प्र. क्र. Q. No. 1 (A)

(i) (A)

(ii) (B)

(iii) (D)

(iv) (C) *(1 mark each)*

Note : Answers with solutions are expected.

1 (B) (i) Ans.

$17x+15y=11$ ... (1)

$15x+17y=21$ ... (2)

Subtracting equation (2) from equation (1),

$17x+15y=11$ ... (1)

$-\ 15x+17y=21$ ... (2)

$2x-2y=-10$ *(½ mark)*

Dividing both the sides by 2,

$x-y=-5$ *(½ mark)*

The value of $x-y$ is -5.

(ii) Ans.

$t_n=3n-2$

Substituting $n=1$,

$t_1=3\times1-2$ *(½ mark)*

$=3-2=1$ *(½ mark)*

The first term is 1.

प्र. क्र.
Q. No. 1 (B)

(iii) Ans.

The rate of brokerage is 2%.

The market value of the share is ₹150.

The brokerage $= ₹150 \times \frac{2}{100}$ (½ mark)

$= ₹3$ (½ mark)

The brokerage paid on one share is ₹3.

(iv) Ans.

Two-digit numbers are formed using the digits 2, 3 and 5 without repeating a digit. The sample space is

S = {23, 25, 32, 35, 52, 53}. (1 mark)

प्र. क्र.
Q. No. 2 (A)

Note : Any two out of three activities are to be attempted. Here, we have completed all the three activities for the guidance of the students.

(i) Activity :

(0, 2) is the solution of the equation $2x+3y=k$.

Put $x=$ 0 and $y=$ 2 in the given equation. *(½ + ½ mark)*

$\therefore 2\times 0+3\times 2=k$ *(½ mark)*

$\therefore 0+6=k$

$\therefore k=$ 6 *(½ mark)*

(ii) Activity :

Let $\alpha=2$ and $\beta=5$ be the roots of the quadratic equation.

Then the quadratic equation is,

$x^2-(\alpha+\beta)x+\alpha\beta=0$

$\therefore x^2-(2+5)x+2\times 5=0$ *(½ + ½ mark)*

$\therefore x^2-7x+10=0$ *(½ + ½ mark)*

(iii) Activity :

Two coins are tossed simultaneously.

$\therefore$ sample space is

$S=\{HH, HT, TH, TT\}$ *(½ + ½ mark)*

Event A : To get at least one head.

$\therefore A=\{HH, HT, TH\}$ *(½ mark)*

Event B : To get no head.

$\therefore B=\{TT\}$ *(½ mark)*

प्र. क्र.
Q. No. 2 (B)

Note : Any four out of five questions are to be solved. Answers with solutions are expected.

(i) Solution :

□ABCD is a rectangle.

∴ DC = AB ... (Opposite sides of a rectangle)

∴ $4x - y = 2x + y + 8$ *(½ mark)*

∴ $4x - y - 2x - y = 8$

∴ $2x - 2y = 8$

∴ $x - y = 4$ ... (Dividing both the sides by 2) ... (1) *(½ mark)*

Also, BC = AD ... (Opposite sides of a rectangle)

∴ $x + 4 = 2y$ *(½ mark)*

∴ $x - 2y = -4$ ... (2) *(½ mark)*

Ans. The equations are $x - y = 4$ and $x - 2y = -4$.

(ii) Solution :

$x^2 + x - 20 = 0$

∴ $x^2 + 5x - 4x - 20 = 0$ *(½ mark)*

∴ $x(x + 5) - 4(x + 5) = 0$

∴ $(x + 5)(x - 4) = 0$ *(½ mark)*

∴ $x + 5 = 0$ or $x - 4 = 0$ *(½ mark)*

∴ $x = -5$ or $x = 4$ *(½ mark)*

Ans. $-5, 4$ are the roots of the given quadratic equation.

(iii) Solution :

7, 13, 19, 25, ... is an A.P.

Here, $a = t_1 = 7$, $t_2 = 13$, $t_3 = 19$, $t_4 = 25$, ...

$d = t_2 - t_1 = 13 - 7 = 6$.

