

Chapter : 8. LINEAR EQUATIONS

Exercise : 8A

Question: 1

Solve:

Solution:

$$8x + 3 = 27 + 2x$$

By transposition,

$$\Rightarrow 8x - 2x = 27 - 3$$

$$\Rightarrow 6x = 24$$

$$\Rightarrow x = 4$$

Question: 2

Solve:

Solution:

$$5x + 7 = 2x - 8$$

By transposition,

$$\Rightarrow 5x - 2x = -8 - 7$$

$$\Rightarrow 3x = -15$$

$$\Rightarrow x = -5$$

Question: 3

Solve:

Solution:

$$2z - 1 = 14 - z$$

By transposition,

$$\Rightarrow 2z + z = 14 + 1$$

$$\Rightarrow 3z = 15$$

Dividing by 3, on both the sides we get, $\Rightarrow \frac{3z}{3} = \frac{15}{3}$

$$\Rightarrow z = 5$$

Question: 4

Solve:

Solution:

$$9x + 5 = 4(x - 2) + 8$$

By transposition,

$$\Rightarrow 9x + 5 = 4x - 8 + 8$$

$$\Rightarrow 9x - 4x = -5 + 0$$

$$\Rightarrow 5x = -5$$

$$\Rightarrow x = -1$$

Question: 5

Solve:

Solution:

$$\frac{7y}{5} = y - 4$$

By cross multiplication

$$\Rightarrow \frac{7y}{5} - y = -4$$

Taking LCM of 5 and 1 = 5 on LHS

$$\Rightarrow \frac{7y-5y}{5} = -4$$

$$\Rightarrow 2y = -5 \times 4$$

$$\Rightarrow y = -5 \times 2 = -10$$

Question: 6

Solve:

Solution:

$$3x + \frac{2}{3} = 2x + 1$$

By cross multiplication

$$\Rightarrow 3x - 2x = -\frac{2}{3} + 1$$

Taking LCM of 3 and 1 = 3 on RHS

$$\Rightarrow x = \frac{-2+3}{3} = \frac{1}{3}$$

Question: 7

Solve:

Solution:

$$15(y - 4) - 2(y - 9) + 5(y + 6) = 0$$

Opening the brackets and multiplying, we get,

$$\Rightarrow 15y - 60 - 2y + 18 + 5y + 30 = 0$$

$$\Rightarrow 15y - 2y + 5y - 60 + 18 + 30 = 0$$

$$\Rightarrow 18y = 12$$

$$\Rightarrow y = \frac{12}{18} = \frac{2}{3}$$

Question: 8

Solve:

Solution:

$$3(5x - 7) - 2(9x - 11) = 4(8x - 13) - 17$$

Multiplying we get,

$$\Rightarrow 15x - 21 - 18x + 22 = 32x - 52 - 17$$

$$\text{Solving, we get } (15x - 18x) + (22 - 21) = 32x - (52 + 17)$$

$$\Rightarrow -3x + 1 = 32x - 69$$

$$\Rightarrow 35x = 70$$

$$\Rightarrow x = 2$$

Question: 9

Solve:

Solution:

$$\frac{x-5}{2} - \frac{x-3}{5} = \frac{1}{2}$$

Taking LCM of 2 and 5 = 10 on LHS

$$\Rightarrow \frac{5(x-5)-2(x-3)}{10} = \frac{1}{2}$$

By cross multiplication

$$\Rightarrow 5x - 25 - 2x + 6 = 10/2$$

$$\Rightarrow 3x = 5 + 19$$

$$\Rightarrow x = \frac{24}{3} = 8$$

Question: 10

Solve:

Solution:

$$\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$$

Taking LCM of 3 and 4 = 12 on LHS and LCM of 3 and 1 = 3 on RHS

$$\Rightarrow \frac{3(3t-2)-4(2t+3)}{12} = \frac{2-3t}{3}$$

$$\text{By cross multiplication} \Rightarrow \frac{3(3t-2)-4(2t+3)}{4} = 2-3t$$

$$\Rightarrow 9t - 6 - 8t - 12 = 4(2 - 3t) \Rightarrow 9t - 6 - 8t - 12 = 8 - 12t \Rightarrow t - 18 = 8 - 12t \Rightarrow t + 12t = 8 + 18$$

$$\Rightarrow t = \frac{26}{13} = 2$$

Question: 11

Solution:

$$\frac{2x+7}{5} - \frac{3x+11}{2} = \frac{2x+8}{3} - 5$$

Taking LCM of 5 and 2 = 10 on LHS and LCM of 3 and 1 = 3 on RHS

$$\frac{2(2x+7)-5(3x+11)}{10} = \frac{2x+8-15}{3}$$

By cross multiplication

$$\Rightarrow 3(4x + 14 - 15x - 55) = 10(2x - 7)$$

$$\Rightarrow 3(-11x - 41) = 20x - 70$$

$$\Rightarrow -33x - 20x = 123 - 70$$

$$\Rightarrow x = -\frac{53}{53} = -1$$

Question: 12

Solve:

Solution:

$$\frac{5x-4}{6} = 4x+1 - \frac{3x+10}{2}$$

Taking LCM of 1 and 2 = 2 on RHS

$$\frac{5x-4-6(4x+1)+3(3x+10)}{6} = 0$$

By cross multiplication

$$\Rightarrow 5x - 4 - 24x - 6 + 9x + 30 = 0$$

$$\Rightarrow -10x = -20$$

$$\Rightarrow x = \frac{20}{10} = 2$$

Question: 13

Solve:

Solution:

$$5x - \frac{1}{3}(x+1) = 6\left(x + \frac{1}{30}\right)$$

Taking LCM on both the sides

$$\frac{15x-(x+1)}{3} = \frac{6(30x+1)}{30}$$

By cross multiplication

$$\Rightarrow 10(14x - 1) = 6(30x + 1)$$

$$\Rightarrow 140x - 180x = 6 + 10$$

$$\Rightarrow -40x = 16$$

$$\Rightarrow x = -\frac{2}{5}$$

Question: 14

Solve:

Solution:

$$4 - \frac{2(z-4)}{3} = \frac{1}{2}(2z+5)$$

Taking LCM of 1 and 3 on LHS = 3

$$\frac{12-2(z-4)}{3} = \frac{2z+5}{2}$$

By cross multiplication

$$\Rightarrow 2(12 - 2z + 8) = 3(2z + 5)$$

$$\Rightarrow 40 - 4z = 6z + 15$$

$$\Rightarrow -10z = -25$$

$$\Rightarrow z = \frac{25}{10} = \frac{5}{2}$$

Question: 15

Solve:

Solution:

$$\frac{3(y-5)}{4} - 4y = 3 - \frac{(y-3)}{2}$$

Taking LCM of 4 and 1 on LHS = 4 and 1 and 2 on RHS = 2

$$\frac{3(y-5)-16y}{4} = \frac{6-y+3}{2}$$

By cross multiplication

$$\Rightarrow 3y - 15 - 16y = 2(9 - y)$$

$$\Rightarrow -13y + 2y = 18 + 15$$

$$\Rightarrow -11y = 33$$

$$\Rightarrow y = -3$$

Question: 16

Solve:

Solution:

$$\frac{8x-3}{3x} = 2$$

By cross multiplication

$$8x - 3 = 6x$$

$$\Rightarrow 2x = 3$$

$$\Rightarrow x = \frac{3}{2}$$

Question: 17

Solve:

Solution:

$$\frac{9x}{7-6x} = 15$$

By cross multiplication

$$9x = 15(7 - 6x)$$

$$\Rightarrow 9x + 90x = 105$$

$$\Rightarrow 99x = 105$$

$$\Rightarrow x = \frac{35}{33}$$

Question: 18

Solve:

Solution:

$$\frac{3x}{5x+2} = -4$$

By cross multiplication

$$3x = -4(5x + 2)$$

$$\Rightarrow 3x = -20x - 8$$

$$\Rightarrow 3x + 20x = -8$$

$$\Rightarrow 23x = -8$$

$$\Rightarrow x = \frac{-8}{23}$$

Question: 19

Solve:

Solution:

$$\frac{6y-5}{2y} = \frac{7}{9}$$

By cross multiplication

$$9(6y - 5) = 7 \times 2y$$

$$\Rightarrow 54y - 45 = 14y$$

$$\Rightarrow 54y - 14y = 45$$

$$\Rightarrow 40y = 45$$

$$\Rightarrow y = \frac{45}{40}$$

$$\text{Or } y = \frac{9}{8}$$

Question: 20

Solve:

Solution:

$$\frac{2 - 9z}{17 - 4z} = \frac{4}{5} \text{ By cross multiplication}$$

$$5(2 - 9z) = 4(17 - 4z)$$

$$\Rightarrow 10 - 45z = 68 - 16z$$

$$\Rightarrow -45z + 16z = 68 - 10$$

$$\Rightarrow x = -\frac{58}{29} = -2$$

Question: 21

Solve:

Solution:

$$\frac{4x+7}{9-3x} = \frac{1}{4}$$

By cross multiplication

$$4(4x + 7) = (9 - 3x)$$

$$\Rightarrow 16x + 28 = 9 - 3x$$

$$\Rightarrow 19x = -19$$

$$\Rightarrow x = -1$$

Question: 22

Solve:

Solution:

$$\frac{7y+4}{y+2} = -\frac{4}{3}$$

By cross multiplication

$$3(7y + 4) = -4(y + 2)$$

$$\Rightarrow 21y + 12 = -4y - 8$$

$$\Rightarrow 25y = -20$$

$$\Rightarrow x = -\frac{4}{5}$$

Question: 23

Solve:

Solution:

$$\frac{15(2 - y) - 5(y + 6)}{1 - 3y} = 10$$

By cross multiplication

$$30 - 15y - 5y - 30 = 10 - 30y$$

$$\Rightarrow -20y + 30y = 10$$

$$\Rightarrow 10y = 10$$

$$\Rightarrow x = 1$$

Question: 24

Solve:

Solution:

$$\frac{2x - (7 - 5x)}{9x - (3 + 4x)} = \frac{7}{6}$$

By cross multiplication

$$6(2x - 7 + 5x) = 7(9x - 3 - 4x)$$

$$\Rightarrow 42x - 42 = 35x - 21$$

$$\Rightarrow 7x = 21$$

$$\Rightarrow x = 3$$

Question: 25

Solve:

Solution:

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

Taking LCM of 1 and 2 on LHS = 2 and 1 and 3 on RHS = 3

$$\frac{2m-m+1}{2} = \frac{3-m+2}{3}$$

Taking transposition

$$\Rightarrow 3(m + 1) = 2(5 - m)$$

$$\Rightarrow 3m + 3 = 10 - 2m$$

$$\Rightarrow 5m = 7$$

$$\Rightarrow m = 7/5$$

Question: 26

Solve:

Solution:

$$\frac{3x+5}{4x+2} = \frac{3x+4}{4x+7}$$

Taking transposition

$$(4x + 7)(3x + 5) = (3x + 4)(4x + 2)$$

$$\Rightarrow 12x^2 + 20x + 21x + 35 = 12x^2 + 6x + 16x + 8$$

$$\Rightarrow 12x^2 - 12x^2 + 41x - 22x = 8 - 35$$

$$\Rightarrow 19x = -27$$

$$\Rightarrow x = -\frac{27}{19}$$

Question: 27

Solve:

Solution:

$$\frac{9x-7}{3x+5} = \frac{3x-4}{x+6}$$

By cross multiplication

$$(9x - 7)(x + 6) = (3x - 4)(3x + 5)$$

$$\Rightarrow 9x^2 + 54x - 7x - 42 = 9x^2 + 15x - 12x - 20$$

$$\Rightarrow 9x^2 - 9x^2 + 47x - 3x = -20 + 42$$

$$\Rightarrow 44x = 22$$

$$\Rightarrow x = \frac{1}{2}$$

Question: 28

Solve:

Solution:

$$\frac{2-7x}{1-5x} = \frac{3+7x}{4+5x}$$

By cross multiplication

$$(2 - 7x)(4 + 5x) = (3 + 7x)(1 - 5x)$$

$$\Rightarrow 8 + 10x - 28x - 35x^2 = 3 - 15x + 7x - 35x^2$$

$$\Rightarrow -35x^2 - 35x^2 - 18x + 8x = 3 - 8$$

$$\Rightarrow -10x = -5$$

$$\Rightarrow x = \frac{1}{2}$$

Exercise : 8B

Question: 1

Two numbers are i

Solution:

Since the numbers are in the ratio 8:3 so Let the numbers be $8x$ and $3x$

According to the question

$$8x + 3x = 143$$

$$\Rightarrow 11x = 143$$

$$\Rightarrow x = 13$$

So the numbers are $8x = 8 \times 13 = 104$ and $3x = 3 \times 13 = 39$

Question: 2**Solution:**

Let the numbers be x

According to the question

$$\frac{2}{3}x + 20 = x$$

By cross multiplication

$$\Rightarrow x - \frac{2}{3}x = 20$$

Taking LCM of 1 and 3 on LHS = 3

$$\Rightarrow \frac{3x - 2x}{3} = 20$$

$$\Rightarrow x = 60$$

So the number 60

Question: 3

Four - fifths of

Solution:

Let the numbers be x

According to the question

$$\frac{4}{5}x - 10 = \frac{2}{3}x$$

$$\Rightarrow \frac{4}{5}x - \frac{2}{3}x = 10$$

$$\Rightarrow \frac{12x - 10x}{15} = 10$$

$$\Rightarrow 2x = 10 \times 15 = 150 \Rightarrow x = 75$$

So the number is 75.

Question: 4

Twenty - four is

Solution:

Let the two parts be x and $(24 - x)$

According to the question

$$7x + 5(24 - x) = 146$$

By cross multiplication

$$\Rightarrow 2x = 146 - 120$$

$$\Rightarrow 2x = 26$$

$$\Rightarrow x = 13$$

So the parts are 13 and $(24 - 13) = 11$

Question: 5

Find the number w

Solution:

Let the numbers be x

According to the question

$$\frac{1}{5}x + 5 = \frac{1}{4}x - 5$$

Taking LCM of 5 and 1 on LHS = 5 and 4 and 1 on RHS = 1

$$\Rightarrow \frac{1}{5}x - \frac{1}{4}x = -10$$

$$\Rightarrow \frac{4x-5x}{20} = -10$$

$$\Rightarrow x = 200$$

So the number 200

Question: 6

Three numbers are

Solution:

Let the numbers be 4x, 5x and 6x

According to the question

$$6x + 4x = 5x + 55$$

By cross multiplication

$$\Rightarrow 10x - 5x = 55$$

$$\Rightarrow 5x = 55$$

$$\Rightarrow x = 11$$

So the numbers are $4x = 4 \times 11 = 44$, $5x = 5 \times 11 = 55$ and $6x = 6 \times 11 = 66$

Question: 7

If 10 be added to

Solution:

Let the number be x

According to the question

$$10 + 4x = 5x - 5 \quad [10 \text{ is added to } 4 \text{ times the number, } 5 \text{ less than } 5 \text{ times the number}]$$

By transposing

$$\Rightarrow 5x - 4x = 10 + 5$$

$$\Rightarrow x = 15$$

So the number is 15

Question: 8

Two numbers are s

Solution:

Let the numbers be $3x$ and $5x$

According to the question

$$\frac{3x + 10}{5x + 10} = \frac{5}{7}$$

By cross multiplication

$$\Rightarrow 7(3x + 10) = 5(5x + 10)$$

$$\Rightarrow 21x + 70 = 25x + 50$$

$$\Rightarrow 4x = 20$$

$$\Rightarrow x = 5$$

So the numbers are $3x = 3 \times 5 = 15$ and $5x = 5 \times 5 = 25$

Question: 9

Find three consec

Solution:

Let the numbers be $(2x + 1)$, $(2x + 3)$ and $(2x + 5)$

According to the question

$$2x + 1 + 2x + 3 + 2x + 5 = 147$$

By cross multiplication

$$\Rightarrow 6x + 9 = 147$$

$$\Rightarrow 6x = 147 - 9$$

$$\Rightarrow x = \frac{138}{6} = 23$$

So the numbers are $(2x + 1) = 47$, $(2x + 3) = 49$ and $(2x + 5) = 51$

Question: 10

Find three consec

Solution:

Let the numbers be $2x$, $(2x + 2)$ and $(2x + 4)$

According to the question

By cross multiplication

$$2x + 2x + 2 + 2x + 4 = 234$$

$$\Rightarrow 6x + 6 = 234$$

$$\Rightarrow 6x = 228$$

$$\Rightarrow x = \frac{228}{6} = 38$$

So the numbers are $2x = 76$, $(2x + 2) = 78$ and $(2x + 4) = 80$

Question: 11

The sum of the di

Solution:

Let the digits be x and y so the number = $(10x + y)$, on reversing the digits number = $(10y + x)$

According to the question

$$x + y = 12 \dots\dots(A)$$

$$\text{And } 10y + x - 10x - y = 54$$

$$\Rightarrow 9y - 9x = 54$$

$$\Rightarrow y - x = 54/9 = 6$$

$$\Rightarrow y = 6 + x$$

Putting in (A) we get

$$x + 6 + x = 12$$

$$\Rightarrow 2x = 6$$

$$\Rightarrow x = 3$$

$$\Rightarrow y = 6 + x = 9$$

So the number is 39

Checking the answer:

$$\text{Digit sum} = 3 + 9 = 12$$

$$\text{Reversing the digits number becomes} = 93$$

$$93 - 39 = 54$$

Hence, verified.

Question: 12

The digit in the

Solution:

Let the unit digit be y and tens digit is x so numbers = $(10x + y)$, on reversing the digits number = $(10y + x)$

According to the question

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

$$\text{And } 10y + x + 36 = 10x + y$$

$$\Rightarrow 10y - y + 36 = 10x - x$$

$$\Rightarrow 9y - 9x = -36$$

Putting (A) we get

$$9y - 27y = -36$$

$$\Rightarrow -18y = -36$$

$$\Rightarrow y = 2$$

$$\Rightarrow x = 3y = 6$$

So the number is 62

Checking the answer:

$$\text{Digit at tens place} = 6 = 3 \times \text{digit at unit place } 2$$

$$\text{Reversing the digits number becomes} = 26$$

$$26 + 36 = 62$$

Hence, verified.

Question: 13

The denominator o

Solution:

Let the rational numbers be $\frac{x}{y}$

According to the question

$$y = x + 7 \quad x = y - 7 \dots (1)$$

$$\text{And } \frac{x + 17}{y - 6} = 2$$

Putting (1), we get, $\frac{y - 7 + 17}{y - 6} = 2$

By cross multiplication

$$\Rightarrow y - 7 + 17 = 2(y - 6)$$

$$\Rightarrow y + 10 = 2y - 12$$

$$\Rightarrow 2y - y = 10 + 12$$

$$\Rightarrow y = 22$$

$$\Rightarrow x = y - 7 = 22 - 7 = 15$$

So the number is $\frac{15}{22}$

Question: 14

In a fraction, tw

Solution:

Let the numerator is x. Now, according to question twice the numerator (2x) is 2 more than denominator. Then denominator = 2x - 2. The fraction = $\frac{x}{2x - 2}$

Now, the numerator is increased by 3, numerator becomes x + 3. The denominator is increased by 3, denominator becomes (2x - 2 + 3) = 2x + 1. Therefore, the new fraction = $\frac{x + 3}{2x + 1}$

$$\text{According to question, } \frac{x + 3}{2x + 1} = \frac{2}{3}$$

Cross-multiplying we get, $3(x + 3) = 2(2x + 1)$
 $3x + 9 = 4x + 2$
 $3x + 9 - 4x = 2 - 9$
 $-x = -7$
 $x = 7$
 Now, putting the value of x, we get that Original fraction = $\frac{x}{2x - 2} = \frac{7}{2 \times 7 - 2} = \frac{7}{12}$ **Hence, the original fraction is 7/12.**

