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Std.: X (English)	Mathematics Part - I	Marks: 40
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	Chapter: All	

Note:-

Q.1 A) Solve Multiple choice questions. **(4)**

1) If a share is at premium, then -
a. Market value > Face value
b. Market value = Face value
c. Market value < Face value
d. Market value ≤ Face value

Ans. Market value > Face value

2) Find the roots of quadratic equation :
$2x^2 - 2\sqrt{3x} + 3 = 0$
a. x = 3 b. x = $\sqrt{3}$ c. x = $\sqrt{6}$ d. x = 2

Ans. Option b.

3) If P(A) = 0.75, then what is the probability of P(A')?
a. 0.75 b. 0.25 c. 0 d. 1

Ans. Option b.

4) For a frequency distributions, $\Sigma f_i = 60$ and $\Sigma f_i x_i = 1260$ then the mean ($\bar{x}$) is ?
a. 20 b. 22 c. 23 d. 21

Ans. Option d.

B) Solve the following questions. **(4)**

1) How many possibilities are there in each of the following?
One number from 10 to 20 is written on each card. Select one card randomly.

Ans. Here possibility are : 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
∴ There are 11 cards bearing numbers 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
∴ There are 11 possibilities.

2) Write an A.P. whose first term is a and common difference is d in each of the following. a = 6, d = - 3

Ans. $a = t_1 = 6$,
$t_2 = t_1 + d = 6 + (-3) = 3$,
$t_3 = t_2 + d = 3 + (-3) = 0$,
$t_4 = t_3 + d = 0 + (-3) = -3$.
∴ Arithmetic progression is 6, 3, 0, -3, ...

3) Find the values of the following determinants.

$N = \begin{vmatrix} -8 & -3 \\ 2 & 4 \end{vmatrix}$

Ans. $N = \begin{vmatrix} -8 & -3 \\ 2 & 4 \end{vmatrix}$ = [(-8)×(4)] - [(-3) ×(2)] = - 32 - (- 6)

= - 32 + 6 = - 26

4) Find the value of the discriminant for the quadratic equation. $x^2 + 4x + 1 = 0$.

Ans. $x^2 + 4x + 1 = 0$

Comparing with $ax^2 + bx + c = 0$,

$a = 1, b = 4, c = 1$.

The discriminant $(\triangle) = b^2 - 4ac$

$= (4)^2 - 4(1)(1) = 16 - 4 = 12$

$\therefore \quad \triangle = 12$

The value of the discriminant is 12.

Q.2 A) Complete the following Activities. (Any Two) **(4)**

1) Complete the table to solve the following simultaneous equations.

x - y = 4

x	_____	- 1	0
y	0	_____	- 4
(x, y)	_____	_____	_____

Ans. Complete the table to solve the following simultaneous equations.

x - y = 4

x	4	- 1	0
y	0	- 5	- 4
(x, y)	(4, 0)	(- 1, -5)	(0, - 4)

2) First term and common difference of an A.P. are 6 and 3 respectively ; find S_{27}.

a = 6, d = 3, S_{27} = ?

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

$\therefore \quad S_{27} = \frac{27}{2}$[12 + (27 - 1) _____]

$= \frac{27}{2} \times$ _____

$= 27 \times 45$

$\therefore$ _____

Ans. First term and common difference of an A.P. are 6 and 3 respectively ; find S_{27}.

a = 6, d = 3, S_{27} = ?

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

$\therefore \quad S_{27} = \frac{27}{2}$[12 + (27 - 1) 3]

$= \frac{27}{2} \times 90$

$= 27 \times 45$

$\therefore \quad S_{27} = 1215$

3) Complete the following table by writing suitable numbers and words.

Sr. No.	Face value	Type	Market Value

(1)	Rs. 100	Par	.....
(2)	.....	Premium Rs. 500	Rs. 575
(3)	Rs. 10	.....	Rs. 5

Ans.

