Note:-

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

1) On comparing $6x^2 + 11x - 35 = 0$ with $ax^2 + bx + c = 0$. We get a, b and c as :

a. a = 11, b = 6, c = 35   b. a = 6, b = 11, c = 35

c. a = 6, b = 11, c = −35   d. a = 35, b = 11, c = −35

Ans. Option c.

2) In an A.P. if d = -4, n = 7, t_n = 4, then a is

a. 6   b. 7   c. 20   d. 28

Ans. Option d.

3) GST system was introduced in our country from ....

a. 31st March 2017   b. 1st April 2017

c. 1st January 2017   d. 1st July 2017

Ans. Option d.

4) How many solutions are there for linear equation in two variables?

a. One   b. Two   c. Three   d. Infinite solutions

Ans. Option d.

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

1) Write an A.P. whose first term is a and common difference is d in each of the following.

a = - 7, d = $\frac{1}{2}$

Ans.   a = t_1 = - 7

$t_2 = t_1 + d = - 7 + \frac{1}{2} = - 7 + 0.5 = - 6.5$,

$t_3 = t_2 + d = - 6.5 + \frac{1}{2} = - 6.5 + 0.5 = - 6$,

$t_4 = t_3 + d = - 6 + \frac{1}{2} = - 6 + 0.5 = - 5.5$

∴ Arithmetic progression is - 7, - 6.5, - 6, -5.5

2) Mr. Azhar paid 28% GST on spare parts of motor cycle worth Rs. 20,000 and sold to a customer for Rs. 25,000. What are the amounts of CGST and SGST shown in the tax invoice issued ?

Ans.   CGST = SGST = $\left(28 \times \frac{1}{2}\right)$ %

= 14%

∴ CGST = $\frac{14}{100} \times 25000$

= 3500

= SGST

3) Find the value of discriminant for each of the following equations.

$5m^2 - m = 0$

Ans. $5m^2 - m = 0$

∴ $5m^2 - m + 0 = 0$

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

      a = 5, b = -1, c = 0

      $\triangle = b^2 - 4ac$

         $= (-1)^2 - 4 \times 5 \times 0$

         $= 1 - 0$

∴ $\triangle = 1$

4) Two coins are tossed simultaneously, Find the probability of getting at least one head.

Ans.   S = {HH, HT, TH, TT}

    n (S) = 4

    A   = {HH, HT, TH}

    n(A) = 3

    $p(A) = \dfrac{n\,(A)}{n\,(S)} = \dfrac{3}{4}$

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

1) Fill up the boxes and find out the number of terms in the A. P. 1, 3, 5, ..., 149.

      Here a = 1, d = _____, t_n = 149

      $t_n = a + (n - 1)\,d$

∴   149 = _____

      149 = 1 + 2n - 2

∴   149 = 2n - _____

∴   2n = 150

∴   n = _____

Ans. Fill up the boxes and find out the number of terms in the A. P. 1, 3, 5, ..., 149.

      Here a = 1, d = 2, t_n = 149

      $t_n = a + (n - 1)\,d$

∴ $149 = 1 + (n - 1) \times 2$

      149 = 1 + 2n - 2

∴   149 = 2n - 1

∴   2n = 150

∴   n = 75

2) Out of 200 students from a school, 135 like Kabbaddi and the remaining students do not like the game. If one student is selected at random from all the students, find the probability that the student selected dosen't like Kabbaddi.

Let S be the sample space.

Total number of students = 200

∴   n(S) = _____

Number of students like Kabbaddi = 135

∴   Number of students doesn't like Kabbaddi

= 200 - 135

= _____

Event A : The student selected doesn't like Kabbaddi.

∴　n(A) = 65

　　P(A) = _____

∴　n(A) = $\dfrac{65}{200}$

　　　　 = $\dfrac{13}{40}$

∴　Probability of selected students doesn't like kabbaddi is _____

Ans. Out of 200 students from a school, 135 like Kabbaddi and the remaining students do not like the game. If one student is selected at random from all the students, find the probability that the student selected dosen't like Kabbaddi.

Let S be the sample space.

Total number of students = 200

∴　n(S) = 200

Number of students like Kabbaddi = 135

∴　Number of students doesn't like Kabbaddi

= 200 - 135

= 65

Event A : The student selected doesn't like Kabbaddi.