We have to find 19th term, $t_{19} = ?$ *(½ mark)*

प्र. क्र.
Q. No. 2 (B)

$t_n = a + (n-1)d$ ... (Formula) *(½ mark)*

$\therefore t_{19} = 7 + (19-1) \times 6$ *(½ mark)*

$= 7 + 18 \times 6$

$= 7 + 108$

$\therefore t_{19} = 115$ *(½ mark)*

Ans. The 19th term is 115.

(iv) Solution :

S is the sample space. $\therefore n(S) = 52$. *(½ mark)*

Let event A : A card drawn is a face card.

Total face cards = 12

$\therefore n(A) = 12$ *(½ mark)*

$P(A) = \frac{n(A)}{n(S)}$ ... (Formula) *(½ mark)*

$\therefore P(A) = \frac{12}{52}$

$\therefore P(A) = \frac{3}{13}$ *(½ mark)*

Ans. The probability is $\frac{3}{13}$.

(v) Solution :

Daily number of hours	Number of workers	Cumulative frequency less than upper limit type	
8-10	150	150	*(½ mark)*
10-12	500	650	*(½ mark)*
12-14	300	950	*(½ mark)*
14-16	50	1000	*(½ mark)*

प्र. क्र.
Q. No. 3 (A)

Note : Any one out of two activities are to be attempted. Here, we have completed both the activities for the guidance of the students.

(i) Activity :

From the given table,

[the maximum frequency (40) is in the class 3.5 – 6.5.]

Modal class = 3.5 – 6.5 *(½ mark)*

$\text{Mode} = L + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$ *(½ + ½ mark)*

$\therefore \text{mode} = 3.5 + \left[\frac{40 - 33}{2(40) - 33 - 27}\right] \times 3$ *(½ mark)*

$\therefore \text{mode} = 3.5 + \left[\frac{7}{80 - 60}\right] \times 3$

$\therefore \text{mode} = 4.55$ *(½ mark)*

$\therefore$ the mode of the volume of petrol filled is 4.55 litres. *(½ mark)*

(ii) Activity :

Total value for toy car with GST = ₹2360

The rate of GST = 18%.

Let the taxable value for toy car be ₹x.

$\therefore \text{GST} = \frac{18}{100} \times x$

$\therefore$ total value for toy car = (taxable value for toy car) + GST

... (Formula) *(½ mark)*

$\therefore 2360 = x + \frac{18}{100} \times x$ *(½ + ½ mark)*

$\therefore 2360 = \frac{118}{100} \times x$ *(½ mark)*

$\therefore 2360 \times 100 = 118x \quad \therefore x = \frac{2360 \times 100}{118}$ *(½ mark)*

$\therefore$ taxable value for toy car is ₹ 2000. *(½ mark)*

प्र. क्र.
Q. No. 3 (B)

Note : Any two out of four questions are to be solved. Here, we have solved all the four questions for the guidance of the students.

(i) Solution :

$3m^2 - m - 10 = 0$

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

we get, $a = 3,\ b = -1,\ c = -10$. *(½ mark)*

$b^2 - 4ac = (-1)^2 - 4 \times 3 \times (-10)$

$= 1 + 120$

$\therefore b^2 - 4ac = 121$ *(½ mark)*

$m = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ ... (Formula) *(½ mark)*

$\therefore m = \dfrac{-(-1) \pm \sqrt{121}}{2 \times 3}$

$\therefore m = \dfrac{1 \pm 11}{6}$ *(½ mark)*

$\therefore m = \dfrac{1+11}{6}$ or $m = \dfrac{1-11}{6}$ *(½ mark)*

$\therefore m = \dfrac{12}{6}$ or $m = \dfrac{-10}{6}$

$\therefore m = 2$ or $m = \dfrac{-5}{3}$ *(½ mark)*

Ans. $2, \dfrac{-5}{3}$ are the roots of the given quadratic equation.

(ii) Solution :

$3x - 4y = 10$ ... (1) Here, $a_1 = 3,\ b_1 = -4,\ c_1 = 10$

$4x + 3y = 5$ ... (2) $a_2 = 4,\ b_2 = 3,\ c_2 = 5$.