Sr. No.	Face value	Type	Market Value
(1)	Rs. 100	At Par	**Rs. 100**
(2)	**Rs. 75**	Premium = Rs. 50	Rs. 575
(3)	Rs. 10	**Discount = Rs. 5**	Rs. 5

B) Solve the following questions. (Any four) **(8)**

1) Solve the following quadratic equations by factorization.
$6\sqrt{3}x^2 + 7x = \sqrt{3}$

Ans. $6\sqrt{3}x^2 + 7x = \sqrt{3}$

$\therefore$ $6\sqrt{3}x^2 + 7x - \sqrt{3} = 0$

$\therefore$ $6\sqrt{3}x^2 + 9x - 2x - \sqrt{3} = 0$

$\therefore$ $3\sqrt{3}x(2x + \sqrt{3}) - 1\ (2x + \sqrt{3}) = 0$

$\therefore$ $(2x + \sqrt{3})\ (3\sqrt{3}x - 1) = 0$

$\therefore$ $2x + \sqrt{3} = 0$ or $3\sqrt{3}x - 1 = 0$

$\therefore$ $2x = -\sqrt{3}$ or $3\sqrt{3}x = 1$

$\therefore$ $x = -\frac{\sqrt{3}}{2}$ or $x = \frac{1}{3\sqrt{3}}$

$\therefore$ $-\frac{\sqrt{3}}{2}$ and $\frac{1}{3\sqrt{3}}$ are the roots of the given quadratic equation.

2) Form the given table, find the median number of rooms occupied per day in a hotel:

Number of rooms occupied	Number of days (f)	(c.f.) (less than type)
0 - 10	5	5
10 - 20	15	20
20 - 30	25	45
30 - 40	10	55
40 - 50	5	60

Ans. Here, L = 20, $\frac{N}{2}$= 30, f = 25, c.f. = 20, h = 10.

Median= $L + \left(\frac{N}{2} - c.f\right)\frac{h}{f}$ ... (Formula)

$= 20 + (30 - 20) \times \frac{10}{25}$ ... (Substituting the values)

$= 20 + 10 \times \frac{10}{25} = 20 + 4 = 24$

The median number of rooms occupied per day in a hotel is **24.**

3) M/s. Jay Chemicals purchased a liquid soap having taxable value Rs. 8000 and sold it to the consumers for the taxable value Rs. 10,000. Rate of GST is 18%. Find the CGST and SGST payable by M/s. Jay

Chemicals.

Ans. Input Tax = 18% of 8000

$= \frac{18}{100} \times 8000$

= Rs. 1440.

Output Tax = 18% of 10,000

$= \frac{18}{100} \times 10000$

= Rs. 1800

∴ GST payable = Output tax - ITC

= 1800 - 1440

= Rs. 360

∴ Payable CGST = Rs. 180 and payable SGST = Rs. 180 by M/s. Jay Chemicals

4) Six faces of a die are as shown below.

A	B	C	D	E	A

If the die is rolled once, find the probability of -

(1) 'A' appears on upper face. (2) 'D' appears on upper face.

Ans. There are 6 letters in all consisting of 2As, 1B, 1C, 1D and 1 E.

∴ n(S) = 2 + 1 + 1 + 1 + 1

= 6

Event A : 'A' appears on upper face.

∴ n(A) = 2

$P(A) = \frac{n(A)}{n(S)}$

∴ $P(A) = \frac{2}{6} = \frac{1}{3}$

Event B : 'D' appears on upper face.

