi r^2$

7. A cone made of modelling clay whose height is 24cm and radius of base 6 cm is reshaped into sphere, then the radius of sphere is

   A) 3 cm B)6cm C) 12cm D)24 cm

8. The surface area of a sphere of radius 7 cm is

   A) 154cm^2 B)308cm^2 C) 616cm^2 D) 770cm^2

9. The curved surface area of a right circular cylinder is 440 cm^2 and its radius is 7cm, its height is

   A) 3.5 cm B) 7cm C) 10cm D)14cm

10. The volume of a cylinder is 300m3 then the volume of a cone having the same radius and height as that of the cylinder is

    A) 900 m^3 B) 600 m^3 C) 150 m^3 D) 100 m^3

Key answers:

1	C	2	B	3	B	4	C	5	A
6	A	7	B	8	C	9	C	10	D

CIRCLES

MCQ Questions

1. Line segment joining the centre and a point on the circle is called
   (a) radius (b) diameter (c) Chord (d) Arc

2. Part of a circle is called
   (a) Chord (b) diameter (c) Segment (d) Arc

3. The biggest chord in a circle is called
   (a) radius (b) diameter (c) chord (d) Arc

4. The region bounded by a major arc and a chord is called
   (a) Segment (b) major segment (c) minor segment (d) major arc

5. The length of the biggest chord is 8 cm then the value of radius is
   (a) 8 cm (b) 4 cm (c) 3 cm (d) 5 cm

6. How many radius can be drawn in circle
   (a) 1 (b) 2 (c) only 3 (d) many

7. An angle in a semicircle is.
   (a) 60° (b) 30° (c) 90° (d) 180°

8. Equal chords of a circle are.
   (a) Equidistant from the centre. (b) Equal
   (c) Unequal (d) Not equidistant from the centre

9. If the length of the chord increases its perpendicular distance from the centre.
   (a) Increases (b) Decreases (c) Equal (d) Constant

10. The perpendicular distance between the biggest chord and the centre is.
    (a) zero (b) Equal (c) 9 cm (d) 10 cm

11. In a circle angles in the major segment are called.
    (a) Obtuse angles (b) Acute angles. (c) Right angles (d) Complete angle

12. In a circle angles in the minor segment are called.
    (a) Obtuse angles (b) Acute angles. (c) Right angles (d) zero angle

13. In a circle angles in the same segment are
(a) Not equal (b) Right angles (c) Equal (d) zero angle.

14. Circles having the same centre but different radii are called.
(a) Congruent circles (b) Concentric circles
(c) Equal circles (d) None of these

15. Circles having same radii but different centres are called
(a) Congruent circles (b) Concentric circles
(c) Equal circles. (d) Intersecting circles

16. The number of circles are drawn through three non-collinear points in a plane is.
(a) 1 (b) 2 (c) 3 (d) 4

17. A line which intersects a circle in two points is called
(a) A secant (b) A chord (c) An arc (d) A tangent

18. A line which intersects a circle in only one point is called
(a) A secant (b) A tangent (c) A chord (d) A diameter

19. A tangent to a circle intersects the circle is
(a) one point only (b) Two points (c) No point (d) Three points

20. A secant of a circle intersects the circle in
(a) only one point (b) Two points (c) Three points (d) No point

Key answers:

1-a	2-d	3-b	4-b	5-b	6-d	7-c	8-b	9-b	10-a
11-b	12-a	13-c	14-b	15-a	16-a	17-a	18-b	19-a	20-b

1 Mark Short Answer

1. **Define concentric circles.**

   Ans: Circles which are having same centre and different radii are called concentric circles.

2. **Define congruent circles**

   Ans: Circles which are having same radii & different centres are called congruent circles.

3. **Define sector of a circle.**

   Ans: The region bounded by an arc of a circle and its two bounding radii is called sector.

4. **Name the biggest chord of a circle.**

   Ans: Diameter

5. **Write the formula to find the perimeter of a circle.**

   Ans: Circumference = $C = 2\pi r$.

6. **Name the angle formed in a semi circle is**

   Ans: Right angle

7. **Name the angle formed in a major segment**

   Ans: Acute angle

8. **Name the angle formed in a minor segment.**

   Ans: Obuse angle

9. **Write the relationship between radius and diameter.**

   Ans: $d = 2r$ (or) $r = d/2$

10. **Angles formed in a same segment are _____**

    Ans: Equal.

3 mark questions: Theorems:

Theorem 1: Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

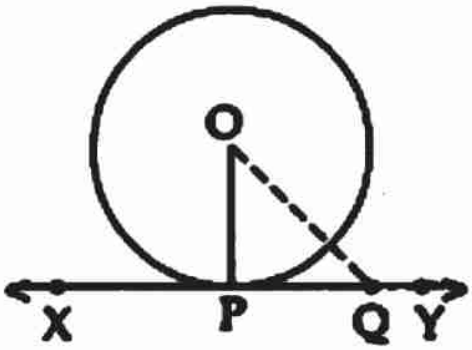
Given: XY is a tangent at point P to the circle with centre O.

To prove: OP $\perp$ XY

Construction: Take a point Q on XY other than P and join OQ

Proof: If point Q lies inside the circle, then XY will become a secant and not a tangent to the circle.

OQ > OP



This happens with every point on the line XY except the point P. OP is the shortest of all the distances of the point O to the points of XY

OP $\perp$ XY ...[Shortest side is the perpendicular]

Theorem 2: Prove that the lengths of tangents drawn from an external point to a circle are equal

Given: PT and PS are tangents from an external point P to the circle with centre O.

To prove: PT = PS

Construction: Join O to P, T and S.

Proof : In ΔOTP and ΔOSP.

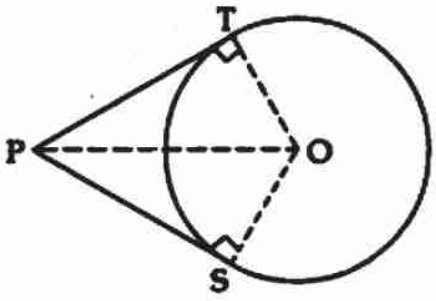
OT = OS ...[radii of the same circle]

OP = OP ...[common]

$\angle OTP = \angle OSP$ ...[each 90°]

$\Delta OTP = \Delta OSP$ ...[R.H.S.]

PT = PS ...[c.p.c.t.]



STATISTICS

3 Marks (Mean or Median or Mode) + 3 Marks

Mean

For Ungrouped:

Consider 'n' observations in ungrouped data as : $x_1, x_2, x_3, \ldots x_n$. The mean of these observations is:

$\frac{1}{2}$ x (Upper class limit + Lower class limit)

(i) Direct method:

Mean $(\bar{x}) = \dfrac{\sum x_i f_i}{\sum f_i}$

where 'f_i' is the frequency corresponding to the class mark 'x_i'

(ii) Assumed mean method:

Mean $(\bar{x}) = A + \dfrac{\sum f_i d_i}{\sum f_i}$

Where A is assumed mean and $d_i = x_i - A$

(iii) step deviation method:

$$\text{Mean } (\bar{x}) = A + \left(\frac{\sum f_i u_i}{\sum f_i}\right) h,$$

where $u_i = \dfrac{x_i - A}{h}$ and 'f_i' is the frequencey

corresponding to the class mark 'x_i'.

Median

$$\text{Median} = l + \left[\frac{\frac{n}{2} - cf}{f}\right] \times h, \text{ where}$$

Mode

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

Some problems on mean median and mode

1. Find the mean, median and mode for the following table.

C.I	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	2	3	1	4	7	3

Mean : by using direct method

C.I	Frequency	x	fx
0–10	2	5	10
10–20	3	15	45
20–30	1	25	25
30–40	4	35	140
40–50	7	45	315
50–60	3	55	165
	fi= 20		Σfx = 700

$$\text{Mean} : (\bar{x}) = \frac{\Sigma x_i f_i}{\Sigma f_i}$$

$$= \frac{700}{20}$$

$$\boxed{\text{Mean} = 35}$$

Median :

C.I	Frequency	CF
0–10	2	2
10–20	3	5
20–30	1	6
30–40	4	10
40–50	7	17
50–60	3	20
	n = 20	

$\therefore$ Median $= l + \left(\dfrac{\frac{n}{2} - cf}{f} \right) \times h$, where

Here $\frac{n}{2} = \frac{20}{2} = 10$, l=30, cf=6, h=10 and f=4

$$\text{Median} = 30 + \left[\frac{\frac{20}{2} - 6}{4} \right] \times 10$$

$$= 30 + \frac{4}{4} \times 10$$

$$= 30 + 10$$

Median =40

Mode:

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

C.I	Frequency
0–10	2
10–20	3
20–30	1
30–40	4
40–50	7
50–60	3

Here $f_0=4$, $f_1=7$ and $f_2=3$, l=40 and h=10

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

$$= 40 + \frac{7-4}{14-4-3} \times 10$$

$$= 40 + \frac{3}{7} \times 10$$

$$= 40 + 7.5$$

Mode = 47.5

2. Find the mean, median and mode for the following table.

C.I	5-15	15-25	25-35	35-45	45-55	55-65
Frequency	1	2	1	3	1	2

Mean: by using direct method

C.I	F	X	fx
5 – 15	1	10	10
15 – 25	2	20	40
25 – 35	1	30	30
35 – 45	3	40	120
45 –55	1	50	50
55 –65	2	60	120
	fi=10		$\Sigma fx = 370$

$$\text{Mean} : (\bar{x}) = \frac{\Sigma x_i f_i}{\Sigma f_i}$$

$$= \frac{370}{10}$$

Mean = 37

Median

C.I	F	CF
5–15	1	1
15–25	2	3
25–35	1	4
35–45	3	7
45–55	1	8
55–65	2	10
	n = 10	

$$\therefore \quad \text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h, \text{ where}$$

Here $\frac{n}{2} = \frac{10}{2} = 5$, l=35, cf=4, h=10 and f=3

$$\text{Median} = 35 + \left[\frac{\frac{10}{2} - 4}{3} \right] \times 10$$

$$= 35 + \frac{1}{4} \times 10$$

$$= 35 + 2.5$$

Median =37.5

Mode

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

C.I	F
5–15	1
15–25	2
25–35	1
35–45	3
45–55	1
55–65	2

Here $f_0=1$, $f_1=3$ and $f_2=1$, $l=35$ and $h=10$

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

$$= 35+\frac{3-1}{6-1-1} \times 10$$

$$= 35+\frac{2}{4} \times 10$$

$$= 35+5$$

Mode= 40

Empirical relationship between mean median and mode is

Mode = 3 median - 2 mean

For practice:

Find the mean median and mode

C.I	10-30	30-50	50-70	70-90	90-110
Frequency	2	3	7	3	5

C.I	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	12	15	13	10	4	6

C.I	0-50	50-100	100-150	150-200	200-250
Frequency	1	9	3	4	2

C.I	2-6	7-11	12-16	17-21	22-26	27-31
Frequency	1	2	1	3	1	2

TRIANGLES

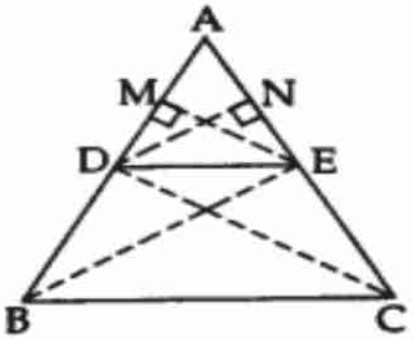
THALES THEOREM OR BASIC PROPORTIONALITY THEORY

Theorem 1:

State and prove Thales' Theorem.

Statement:

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



Given: In ΔABC, DE || BC.

To prove: $\frac{AD}{DB}=\frac{AE}{EC}$

Const.: Draw EM ⊥ AD and DN ⊥ AE. Join B to E and C to D.

Proof: In ΔADE and ΔBDE,

$\frac{ar(\Delta ADE)}{ar(\Delta BDE)}=\frac{1/2\times AD\times EM}{1/2\times DB\times EM}=\frac{AD}{DB}$ ……..(i)

[Area of Δ = 1/2 x base x corresponding altitude)

In ΔADE and ΔCDE,

$\frac{ar(\Delta ADE)}{ar(\Delta CDE)}=\frac{1/2\times AE\times DN}{1/2\times EC\times DN}=\frac{AE}{EC}$ ……..(ii)

∵ DE || BC …[Given

∴ ar(ΔBDE) = ar(ΔCDE)….. (iii) [∵ As on the same base and between the same parallel sides are equal in area

From (i), (ii) and (iii),

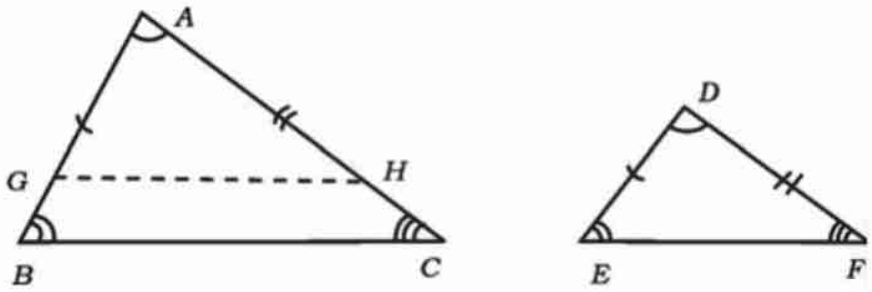
$\frac{AD}{DB}=\frac{AE}{EC}$

Hence the proof

Theorem (AA similarity Criterion)

Theorem 2:

"If two triangles are equiangular, then their corresponding sides are proportional".



