

Time: 2 Hours

MARCH – 2022

[Max. Marks: 40]

Note: (i) All questions are compulsory.
(ii) Use of a calculator is not allowed.
(iii) The numbers to the right of the questions indicate full marks.
(iv) In case of MCQs [Q. No. 1(A)] only the first attempt will be evaluated and will be given credit.
(v) For every MCQ, the correct alternative (A), (B), (C) or (D) with subquestion number is to be written as an answer.

Q.1. (A) Four alternative answers are given for every subquestion. Choose the *correct* alternative and write its alphabet with subquestion number. [4]

(1) Which one is the quadratic equation?

- (a) $\frac{5}{x} - 3 = x^2$ (b) $x(x + 5) = 2$
(c) $n - 1 = 2n$ (d) $\frac{1}{x^2}(x + 2) = x$

(2) First four terms of an A.P. are _____, whose first term is -2 and common difference is -2 .

- (a) $-2, 0, 2, 4$ (b) $-2, 4, -8, 16$
(c) $-2, -4, -6, -8$ (d) $-2, -4, -8, -16$

(3) For simultaneous equations in variables x and y , $D_x = 49$, $D_y = -63$, $D = 7$, then what is the value of y ?

- (a) 9 (b) 7 (c) -7 (d) -9

(4) Which number cannot represent a probability?

- (a) 1.5 (b) $\frac{2}{3}$ (c) 15% (d) 0.7

Q.1. (B) Solve the following subquestions. [4]

(1) To draw a graph of $4x + 5y = 19$, find y when $x = 1$.

(2) Determine whether 2 is a root of quadratic equation $2m^2 - 5m = 0$.

- (3) Write second and third terms of an A.P. whose first term is 6 and common difference is -3 .
- (4) Two coins are tossed simultaneously. Write the sample space 'S'.

Q.2. (A) Complete the following activities and rewrite them.
(Any two) [4]

- (1) Complete the activity to find the value of the determinant.

Activity:

$$\begin{vmatrix} 2\sqrt{3} & 9 \\ 2 & 3\sqrt{3} \end{vmatrix} = 2\sqrt{3} \times \boxed{} - 9 \times \boxed{} \\ = \boxed{} - 18 \\ = \boxed{}$$

- (2) Complete the following activity to find the 19th term of an A.P., 7, 13, 19, 25,:

Activity:

Given A.P.: 7, 13, 19, 25,

Here first term $a = 7$; $t_{19} = ?$

$$t_n = a + (\boxed{}) d \text{ (formula)}$$

$$\therefore t_{19} = 7 + (19 - 1) \boxed{}$$

$$\therefore t_{19} = 7 + \boxed{}$$

$$\therefore t_{19} = \boxed{}$$

- (3) If one die is rolled, then to find the probability of an event to get prime number on upper face, complete the following activity.

Activity:

One die is rolled.

'S' is sample space.

$$S = \{\boxed{}\}$$

$$\therefore n(S) = 6$$

Event A : Prime number on the upper face.

$$A = \{\boxed{}\}$$

$$\therefore n(A) = 3$$

$$P(A) = \frac{\boxed{}}{n(S)} \dots\dots\dots \text{(formula)}$$

$$\therefore P(A) = \boxed{}$$

Q.2. (B) Solve the following subquestions. (Any four) [8]

- (1) To solve the following simultaneous equations by Cramer's rule, find the values of D_x and D_y .

$$3x + 5y = 26$$

$$x + 5y = 22$$

- (2) A box contains 5 red, 8 blue and 3 green pens. Rutuja wants to pick a pen at random. What is the probability that the pen is blue?
- (3) Find the sum of first ' n ' even natural numbers.

- (4) Solve the following quadratic equation by factorisation method:

$$x^2 + x - 20 = 0$$

- (5) Find the values of $(x + y)$ and $(x - y)$ of the following simultaneous equations :

$$49x - 57y = 172$$

$$57x - 49y = 252$$

Q.3. (A) Complete the following activity and rewrite it. (Any one) [3]

- (1) One of the roots of equation $kx^2 - 10x + 3 = 0$ is 3. Complete the following activity to find the value of k .