∴　n(A) = 65

　　P(A) = $\dfrac{n(A)}{n(S)}$

∴　n(A) = $\dfrac{65}{200}$

　　　　 = $\dfrac{13}{40}$

∴　Probability of selected students doesn't like kabbaddi is $\dfrac{13}{40}$

3) Complete the following table to draw the graph of 3x - y = 2

x	☐	- 1
y	1	☐
(x, y)	☐	☐

Ans.

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

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

1) Form the given table, find the median size of a farm.

Size of farm (in acres)	Number of farms	c.f. (less than type)
15 - 25	5	5
25 - 35	10	5 + 10 = 15
35 - 45	20	15 + 20 = 35

| 45 - 55 | 9 | 35 + 9 = 44 |
| 55 - 65 | 6 | 44 + 6 = 50 |

Ans. Here, L = 35, $\frac{N}{2}$ = 25, f = 20, c.f. = 15, h = 10.

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

$= 35 + (25 - 15) \times \frac{10}{20}$ ... (Substituting the values)

$= 35 + 10 \times \frac{1}{2}= 35 + 5 = 40$

The median size of a farm is **40 acres**.

2) For each of the following experiments write sample space 'S' and number of sample points n(S).
One coin and one die are thrown simultaneously.

Ans. S = {(1, H), (2, H), (3, H), (4, H), (5, H), (6, H), (1, T), (2, T), (3, T), (4, T), (5, T), (6, T)}.
n (s) = 12

3) The nth term of the A. P. 3, 8, 13, 18, ... is 148. Find n

Ans. The A. P. is 3, 8, 13, 18, ...
Let the nth term of the A. P. be 148.
a = 3, d = 5 and t_n = 148
t_n = a + (n - 1) d
148 = 3 + (n - 1) 5
     = 3 + 5n - 5
∴   5n = 148 + 2 = 150
∴   n = 30
∴   30th term is 148.

4) Find the values of a, b, c for following quadratic equations by comparing with standard form.
$y^2 = 7y$

Ans. $y^2 = 7y$
∴ $y^2 - 7y = 0$
∴ $y^2 - 7y + 0 = 0$
Comparing with $ay^2 + by + c = 0$ [Here y = x] we get,
∴   a = 1, b = – 7, c = 0

5) For certain simultaneous equations, if
i. D = -5, D_x = 15, D_y = 10
ii. D = 4, D_x = 2, D_y = 8
find the values of x and y.

Ans. i. The value of x = $\frac{Dx}{D} = \frac{15}{-5}$ = **-3**

The value of y = $\frac{Dy}{D} = \frac{10}{-5}$ = **-2.**

ii. The value of x = $\frac{Dx}{D} = \frac{2}{4} = \frac{1}{2}$

The value of y = $\frac{Dy}{D} = \frac{8}{4}$ = **2.**

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

1) If the face value of the share is Rs. 100 and market value is Rs. 150. Let the rate of brokerage be 0.5%. What amount should one pay for purchasing 100 such shares? What amount should one receive after selling 100 such shares?

I) At the time of buying shares:

Buying price of 1 share = MV + Brokerage

= 150 + 0.5% of 150

= 150 + 0.75

= _____

If someone purchases 100 such shares the total cost is 100 × 150.75 = Rs. 15075.

Here _____ is the share price and _____ is the brokerage paid.

II) At the time of selling shares.

Selling price per share = _____

= 150 - 5% of 150 = 150 - 0.75

= _____.

If someone sells 100 such shares, he will get,

100 × 150 - Rs. 75 = _____ after selling 100 such shares.

Ans. If the face value of the share is Rs. 100 and market value is Rs. 150. Let the rate of brokerage be 0.5%. What amount should one pay for purchasing 100 such shares? What amount should one receive after selling 100 such shares?

I) At the time of buying shares:

Buying price of 1 share = MV + Brokerage

= 150 + 0.5% of 150

= 150 + 0.75

= Rs. 150.75

If someone purchases 100 such shares the total cost is 100 × 150.75 = Rs. 15075.

Here Rs. 15000 is the share price and Rs. 75 is the brokerage paid.

II) At the time of selling shares.

Selling price per share = MV - Brokerage

= 150 - 5% of 150 = 150 - 0.75

= Rs. 149.25.