∴ n(B) = 1

$P(B) = \frac{n(B)}{n(S)} = \frac{1}{6}$

5) Solve the following simultaneous equations.

x + 7y = 10 ; 3x - 2y = 7

Ans. x + 7y = 10 ...I

3x - 2y = 7 ...II

Equation I can be written as

x = 10 - 7y ...III

Substituting the value of x in equation II

3x - 2y = 7

∴ 3(10 - 7y) - 2y = 7

∴ 30 - 21y - 2y = 7

∴ 30 - 23y = 7

∴ -23y = 7-30

∴ -23y = -23

∴ $y = \frac{-23}{-23}$

∴ **y = 1**

∴ Substituting y = 1 in equation III

x = 10 - 7y

$\therefore$ $x = 10 - 7 \times 1$

$\therefore$ $x = 10 - 7$

$\therefore$ **$x = 3$**

$\therefore$ $x = 3, y = 1$ is the solution of given simultaneous equations.

Q.3 A) Complete the following Activity (Any one) **(3)**

1) The difference between the roots of the equation $x^2 - 13x + k = 0$ is 7 find k.

Comparing $x^2 - 13x + k = 0$ with $ax^2 + bx + c = 0$

$\therefore$ $a = 1, b = -13, c = k,$

Let α and β be the roots of the equation.

$\therefore$ $\alpha + \beta =$ _____ $= -\frac{(-13)}{1} =$ _____ ... I

But $\alpha - \beta = 7$ ... (given) II

$2\alpha = 20$ ... [adding (I) and (II)]

$\therefore$ $\alpha =$ _____

$\therefore$ $10 + \beta = 13$ ... [from (I)]

$\therefore$ $\beta = 13 - 10$

$\therefore$ $\beta =$ _____

But $\alpha \times \beta =$ _____

$\therefore$ $10 \times 3 = \frac{k}{1}$

$\therefore$ $k =$ _____

Ans. The difference between the roots of the equation $x^2 - 13x + k = 0$ is 7 find k.

Comparing $x^2 - 13x + k = 0$ with $ax^2 + bx + c = 0$

$\therefore$ $a = 1, b = -13, c = k,$

Let α and β be the roots of the equation.

$\therefore$ $\alpha + \beta = -\frac{b}{a} = -\frac{(-13)}{1} = 13$ ... I

But $\alpha - \beta = 7$ ... (given) II

$2\alpha = 20$ ... [adding (I) and (II)]

$\therefore$ $\alpha = 10$

$\therefore$ $10 + \beta = 13$ ... [from (I)]

$\therefore$ $\beta = 13 - 10$

$\therefore$ $\beta = 3$

But $\alpha \times \beta = \frac{c}{a}$

$\therefore$ $10 \times 3 = \frac{k}{1}$

$\therefore$ $k = 30$

2) Find four consecutive terms in an A.P. whose sum is 88 and the sum of the 1st and the 3rd terms is 40.

Let the four consecutive terms in the A.P. be

a - 3d, a - d, a + d, and a + 3d.

From the first condition,

_____ = 88

$\therefore$ $4a = 88$

$\therefore a = \frac{88}{4}$ ... (1)

$\therefore$ a = _____

From the second condition,

_____ = 40

$\therefore$ 2a - 2d = 40

$\therefore$ a - d = 20

22 - d = 20

$\therefore$ d = _____

Four consecutive terms are

a - 3d = 22 - 3(2) = 16

a - d = _____ = 20

a + d = 22 + 2 = 24

a + 3d = _____ = 28

Ans. Find four consecutive terms in an A.P. whose sum is 88 and the sum of the 1st and the 3rd terms is 40.

Let the four consecutive terms in the A.P. be

a - 3d, a - d, a + d, and a + 3d.

From the first condition,

a - 3d + a - d + a + d + a+ 3d = 88

$\therefore$ 4a = 88

$\therefore a = \frac{88}{4}$ ... (1)

$\therefore$ a = 22

From the second condition,

a - 3d + a + d = 40

$\therefore$ 2a - 2d = 40

$\therefore$ a - d = 20

22 - d = 20

$\therefore$ d = 2

Four consecutive terms are

a - 3d = 22 - 3(2) = 16

a - d = 22 - 2 = 20

a + d = 22 + 2 = 24

a + 3d = 22 + 3(2) = 28

B) Solve the following questions. (Any two) **(6)**

1) Mr.Amol purchased 50 shares of Face Value Rs. 100 when the Market value of the share was Rs. 80. Company had given 20% dividend. Find the rate of return on investment.