Activity:

One of the roots of equation

$$kx^2 - 10x + 3 = 0 \text{ is } 3.$$

Putting $x = \boxed{}$ in the above equation

$$\therefore k(\boxed{})^2 - 10 \times \boxed{} + 3 = 0$$

$$\therefore \boxed{} - 30 + 3 = 0$$

$$\therefore 9k = \boxed{}$$

$$\therefore k = \boxed{}$$

- (2) A card is drawn at random from a pack of well shuffled 52 playing cards. Complete the following activity to find the probability that the card drawn is –

Event A: The card drawn is an ace.

Event B: The card drawn is a spade.

Activity:

‘S’ is the sample space.

$$\therefore n(S) = 52$$

Event A: The card drawn is an ace.

$$\therefore n(A) = \boxed{}$$

$$P(A) = \boxed{} \dots\dots\dots \text{(Formula)}$$

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

$$\therefore P(A) = \frac{\boxed{}}{13}$$

Event B: The card drawn is a spade.

$$\therefore n(B) = \boxed{}$$

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

$$\therefore P(B) = \frac{\boxed{}}{4}$$

Q.3. (B) Solve the following subquestions. (Any two) [6]

- (1) Solve the simultaneous equations by using graphical method:

$$x + 3y = 7$$

$$2x + y = -1$$

- (2) There is an auditorium with 27 rows of seats. There are 20 seats in the first row, 22 seats in the second row, 24 seats in the third row and so on. Find how many total seats are there in the auditorium?
- (3) Sum of the present ages of Manish and Savita is 31 years. Manish’s age 3 years ago was 4 times the age of Savita at that time. Find their present ages.
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- (4) Solve the following quadratic equation using formula:

$$x^2 + 10x + 2 = 0$$

Q.4. Solve the following subquestions. (Any two) [8]

- (1) If 460 is divided by a natural number, then quotient is 2 more than nine times the divisor and remainder is 5. Find the quotient and divisor.
- (2) If the 9th term of an A.P. is zero, then prove that the 29th term is double the 19th term.
- (3) The perimeter of an isosceles triangle is 24 cm. The length of its congruent sides is 13 cm less than twice the length of its base. Find the lengths of all sides of the triangle.

Q.5. Solve the following subquestions. (Any one) [3]

- (1) A bag contains 8 red and some blue balls. One ball is drawn at random from the bag. If ratio of probability of getting red ball and blue ball is 2:5, then find the number of blue balls.
- (2) Measures of angles of a triangle are in A.P. The measure of smallest angle is five times of common difference. Find the measures of all angles of a triangle.
(Assume the measures of angles as $a, a + d, a + 2d$.)

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(c) $n - 1 = 2n$ (d) $\frac{1}{x^2}(x + 2) = x$

(2) First four terms of an A.P. are _____, whose first term is -2 and common difference is -2 .

- (a) $-2, 0, 2, 4$ (b) $-2, 4, -8, 16$
(c) $-2, -4, -6, -8$ (d) $-2, -4, -8, -16$

(3) For simultaneous equations in variables x and y , $D_x = 49$, $D_y = -63$, $D = 7$, then what is the value of y ?

- (a) 9 (b) 7 (c) -7 (d) -9

(4) Which number cannot represent a probability?

- (a) 1.5 (b) $\frac{2}{3}$ (c) 15% (d) 0.7

Ans. (1) – (b), (2) – (c), (3) – (d), (4) – (a)

Q.1. (B) Solve the following subquestions. [4]

(1) To draw a graph of $4x + 5y = 19$, find y when $x = 1$.

Solution:

$$\begin{aligned}4x + 5y &= 19 \\ \therefore 4 \times 1 + 5y &= 19 \quad (\text{If } x = 1) \\ \therefore 4 + 5y &= 19 \\ \therefore 5y &= 19 - 4 \\ \therefore y &= \frac{15}{5}\end{aligned}$$

Ans. $y = 3$

(2) Determine whether 2 is a root of quadratic equation $2m^2 - 5m = 0$.

Solution:

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

$$\begin{aligned}\text{LHS} &= 2m^2 - 5m \\ &= 2(2)^2 - 5 \times 2 \quad (\text{Put } m = 2) \\ &= 8 - 10 \\ &= -2\end{aligned}$$

$$\therefore \text{LHS} \neq \text{RHS}$$

Ans. 2 is not a root of the given equation.