If someone sells 100 such shares, he will get,

100 × 150 - Rs. 75 = Rs. 14925 after selling 100 such shares.

2) Write the sample space S, and number of sample points 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).

One die is rolled.

∴ the sample space S = {_____}

n(S) = _____

Event A : Even number on the upper face.

∴ A = {_____}

∴ n (A) = 3

Event B : Odd number on the upper face.

∴ B = {_____}

∴ n (B) = 3

Event C : _____.

∴ C = {2, 3, 5}

∴n (C) = _____

Ans. Write the sample space S, and number of sample points 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).

   One die is rolled.
   ∴ the sample space S = {1, 2, 3, 4, 5, 6}
   n(S) = 6
   Event A : Even number on the upper face.
   ∴ A = {2, 4, 6}
   ∴ n (A) = 3
   Event B : Odd number on the upper face.
   ∴ B = {1, 3, 5}
   ∴ n (B) = 3
   Event C : Prime number on the upper face.
   ∴ C = {2, 3, 5}
   ∴ n (C) = 3

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

1) Solve : $7y = -3y^2 - 4$

Ans. $3y^2 + 3y + 4y + 4 = 0$
   ∴ $3y (y + 1) + 4 (y + 1) = 0$
   ∴ $(3y + 4) (y + 1) = 0$
   ∴ $y = -1$ or $y = -\dfrac{4}{3}$

2) Mr. Rohit is a retailer. He paid GST of Rs. 6500 at the time of purchase. He collected GST of Rs. 8000 at the time of sale. (i) Find his input tax and output tax. (ii) What is his Input tax credit ? (iii) Find his payable GST. (iv) Hence find the payable CGST and payable SGST.

Ans.   Mr. Rohit's payable GST means, GST to be paid to the government by Mr. Rohit.
   (i)   Output tax (tax collected at the time of sale) = Rs. 8000.
   (ii)   Input tax (tax paid at the time of purchase) = Rs. 6500
   ∴   ITC = Rs. 6500.
   (iii)   GST payable = Output tax - ITC
                  = Rs. 8000 - Rs. 6500
                  = Rs. 1500
   (iv) ∴   Payable CGST = $\dfrac{1500}{2}$ = Rs. 750 and Payable SGST = Rs. 750.

3) Three years hence a man's age will be there time his son's age and 7 years ago he was seven times as old his son. How old are they now?

Ans. Let the man's age now = x years
   and his son's age now = y years
   three years hence man's age = (x + 3) years
   three years hence son's age = (y + 3) years
   7 years ago man's age = (x - 7) years
   7 years ago son's age = (y - 7) years
   According to first condition of given problem,
   (x + 3) = 3 (y + 3)
   x + 3 = 3y + 9

x - 3y = 9 - 3

x - 3y = 6 .....(1)

According to second condition of given problem,

(x - 7) = 7 (y - 7)

x - 7 = 7y - 49

x - 7y = - 49 + 7

x - 7y = - 42 ...... (2)

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

$$\begin{array}{r} x - 3y = 6 \\ x - 7y = -42 \\ \underline{- \quad + \quad +} \\ +4y = 48 \end{array}$$

$y = \dfrac{48}{2}$

y = 12

Substituting the value of y in equation (1), we get

x - 3 × 12 = 6

x - 36 = 6

x = 6 + 36

x = 42

Hence, Man's age = 42 years

His son's age y years = 12 years

4) Draw a pie diagram to represent the world population of countries given in the following table after determining the valued of

Country	India	China	Russia	USA	Other	Total
Percentage of population	15	20	a	a	25	100

Ans.

Country	% of World Population	Measure of central angle (θ)
India	15	$\dfrac{15}{100}$× 360° = 54°
China	20	$\dfrac{20}{100}$× 360° = 72°
Russia	20	$\dfrac{20}{100}$× 360° = 72°
USA	20	$\dfrac{20}{100}$× 360° = 72°
Others	25	$\dfrac{25}{100}$× 360° = 90°
Total	100	360°