Ans. Face value of share = Rs. 100

Dividend on one share = 20% of Rs. 100

$= \frac{20}{100} \times 100$

$\therefore$ Dividend on one share = Rs. 20

$\therefore$ Dividend on 50 shares = 50×20

= Rs. 1000

Market value of share = Rs. 80

$\therefore$ Total investment = 50×80

= 4000

$\therefore$ Rate of return $= \frac{\text{Total dividend received}}{\text{Total investment}} \times 100$

$= \frac{1000}{4000} \times 100$

$\therefore$ Rate of return = 25%

2) Solve the following quadratic equation.
$5m^2 + 2m + 1 = 0$

Ans. $5m^2 + 2m + 1 = 0$

Comparing with $am^2 + bm + c = 0$ [Here m = x] we get,

$a = 5, b = 2, c = 1$

$b^2 - 4ac = (2)^2 - 4 \times 5 \times 1$

$= 4 - 20$

$= -16$

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

$$= \frac{-2 \pm \sqrt{-16}}{2 \times 5}$$

$$= \frac{-2 \pm \sqrt{-16}}{10}$$

$\therefore$ As $\sqrt{-16}$ is not real number, roots of given quadratic equation are not real, so discarded.

3) Solve the following simultaneous equations using Cramer's method.
$4x + 3y - 4 = 0$; $6x = 8 - 5y$

Ans. $4x + 3y - 4 = 0$ Expressing the given equations in the form of $ax + by = c$, we get

$4x + 3y = 4$

$6x + 5y = 8$

$$D = \begin{vmatrix} 4 & 3 \\ 6 & 5 \end{vmatrix}$$

$= (4 \times 5) - (3 \times 6)$

$= 20 - 18$

$\therefore$ $D = 2$

$$Dx = \begin{vmatrix} 4 & 3 \\ 8 & 5 \end{vmatrix}$$

$= (4 \times 5) - (3 \times 8)$

$= 20 - 24$

$\therefore$ $Dx = -4$

$$Dy = \begin{vmatrix} 4 & 4 \\ 6 & 8 \end{vmatrix}$$

$= (4 \times 8) - (4 \times 6)$

$= 32 - 24$

$\therefore$ $Dy = 8$

By Cramer's rule

$$x = \frac{Dx}{D} = \frac{-4}{2} = -2 \text{ and}$$

$$y = \frac{Dy}{D} = \frac{8}{2} = 4$$

$\therefore$ $x = -2$ and $y = 4$ is the solution of given simultaneous equations.

4) Write sample space 'S' and number of sample point n(S) for each of the following experiments. Also write events A, B, C in the set form and write n(A), n(B), n(C).
Two digit numbers are formed using digits 0, 1, 2, 3, 4, 5 without repetition of the digits.

Condition for event A : The number formed is even
Condition for event B : The number formed is divisible by 3.
Condition for event C : The number formed is greater than 50.

Ans. S = { 10, 12, 13, 14, 15, 20, 21, 23, 24, 25, 30, 31, 32, 34, 35, 36, 40, 41, 42, 43, 45, 50, 51, 52, 53, 54 }
∴ n(S) = 25
A is the event that the number formed is even.
A = { 10, 12, 14, 20, 24, 30, 32, 34, 40, 42, 50, 52, 54 }
∴ n(A) = 13
B is the event that the number formed is divisible by 3
B = { 12, 15, 21, 24, 30, 42, 45, 51, 54 }
∴ n(B) = 9
C is the event that the number formed is greater than 50.
C = { 51, 52, 53, 54 }
∴ n(C) = 4