- (3) Write second and third terms of an A.P. whose first term is 6 and common difference is -3.**

Solution:

$$t_1 = a = 6 \text{ and } d = -3$$

$$t_2 = t_1 + d = 6 + (-3) = 6 - 3 = 3$$

$$t_3 = t_2 + d = 3 + (-3) = 3 - 3 = 0$$

Ans. The second and third terms of the A.P. are 3 and 0, respectively.

- (4) Two coins are tossed simultaneously. Write the sample space 'S'.**

Solution:

Two coins are tossed simultaneously.

$$\therefore S = \{HH, HT, TH, TT\}$$

Q.2. (A) Complete the following activities and rewrite them. (Any two) [4]

- (1) Complete the activity to find the value of the determinant.**

Activity:

$$\begin{aligned}\begin{vmatrix} 2\sqrt{3} & 9 \\ 2 & 3\sqrt{3} \end{vmatrix} &= 2\sqrt{3} \times \boxed{} - 9 \times \boxed{} \\ &= \boxed{} - 18 \\ &= \boxed{}\end{aligned}$$

Solution:

$$\begin{aligned}\left| \begin{array}{cc} 2\sqrt{3} & 9 \\ 2 & 3\sqrt{3} \end{array} \right| &= 2\sqrt{3} \times \boxed{3\sqrt{3}} - 9 \times \boxed{2} \\ &= \boxed{18} - 18 \\ &= \boxed{0}\end{aligned}$$

- (2) Complete the following activity to find the 19th term of an A.P., 7, 13, 19, 25,

Activity:

Given A.P.: 7, 13, 19, 25,

Here first term $a = 7$; $t_{19} = ?$

$$t_n = a + (\boxed{}) d \text{ (formula)}$$

$$\therefore t_{19} = 7 + (19 - 1) \boxed{}$$

$$\therefore t_{19} = 7 + \boxed{}$$

$$\therefore t_{19} = \boxed{}$$

Solution:

Complete the following activity to find the 19th term of an A.P., 7, 13, 19, 25,

Activity:

Given A.P.: 7, 13, 19, 25,

Here first term $a = 7$; $t_{19} = ?$

$$t_n = a + (\boxed{n-1}) d \text{ (formula)}$$

$$\therefore t_{19} = 7 + (19 - 1) \boxed{6}$$

$$\therefore t_{19} = 7 + \boxed{108}$$

$$\therefore t_{19} = \boxed{115}$$

- (3) If one die is rolled, then to find the probability of an event to get prime number on upper face, complete the following activity.

Activity:

One die is rolled.

'S' is sample space.

$$S = \{ \boxed{} \}$$

$$\therefore n(S) = 6$$

Event A : Prime number on the upper face.

$$A = \{ \boxed{} \}$$

$$\therefore n(A) = 3$$

$$P(A) = \frac{\boxed{}}{n(S)} \dots\dots\dots \text{(formula)}$$

$$\therefore P(A) = \boxed{}$$

Solution:

One die is rolled.

'S' is sample space.

$$S = \{ \boxed{1, 2, 3, 4, 5, 6} \}$$

$$\therefore n(S) = 6$$

Event A : Prime number on the upper face.

$$A = \{ \boxed{2, 3, 5} \}$$

$$\therefore n(A) = 3$$

$$P(A) = \frac{\boxed{n(A)}}{n(S)} \dots\dots\dots \text{(formula)}$$

$$\therefore P(A) = \boxed{\frac{1}{2}}$$

Q.2. (B) Solve the following sub questions. (Any four) [8]

(1) To solve the following simultaneous equations by Cramer's rule, find the values of D_x and D_y .

$$3x + 5y = 26$$

$$x + 5y = 22$$

Solution:

$$3x + 5y = 26 ; \quad x + 5y = 22$$

$$\begin{aligned} D_x &= \begin{vmatrix} 26 & 5 \\ 22 & 5 \end{vmatrix} = 26 \times 5 - 5 \times 22 \\ &= 130 - 110 \\ &= 20 \end{aligned}$$

$$\begin{aligned} D_y &= \begin{vmatrix} 3 & 26 \\ 1 & 22 \end{vmatrix} = 3 \times 22 - 26 \times 1 \\ &= 66 - 26 \\ &= 40 \end{aligned}$$

Ans. $D_x = 20$ and $D_y = 40$

- (2) A box contains 5 red, 8 blue and 3 green pens. Rutuja wants to pick a pen at random. What is the probability that the pen is blue?**

Solution:

Box contains 5 red, 8 blue and 3 green pens.