India 54°
China 72°
72°
Other 90°
72° Russia
72°
USA
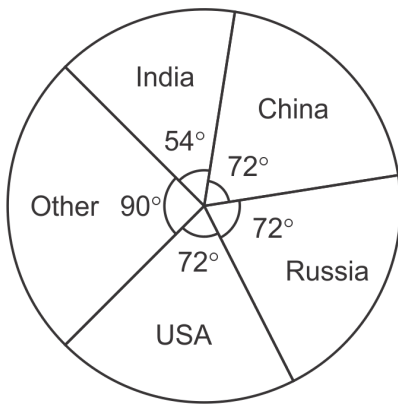
Q.4 **Solve the following questions. (Any two)** **(8)**

1) Solve the following simultaneous equations graphically.
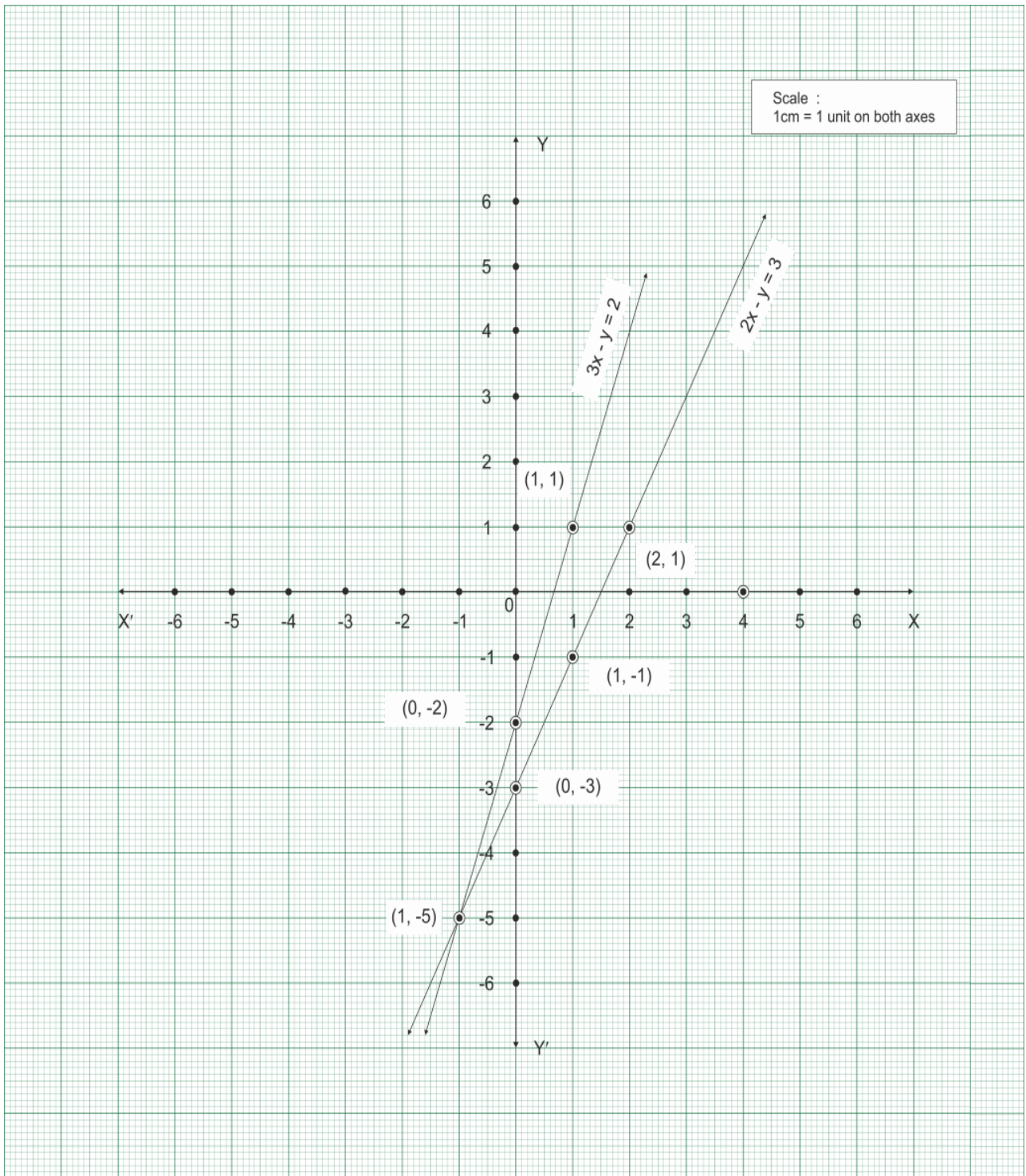3x - y = 2 ; 2x - y = 3