Q.4 Solve the following questions. (Any two) **(8)**

1) Solve the following simultaneous equations graphically.
x + y = 5 ; x - y = 3

Ans. x + y = 5 i.e. y = 5 - x

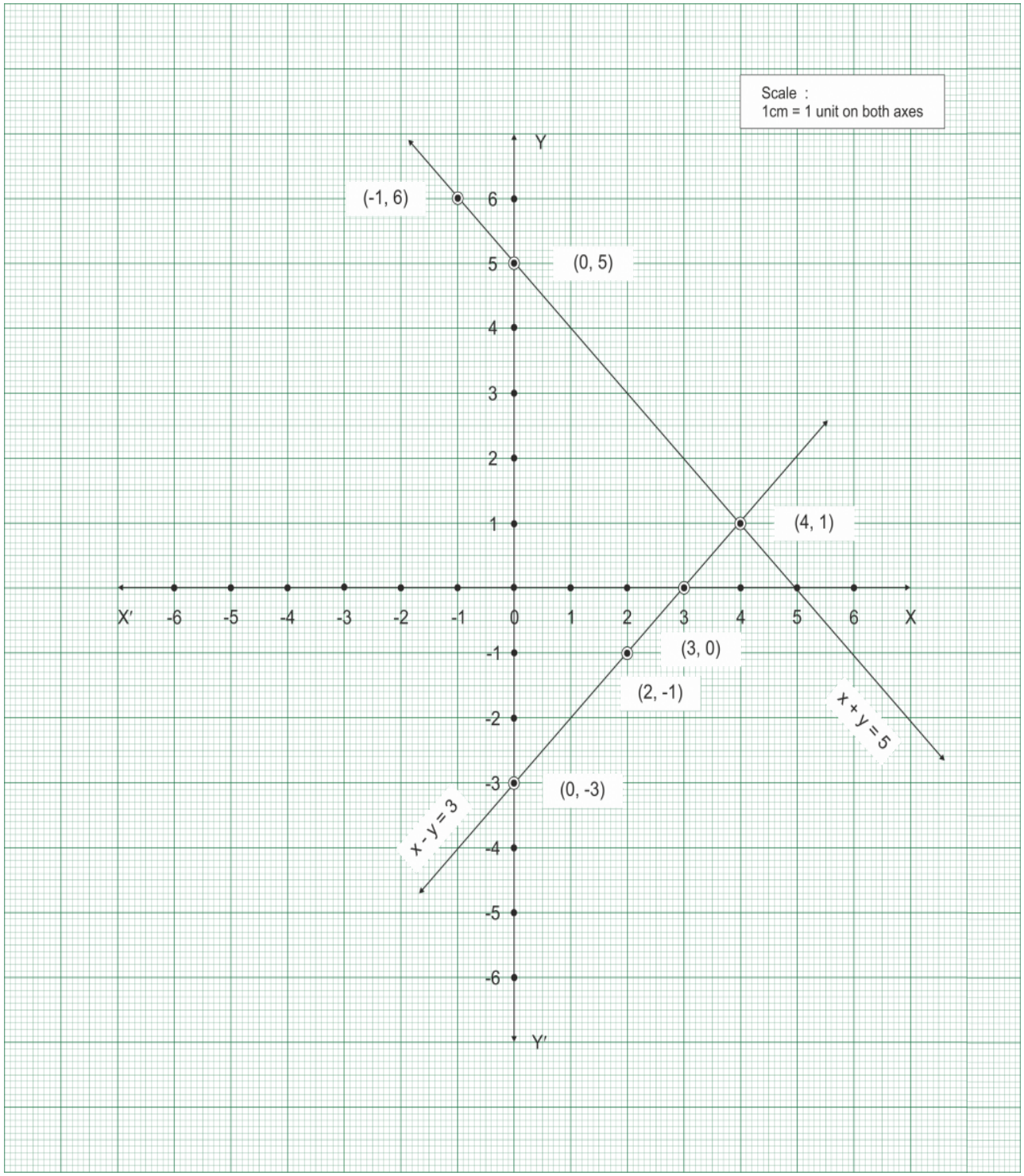
x	0	-1	4
y	5	6	1
(x,y)	(0,5)	(-1,6)	(4,1)