$n(S) = \{5 \text{ red pens, } 8 \text{ red pens, } 3 \text{ green pens}\}$

$n(S) = 16$

Let A be the event of getting a blue pen.

$\therefore A = \{8 \text{ blue pens}\}$

$\therefore n(A) = 8$

$\therefore p(A) = \frac{n(A)}{n(S)} = \frac{8}{16} = \frac{1}{2}$

Ans. The probability of picking a blue pen is $\frac{1}{2}$

- (3) Find the sum of first 'n' even natural numbers.**

Solution:

The first n even natural numbers are 2, 4, 6, 8, ..., n .

This is an A.P.

Here, $a = 2$, $d = t_2 - t_1 = 4 - 2 = 2$

The sum of the first n even natural numbers is

$$\begin{aligned}
 S_n &= \frac{n}{2} [2a + (n-1)d] \\
 &= \frac{n}{2} [2(2) + (n-1)(2)] \\
 &= \frac{n}{2} (4 + 2n - 2) \\
 &= \frac{n}{2} (2n + 2) \\
 &= \frac{n}{2} \times 2(n+1) \\
 &= n(n+1)
 \end{aligned}$$

Ans. The sum of the first n even natural numbers is $n(n+1)$.

- (4) Solve the following quadratic equation by factorisation method:**

$$x^2 + x - 20 = 0$$

Solution:

$$\begin{aligned}
 x^2 + x - 20 &= 0 \\
 \therefore x^2 + 5x - 4x - 20 &= 0 \\
 \therefore x(x+5) - 4(x+5) &= 0 \\
 \therefore (x+5)(x-4) &= 0 \\
 \therefore x+5=0 \text{ or } x-4=0 \\
 \therefore x=-5 \text{ or } x=4
 \end{aligned}$$

Ans. The solution of the equation is $(-5, 4)$.

- (5) Find the values of $(x + y)$ and $(x - y)$ of the following simultaneous equations:**

$$49x - 57y = 172$$

$$57x - 49y = 252$$

Solution:

$$\begin{array}{rcl}
 49x - 57y & = & 172 \quad \dots(i) \\
 + \quad 57x - 49y & = & 252 \quad \dots(ii) \\
 \hline
 106x - 106y & = & 424 \quad \dots[\text{Adding (i) and (ii)}] \\
 \therefore x - y & = & 4 \quad \dots(\text{Dividing by } 106) \\
 49x - 57y & = & 172 \quad \dots(i) \\
 - \quad 57x - 49y & = & 252 \quad \dots(ii) \\
 \hline
 -8x - 8y & = & -80 \quad \dots[\text{Subtracting (ii) from (i)}] \\
 \therefore x + y & = & 10 \quad \dots(\text{Dividing by } -8)
 \end{array}$$

Ans. $x + y = 10$ and $x - y = 4$

Q.3. (A) Complete the following activity and rewrite it. (Any one) [3]

- (1) One of the roots of equation $kx^2 - 10x + 3 = 0$ is 3. Complete the following activity to find the value of k .

Activity:

One of the roots of equation

$$kx^2 - 10x + 3 = 0 \text{ is } 3.$$

Putting $x = \boxed{}$ in the above equation

$$\therefore k(\boxed{})^2 - 10 \times \boxed{} + 3 = 0$$

$$\therefore \boxed{} - 30 + 3 = 0$$

$$\therefore 9k = \boxed{}$$

$$\therefore k = \boxed{}$$

Solution:

One of the roots of equation

$$kx^2 - 10x + 3 = 0 \text{ is } 3.$$

Putting $x = \boxed{3}$ in the above equation

$$\therefore k(\boxed{3})^2 - 10 \times \boxed{3} + 3 = 0$$

$$\therefore \boxed{9k} - 30 + 3 = 0$$

$$\therefore 9k = \boxed{27}$$

$$\therefore k = \boxed{3}$$

- (2) A card is drawn at random from a pack of well shuffled 52 playing cards. Complete the following activity to find the probability that the card drawn is –

Event A : The card drawn is an ace.