Ans. 3x - y = 2 i.e. y = 3x - 2

x	1	0	-1
y	1	-2	-5
(x,y)	(1,1)	(0,-2)	(-1,-5)

when x = 1   when x = 0   when x = 0 - 1
∴ y = 3(1) - 2   ∴ y = 3(0) - 2   ∴ y = 3(-1) - 2
∴ y = 3 - 2   ∴ y = 0 - 2   ∴ y = - 3 - 2
∴ y = 1   ∴ y = - 2   ∴ y = - 5

2x - y = 3 i.e. y = 2x - 3

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

Scale :
1cm = 1 unit on both axes

when x = 1　　　　when x = 0　　　　when x = 2
∴　y = 2(1) - 3　∴　y = 2(0) - 3　∴　y = 2(2) - 3
∴　y = 2 - 3　　∴　y = 0 - 3　　∴　y = 4 - 3
∴　y = - 1　　　∴　y = - 3　　　∴　y = 1

The lines of the two given simultaneous equations intersect each other at (- 1, - 5).
∴　The solution of the given simultaneous equation is (- 1, - 5) i.e. x = - 1, y = - 5.

2)　A frequency distribution of funds collected by 120 workers in a company for the drought affected people are given in the following table. Find the mean of the funds by 'step deviation' method.

Fund (Rupees)	0 - 500	500 - 1000	1000 - 1500	1500 - 2000	2000 - 2500
No. of workers	35	28	32	15	10

Ans. Let A = 1250; g = 500

Class Fund (Rupees)	Class mark x_i	$d_i = x_i - A = x_i - 1250$	$u_i = \dfrac{d_i}{g}$	Frequency f_i	$f_i u_i$
0 - 500	250	- 1000	- 2	35	- 70
500 - 1000	750	- 500	- 1	28	- 28
1000 - 1500	1250	0	0	32	0
1500 - 2000	1750	500	1	15	15
2000 - 2500	2250	1000	2	10	20
Total				$\Sigma f_i = 120$	$\Sigma f_i u_i = -63$

$$\therefore \quad \bar{u} = \frac{\Sigma f_i u_i}{\Sigma f_i}$$

Or $\quad \therefore \quad \bar{u} = \dfrac{\Sigma f_i u_i}{\Sigma f_i}$

$$= \frac{-63}{120}$$

$$= \frac{-63}{120} = \frac{-21}{40}$$

$$\bar{u} = \frac{-21}{40}$$

$\therefore \quad \bar{u} = - 0.53$

Mean($\bar{x}$) = A + g $\bar{u}$ Mean($\bar{x}$) = A + g $\bar{u}$

$\quad = 1250 + 500 \left(\dfrac{-21}{40}\right)$ $= 1250 + 500 \ (-0.53)$

$\quad = 1250 - 25 \left(\dfrac{21}{2}\right)$ $= 1250 - 265$

$\quad = 1250 - \dfrac{525}{2}$ $= 985$ rupees

$\quad = 1250 - 262.5$

Mean $\quad = 987.5$ rupees

$\therefore$ Mean of the funds distributed to workers is Rs.987.5 or Rs.985.

3) In the orange garden of Mr. Madhusudan there are 150 orange trees. The number of trees in each row is 5 more than that in each column. Find the number of trees in each row and each column with the help of following flow chart.
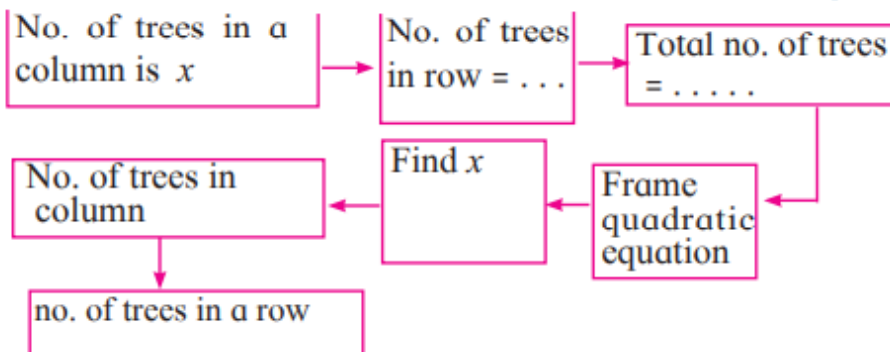
Ans. Let the number of trees planted in vertical rows be x.