when x = 0 when x = - 1 when x = 4
∴ y = 5 - 0 ∴ y = 5 - (-1) ∴ y = 5 - 4
∴ y = 5 ∴ y = 5 + 1 ∴ y = 1
∴ y = 6

x - y = 3 i.e. y = x - 3

x	0	3	2
y	-3	0	-1
(x,y)	(0,-3)	(3,0)	(2,-1)

when x = 0 when x = 3 when x = 2
∴ y = 0 - 3 ∴ y = 3 - 3 ∴ y = 2 - 3
∴ y = -3 ∴ y = 0 ∴ y = -1



The lines of the two given simultaneous equations intersect each other at (4, 1).

∴ The solution of the given simultaneous equation is (4, 1) i.e. x = 4, y = 1.

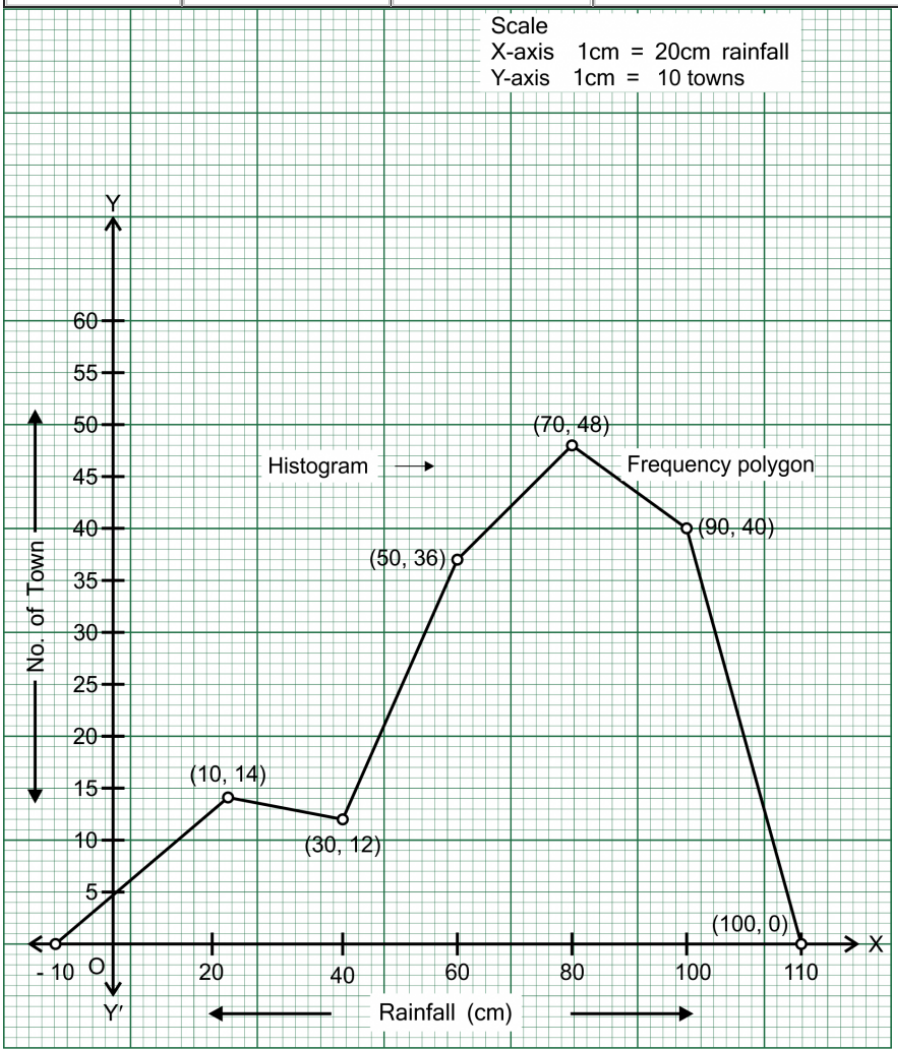
2) The following table shows the average rainfall in 150 towns. Show the information by a frequency polygon.