Given: ∠BAC=∠EDF

∠ABC=∠DEF

To prove: $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$

Construction: Mark points G and H on the side AB and AC such that

AG=DE , AH=DF

proof: in triangle AGH and DEF

AG=DE.....by construction

AH=DF ..... by contsruction

∠GAH=∠EDF...Given

therefore,

Δ AGH ≅ ΔFED by SAS congruency thus

∠AGH=∠DEF ....by CPCT

but

∠ABC=∠DEF

∠AGH=∠ABC

thus

GH ∥ BC

Now , In triangle ABC

$\frac{AB}{AG} = \frac{BC}{GH} = \frac{CA}{HA}$

Hence ,

$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$

hence proved.

Solve Graphically

1. Solve 2x+y-6=0 & 4x-2y-4=0 graphically.

   Solution: prepare table for both the equations we get

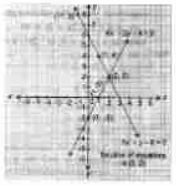
   2x+y-6=0

x	-1	1	2
y	8	4	2

&

   4x-2y-4=0

x	1	2	0
y	0	2	-2



   Hence solution of this equations are (2, 2)

2. Solve 2x+3y=8 & 3x+2y=4 graphically.

   Solutions: prepare table for both the equations we get

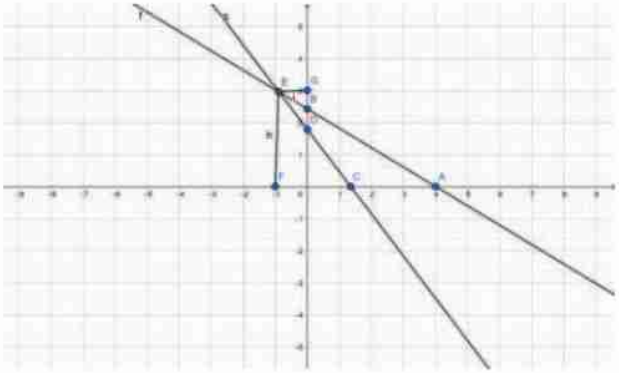
   2x+3y=8

x	0	4
y	2.6	0

&

   3x+2y=4

x	0	1.3
y	2	0



3. Solve graphically

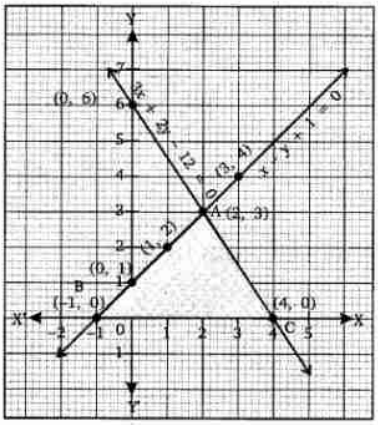
   x – y + 1 = 0 and 3x + 2y – 12 = 0.

   Solution:

x	0	1	3	–1
y	1	2	4	0

x	0	2	4
y	6	3	0

   Plotting the points on a graph paper,
   we get the shaded triangel ABC
   with vertices A(2,3), B (–1, 0) and C(4, 0).



4. Solve graphically

$5x - y = 5$ and $3x - y = 3$

$5x - y = 5$ ...(i)

$3x - y = 3$ ...(ii)

For graphical representation:

From equation (i), we get: $y = 5x - 5$

When $x = 0$, then $y = -5$ When $x = 2$, then $y = 10 - 5 = 5$

When $x = 1$, then $y = 5 - 5 = 10$

Thus, we have the following table of solutions:

x	0	2	1
y	–5	5	0

From equation (ii), we get:

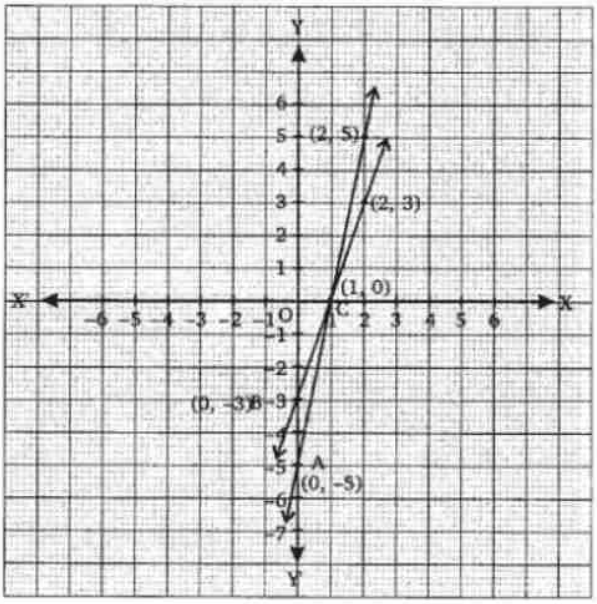
$\Rightarrow y = 3x - 3$

When $x = 0$, then $y = -3$ When $x = 2$, then $y = 6 - 3 = 3$

When $x = 1$, then $y = 3 - 3 = 0$ Thus, we have the following table of solutions:

x	0	2	1
y	–3	3	0

Plotting the points of each table of solutions, we obtain the graphs of two lines intersecting each other at a point C(1, 0).

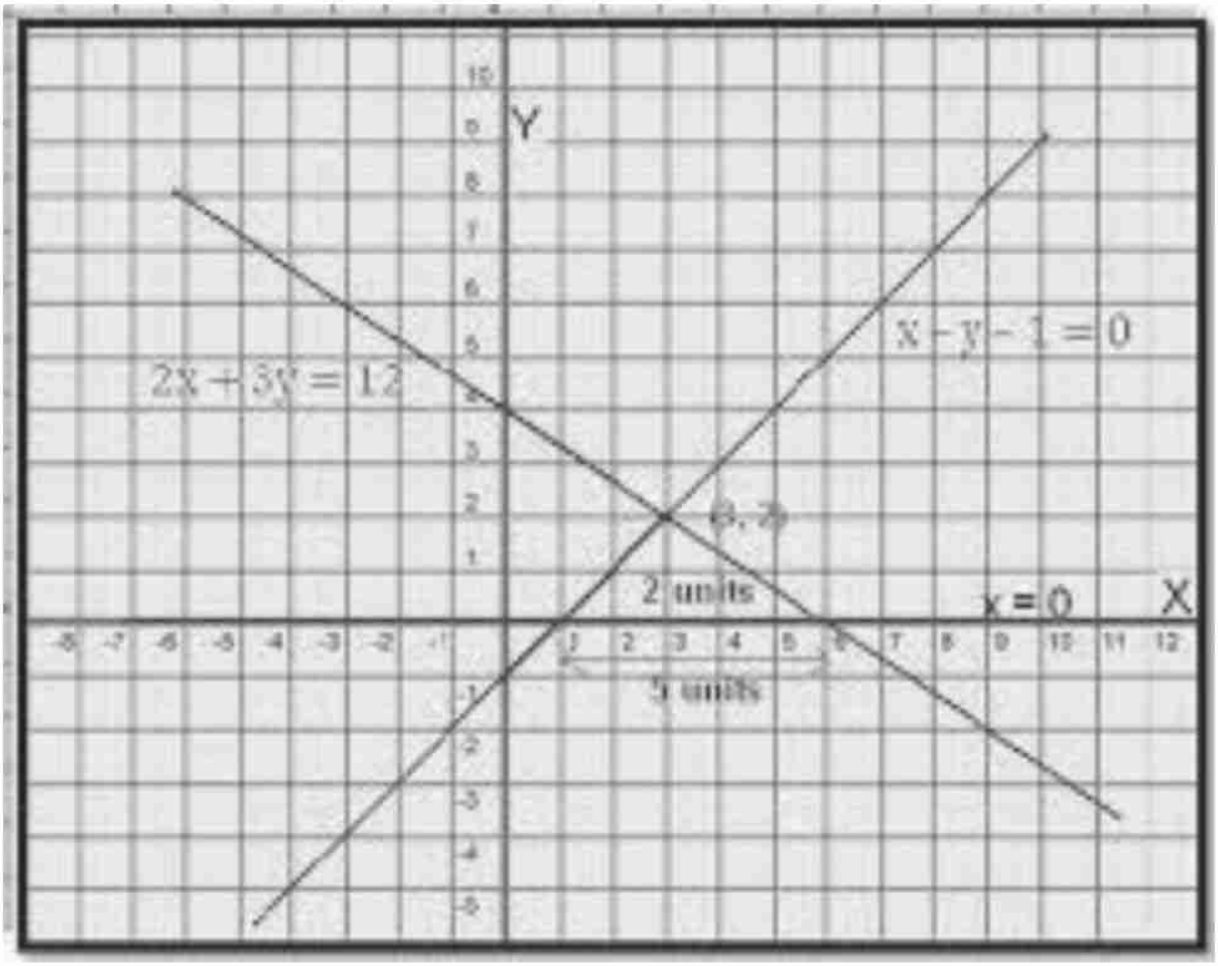


5. Solve graphically: x – y -1 = 0 and 2x + 3y = 12.

   Solution: Prepare table for above two equations we get

   x – y -1 = 0 when x= 0, y=-1 & y=0, x=1

   2x+3y=12 when x=0, y=4 & y=0, x=6



For practice: solve graphically

8. x+3y=11 & 3x+2y=3.
9. 5x+2y=12 & x-3y=-1.
10. 3x+4y=2 & x+3y=4.
11. x+3y=-2 & 3x+y=2.
12. x-2y=-9 & 7x+y=12.
13. x+4y=-5 & 2x+5y=-4.
14. 3x+y= -9 & 5x+2y= -16.

OLD QUESTION PAPER PROBLEMS

REAL NUMBERS

1 Mark Mcq

1) The rational number having a non-terminating and repeating decimal expansion in the following is **(MQP 2023)**

A) $\frac{1}{5^3}$ B) $\frac{7}{2^3X5}$ C) $\frac{5}{2X7}$ D) $\frac{1}{2^3}$

2) If *a* and *b* are any two positive integers then HCF (a, b) X LCM (a, b) is equal to **(April 2019)**

A) a + b B) a – b C) a X b D) a ÷ b

3) If the HCF of 72 and 120 is 24, then their LCM is **(June 2019)**

(A) 36 (B) 720 (C) 360 (D) 72

4) The number that represents the remainder when 19 = 6 x 3 + 1 is compared with Euclid's division lemma $a = bq + r$ is **(April 2023)**

(A) 3 (B) 6 (C) 1 (D) 19

5) The H.C.F of any two prime numbers is

A) 0 B) 2 C) 1 D)-1 **(June 2023)**

6) In the following numbers, irrational number is **(MQP-1 2020)**

A) $\sqrt{16} - \sqrt{9}$ B) $\frac{3}{4}$ C) 0.33333…….. D) $2+\sqrt{3}$

7) The product of prime factors of 120 is **(MQP-2 2020)**

A) $2^3 \times 3^2 \times 5^1$ *B*) $2^2 \times 3^1 \times 5^1$ *C*) $2^3 \times 3^1 \times 5^2$ *D*) $2^3 \times 3^1 \times 5^1$

1 Marks short answers

8) Find the HCF of 7 and 11. **(MQP 2023)**

9) Find the H.C.F. of the smallest prime number and the smallest composite number. **(JUN 2020)**

10) The LCM of 24 and 36 is 48 and hence find their HCF. **(MQP-2 2020)**

11) Write 96 as the product of prime factors. **(June 2019)**

12) Express the denominator of $\frac{23}{20}$ in the form of $2^n \times 5^m$ and state Whether the given fraction is terminating or non-terminating repeating decimal. **(April 2020)**

13) Express the denominator of $\frac{7}{80}$ in the form of $2^n \times 5^m$ **(April 2023)**

14) According to Euclid's division lemma, if 13= 4X3+r, then find the value of 'r'. **(Sep 2023)**

15) In Euclid's division lemma, if a = 3q+r, then write all the possible values of r. **(MQP-1 2020)**

16) 17 = 6 × 2 + 5 is compared with Euclid's Division lemma a = bq + r, then which number is representing the remainder ? **(April 2019)**

19) Prove that $7 + \sqrt{5}$ is an irrational number **(MQP-2 2020)**

20) Show that $5 + \sqrt{3}$ is an irrational number.