$\therefore$ The number of trees planted in horizontal rows is (x + 5).

$\therefore$ The total number of trees planted = x × (x + 5).

$\therefore$ But number trees planted is 150.

$\therefore$ x × (x + 5) = 150

$\therefore$ $x^2 + 5x = 150$

$\therefore$ $x^2 + 15x - 10x - 150 = 0$

$\therefore$ x (x + 15) − 10 (x + 15) = 0

$\therefore$ (x + 15) (x − 10) = 0

$\therefore$ x + 15 = 0

or x - 10 = 0

$\therefore$ x = − 15 or x = 10

$\therefore$ x ≠ − 15 as natural number of trees can not be negative.

$\therefore$ x = 10 and x + 5 = 10 + 5 = 15

$\therefore$ The number of trees planted in horizontal rows is 15.

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

1)   As deduced from a survey, the classification of skilled workers is shown in the pie diagram. If the number of workers in the production sector is 4500, answer the following questions.

(i) What is the total number of skilled workers in all fields?

(ii) What is the number of skilled workers in the field of constructions?

(iii) How many skilled workers are in agriculture?

(iv) Find the difference between the numbers of workers in the field of production and construction.
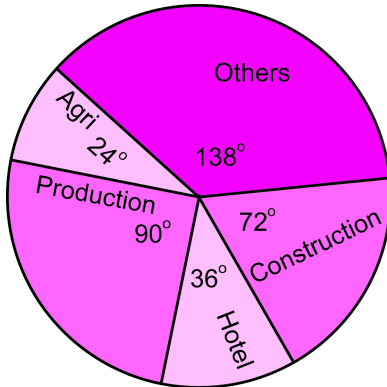
Ans. (i) Suppose, the total number of skilled workers in all fields is x.

$\therefore$ the central angle for x persons is = 360°

Central angle for number of persons in production field

= $\dfrac{\text{Number of persons in production field}}{x} \times 360$

$\therefore$ 90 = $\dfrac{4500}{x} \times 360$

$\therefore$ x = 18000

$\therefore$ total number of skilled workers in all the fields together = 18000.

(ii) The angle shown for construction sector = 72°.

$\therefore$ 72 = $\dfrac{\text{Number of persons in construction}}{18000} \times 360$

$\therefore$ number of persons in construction field = $\dfrac{72 \times 18000}{360}$ = 3600

(iii) The central angle for agriculture field is 24°.

$\therefore$ 24 = $\dfrac{\text{Number of persons in construction}}{\text{total skilled workers}} \times 360$

$\therefore$ 24 = $\dfrac{\text{Number of workers in agriculculture}}{18000} \times 360$

$\therefore$ number of workers in agriculture = $\dfrac{24 \times 18000}{360}$ = 1200

(iv) The difference between angles relating fields of production and construction = 90° − 72° = 18°.

∴   The difference between the central angles =

$$\frac{\text{Difference between numbres of workers in the fields}}{\text{Total number of skilled workers}} \times 360$$

$$18 = \frac{\text{Difference between numbres of workers in the fields}}{18000} \times 360$$

Difference between the numbers of workers in the two fields = $\frac{18 \times 18000}{360}$ = 900

2)   Divide 207 in three parts, such that all parts are in A.P. and product of two smaller parts will be 4623.

Ans. Let the three parts of 207, which are in A.P. be a - d, a, a + d.

Sum of three parts is 207   ... [Given]

∴   a - d + a + a + d = 207

∴   3a = 207

∴   a = $\frac{207}{3}$

∴ $\boxed{a=69}$

Also, the product of two smaller parts is 4623... [Given]

∴   (a - d) × a = 4623

∴   (69 - d) × 69 = 4623

∴   69 - d = $\frac{4623}{69}$

∴   69 - d = 67

∴   69 - 67 = d

∴ $\boxed{d=2}$

Thus, the three parts of 207 are

a - d = 69 - 2 = 67, a = 69,

a + d = 69 + 2 = 71

Hence, three parts of 207 are 67, 69, 71.