Event B : The card drawn is a spade.

Activity:

‘S’ is the sample space.

$$\therefore n(S) = 52$$

Event A : The card drawn is an ace.

$$\therefore n(A) = \boxed{}$$

$$P(A) = \boxed{} \dots\dots\dots \text{(Formula)}$$

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

$$\therefore P(A) = \frac{\boxed{}}{13}$$

Event B : The card drawn is a spade.

$$\therefore n(B) = \boxed{}$$

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

$$\therefore P(B) = \frac{\boxed{}}{4}$$

Solution:

‘S’ is the sample space.

$$\therefore n(S) = 52$$

Event A : The card drawn is an ace.

$$\therefore n(A) = \boxed{4}$$

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

$$\therefore P(A) = \frac{\boxed{4}}{52}$$

$$\therefore P(A) = \frac{\boxed{1}}{13}$$

Event B : The card drawn is a spade.

$$\therefore n(B) = \boxed{13}$$

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

$$\therefore P(B) = \frac{\boxed{1}}{4}$$

Q.3. (B) Solve the following subquestions. (Any two) [6]

(1) Solve the simultaneous equations by using graphical method :

$$\begin{aligned} x + 3y &= 7 \\ 2x + y &= -1 \end{aligned}$$

Solution:

$$x + 3y = 7$$

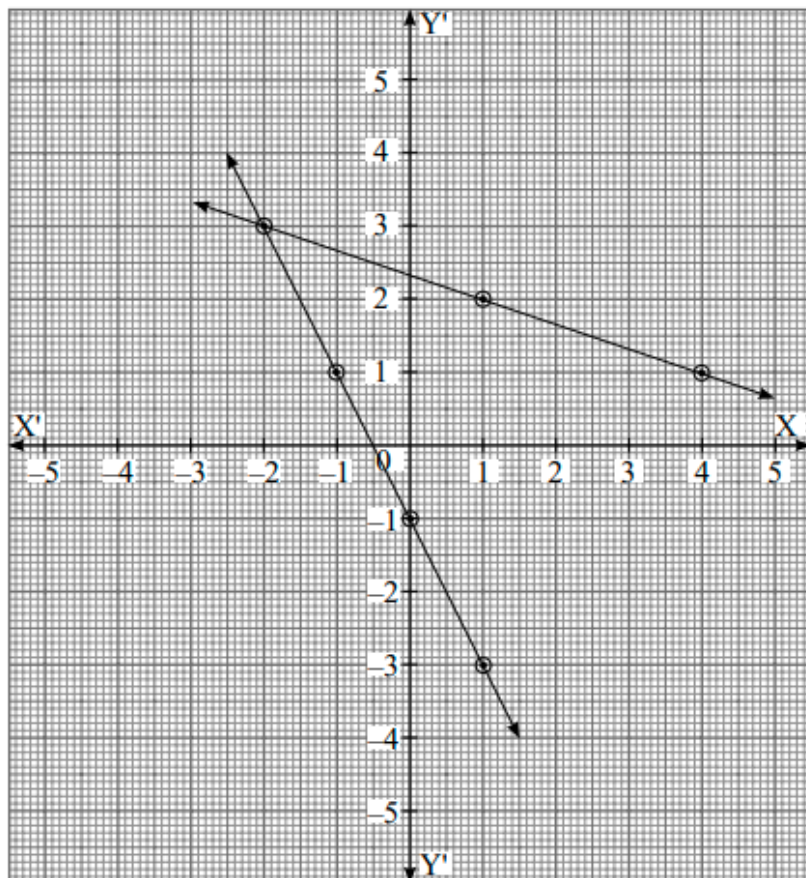
$$x = 7 - 3y$$

x	4	1	-2
y	1	2	3
(x, y)	(4, 1)	(1, 2)	(-2, 3)

$$2x + y = -1$$

$$y = -1 - 2x$$

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



Ans. $(-2, 3)$ is the solution of the given equations.

- (2) There is an auditorium with 27 rows of seats. There are 20 seats in the first row, 22 seats in the second row, 24 seats in the third row and so on. Find how many total seats are there in the auditorium?**

Solution:

Here $t_1 = 20, t_2 = 22, t_3 = 24, \dots$

$\therefore$ The A.P.: 20, 22, 24,.....