OR

Find the H.C.F. of 72 and 120 by using Euclid's division Algorithm. **(April 2023)**

21) Prove that $2 + \sqrt{3}$ is an irrational number. **OR**

Show that the rational number $\frac{29}{147}$ has non-terminating decimal expansion without performing long division. **(Sep 2021)**

3 Marks

22) Prove that $\sqrt{5}$ is an irrational number. **OR**

Find the HCF of 24 and 40 by using Euclid's division algorithm. Hence find the LCM of HCF (24, 40) and 20. **(April 2020)**

23) Prove that $\sqrt{3}$ is an irrational number. **OR**

Find L.C.M. of H.C.F. (306, 657) and 12. **(June 2020)**

POLYNOMIALS

1 Mark Mcq

1. The quadratic polynomial whose sum and product of zeroes are 4 and 5 respectively is **(MQP 2023)**

   A) P $(x) = x^2 - 4x - 5$ B) $(x) = x^2 + 4x - 5$

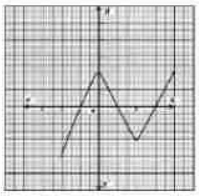
   C) P $(x) = x^2 - 5x + 4$ D) $(x) = x^2 - 4x + 5$

2. If one of the zeroes of the polynomial $p(x) = x^2-x+k$ is 2 then the value of 'k' is **(MQP-1 2020)**

   A) 2 *B*) – 2 *C*) – 6 *D*) 6

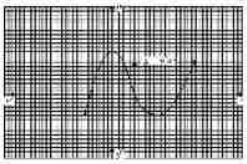
3. In the given graph of y = p (*x*), the number of zeros is **(June 2019)**

   A) 4 B) 3 C) 2 D) 7



4. The number of zeroes of the polynomial y = p (x) in the given graph is **(April 2023)**

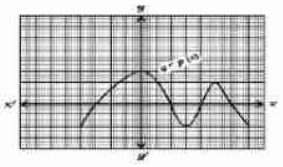
   (A) 3 (B) 2 (C) 1 (D) 4



5. In the given graph, the number of zeros of the polynomial *y = p (x) is*

   (June 2020)

   A) 3 B) 5 C) 4 D) 2



6. The degree of a linear polynomial is **(April 2020)**

   A) 0 B) 1 C) 2 D) 3

7. The degree of the polynomial $p(x) = 3x^3-8x^2+6x-3$. **(June 2023)**

   A) 3 B) 2 C) 1 D) 0

1 Mark Short Answers

8. Write the degree of the polynomial (x) = $x^2+2x^2-5x^4+6$. **(MQP 2023)**

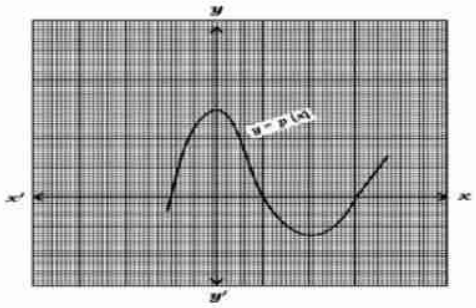
9. Write the number of zeroes of the polynomial (x) = x^3+2x^2+x+6. **(MQP-1 2020)**

10. Find the zeroes of the polynomial P (x) = x^2-3. **(April 2019)**

11. Write the degree of the polynomial P (x) = $2x^2-x^3+5$. **(April 2019)**

12. Find the degree of the polynomial (x) = x^3+2x^2-5x-6. **(June 2019)**

13. The following graph represents the polynomial y = p (x). Write the number of zeroes that p (x) has. **(April 2020)**



14. If P (x)=$2x^3+3x^2-11x+6$, then find the value of P (1). **(June 2020)**

15. Find the sum of the zeroes of the polynomial p(x)= x^2-5x+6. **(June 2023)**

2 Marks Questions

16. Sum and product of the zeroes of a quadratic polynomial (x) = ax^2+bx-4 are ¼ and -1 respectively. Then find the values of *a* and *b*. **(June 2019)**

OR

Find the quotient and remainder when (x)=$2x^2+3x+1$ is divided by g(x)=x+2.

17. Find the value of k, in which one of its zeros is −4 of the polynomial P(x)=$x^2-x-(2k+2)$. **(June 2019)**

18. Write the general form of the following

a) Linear polynomial b) Cubic polynomial **(MQP-2 2020)**

19. If α and β are the zeroes of the polynomial $p(x)=3x^2-12x+15$, find the value of $\alpha^2+\beta^2$ **(MQP-2 2020)**

20. The sum and product of the zeroes of a quadratic polynomial $P(x) = ax^2+bx+c$ are - 3 and 2 respectively. **(April 2019)**

Show that b+c = 5a

21. Find the quotient and the remainder when $P(x)=3x^{3+}x^2+2x+5$ is divided by $g(x)=2x+2x+1$ **(April 2019)**

22. If one zero of the polynomial $(x)=x^2-6+k$ is twice the other then find the value of . **(April 2020)**

OR

Find the polynomial of least degree that should be subtracted from

$p(x)=x^3-2x^2+3x+4$ so that it is exactly divisible by

$(x)=x^2-3x+1.$

23. Find the value of k of the polynomial $p(x)=x^2-6x+k,$ such that the sum of zeroes of it is equal to half of the product of their zeros. **(June 2020)**

3 Marks Questions

24. Divide the polynomial $(x)=x^3-3x^2+5x-3$ by the polynomial $(x)=x^2-2$ and find the quotient $q(x)$ and remainder $r(x)$. **(MQP 2023)**

25. If 3 and -3 are two zeroes of the polynomial $(x)=x^4+x^3-11x^2-9x+18,$ then find the remaining two zeroes of the polynomial. **(MQP-1 2020)**

26. Divide p (x) = $3x^3+x^2+2x+5$ by g (x) = x^2+2x+1 and find the quotient [z(x)] and remainder [r(x)]. **(April 2023)**

OR

Find the zeroes of the quadratic polynomial p(x) = $x^2+7x+10$, and verify the relationship between zeroes and the coefficients.

27. Divide the polynomial $(x)=x^3-3x^2+5x-3$ by the polynomial $(x)=x^2-x-1$ and find the quotient $q(x)$ and remainder $r(x)$. **(June 2023)**

PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1 Mark Mcq

1) In the pair of linear equations $a_1x+b_1y+c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, if $\frac{a1}{a2} \neq \frac{b1}{b2}$ then the **(April 2020)**

A) Equations have no solution. B) Equations have unique solution.

C) Equations have three solutions. D) Equations have infinitely many solutions.

2) If a pair of linear equations $a_1x+b_1y+c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ in two variables have unique solution then correct relation among the following is **(MQP 2021 22)**

A) $\frac{a1}{a2} \neq \frac{b1}{b2}$ B) $\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2}$ C) $\frac{a1}{a2} = \frac{b1}{b2}$ D) $\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$

3) The lines represented by $2x+3y-9=0$ and $4x+6y-18=0$ are

A) Intersecting lines B) Perpendicular lines to each other

C) Parallel lines D) Coincident lines **(April 2019)**

4) If the lines drawn to the linear equations of the type $a_1x+b_1y+c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are coincident on each other, then the correct relation among the following is **(June 2019)**

A) $\frac{a1}{a2} \neq \frac{b1}{b2}$ **B)** $\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2}$ **C)** $\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$ **D)** $\frac{a1}{a2} \neq \frac{b1}{b2} \neq \frac{c1}{c2}$

5) The lines represented by $x+2y-4=0$ and $2x+4y-12=0$ are,

A) Intersecting lines B) parallel lines

C) Coincident lines D) Perpendicular lines to each other. **(Sep 2020)**

6) The graphical representation of the pair of lines $x+2y-4=0$ and $2x+4y-12=0$ is **(April 2022)**

(A) Intersecting lines (B) parallel lines

(C) Coincident lines (D) perpendicular lines.

7) If the pair of Linear equations $x + 2y = 3$ and $2x + 4y = k$ are coincide then the value of 'k' is: **(MQP-1 2020-21)**

A) 3 B) 6 C) -3 D) -6

8) The Pair of lines $a_1x+b_1y+c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are intersecting lines then the ratio of their coefficients is : **(MQP-2 2020-21)**

A) $\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2}$ B) $\frac{a1}{a2} \neq \frac{b1}{b2} = \frac{c1}{c2}$ C) $\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$ D) $\frac{a1}{a2} \neq \frac{b1}{b2} \neq \frac{c1}{c2}$

9) The lines represented by the equations 4x+5y-10=0, and 8x+10y+20=0 are **(April 2023)**

A) Intersecting lines B) Perpendicular lines to each other
C) Coincident lines D) Parallel lines

10) Lines represented by the pair of linear equations $x - y = 8$ and $3x - 3y = 16$ are **(June 2022)**

A) Intersecting lines B) Parallel lines
C) Perpendicular lines D) Coincident lines.

1 Marks short answers

11) If a pair of linear equations represented by lines has no solutions (inconsistent) then write what kinds of lines are these. **(June 2019)**

12) If a pair of linear equations in two variables are inconsistent then write how many solutions do they have. **(MQP 2021 22)**

13) In two linear equations $a_1x+b_1y+c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, If $\frac{a1}{a2} \neq \frac{b1}{b2}$ then write the number of solutions these pair of equations have. **(Sep 2020)**

14) How many solutions do the pair of linear equations has, if the lines represented by them are coincident? **(MQP 2023)**

15) If the pair of linear equations in two variables are inconsistent, then how many solutions do they have? **(April 2022)**

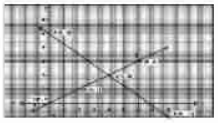
16) How many solutions have the pair of linear equations $2x+3y-9=0$ and $4x + 6y - 18 = 0$? **(Model paper-1 2020-21)**

17) In equation $x + y=7$, if $x =3$, then find the value of y ? **(MQP-2 2020-21)**

18) If the pair of lines represented by the linear equations $x + 2y - 4=0$ and $ax + by - 12=0$ are coincident lines, then find the values of 'a' and 'b'. **(April 2023)**

19) How many solutions do the pair of linear equations: $x + 2y - 4 = 0$ and $3x+2y - 5=0$ have? **(June 2023)**

20) The given graph represents a pair of linear equations in two variables. Write how many solutions these pair of equations have **(April 2019)**



2 Marks short answers

21) Find the solution for the pair of linear equations :
$x + y = 14$, $x - y = 4$. **(June 2019)**

22) Solve the following pair of linear equations :
$2x + 3y = 11$, $2x - 4y = -24$, **(Sep 2020)**

23) Solve
$2x + y = 11$, and $x + y = 8$. **(April 2020)**

24) Solve the following pair of linear equations by any suitable method:
$x + y = 5$, $2x - 3y = 5$. **(April 2019)**

25) Solve the pair of linear equations by elimination method.

$2x + y = 3$, $4x - y = 9$ **OR**
Show that the lines represented by linear pair of equations $2x + 3y = 1$ and $5x + 6y = 2$ are intersecting lines by comparing their co-efficient.
(MQP 2021 22)

26) Solve the given pair of linear equations.
$2x+y=7$, $x-y=2$ **(MQP 2023)**

27) Solve the given pair of linear equations by Elimination method.
$2x + y = 8$, $x - y = 1$. **(April 2022)**

28) Solve
$3x + y = 15$, $2x - y = 5$. **(MQP-1 2020-21)**

29) Solve by using elimination method? **(MQP-2 2020-21)**
$x + y = 8$, $2x - y = 7$

30) Solve the given pair of linear equations:
$3x + y = 12$, $x + y = 6$. **(April 2023)**

31) Find the solution for the given pair of linear equations
$x + y = 10$ and $2x - y = 8$. **(June 2023)**

32) Solve the given equations by elimination method :
$2x + 3y = 7$ and $2x + y = 5$ **(June 2022)**

4 Marks long answers

33) Find the solution of the pair of linear equations by graphical method.
$x + y = 7, 3x - y = 1.$ **(April 2020)**

34) Find the solution of the following pair of linear equations by the graphical method.
$2x + y = 8, \quad x + y = 5.$ **(Sep 2020)**

35) Find the solution of the following pairs of linear equation by the graphical method
$2x + y = 6, \quad 2x - y = 2.$ **(April 2019)**

36) Solve graphically
$2x + y = 8, \quad x - y = 1.$ **(June 2019)**

37) Find the solution of the given pair of linear equations by graphical method.
$x+y = 5, \quad x-y = 1.$ **(MQP 2021 22)**

38) Find the solution of the given pair of linear equations by graphical method
$x+y = 5, \quad 2x+y = 7$ **(MQP 2023)**

39) Solve the pair of linear equations graphically :
$x-2y = 0$ and $3x + 4y = 20$ **(MQP-1 2020)**

40) Find the solution of the given pair of linear equations by graphical method:
$x + 2y = 6, \quad x + y = 5.$ **(April 2022)**

41) Find the solution of the following pair of linear equations by the graphical method.
$2x + y = 10, \quad x + y = 6.$ **(MQP-1 2020-21)**

42) Find the Solution to the given pair of linear equations by graphical method.
$x + y = 5, \quad 2x - y = 4.$ **(MQP-2 2020-21)**

43) Find the Solution to the given pair of linear equations by graphical method.
$2x + y = 8$ and $x - y = 1.$ **(April 2023)**

44) Find the Solution to the given pair of linear equations by graphical method:
$x + y = 5, \quad 2x + y = 6.$ **(June 2023)**