$D = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = \begin{vmatrix} 3 & -4 \\ 4 & 3 \end{vmatrix} = 3 \times 3 - (-4) \times 4$

$= 9 + 16$

$\therefore D = 25$ *(½ mark)*

प्र. क्र. Q. No. 3 (B)

$D_x = \begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix} = \begin{vmatrix} 10 & -4 \\ 5 & 3 \end{vmatrix} = 10 \times 3 - (-4) \times 5$

$= 30 + 20$

$\therefore D_x = 50$ *(½ mark)*

$D_y = \begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix} = \begin{vmatrix} 3 & 10 \\ 4 & 5 \end{vmatrix} = 3 \times 5 - 10 \times 4$

$= 15 - 40$

$\therefore D_y = -25$ *(½ mark)*

Using Cramer's rule,

$x = \frac{D_x}{D}; y = \frac{D_y}{D}$ *(½ mark)*

$\therefore x = \frac{50}{25}; y = \frac{-25}{25}$

$\therefore x = 2; y = -1$ *(½ + ½ mark)*

Ans. $(x, y) = (2, -1)$ is the solution.

(iii) Solution :

FV = ₹10; MV = ₹25

Number of shares = 50

(a) Sum invested = MV × Number of shares

= ₹25 × 50

= ₹1250 *(½ mark)*

(b) Dividend per share = 30% of FV

$= \frac{30}{100} \times 10 = ₹3$ *(½ mark)*

Total dividend received on 50 shares = ₹3 × 50 = ₹150 *(½ mark)*

(c) Rate of return $= \frac{\text{Dividend received}}{\text{Sum invested}} \times 100$ *(½ mark)*

$= \frac{150}{1250} \times 100$ *(½ mark)*

$= 12\%$ *(½ mark)*

Ans. (a) Sum invested is ₹1250.

(b) Dividend received is ₹150.

(c) Rate of return is 12%.

प्र. क्र. Q. No. 3 (B)

(iv)

प्र. क्र.
Q. No. 3 (B)

(iv) Solution :

One coin and a die are thrown simultaneously.

∴ sample space is

$S = \{H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6\}$ *(½ mark)*

$\therefore n(S) = 12$ *(½ mark)*

Event A : To get a head and a prime number.

$\therefore A = \{H2, H3, H5\}$ *(½ mark)*

$\therefore n(A) = 3$

$P(A) = \frac{n(A)}{n(S)} \quad \therefore P(A) = \frac{3}{12} = \frac{1}{4}$ *(½ mark)*

Event B : To get a tail and an odd number.

$\therefore B = \{T1, T3, T5\}$ *(½ mark)*

$\therefore n(B) = 3$

$P(B) = \frac{n(B)}{n(S)} \quad \therefore P(B) = \frac{3}{12} = \frac{1}{4}$ *(½ mark)*

Ans. The probability of event A is $\frac{1}{4}$ and

the probability of event B is $\frac{1}{4}$.

प्र. क्र.
Q. No. 4

Note : Any two out of three questions are to be solved. Here, we have solved all the three questions for the guidance of the students.

(i) Solution :

Let the bigger tap alone fill the tank in x hours. Then the smaller tap alone fill the tank in $(x+5)$ hours. *(½ mark)*

In one hour, the bigger tap will fill $\frac{1}{x}$ part of the tank and the smaller tap will fill $\frac{1}{x+5}$ part of the tank.

$\therefore$ both the taps together will fill $\left(\frac{1}{x}+\frac{1}{x+5}\right)$ part of the tank. *(½ mark)*

The tank is filled up by two taps in 6 hours.

$\therefore$ both the taps together fill $\frac{1}{6}$ part of the tank in 1 hour.

$\therefore \frac{1}{x}+\frac{1}{x+5}=\frac{1}{6}$ *(½ mark)*

$\therefore \frac{x+5+x}{x(x+5)}=\frac{1}{6} \quad \therefore \frac{2x+5}{x^2+5x}=\frac{1}{6}$

$\therefore 6(2x+5)=x^2+5x$

$\therefore x^2+5x=6(2x+5)$

$\therefore x^2+5x=12x+30$

$\therefore x^2+5x-12x-30=0$

$\therefore x^2-7x-30=0$ *(½ mark)*

$\therefore x^2-10x+3x-30=0$

$\therefore x(x-10)+3(x-10)=0$

$\therefore (x-10)(x+3)=0$ *(½ mark)*

$\therefore x-10=0$ or $x+3=0$

$\therefore x=10$ or $x=-3$ *(½ mark)*

But the time cannot be negative.