$a = 20, d = 2, n = 27, s_{27} = ?$

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

$$\begin{aligned}\therefore S_{27} &= \frac{27}{2} [2 \times 20 + (27 - 1) \times 2] \\ &= \frac{27}{2} [40 + 26 \times 2] \\ &= \frac{27}{2} [40 + 52] \\ &= \frac{27}{2} \times 92 \\ &= 27 \times 46 \\ S_{27} &= 1242\end{aligned}$$

Ans. There are 1242 seats in the auditorium.

- (3) Sum of the present ages of Manish and Savita is 31 years. Manish's age 3 years ago was 4 times the age of Savita at that time. Find their present ages.**

Solution:

Let the present age of Manish be x and that of Savita be y .

According to the first condition,

$$x + y = 31 \quad \dots(1)$$

Three years ago, Manish's age was $(x - 3)$ and Savita's age was $(y - 3)$.

$\therefore$ According to the second condition,

$$(x - 3) = 4(y - 3)$$

$$\therefore x - 3 = 4y - 12$$

$$\therefore x - 4y = -12 + 3$$

$$\therefore x - 4y = -9 \quad \dots(ii)$$

Subtract equation (ii) from (i):

$$x + y = 31 \quad \dots(i)$$

$$- \quad x - 4y = -9 \quad \dots(ii)$$

$$\hline 5y = 40$$

$$\therefore y = \frac{40}{5}$$

$$\therefore \boxed{y = 8}$$

Substituting $y = 8$ in equation (i),

$$x + 8 = 31$$

$$\therefore x = 31 - 8$$

$$\therefore \boxed{x = 23}$$

Ans. The present ages of Manish and Savita are 23 years and 8 years, respectively.

- (4) Solve the following quadratic equation using formula:**

$$x^2 + 10x + 2 = 0$$

Solution:

$$x^2 + 10x + 2 = 0$$

$$\therefore a = 1, b = 10, c = 2$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \dots(\text{formula})$$

$$\begin{aligned}
&= \frac{-10 \pm \sqrt{10^2 - 4 \times 1 \times 2}}{2 \times 1} \\
&= \frac{-10 \pm \sqrt{100 - 8}}{2} \\
&= \frac{-10 \pm \sqrt{92}}{2} \\
&= \frac{-10 \pm 2\sqrt{23}}{2} \\
&= \frac{2(-5 \pm \sqrt{23})}{2}
\end{aligned}$$

$$\therefore x = -5 + \sqrt{23} \text{ or } x = -5 - \sqrt{23}$$

Q.4. Solve the following subquestions. (Any two) [8]

- (1) If 460 is divided by a natural number, then quotient is 2 more than nine times the divisor and remainder is 5. Find the quotient and divisor.

Solution:

Let the divisor be x .

Then, quotient = $9x + 2$ and remainder = 5.

We know that

$$\text{Dividend} = \text{Divisor} \times \text{Quotient} + \text{Remainder}$$

$$\therefore 460 = x(9x + 2) + 5$$

$$\therefore 460 = 9x^2 + 2x + 5$$

$$\therefore 9x^2 + 2x + 5 - 460 = 0$$

$$\therefore 9x^2 + 2x - 455 = 0$$

Here, $a = 9$, $b = 2$ and $c = -455$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \dots(\text{formula})$$

$$= \frac{-2 \pm \sqrt{2^2 - 4 \times 9 \times -455}}{2 \times 9}$$

$$= \frac{-2 \pm \sqrt{4 + 16380}}{18}$$

$$= \frac{-2 \pm \sqrt{16384}}{18}$$

$$= \frac{-2 \pm 128}{18}$$

$$\therefore x = \frac{-2 \pm 128}{18} \text{ or } x = \frac{-2 - 128}{18}$$

$$\therefore x = 7 \text{ or } x = -\frac{65}{9}$$

But $\frac{65}{9}$ is not a natural number.

$$\therefore x = 7$$

$$\therefore \text{Quotient} = 9x + 2 = 9 \times 7 + 2 = 65$$

Ans. Divisor = 7 and quotient = 65

(2) If the 9th term of an A.P. is zero, then prove that the 29th term is double the 19th term.