45) Find the solution of the pair of linear equations by graphical method :
$2x - y = 7, \quad x - y = 2$ **(June 2022)**

QUADRATIC EQUATIONS

Mcq 1 Marks Questions

- In a class, "the number of boys *(x)* is 5 more than the number of girls *(y)*." The linear equation from of this statement is **(MQP 2023)**

  A) $x - y = 5$ B) $x = 5y$ C) $y - x = 5$ D) $x + y = 5$

- If the roots of the quadratic equation $x^2+6x+k=0$ are equal, then the value of '*k*' is

  A) 9 *B*) – 9 *C*) 8 *D*) 5 **(MQP-1 2021)**

3. The standard form of quadratic equation is **(MQP-2 2021)**

   A) $ax^2 - bx + c = 0$ *B*)$ax^2 + bx + c = 0$ *C*) $ax^2 - bx - c = 0$ *D*) $ax^2 + bx - c = 0$

4. "The product of two consecutive positive integers is 30." This can be expressed algebraically as **(April 2019)**

   A) $(x + 2) = 30$ B) $(x - 2) = 30$ C) $(x - 3) = 30$ D) $(x + 1) = 30$

5. The standard form of $2x^2=x-7$ is **(April 2022)**

   A) $2x^2 - x = -7$ B) $2x^2 + x - 7 = 0$ C) $2x^2 - x + 7 = 0$ D) $2x^2 + x + 7 = 0$

6. $x(x+1) = 5$ is a

   A) linear equation B) quadratic equation

   C) Cubic equation D) quadratic polynomial. **(June 2022)**

1 Marks short answers

7. Find the discriminant of the quadratic equation $x^2 - 2x - 3 = 0$. **(MQP 2023)**

8. Write the standard form of quadratic equation. **(June 2022) (April 2022)**

9. Express the equation $x\ (\ 2 + x\ ) = 3$ in the standard form ofa quadratic equation. **(April 2023)**

10. Find the discriminant of the quadratic equation $2x^2 - 4x + 3 = 0$. **(April 2023)**

11. Write $\frac{x+1}{2} = \frac{1}{x}$ in the standard form of a quadratic equation. **(April 2020)**

12. If one root of the equation $(x+ 4)\ (x + 3) = 0$ is -4, then find the another root of the equation. **(June 2020)**

13. Find the roots of the quadratic equation $x^2 + 7x + 12=0$ **(MQP-2 2020)**

14. Find the value of the discriminant of the quadratic equation $2x^2 - 4x+3=0$. **(April 2019)**

15. Write the 'discriminant' of the quadratic equation $ax^2 + bx + c = 0$ **(MQP-1 2020)**

16. Write the standard form of a quadratic equation. **(MQP-1 2021)**

2 Marks questions

17. Find the roots of the quadratic equation $x^2 + 4x + 5 = 0$ using the 'quadratic formula'.

OR

Find the roots of the quadratic equation $2x^2+x-4 = 0$ by the method of completing the square. **(MQP 2023)**

18. Find the roots of the equation $6x^2 + 7x - 10 = 0$ **(MQP -1 2020)**

19. Solve by using quadratic formula : $x^2 - 3x + 1 = 0$. **(MQP -1 2021)**

20. Find the discriminant of the quadratic equation $2x^2-6x+3 = 0$ and hence write the nature of roots.

OR

Prove that the quadratic equation $x^2+ax-4 = 0$ has distinct, real roots. **(MQP-1 2021)**

21. Find the discriminant of the equation $3x^2 - 5x + 2 = 0$ and hence write the nature of its roots. **(MQP-2 2021)**

22. Solve $x^2 - 2x + 3 = 0$ by using the quadratic formula.

OR

Solve by factorisation $x^2 + 5x + 6 = 0$. **(MQP-2 2021)**

23. Solve $2x^2 - 5x + 3 = 0$ by using formula. **(April 2019)**

24. The length of a rectangular field is 3 times its breadth. If the area of the field is 147 sq. m, find its length and breadth. **(April 2019)**

25. Solve the equation $x^2-3x-10=0$ by using formula. **(June 2019)**

26. Find the discriminant of the equation $2x^2-5x+3=0$ and hence write the nature of the roots. **(April 2020)**

27. Find the value of the discriminant of the quadratic equation $2x^2-5x-1=0$, and hence write the nature of its roots. **(June 2020)**

28. Find the roots $x^2+5x+2=0$, by using quadratic formula. **(June 2022)**

29. Find the value of the discriminant and hence write the nature of roots of the quadratic equation $x^2+4x+4=0$, **(June 2022)**

30. Find the value of the discriminant of the equation $4x^2-12x+9=0$ and hence write the nature of the roots. **(June 2022)**

31. Find the roots of the equation $x^2-3x+1=0$ using quadratic formula. **(June 2022)**

32. Find the roots of the equation $2x^2-5x+3=0$ by using 'quadratic formula'. **OR**

    Find the roots of the equation $5x^2-6x-2=0$ by the method of completing the square. **(April 2023)**

33. Find the value of the discriminate of the quadratic equation $x^2-5x+1=0$, **(June 2023)**

34. Find the roots of the equation $x^2-3x+1=0$ by using 'quadratic formula'. **OR**

    Find the roots of the equation $x^2-3x-10 = 0$ by the method of completing the square. **(June 2023)**

3 Marks Questions

35. The diagonal of a rectangular playground is 60 *m* more than the smaller side of the rectangle. If the longer side is 30 *m* more than the smaller side, find the sides of the playground.

OR

The altitude of a triangle is 6 *cm* more than its base. If its area is 108 cm^2, find the base and height of the triangle. **(June 2020)**

36. The diagonal of a rectangular field is 60*m* more than its shorter side. If the longer side is 30 *m* more than the shorter side, then find the sides of the field.

OR

In a right angled triangle, the length of the hypotenuse is 13*cm.* Among the remaining two sides, the length of one side is 7 *cm* more than the other side. Find the sides of the triangle. **(June 2022)**

37. The area and perimeter of a rectangular field are 60 m^2 and 32m respectively. Find the length and breadth of the field. **OR**

38. A bus travels 360 km distance with uniform speed. If the speed of the bus had been 10km/h more, it would have taken 3 hours less for the same journey. Find the speed of the bus. **(MQP 2023)**

39. The sum of the areas of two squares is 640m^2. If the difference between their perimeters is 64 m, then find sides of the square **OR**

If the roots of the equation $(a^2+b^2)^2+2(bc-ad)+c^2+d^2=0$ are equal, show that $ac+bd=0$ **(MQP-1 2020)**

40. Find the two consecutive positive integers, whose sum of their squares is 365. **(MQP-2 2020)**

41. A man drives his car with uniform speed from place A to the place B which is 150 km away. Again he returns to the place A by increasing the speed of the car 10$km/hour$ and there by reaches 30 minutes earlier than the time taken in his forward journey. Find the total by him in forward and return journey. **OR**

A, B and P are the three non-collinear points on a plane. The distance between the point A and P is 2 m more than the distance between the points B and P. If the distance between points A and B is 10 m and AB is the longest side of the triangle ABC. Is ABC is a right angled or not, Justify your answer using the discriminate of quadratic equation and also find the measure of and BP **(MQP-2 2020).**

42. The sum of two natural numbers is 9 and the sum of their reciprocals is 9/20. Find the numbers. **OR**

The perimeter and area of a rectangular playground are 80m and 384m^2 respectively. Find the length and breadth of the playground. **(MQP-1 2021)**

43. A train travels 480km at a uniform speed. If the speed had been 10km/h more, it would have taken 4 hours less for the same journey, find the speed of the train. **OR**

Find two consecutive odd positive integers, sum of whose squares is 290.

(MQP-2 2021)

44. To save fuel, to avoid air pollution and for good health two persons A and B ride bicycle for a distance of 12km to reach their office. As the cycling speed of B is 2 km/h more than that of A, B takes 30 minutes less than that of A to reach the office. Find the time taken by A and B to reach the office. **(April 2020)**

45. The sum of the reciprocals of Rehman's age (in years) 3 years ago and his age 5 years from now is 1/3. Find his present age. **OR**

A train travels 360*km* at a uniform speed. If the speed had been 5*km/h* more, it would have taken 1 hour less for the same journey. Find the speed of the train.

(June 2022)

46. The distance between two cities '*A*' and '*B*' is 132 km. Flyovers are built to avoid the traffic in the intermediate towns between these cities. Because of this, the average speed of a car travelling in this route through flyovers increases by 11 km/h and hence, the car takes 1 hour less time to travel the same distance than earlier. Find the current average speed of the car. **(April 2023)**

4 Marks questions

47. The ages of two students' *A* and *B* are 19 years and 15 years respectively. Find how many years it will take so that the product of their ages becomes equal to 480.

OR

If the quadratic equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ has equal roots, then show that $2b = a + c$ **(June 2019)**

48. The denominator of a fraction is 3 more than its numerator. If the sum of this fraction and its reciprocal is then find the fraction.

OR

A student bought some books for Rs. 60. Had he bought 5 more books for the same amount each book would have cost him Rs. 1 less. Find the number of books bought by him. **(June 2023)**

OlD QUESTION PAPER PROBLEMS

ARITHMETIC PROGRESSION

1 MCQ :

1) If the *n*th term of an arithmetic progression is a_n = 3n +1, then the 4*th* term of the progression is

A) 10 B) 13 C) 11 D) 12 **(MQP 2023)**

2) The common difference of the Arithmetic progression 8, 5, 2, – 1, ...

A) –3 B) –2 C) 3 D) 8 **(April 2022)**

3) In an arithmetic progression 5, 3, 1, – 1, ... the common difference is

A) –2 B) 2 C) –3 D) 5 **(June 2022)**

4) The n*th* term of an arithmetic progression is a_n = 4n + 5 then the 3rd term is

A) 5 B) 9 C) 13 D) 17 **(MQP-1, 2021 22)**

5) 2, x, 14 are in Arithmetic progression, then the value of x is

A) 28 B) 16 C) 7 D) 8 **(MQP-2, 2021 22)**

6) The n^{th} term of an Arithmetic Progression is an = 4 n + 5. Then its 5^{th} term is

A) 20 B) 14 C) 25 D)24 **(April 2021)**

7) Which of the following is an Arithmetic Progression ?

A) 1, –1, –2, ... B) 1, 5, 9, ... **(April 2021)**

C) 2, –2, 2, –2, ... D) 1, 2, 4, 8, ...

8) The 11^{th} term of the Arithmetic Progression – 3, – 1, 1, 3, ... is

A)23 B) – 23 C)– 17 D)17 **(April 2021)**

9) The sum of the first 10 terms of an Arithmetic Progression is 155 and the sum of the first 9 terms of the same progression is 126 then the 10th term of the progression is

A)27 B)126 C)29 D)25 **(April 2021)**

10) The 10^{th} term of an A.P. 5,9,13, ... is **(MQP-1. 2020)**

A) 36 B) 31 C) 41 D) 21

11) If the n^{th} term of an sequence is $4n^2$–1, then the 8^{th} term is

A) 32 B) 31 C) 256 D) 255 **(MQP-2. 2020)**

12) In an arithmetic progression, if $a_n = 2n + 1$, then the common difference of the given progression is **(April 2020)**

A) 0 B) 1 C) 2 D) 3

13) If the n^{th} term of an arithmetic progression $a_n = 3n - 2$, then its 9^{th} term is

A) – 25 B) 5 C) –5 D) 25 **(June 2020)**

14) If the *nth* term of an arithmetic progression $a_n = 24 - 3n$, then its 2*nd* tern is

A) 18 B) 15 C) 0 D) 2 **(April 2019)**

15) If the $n - th$ term of an arithmetic progression is $5n + 3$, then 3*rd* term of the arithmetic progression is **(June 2019)**

A) 11 B) 18 C) 12 D) 13

16) The 10th term of an A.P.5,9,13,.....is **(MQP-1 2019-20)**

A) 36 B) 31 C) 41 D) 21

17) If the nth term of an arithmetic progression is $4n^2 - 1$, then the 8th term is

A) 32 B) 31 C) 256 D) 255 **(MQP-2. 2019-20)**

18) Sum of all the first 'n' terms of even natural number is **(April 2018)**

A) n (n + 1) B) n (n + 2) C) n^2 D) $2n^2$

19) If the *nth* term of an arithmetic progression is $a_n = 3n + 1$, then the 4*th* term of the progression is

A) 10 B) 13 C) 11 D) 12 **(Model Paper 2023)**

1 Marks Very Short Answers

20) If x, 7, 10,..... are in Arithmetic progression then write the value of x. **(June 2023)**

21) In an Arithmetic progression if '*a*' is the first term and '*d*' is the common difference, then write its n^{th} term. **(April 2022)**

22) What is an Arithmetic progression? **(June 2022)**

23) In an arithmetic progression if $a_n = 3n - 2$, then find the second term of the progression. **(MQP-2 . 2021)**

24) If the first term and the common difference of an A.P. are 6 and 5 respectively, find its 3^{rd} term. **(MQP-1 . 2020)**

25) Write the formula to find the sum of the first *n* terms of an Arithmetic progression, whose first term is *a* and the last term is. **(June 2019)**

2 Marks Short Answers

26) Find the 21^{th} term of the arithmetic progression 5, 9, 13,... by using formula.