$\therefore x=-3$ is unacceptable.

$\therefore x=10$ and $x+5=10+5=15$ *(½ mark)*

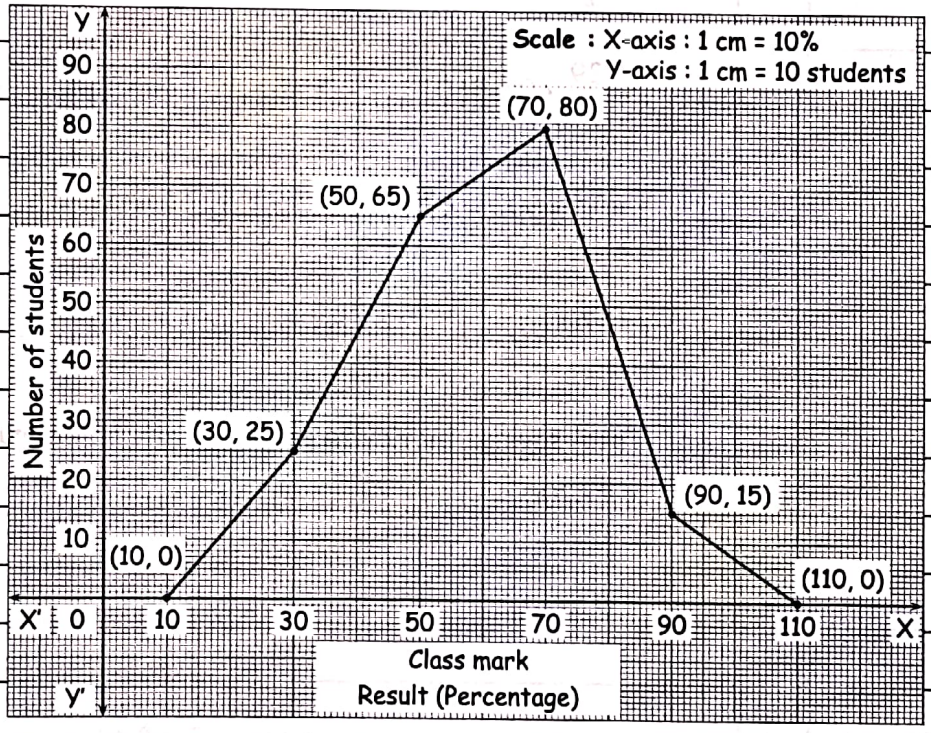
Ans. The bigger tap alone fills the tank in 10 hours and the smaller tap alone fills the tank in 15 hours. *(½ mark)*

प्र. क्र.
Q. No. 4

(ii) Solution :

To draw the frequency polygon, we take two more classes. The class preceding the first class and the class succeeding the last class, each with frequency zero. The table to draw the frequency polygon is as follows :

Class result (percentage)	Class mark	Frequency (Number of students)	Coordinates of the points
0-20	10	0	(10, 0)
20-40	30	25	(30, 25)
40-60	50	65	(50, 65)
60-80	70	80	(70, 80)
80-100	90	15	(90, 15)
100-120	110	0	(110, 0)



[Scheme of marking : ½ mark for class mark column; ½ mark for coordinates of points column; 2 marks for plotting the point; ½ mark for completing polygon; ½ mark for proper scale.]

प्र. क्र. Q. No. 4

(iii) Solution :

Investment by Kavita on the 1st day of the month is ₹20, on the 2nd day ₹40, on the 3rd day ₹60 and so on. This is a sequence with common difference $d = 20$.

$\therefore$ this is an A.P. *(½ mark)*

Here, $a = 20$, $d = 20$. *(½ mark)*

2020 is a leap year. $\therefore$ in the month of February 2020, there are 29 days.

$\therefore n = 29$ *(½ mark)*

We want to find S_{29}.