Solution:

If $t_9 = 0$, then prove that $t_{29} = 2t_{19}$.

We know that

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

$$\therefore t_9 = a + (9 - 1)d$$

$$\therefore a + 8d = 0$$

$$\therefore a = -8d \quad \dots(i)$$

$$\therefore t_{19} = a + (19 - 1)d$$

$$\therefore t_{19} = -8d + 18d \quad \dots[\text{From (i)}]$$

$$\therefore t_{19} = 10d \quad \dots(ii)$$

$$t_{29} = a + (29 - 1)d$$

$$\therefore t_{29} = -8d + 28d \quad \dots[\text{From (ii)}]$$

$$\therefore t_{29} = 20d$$

$$= 2 \times 10d$$

$$= 2 \times t_{19} \quad \dots[\text{From (ii)}]$$

Hence, it is proved that $t_{29} = 2t_{19}$.

(3) The perimeter of an isosceles triangle is 24 cm. The length of its congruent sides is 13 cm less than twice the length of its base. Find the lengths of all sides of the triangle.

Solution:

Let the congruent sides be x cm and base be y cm.

According to the first condition,

$$2x + y = 24 \quad \dots(i)$$

According to the second condition,

$$x = 2y - 13$$

$$\therefore x - 2y = -13 \quad \dots(ii)$$

Multiplying equation (ii) by 2, we get

$$2x - 4y = -26 \quad \dots(iii)$$

$$- \quad 2x + y = 24 \quad \dots(i)$$

$$\hline -5y = -50 \quad \dots[\text{Subtracting (i) from (iii)}]$$

$$\therefore y = \frac{-50}{-5}$$

$$\therefore y = 10$$

Substituting $y = 10$ in equation (i),

$$2x + 10 = 24$$

$$\therefore 2x = 24 - 10$$

$$\therefore x = \frac{14}{2}$$

$$\therefore x = 7$$

Ans. Length of congruent sides is 7cm and base is 10 cm.

Q.5. Solve the following subquestions. (Any one)

- (1) A bag contains 8 red and some blue balls. One ball is drawn at random from the bag. If ratio of probability of getting red ball and blue ball is 2:5, then find the number of blue balls.

Solution:

Let the number of blue balls be x ,

$$S = \{8 \text{ red balls}, x \text{ blue balls}\}$$

$$\therefore n(S) = (8 + x)$$

Let R be the event of getting a red ball.

$$n(R) = 8$$

$$P(R) = \frac{n(R)}{n(S)} = \frac{8}{8 + x}$$

Let B be the event of getting a blue ball.

$$n(B) = x$$

$$P(R) = \frac{n(B)}{n(S)} = \frac{x}{8 + x}$$

According to the given condition,

$$\frac{\frac{8}{8+x}}{\frac{x}{8+x}} = \frac{2}{5}$$

$$\therefore \frac{8}{8+x} \times \frac{8+x}{x} = \frac{2}{5}$$

$$\therefore \frac{8}{x} = \frac{2}{5}$$

$$\therefore 40 = 2x$$

$$\therefore x = 20$$

Ans. The number of blue balls is 20.

- (2) Measures of angles of a triangle are in A.P. The measure of smallest angle is five times of common difference. Find the measures of all angles of a triangle.

(Assume the measures of angles as $a, a + d, a + 2d$.)

Solution:

Let the angles be $a, a + d, a + 2d$.

$$\therefore a + a + d + a + 2d = 180^\circ \text{ (sum of all angles in a triangle)}$$

$$\therefore 3a + 3d = 180^\circ$$

$$\therefore a + d = 60 \quad \dots(i) \text{ (Dividing by 3)}$$

According to the given condition,

$$a = 5d \quad \dots(ii)$$

Substituting value of a from equation (ii) in equation (i),

$$5d + d = 60$$

$$\therefore 6d = 60$$

$$\therefore d = \frac{60}{6}$$

$$\therefore d = 10$$

Substituting $d = 10$ in equation (ii),

$$a = 5 \times 10$$

$$\therefore a = 50^\circ$$

$$a + d = 50 + 10 = 60^\circ$$

$$a + 2d = 50 + 2 \times 10 = 70^\circ$$

Ans. The measures of the angles of the given triangle are $50^\circ, 60^\circ$ and 70° .

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