(June 2023)

27) Find the 20^{th} term of the arithmetic progression 4, 7, 10,... by using formula.

(April 2023)

28) Find the 30*th* term of the arithmetic progression 7, 11, 15..... using formula.

(MQP 2023)

29) Find the 30*th* term of the arithmetic progression 5, 8, 11, ... by using formula. **(April 2022)**

30) Find the sum of first 20 terms of the Arithmetic progression 10, 15, 20, ... by using formula **(April 2022)**

OR

Find the sum of first 20 positive integers using formula. **(April 2022)**

31) Find the 12*th* term of the Arithmetic progression 2, 5, 8, ... using formula.

(June 2022)

32) Find the sum of arithmetic progression 7, 11, 15, ... to 16 terms using formula. **(June 2022)**

OR

Find how many terms of the arithmetic progression 3, 6, 9, ... must be added to get the sum 165. **(June 2022)**

33) Find the 25*th* term of an arithmetic progression 2, 6, 10, 14, ...

(MQP-1 2021 22)

34) Find the sum of first 20 terms of the arithmetic progression 3, 8, 13, ... using the formula. **(MQP-1. 2021 22)**

OR

Find the sum of the first 30 positive integers divisible by 6. **(MQP-1 .2021 22)**

35) Find the 10th term of arithmetic progression 2, 7, 12.....using the formula.

(MQP-2. 2021 22)

36) Find the sum of 2 + 5 + 8+ ..... to 20 terms using the formula.

(MQP-2. 2021 22)

37) Find the sum of $5 + 8 + 11 + \ldots$ to 10 terms using the formula. **(April 2020)**

38) Find the sum of first 20 terms of arithmetic series $5 + 10 + 15 + \ldots$ using suitable formula. **(June 2020)**

39) Find the sum of first twenty terms of Arithmetic series $2 + 7 + 12 + \ldots$ Using suitable formula. **(April 2019)**

40) Find the sum of all two digit natural numbers which are divisible by 5. **(June 2018)**

41) Find the sum of the series $3 + 7 + 11 + \ldots\ldots$ to 10 terms. **(April 2018)**

42) Find the 30*th* term of the arithmetic progression 7, 11, 15..... using formula **(Model paper 2023)**

3 Marks Long Answers

43) Find the sum of the first 40 positive integers divisible by 6. **OR**

The second and third terms of an Arithmetic progression are 14 and 18 respectively. Find the sum of the first 26 terms of Arithmetic progression using the formula. **(June 2023)**

44) The sum of first 9 terms of an Arithmetic progression is 144 and its 9*th* term is 28. Then find the first term and common difference of the Arithmetic progression. **(April 2022)**

45) Find the arithmetic progression whose third term is 16 and its 7*th* term exceeds the 5*th* term by 12. **(June 2022)**

46) The sum of first n terms of an arithmetic progression is 210 and sum of its first $(n-1)$ terms is 171. If the first term 3, then write the arithmetic progression. **(MQP-2. 2020)**

47) The seventh term of an Arithmetic progression is four times its second term and twelfth term is 2 more than three times of its fourth term. Find the progression.

OR

A line segment is divided into four parts forming an Arithmetic progression. The sum of the length of 3*rd* and 4*th* parts is three times the sum of the lengths of first two parts. If the length of fourth part is 14 cm, find the total length of the line segment. **(APRIL 2019)**

4 Marks Long Answers:

48) The sum of 2^{nd} and 4^{th} terms of an arithmetic progression is 54 and the sum of its first 11 terms is 693. Find the arithmetic progression. Which term of this progression is 132 more than its 54^{th} term?

OR

The first and the last terms of an arithmetic progression are 3 and 253 respectively. If the 20^{th} term of the progression is 98, then find the arithmetic progression. Also find the sum of the last 10 terms of this progression. **(April 2023)**

49) The sum of first 'n' terms of an arithmetic progression is 222 and sum of its first $(n-1)$ terms is 187. If the first term of the progression is 2, then find the arithmetic progression.

OR

The last term of an arithmetic progression consisting of 12 terms is 37. If the sum of the two middle terms of the progression is 41, then find the arithmetic progression and also the sum of the terms of the arithmetic progression. **(MQP 2023)**

OR

50) An arithmetic progression consists of 37 terms. The sum of the first 3 terms of it is 12 and the sum of is last 3 terms is 318, and then find the first and last terms of the progression.

OR

The sum of the first 7 terms of an arithmetic progression is 140 and the sum of the next 7 terms of the same progression is 385 then find the arithmetic progression. **(MQP-1. 2021 22)**

51. The third term of an arithmetic progression is 8 and its ninth term exceeds three times the third term by 2 find the sum of the first 19 terms.

OR

In an arithmetic progression the sum of the three terms is 24, and their product is 480, write three terms of the arithmetic progression. **(MQP-2. 2021 22)**

52. The 9^{th}, q^{th} and rth term of an A.P. area, b and c respectively.

Prove that $(q-r)+(r-p)+(p-q)=0$

OR

The sum of the first three terms of an A.P is 33. If the product of the first term and third term exceeds the 2^{nd} term by 29, then find the A.P. **(MQP-1. 2020)**

53. If the sum of first 8 terms of arithmetic progression is 136 and that of first 15 terms is 465, then find the sum first of 25 terms. **OR**

The sum of the 5^{th} and 9^{th} terms of an arithmetic progression is 40 and the sum of the 8^{th} and 14^{th} term is 64. Find the sum of first 20 terms. **(MQP-2. 2020)**

54. There are five terms is an Arithmetic Progression. The sum of these terms is 55, and the fourth term is five more than the sum of the first two terms. Find the terms of the Arithmetic progression.

OR

In an Arithmetic Progression sixth term is one more than twice the third term. The sum of the fourth and fifth terms is five times the second term. Find the tenth term of the Arithmetic Progression. **(April 2020)**

55. The sum of the fourth and eighth terms of an arithmetic progression is 24 and the sum of the sixth and tenth terms is 44. Find the first three terms of the Arithmetic progression. **(June 2019)**

56. The sum of first 'n' terms of an arithmetic progression is 222 and sum of its first (n-1) terms is 187. If the first term of the progression is 2, then find the arithmetic progression.

OR

57. The last term of an arithmetic progression consisting of 12 terms is 37. If the sum of the two middle terms of the progression is 41, then find the arithmetic progression and also the sum of the terms of the arithmetic progression. **(Model paper 2023)**

5 Marks Long Answers:

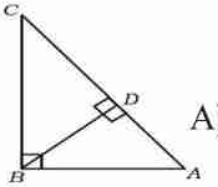
58. The common differences of two different arithmetic progressions are equal. The first term of the first progression is 3 more than the first term of second progression. If the 7th term of first progression is 28 and 8*th* term of second progression is 29, then find the both different arithmetic progressions.

(June 2020)

TRIANGLES

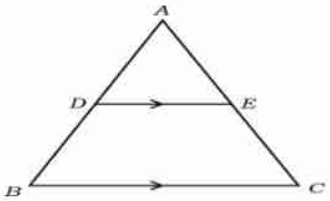
1 Mark MCQ

1) In Δ ABC, $\angle ABC = 90°$, BD $\perp$ AC if BD = 8 cm and AD = 4 cm then the length of CD is **(June 2018)**



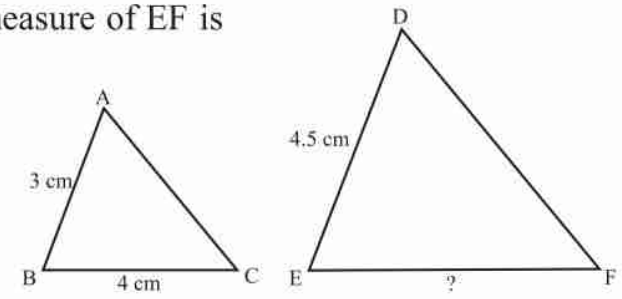
A) 16 cm B) 4 cm C) 64 cm D) 12 cm

2) In the figure, if $DE \parallel BC$, then the correct relation among the following is **(MCQ-1. April / June 2023)**



(A) $\frac{AD}{AB} = \frac{AE}{EC}$ (B) $\frac{AD}{DB} = \frac{EC}{AE}$ (C) $\frac{AD}{DB} = \frac{AE}{Ec}$ (D) $\frac{DB}{AD} = \frac{AE}{EC}$

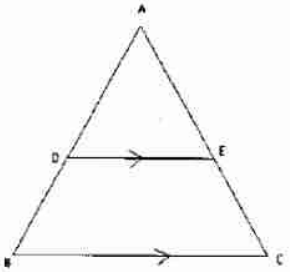
3) In the figure $ABC \sim DEF$. If $AB = 3cm, BC = 4cm$ and $DE = 4.5cm$, then the measure of EF is **(MCQ 2023)**



A) 8 cm B) 6 cm

C) 7 cm D) 6.5 cm

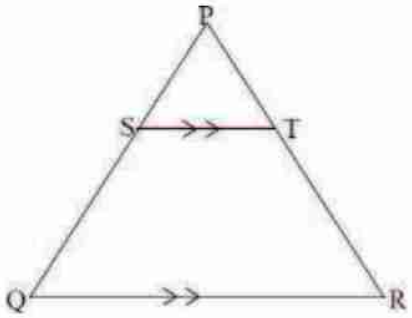
4) In the given $\Delta ABC, DE \parallel BC, DE = 5\ cm, BC = 8\ cm$ and $AD = 3.5\ cm$, then the length of AB is **(MQP-1.2020)**



A) 5.6cm B) 4.8cm

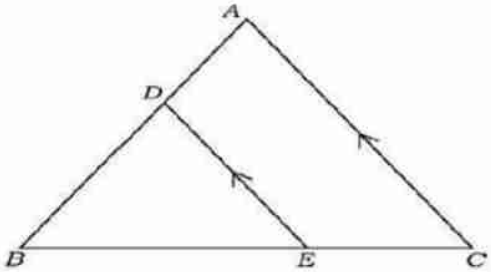
C) 5.2cm D) 6.4cm

5) In the given figure $ST||QR$ then $\frac{PS}{SQ}$ is equal to **(MQP-2.2021)**



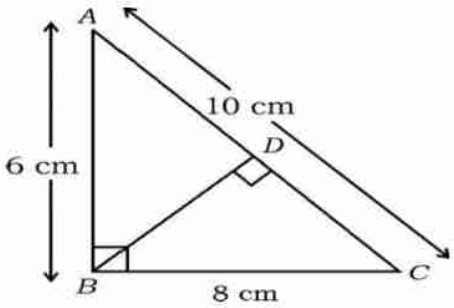
A) $\frac{PT}{TR}$ B) $\frac{PR}{TS}$ C) $\frac{QT}{TR}$ D) $\frac{PS}{TR}$

6) In the $\Delta\ ABC$, if $DE \parallel AC$, then the correct relation is **(June 2020)**



A) $\frac{BD}{AB} = \frac{AC}{DE} = \frac{BC}{BE}$ B) $\frac{AB}{BD} = \frac{AC}{DE} = \frac{BE}{EC}$ C) $\frac{BD}{AB} = \frac{DE}{AC} = \frac{BE}{BC}$ D) $\frac{AD}{BD} = \frac{DE}{AC} = \frac{BE}{EC}$

7) In the Δ ABC, $\angle \boldsymbol{B} = 90°$ and BD $\perp$ AC. If AB=6cm, BC=8cm, then the length of CD is **(April 2021)**



A) 10cm B) 6.4cm
C) 4.8cm D) 3.6cm

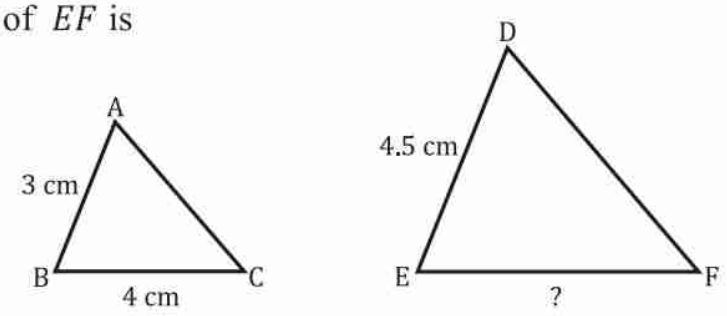
8) Δ ABC ~ Δ PQR. Area of Δ ABC = 64 cm^2 and the area of ΔPQR=100 cm^2. If AB = 8 cm then the length of PQ is **(April 2021)**

A) 12 B) 15 C) 10 D) 8

9) Which of the following pair of triangles are always similar **(MQP 2021-22)**

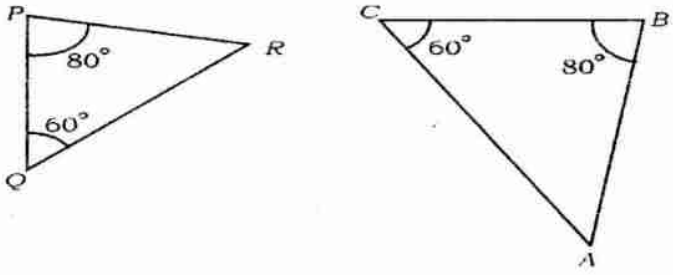
A) Two isosceles triangles B) Two scalene triangles
C) Equilateral triangles D) right angle triangles

10) In the figure $ABC \sim DEF$. If $AB = 3cm, BC = 4cm$ and $DE = 4.5cm$, then the measure of EF is **(Model paper 2023)**



1 Mark Short Answers

11) In the figure, name the side of triangle PQR which corresponding to the side AB of triangle ABC. **(June 2023)**



12) If the ratio of the areas of two similar triangles is 64 : 121, then find the ratio of their corresponding sides. **(MQP 2023)**

13) Write the statement of "Basic Proportionality" theorem (Thales theorem).