$S_n = \frac{n}{2}[2a + (n-1)\,d]$ ... (Formula) *(½ mark)*

$\therefore S_{29} = \frac{29}{2}[2 \times 20 + (29-1) \times 20]$ ... (Substituting the values) *(½ mark)*

$= \frac{29}{2}[40 + 28 \times 20]$

$= \frac{29}{2}[40 + 560]$

$= \frac{29}{2} \times 600 = 29 \times 300$ *(½ mark)*

$\therefore S_{29} = 8700$ *(½ mark)*

Ans. Total savings by Kavita in the month of February 2020 is ₹8700. *(½ mark)*

प्र. क्र.
Q. No. 5

Note : Any one out of two questions are to be solved. Here, we have solved both the questions for the guidance of the students.

(i) Solution :

(a) Let the total amount spent on sports be ₹x.

The total amount spent corresponds to the central angle 360°.

$$\text{The central angle for football} = \frac{\text{Expenditure on football}}{\text{Total expenditure}} \times 360°$$

$$\therefore 45° = \frac{9000}{x} \times 360° \qquad \textit{(½ mark)}$$

$$\therefore x = \frac{9000 \times 360°}{45°} \qquad \textit{(½ mark)}$$

$$\therefore x = 72000$$

The total amount spent on sports is ₹72,000. *(½ mark)*

(b) The central angle for cricket is 160°.

$$\text{The central angle for cricket} = \frac{\text{Expenditure on cricket}}{\text{Total expenditure}} \times 360°$$

$$\therefore 160° = \frac{\text{Expenditure on cricket}}{72000} \times 360° \qquad \textit{(½ mark)}$$

$$\therefore \text{expenditure on cricket} = \frac{72000 \times 160°}{360°} \qquad \textit{(½ mark)}$$

$$= 32000$$

The amount spent on cricket is ₹32,000. *(½ mark)*

Ans. (a) ₹72,000 (b) ₹32,000.

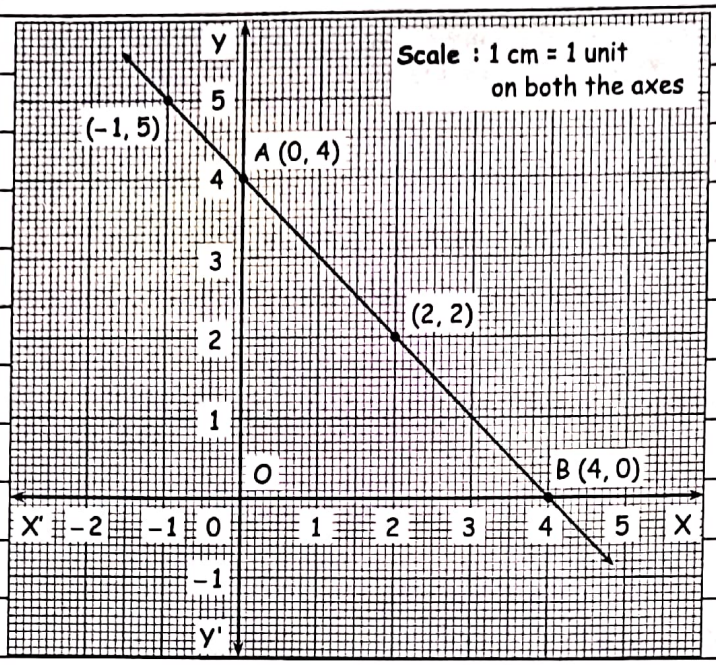
(ii) Solution :

$x + y = 4$

$\therefore y = 4 - x$

x	−1	0	2	4
y	5	4	2	0
(x, y)	(−1, 5)	(0, 4)	(2, 2)	(4, 0)

प्र. क्र.
Q. No. 5



(a) $\triangle AOB$ is formed by the line with the X and Y-axes.

$\triangle AOB$ is an isosceles triangle.

[OA = 4 units, OB = 4 units.]

(b) $A(\triangle AOB) = \frac{1}{2} \times \text{base} \times \text{height}$ ... (Formula)

$= \frac{1}{2} \times OB \times OA$

$= \frac{1}{2} \times 4 \times 4 = 8$ sq units.

Ans. (a) The triangle formed is an isosceles triangle.

(b) The area of the triangle is 8 sq units.

[Scheme of marking : 1 mark for drawing the graph of the equation; 1 mark for writing the type of triangle formed; 1 mark for finding the area of the triangle.]