Average rainfall (cm)	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
No. of towns	14	12	36	48	40

Ans.

Class	Class mark	Frequency	Co-ordinates of Points

-20 - 0	-10	0	(-10, 0)
0 - 20	10	14	(10, 14)
20 - 40	30	12	(30, 12)
40 - 60	50	36	(50, 36)
60 - 80	70	48	(70, 48)
80 - 100	90	40	(90, 40)
100 - 120	110	0	(110, 0)



3) In a bicycle shop, number of bicycles purchased and choice of their colours was as follows. Find the measures of sectors of a circle to show the information by a pie diagram.

Colour	White	Black	Blue	Grey	Red	Total
Number of bicycles	10	9	6	7	4	36

Ans. In all 36 bicycles were purchased. Out of them 10 bicycles were white coloured.
∴ the measure of sector showing white
coloured bicycles

$$= \frac{\text{Number of white bicycles}}{\text{Total number of bicycles}} \times 360$$

= $\frac{10}{36} \times 360 = 100$

The measures of angles of sector relating to bicycles of other colours can be calculated similarly which are shown in the adjacent table.

Colour	Number of bicycles	Central angle of the sector
White	10	$\frac{10}{36} \times 360^o = 100^o$
Black	9	$\frac{9}{36} \times 360^o = 90^o$
Blue	6	60^o
Grey	7	70^o
Red	4	40^o
Total	36	360^o

Q.5 Solve the following questions. (Any one) **(3)**

1) Solve: $\frac{4}{x} + \frac{5}{y} = 7; \frac{3}{x} + \frac{4}{y} = 5$

Ans. $\frac{4}{x} + \frac{5}{y} = 7 ; \frac{3}{x} + \frac{4}{y} = 5$

$4\left(\frac{1}{x}\right) + 5\left(\frac{1}{y}\right) = 7$ ... I

$3\left(\frac{1}{x}\right) + 4\left(\frac{1}{y}\right) = 5$ ... II

Replacing $\left(\frac{1}{x}\right)$ by m and $\left(\frac{1}{y}\right)$ by n in equations (I) and (II), we get

$4m + 5n = 7$ ... III

$3m + 4n = 5$ ... IV

On solving these equations we get

$m = 3, n = -1$

Now, $m = \frac{1}{x}$ $\therefore$ $3 = \frac{1}{x}$ $\therefore$ $x = \frac{1}{3}$

$n = \frac{1}{y}$ $\therefore$ $-1 = \frac{1}{y}$ $\therefore$ $y = -1$

$\therefore$ Solution of given simultaneous equations is $(x, y) = (\frac{1}{3}, -1)$

2) On the world environment day tree plantation programme was arranged on a land which is triangular in shape. Trees are planted such that in the first row there is one tree, in the second row there are two trees, in the third row three trees and so on. Find the total number of trees in the 25 rows.

Ans. The number of trees in each row upto the 25^{th} row are as follows: 1,2,3,4, ...

These trees planted in each row form an A.P. with No. of trees in first row (a) = 1.

Difference between no. of trees planted in two successive rows (d) = 1

No. of rows (n) = 25

Total no. of trees planted (S_{25}) = ?

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

$\therefore \quad S_{25} = \frac{25}{2}[2\times1 + (25 - 1)\ 1]$

$\therefore \quad S_{25} = \frac{25}{2}[2 + 24]$

$\therefore \quad S_{25} = \frac{25}{2}\times26$

$\therefore \quad S_{25} = 25\times13$

$\therefore \quad \boxed{S_{25} = 325}$

$\therefore$ 325 trees were planted in 25 rows.