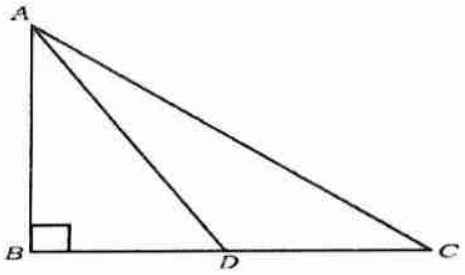
(April 2022)(June 2022)(MQP1.2020/21)

14) State " Pythagoras's theorem " **(MQP 2021 22)**

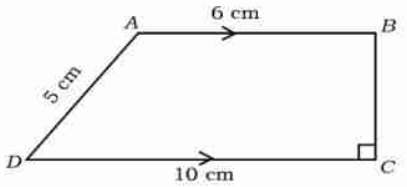
15) $\Delta ABC \sim \Delta PQR$. Area of the ΔABC is 64 cm^2 and the area of the ΔPQR is 100 cm^2. If AB = 8 cm, then find the length of PQ **(April 2023)**

2 Marks short answers

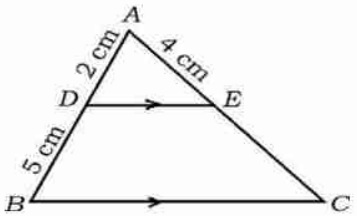
16) In triangle ABC, $\angle ABC = 90^0$ and D is the midpoint of BC prove that $AC^2 = AD^2 + 3CD^2$. **(June 2023)**



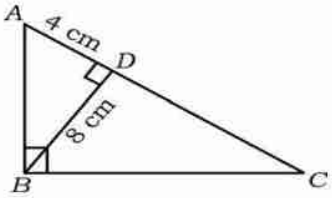
17) In the given figure, ABCD is a trapezium in which AB || DC, and BC ⊥ DC. If AB=6 cm, CD = 10 cm and AD = 5 cm, then find the distance between the parallel lines. **(April 2023)**



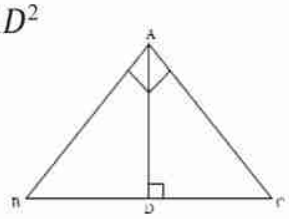
18) In Δ ABC, DE || BC, if AD = 2 cm, DB = 5 cm and AE = 4 cm, find AC. **(June 2018)**



19) In Δ ABC, $\angle \boldsymbol{ABC} = 90°$, $BD \perp AC$. If $BD = 8$ cm, $AD = 4$ cm, find CD and AB. **(April 2018)**



20) In the figure, ABC is a right angled triangle and $\angle BAC = 90°$. If $AD \perp BC$ and $BD = DC$ then prove that $BC^2 = 4AD^2$ **(MQP 2023)**

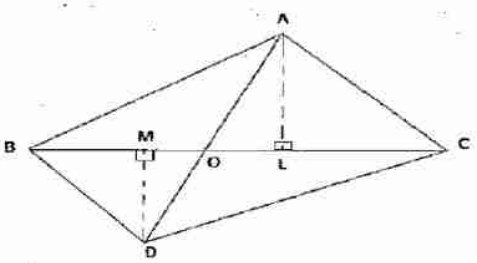


21) The perimeters of two similar are 25 cm and 15 cm. If one side of the first triangle is 9 cm, find the corresponding side of the second triangle.

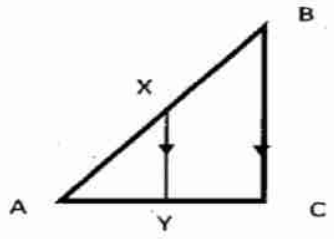
OR

22) In the given figure ΔABC and ΔDBC are on the same base BC. AD intersects BC at 'O'. If AL ⊥ BC and DM ⊥ BC, **(MQP-1.2020)**

Prove $\dfrac{\text{area of } \Delta ABC}{\text{area of } \Delta DBC} = \dfrac{AO}{DO}$

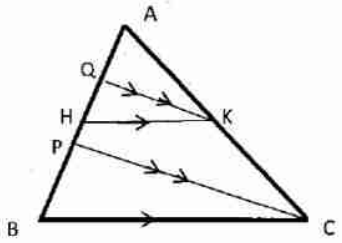


23) In the adjoining figure XY || BC, AX=p-3 BX=2p-2 and $\frac{AY}{CY} = \frac{1}{4}$, Find the value of p.

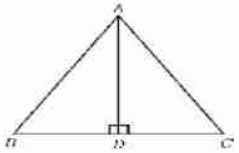


OR

In the figure, PC || QK and BC || HK. If AQ=6cm, QH = 4 cm, HP=5 cm, and KC=18 cm, then find the lengths of AK and AB. **(MQP-2.2020)**

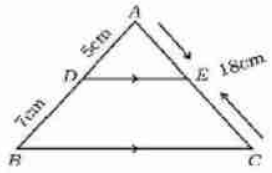


24) In ΔABC, $AD \perp BC$ and $AD^2 = BD \times CD$. Prove that $AB^2 + AC^2 = (BD + CD)^2$. **(April 2019)**



25) In ΔABC, DE || BC. IF AD = 5 cm, BD = 7 cm and AC= 18 cm, find the length of AE.

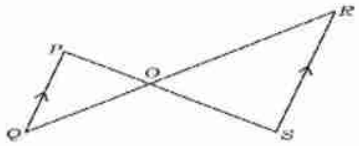
(April 2019)



OR

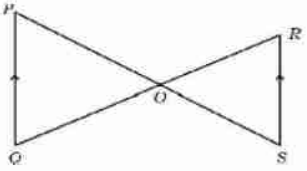
In the given figure if PQ || RS, prove that $\Delta POQ \sim \Delta SOR$.

(April 2019)



26) In the figure, if $\Delta POQ \sim \Delta SOR$ and PQ : RS = 1 : 2, Then OP : OS is

(April 2020)



A) 1 : 2 B) 2 : 1

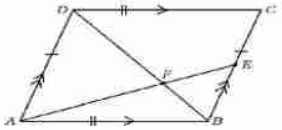
C) 3 : 1 D) 1 : 3

27) $\Delta ABC \sim \Delta DEF$ and their areas are 64 cm^2 and 100 cm^2 respectively. If EF=12 cm then find the measure of BC. **OR**

A vertical pole of height 6 m casts a shadow 4 m long on the ground, and at the sametime a tower on the same ground casts a shadow 28 m long. Find the height of the tower. **(June 2019)**

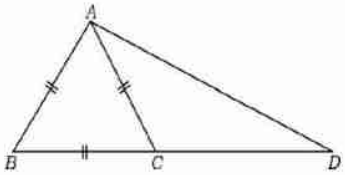
28) The diagonal BD of parallelogram ABCD intersects AE at F as shown in the figure. If E is any point on BC, then prove that **(June 2019)**

$DF \times EF = FB \times FA$



3 Marks long answers

29) In the ΔABD, C is a point on BD such that BC : CD=1:2, and Δ ABC is an equilateral triangle. Then prove that $AD^2 = 7\,AC^2$ **(June 2020)**



4 Marks Long Answers

30) State and prove 'Basic Proportionality Theorem' (Thales Theorem). **(MQP 2023)**

31) Prove that "the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides". **(June 2023) (MQP-1.2020) (April 2019)**

32) Prove that "In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides". **(June 2019)**

5 Marks Long Answers

33) Prove that "the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides". **(MQP-1.2021)(April 2022)**

34) Prove that "if in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar". **(June 2022)(4-M.April 2023)**

35) State and prove "the converse of the Pythagoras theorem" **(MQP-2.2020)**

36) State and Prove "Basic proportionality theorem" **(MQP-2.2020)(MQP-2.2021)**

37) State and prove Pythagoras theorem. **(5-M.APRIL 2020)**

CO-ORDINATE GEOMETRY

1 Mark Mcq

1. The distance between the origin and co-ordinates of a point (x, y) is

   (A) $x^2 + y^2$ (B)$\sqrt{x^2 + y^2}$ (C) $x^2 - y^2$ (D) $\sqrt{x^2 - y^2}$ **(June 2019)**

2. The distance of the point P (x, y) from the origin is

   (A) $x^2 + y^2$ (B)$\sqrt{x^2 + y^2}$ (C) $x^2 - y^2$ (D) $\sqrt{x^2 - y^2}$ **(April 2022)**

3. The of a point p(x, y) from the origin is **(MQP 2021)**

   A) $\sqrt{\boldsymbol{p^2 - q^2}}$ B) $\sqrt{\boldsymbol{p^2 + q^2}}$ C) $\sqrt{p + q}$ (D) $\sqrt{p - q}$

4. The distance of the co-ordinate p(4, 3) from the x- axis is :

   A) 2 unit B) 3 unit C) 4 unit D) 5 unit. **(MQP-1 2020)**

5. Distance of the point P (a, b) from the origin is **(June 2022)**

   (A) $\sqrt{a^2 + b^2}$ unit (B)$\sqrt{a^2 - b^2}$ units

   (C)$\sqrt{a + b}$ units (D) $\sqrt{a - b}$ units

6. The distance of the point (– 8, 3) from the x-axis is

   (A) – 8 units (B) 3 units (C) – 3 units (D) 8 units **(April 2023)**

7. The coordinates of the mid-point of the line segment joining the points (3,4) and (5,6) is **(June 2023)**

   A) (-4,-5) B) (4, 5) C) (4,-5) D (-4, 5)

8. The coordinates of the midpoint of the line segment joining the points (4, 3) and (2, 1) is **(MQP 2023)**

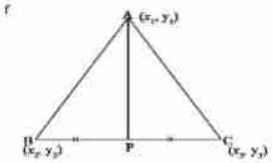
   A) (2, 3) B) (2, 2) C) (3, 2) D) (1, 1)

1 Marks short answers

9. Find the coordinates of the mid-point of the line joining the points (x_1, y_1) and (x_2, y_2) **(MQP-1 2020) (April 2020)**

10. Write the distance of the point (4, 3) from *x*-axis. **(April 2022)**

In the given figure "P" is a midpoint of BC, write the formula to find the co- ordinate of P. **(MQP-2 2020)**



11. Write the coordinates of point P if it divides the line segment joining the points A (x_1, y_1) and B (x_2, y_2) internally in the ratio $m_1:m_2$ **(June 2022)**

12. Write the formula to find the area of a triangle PQR having vertices $P(x_1, y_1)$, $Q(x_2, y_2)$ and $R(x_3, y_3)$. **(June 2023)**

13. Find the coordinates of the mid-point of the line segment joining the points (6, 3) and (4, 7). **(April 2023)**

14. Find the distance between the origin and the point (3, 4). **(MQP 2023)**

2 Marks questions

15. Find the distance between the points (3, 1) and (6, 2) using distance formula. **(MQP 2021)**

16. Find the co-ordinates of point which divides the line segment joining the points *A* (4, – 3) and *B* (8, 5) in the ratio 3: 1 internally. **(April 2019)**

17. Find the distance between the points (2, 3) and (4, 1). **(June 2019)**

18. Find the area of a triangle whose vertices are (1, – 1), (– 4, 6) and (– 3,– 5). **(June 2019)**

19. Find the distance between the points (– 5, 7) and (– 1, 3). **OR**

Find the coordinates of the point which divides the line joining the points (1, 6) and (4, 3) in the ratio 1: 2. **(April 2020)**

20. The points *A* (1, 1), *B* (3, 2) and *C* (5, 3) cannot be the vertices of the triangle *ABC*. Justify. **(April 2020)**

21. Find the coordinates of the mid-point of the line segment joining the points (2, 3) and (4, 7). **(Sep 2020)**

22. Find the distance between the points A (2, 6) and B (5, 10) by using distance formula.
OR
Find the coordinates of the mid-point of the line segment joining the points P (3, 4) and Q (5, 6) by using 'mid-point' formula. **(April 2022)**

23. Find the distance between the co-ordinate of the points A (2, 3) and B (10, -3). **(MQP-1 2020)**

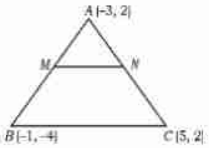
24. Find the distance between the points A (3, 6) and B (5, 7) using distance formula. **OR**
Find the co-ordinates of the point P, which divides the line joining A (0, 0) and B (5, 10) in the ratio of 2:3. **(MQP-2 2020)**

25. Find the distance between the points P (2, 3) and Q (4, 1) using distance formula. **OR**
Find in what ratio the point P (– 4, 6) divides the line segment joining the points A (– 6, 10) and B (3, – 8). **(June 2022)**

3 Marks questions

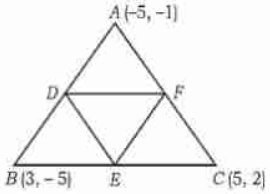
26. Find the area of a triangle ABC whose vertices are A (2, 2), B (3, 4) and C (–1, 3). **OR**
Find the coordinates of the points of "trisection" of the line joining the Points (6,–2) and (10, 8). **(MQP 2021)**

27. The vertices of a Δ ABC are A (– 3, 2), B (– 1, – 4) and C (5, 2). If M and N are the mid-points of AB and AC respectively, show that 2 MN = BC.



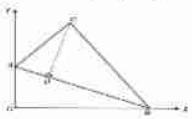
OR

The vertices of a Δ ABC are A (– 5, – 1), B (3, – 5), C (5, 2). Show that the area of the Δ ABC is four times the area of the triangle formed by joining the mid-points of the sides of the triangle ABC. **(April 2019)**



28. Find the coordinates of the point on the line segment joining the points A (– 1, 7) and B (4, – 3) which divides AB internally in the ratio 2 : 3. **OR** Find the area of triangle PQR with vertices P (0, 4), Q (3, 0) and R (3, 5). **(April 2022)**

29. In the figure, the vertices of Δ ABC are A (0,6), B (8, 0) and C (5, 8). If CD ⊥ AB, then find the length of altitude CD.

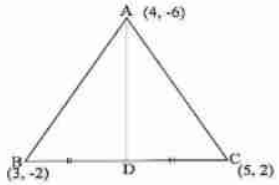


OR

Show that the triangle whose vertices are A (8, – 4), B (9, 5) and C (0, 4) is an isosceles triangle. **(Sep 2020)**

30. Find the value of 'k'. If the co-ordinates of the points A(2, -2), B (-4, 2) and C (-7, k) are collinear. **(MQP-1 2020)**

31. Find the area of triangle ABC, whose co-ordinates are A (4, -6), B (3, -2) and C (5, 2) then find the length of the median AD? **(MQP-2 2020)**



32. Find the value of 'k' if the points P (2, 3), Q (4, k) and R (6,– 3) are collinear. **OR**

    A circle whose Centre is at P (2,3) passes through the points A (4, 3) and B (x, 5). Then find the value of 'x'. **(June 2022)**

33. Find the ratio in which the line segment joining the points A (– 6, 10) and B (3, – 8) is divided by the point (– 4, 6). **OR**

    Find the area of a triangle whose vertices are A (1, – 1), B (– 4, 6) and C (– 3, – 5) **(April 2023)**

34. The points A, B and C are collinear. If A (1, 0) B (4, 4) and AC=8cm, then find the coordinates of point C. **(June 2023)**

35. Find the coordinates of the point which divides the line segment joining the points (–1, 7) and (4, –3) in the ratio 2: 3. **OR**

    Find the area of the triangle whose vertices are (7, –2), (5, 1) and (1, 4) **(MQP 2023)**

36. Find the ratio in which the point (2, x) divides the line joining the points (-2, 2) and (3,7) internally, Also find the value of x. **OR**

    Find the area of the triangle formed by joining the mid-points of the sides of the triangle whose vertices are (2, 2), (4,4) and C(2,6) **(MQP-1 2020)**

37. Find the perimeter of the triangle whose vertices are (–2,1), (4,6) and (6,3) **OR**

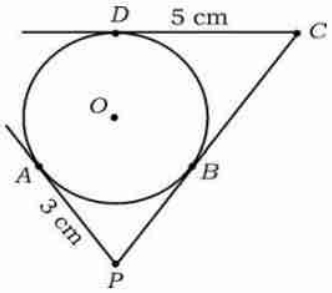
    Three consecutive vertices of a parallelogram are (1, 2), (2,3) and C (8,5). Find the fourth vertex. **(MQP-2 2020)**

CIRCLES

1 Mark Mcq

1) A straight line which passes through two points on a circle is
(A) a chord (B) a secant (C) a tangent (D) a radius. **(April 2019)**

2) In the following figure, *PA*, *PC* and *CD* are tangents drawn to a circle of Centre *O*.
If *AP* = 3 cm, *CD* = 5 cm, then the length of *PC* is **(June 2019)**



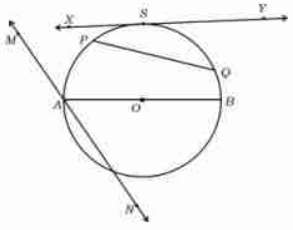
(A) 3 cm (B) 5 cm
(C) 8 cm (D) 2 cm

3) A straight line passing through a point on a circle is. **(April 2020)**
(A) a tangent (B) a secant (C) a radius (D) a transversal.

4) In a circle, the angle between the tangent and the radius at the point of contact is
(A) 30° (B) 60° (C) 90° (D) 180° **(April 2022)**

5) A straight line intersecting a circle at two points is called :
A) A secant B) a tangent C) radius D) a normal. **(MQP-1 2020 21)**

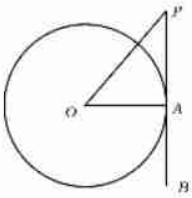
6) In the figure, secant is **(June 2022)**



(A) AB (B) PQ
(C) XY (D) MN.

7) In the given figure, PB is a tangent drawn at the point A to the circle with centre 'O'. If AOP = 45^0, then the measure of ∟ OPA is

(April 2023)

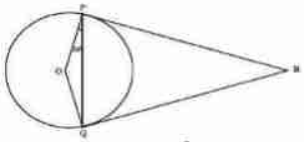


(A) 45^0 (B) 90°
(C) 35° (D) 65°

8) The distance between two parallel tangents in a circle of radius 3 cm is

A) 3 cm B) 1.5 cm C) 9 cm D) 6 cm **(June 2023)**

9) In the figure, BP and BQ are the tangents to the circle with Centre 'O'. If $\angle OPQ=20^0$, then the measure of $\angle PBQ$ is

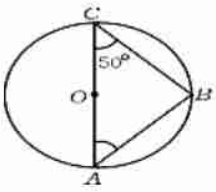


A) 40^0 B) 160^0 C) 140^0 D) 20^0 **(MQP 2023)**

1 Marks short answers

10) In the figure, *O* is the Centre of a circle, *AC* is a diameter.

If $\llcorner ACB = 50°$, then find the measure of $\llcorner BAC$. **(Sep 2020)**



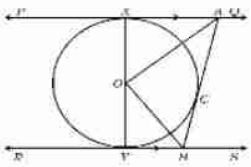
11) Write the measure of angle formed between tangent to a circle and radius drawn from the centre of the circle to the point of contact of the tangent. **(MQP-2 2020 21)**

3 Marks long answers

12) Prove that "the lengths of tangents drawn from an external point to a circle are equal".

(Sup 2020) (April 2019)(April 2020) (JUNE 2019) (MQP 2021 22/2023) (April 2022) (MQP-2 2020 21) (JUNE 2022) (April 2023) OR

In the given figure PQ and RS are two parallel tangents to a circle with Centre O and another tangent AB with point of contact C intersecting PQ at A and RS at B. Prove that angle AOB = 90^0. **(April 2019)**



OR

Two concentric circles of radii 5 cm and 3 cm are drawn. Find the length of the chord of the larger circle which touches the smaller circle. **(June 2019)**

13) Prove that "the tangent at any point of a circle is perpendicular to the radius through the point of contact". **(MQP-1 2020 21) (June 2023)**

AREAS RELATED TO CIRCLES

1 Mark Mcq

1) If the area of a circle is 49π sq. units then its perimeter is **(April 2019)**

(A) 7π units (B) 9π units (C) 14 π units (D) 49 π units

2) Length of an arc of a sector of a circle of radius r and angle θ is **(April 2020)**

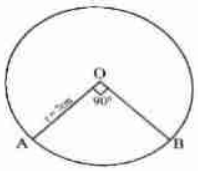
(A) $\frac{\theta}{360} X r^2$ (B) $\frac{\theta}{360} X 2 \pi r^2$ (C) $\frac{\theta}{360} X 2 \pi r$ (D) $\frac{\theta}{360} X 2 \pi r^2$

1 Mark short answers

3) Write the formula to find area of a sector of a circle, if angle at the centre is 'θ' degrees. **(June 2019)**

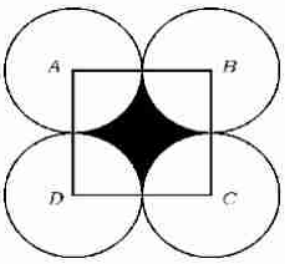
4) If the perimeter and area of a circle are numerically equal, then find the radius of the circle. **(MQP-2 2020)**

5) In the figure find the length of an arc AB of a circlecenter 'O' if $\angle AOB = 90^0$ **(MQP 2021 22)**

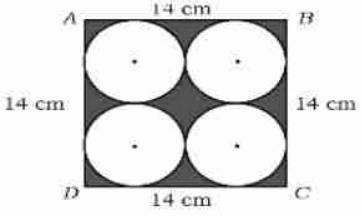


2 Mark short answers

6) In the figure, *ABCD* is a square of side 14 cm. *A, B, C* and *D* are the centers of four congruent circles such that each circle touches externally two of the remaining three circles. Find the area of the shaded region. **(April 2019)**

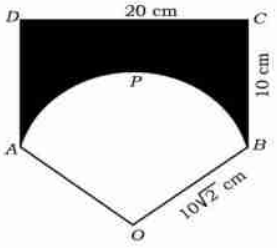


7) ABCD is a square of side 14 cm. Four congruent circles are drawn in the square as shown in the figure. Calculate the area of the shaded region. [Circles touch each other externally and also sides of the square] **(June 2019)**



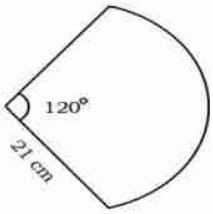
3 Mark long answers

8) *ABCD* is a rectangle of length 20 cm and breadth 10 cm. *OAPB* is a sector of a circle of radius $10\sqrt{2}$ cm. Calculate the area of the shaded region. [Take $\pi = 3.14$]

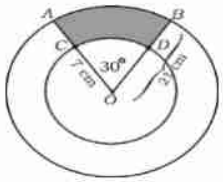


OR

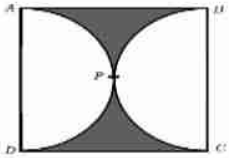
A hand fan is made up of cloth fixed in between the metallic wires. It is in the shape of a sector of a circle of radius 21 cm and of angle 120° as shown in the figure. Calculate the area of the cloth used and also find the total length of the metallic wire required to make such a fan. **(April 2020)**



9) *AB* and *CD* are the arcs of two concentric circles with centre *O* of radius 21 cm and 7 cm respectively. If $\angle AOB = 30°$ as shown in the figure, find the area of the shaded region.

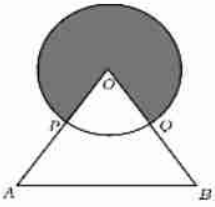


In the figure, *ABCD* is a square, and two semicircles touch each other externally at *P*. The length of each semicircular arc is equal to 11 cm. Find the area of the shaded region. **(Sep 2020)**



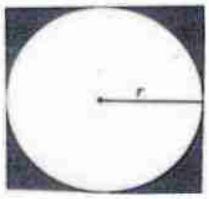
10) In the given figure, 'O' is the centre of a circle and OAB is an equilateral triangle. P and Q are the mid-points of OA and OB respectively.

If the area of OAB is $36\sqrt{3}$ cm^2, then find the area of the shaded region. **April 2023)**



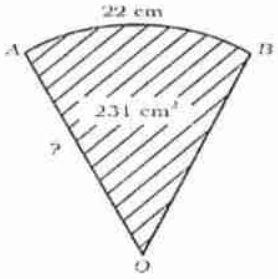
11) The sides of a square touch the circle of radius 'r' as shown in the figure.

If the area of the shaded region is 42 cm^2 then find the radius of the circle.



OR

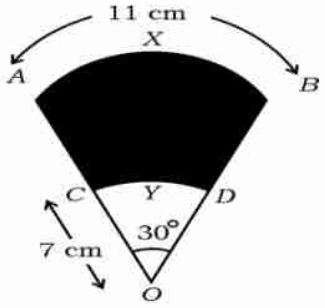
In the figure the area of the sector OAB is 231 cm^2 and length of the arc AB is 22cm. find the radius of the sector. **(JUNE 2023)**



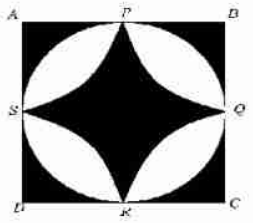
4 Marks long answers

12) In the figure *AXB* and *CYD* are the arcs of two concentric circles with center *O*. The length of the arc *AXB* is 11 cm. If *OC* = 7 cm and ∟ *AOB* = 30°, then find the area of the **(April 2022)**

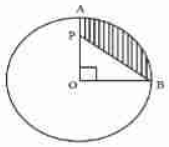
Shaded region. [Take $\pi = \frac{22}{7}$]



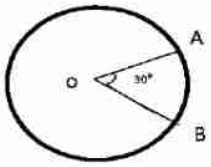
13) *ABCD* is a square of side 14 cm. A circle is drawn inside it which just touches the mid-points of sides of the square, as shown in the figure. If *P, Q, R* and *S* are the mid-points of the sides of the square and *PQ*, *QR*, *RS* and *SP* are the arcs of the circle, then find the area of the shaded region. **(June 2022)**



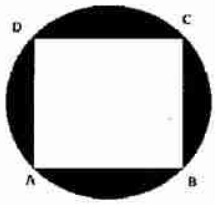
14) In the figure, the length of the arc AB of the circle with Centre 'O' is 11 cm.
If = 4 cm then find the area of the shaded region. **(MQP 2023)**



15) The perimeter of circle with Centre 'O' is 24 cm, the angle formed by an arc of the circle at its Centre is 30^0.
Find the length of the arc AB. **(MQP-2 2020)**



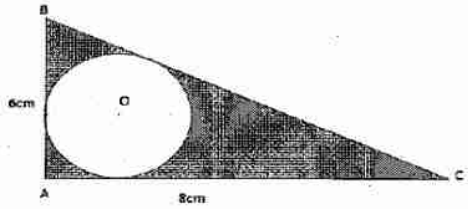
16) In the figure ABCD is a square, whose vertices lie on the circle.
Find the area of the shaded region, if the perimeter of the circle is 88 cm.



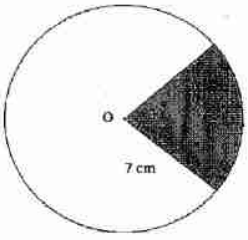
OR

Δ ABC si right angled at A. The sides AB, BC and AC are the tangents to the circle 'O' as shown in the figure . If AB=6 cm, AC=8 cm, find the area of the shaded region.

(MQP -1 2020)



17) Find the area of unshaded region in the given circle of radius 7 cm and sector angle is 30^0 as in the figure.
(MQP-2 2020)



STATISTICS

1 Mark Questions

1) Find the median of the scores 5, 8, 14, 16, 19 and 20 **(MQP-1 2021)**

2) The emperical relationship between the three measures of central tendency is

A) 2 Median = Mode + 3 Mean B) 3 Median = Mode + 2 Mean

C) Median = Mode + Mean D) Median = Mode - Mean **(MQP-2 2021)**

3 Marks questions:

3) Find the 'mean' for the following grouped data. **(MQP 2023)**

Class-Interval	Frequency
0–20	12
20–40	14
40–60	8
60–80	6
80–100	10

OR

Find the 'median' for the following grouped data.

Class-Interval	Frequency
0–10	5
10–20	8
20–30	20
30–40	15
40–50	7
50–60	5

4) A life insurance agent found the following data for distribution of age of 100 policy holders. Draw 'less than type' ogive for the given data. **(MQP 2023)**

Age (In years)	Number of policy holders (cumulative frequency)
Less than 20	12
Less than 25	25
Less than 30	40
Less than 35	66
Less than 40	84
Less than 45	100

5) The following table gives the production yield per hectare of wheat of 100 farms of a village. Draw more than type Ogive. **(MQP-1 2020)**

Yield productivity	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65	65 – 70
Number of farms	4	6	16	20	30	24

6) Find the mean of the following data **(MQP 2020)**

CI	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	3	5	9	5	3

7) The following distribution gives the daily income of 50 workers of a factory. Convert the distribution above to a 'less than type' cumulative frequency distribution, and draw it's Ogive. **(MQP-2 2020)**

Daily income (in RS)	100 –150	150 –200	200 – 250	250 – 300	300 – 350
Number of workers	15	12	10	8	5

8) Calculate the 'mean' for the frequency distribution table given below, by direct method. **(MQP-1 2021)**

Class interval	**Frequency**
5 – 15	4
15 – 25	3
25 – 35	6
35 – 45	5
45 –55	2

OR

Find the 'mode' of the frequency distribution table given below.

Class interval	**Frequency**
0 – 10	7
10 – 20	9
20 – 30	15
30 – 40	11
40 –50	8

9) The following table gives the production yield per hectare of wheat of 100 farms of a village. Draw a 'more than type ogive' for the given data. **(MQP-2021)**

Production yield in kg/hectare	Cumulative Frequency
More than or equal to 50	100
More than or equal to 55	98
More than or equal to 60	90
More than or equal to 65	78
More than or equal to 70	54
More than or equal to 75	16

10) Find the mean of the following data, by direct method.

Class interval	Frequency
1– 5	4
5 – 9	3
9 – 13	5
13 – 17	7
17 –21	1
	N=20

OR

Find the mode of the following data.

Class interval	Frequency
0 – 10	6
10 – 20	9
20 – 30	15
30 – 40	9
40 –50	1
	N = 40

11) Draw a "less than type ogive" for the data given in the following table. **(MQP-2 2021)**

Class interval	Frequency
0 – 10	2
10 – 20	12
20 – 30	2
30 – 40	4
40 –50	3

12) Calculate the median of the following frequency distribution table **(April 2019)**

Class interval	Frequency (f_i)
1– 4	6
4 – 7	30
7 – 10	40
10 – 13	16
13 –16	4
16 –19	4
	$\Sigma f_i = 100$

OR

Calculate the mode for the following frequency distribution table.

Class interval	Frequency (f_i)
10 – 25	2
25 – 40	3
40 – 55	7
55 – 70	6
70 – 85	6
85 –100	6
	$\Sigma f_i = 30$

13) During the medical check-up of 35 students of a class, their weights were recorded as follows. Draw a less than type of ogive for the given data : **(April 2019)**

Weight (in kg)	Number of students
Less than 38	0
Less than 40	3
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	32
Less than 52	35

14) Find the mode for the following data in the frequency distribution table

(June 2019)

Family size	Number of families
1 – 3	7
3 – 5	8
5 –7	2
7 –9	2
9 –11	1

OR

Find the median for the following data in the frequency distribution table

Weight (in kg)	Number of students
15 – 20	2
20 – 25	3
25 – 30	6
30 – 35	4
35 – 40	5

15) The following table gives production yield per hectare of wheat of 100 farms of a village. Change the distribution to a more than type distribution, and draw its ogive.

(June 2019)

Production yield in kg / hectare	Number of farms
50 – 55	2
55 – 60	8
60 – 65	12
65 – 70	24
70 – 75	38
75 – 80	16

16) Find the median of the following data: **(April 2020)**

Class interval	Frequency
20 – 40	7
40 – 60	15
60 – 80	20
80 – 100	8

OR

Find the mode of the following data

Class interval	Frequency
1 – 3	6
3 – 5	9
5 – 7	15
7 – 9	9
9 – 11	1

17) The following table gives the information of daily income of 50 workers of a factory. Draw a 'less than type ogive' for the given data : **(April 2020)**

Daily Income	Number of workers
Less than 100	0
Less than 120	8
Less than 140	20
Less than 160	34
Less than 180	44
Less than 200	50

18) Calculate the mode for the following frequency distribution table: **(June 2020)**

Class interval	Frequency (f_i)
0 – 5	8
5 – 10	9
10 – 15	5
15 – 20	3
20 –25	1
	$\sum f_i = 26$

19) An insurance policy agent found the following data for distribution of ages of 35 policy holders. Draw a "less than type" (below) of ogive for the given data : **(June 2020)**

Age (in years)	Number of policy holders
Below 20	2
Below 25	6
Below 30	12
Below 35	16
Below 40	20
Below 45	25
Below 50	35

20) Find the mean for the following grouped data by Direct method :

Class interval	Frequency
10 – 20	2
20 – 30	3
30 – 40	5
40 – 50	7
50 – 60	3

OR

Find the mode for the following grouped data : **(April 2022)**

Class interval	Frequency
5 – 15	3
15 – 25	4
25 – 35	8
35 – 45	7
45 – 55	3

21) During a medical check-up of 50 students of a class, their heights were recorded as follows : Draw "less than type" ogive for the given data : **(April 2022)**

Height in cm	Number of students (Cumulative frequency)
Less than 140	5
Less than 145	10
Less than 150	15
Less than 155	25
Less than 160	40
Less than 165	50

22) Find the mean of the following scores by direct method :

Class interval	Frequency
5 – 15	1
15 – 25	3
25 – 35	5
35 – 45	4
45 – 55	2

OR

Find the median of the following scores: **June 2022)**

Class interval	Frequency
1 – 3	6
3 – 5	9
5 – 7	15
7 – 9	9
9 – 11	1

23) The following table gives the information of heights of 60 students of class X of a school. Draw a 'less than type' ogive for the given data : **(June 2022)**

Height of students (in cms)	Number of students (Cumulative frequency)
Less than 130	04
Less than 140	12
Less than 150	30
Less than 160	45
Less than 170	56
Less than 180	60

24) Find the mean for the following data : **(April 2023)**

Class interval	Frequency
1 – 5	4
6 – 10	3
11 – 15	2
16 – 20	1
21 – 25	5

OR

Find the mode for the following data :

Class interval	Frequency
0 – 20	6
20 – 40	9
40 – 60	10
60 – 80	8
80 – 100	7

24) A life insurance agent found the following data for distribution of ages of 100 policy holders. Draw a "Less than type ogive" for the given data : **(April 2023)**

Age (in years)	Number of students (Cumulative frequency)
Below 20	2
Below 25	6
Below 30	24
Below 35	45
Below 40	78
Below 45	89
Below 50	100

26) Calculate the mean for the data in the following frequency distribution table : **(June 2023)**

Class interval	Frequency
5 – 15	4
15 – 25	6
25 – 35	5
35 – 45	6
45 – 55	4
	$\Sigma f_i = 25$

OR

Calculate the mode for the data in the following frequency distribution table :

Class interval	Frequency
10 – 15	3
15 – 20	3
20 – 25	7
25 –30	6
30 – 35	6

PROBABILITY

1 Mark MCQ

1) The probability of an event 'E' is 0.05, then the probability of event 'Not E' is **(MQP-1 2020)**

A) 0.05 B) 0.95 C) $\frac{1}{0.05}$ D) $\frac{1}{0.95}$

2) 26 English alphabet cards (without repeating any alphabet) are put in a box and shuffled well. If a card is chosen at random then the probability that the card with an vowel is **(MQP-2 2020)**

A) $\frac{3}{26}$ B) $\frac{5}{26}$ C) $\frac{1}{26}$ D) $\frac{21}{26}$

3) If P (A) = 0.05 then P ($\bar{A}$) is **(April 2019)**

A) 0.59 B) 0.95 C) 1 D) 1.05

4) Faces of a cubical die numbered from 1 to 6 is rolled once. The probability of getting an odd number on the top face is **(June 2019)**

A) $\frac{1}{6}$ B) $\frac{1}{6}$ C) $\frac{2}{6}$ D) $\frac{4}{6}$

5) If $P(A) = \frac{2}{3}$ then $P(\bar{A})$ is **(April 2020)**

6) For an event 'E', if $P(E) = 0.75$, then $P(\bar{E})$ is **(April 2023)**

A) 2.5 B) 0.25 C) 0.025 D) 1.25

7) The probability of winning game is $\frac{3}{4}$ the probability of losing the same game **(June 2023)**

A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $-\frac{1}{4}$ D) $\frac{1}{4}$

1 Marks Short answers

8) If the probability of raining on a particular day is 0.75, then find the probability of not raining on the same day. **(MQP 2023)**

9) If A is an event of a random experiment, such that $(A) : (A) = 1:2$, find the value of (A). **(MQP -2. 2020)**

2 Marks questions

10) There are 6 red, 5 blue and 4 green balls in a box. A ball is drawn at random from the box. What is the probability that the ball drawn is

11) Two cubical dice whose faces are numbered 1 to 6 are rolled simultaneously once. Find the probability that the sum of the two numbers occurring on their top faces is more than 7. **(MQP-1.2020)**

12) A cubical die numbered from 1 to 6 is rolled twice. Find the probability of getting the sum of numbers on its faces is 10. **(April 2019)**

13) A box contains 90 discs, which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears a perfect square number. **(June 2019)**

14) A bag contains 3 red balls, 5 white balls and 8 blue balls. One ball is taken out of the bag at random. Find the probability that the ball taken out is (a) a red ball, (b) not a white ball. **(April 2020)**

15) Letters of English alphabets are marked on the faces of a cubical die. If this die is rolled once, then find the probability of getting a vowel on its top face. **(June 2020)**

OR

A game of chance consists of rotating an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally possible outcomes. Find the probability that it will point at an odd number.

16) A box contains cards which are numbered from 9 to 19. If one card is drawn at random from the box, find the probability that it bears a prime number. **(April 2023)**

17) A box consists of 9 cards. Which are numbered from 10 to 18. If one card is draw is drawn at random from the box then find the probability of getting a prime number.

(June 2023)