Question: 15

The length of a r

Solution:

To Find: Length and Breadth of the original rectangle. Let the length and breadth of a rectangle be l cm and b cm

According to the question

Breadth of rectangle is 7 less than the length of the rectangle,

$$l - 7 = b \dots (1)$$

$$\text{Area of a rectangle} = (l \times b)$$

Now length of the rectangle is decrease by 4, and breadth increased by 3,

$$\text{Area of new rectangle} = (l - 4)(b + 3)$$

$$\text{Area of new rectangle} = \text{Area of Old rectangle} \quad (l - 4)(b + 3) = lb$$

Now

Putting the value of b from equation 1, we get,

$$(1 - 4)(1 - 7 + 3) = 1(1 - 7)$$

$(1 - 4)(1 - 4) = 1(1 - 7)$ Opening the brackets, we get,

$$\Rightarrow 1^2 - 41 - 41 + 16 = 1^2 - 71$$

$$\Rightarrow 1^2 - 81 + 16 = 1^2 - 71$$

$$\Rightarrow -1 = -16$$

$$\Rightarrow 1 = 16 \text{ cm}$$

$$b = 1 - 7 = 16 - 7 = 9 \text{ cm}$$

Hence, length and breadth of original rectangle are 16 cm and 9 cm.

Question: 16

The width of a re

Solution:

Let the length and breadth of a rectangle be l m and b m

According to the question

$$b = \frac{2}{3}l \text{ (A)}$$

Perimeter of a rectangle = $2(l + b)$

$$\text{And } 2(l + b) = 180$$

Putting (A) we get

$$2\left(1 + \frac{2}{3}1\right) = 180$$

$$\Rightarrow \frac{31 + 21}{3} = 90$$

$$\Rightarrow 51 = 90 \times 3$$

$$\Rightarrow 1 = 54 \text{ m}$$

$$\Rightarrow b = \frac{2}{3}(54) = 36 \text{ m}$$

Question: 17

An altitude of a

Solution:

Let the length of the altitude and base of a triangle be l cm and b cm

According to the question

$$l = \frac{5}{3}b \text{ (A)}$$

Area of a triangle = $\frac{1}{2}(\text{base} \times \text{length of the altitude})$

$$\text{And } \frac{1}{2}(l + 4)(b - 2) = \frac{1}{2}l \times b$$

Putting (A) we get

$$\Rightarrow \left(\frac{5}{3}b + 4\right)(b - 2) = \frac{5}{3}b \times b$$

Taking LCM of 3 and 1 = 3 on LHS

$$\Rightarrow \frac{5}{3}b^2 + 4b - \frac{10}{3}b - 8 = \frac{5}{3}b^2$$

$$\Rightarrow \frac{12b-10b}{3} = 8$$

$$\Rightarrow 2b = 24 \text{ cm}$$

$$b = 12 \text{ cm and } l = \frac{5}{3}b = 20 \text{ cm}$$

Question: 18

Two angles of a triangle

Solution:

Let the given two angles of a triangle be $4x$ and $5x$

According to the question

$$3^{\text{rd}} \text{ angle} = 4x + 5x = 9x$$

Using angle sum property of a triangle

$$4x + 5x + 9x = 180^\circ$$

$$\Rightarrow 18x = 180^\circ$$

$$\Rightarrow x = 10$$

So, the angles of the given triangle are:

$$4x = 40^\circ, 5x = 50^\circ \text{ and } 9x = 90^\circ$$

Question: 19

A steamer goes down

Solution:

Let the speed of the steamer in still water be x km/h

Speed in downstream = $x + 1$, Speed in upstream = $x - 1$

Distance = speed $\times$ time

According to the question

$$9(x + 1) = 10(x - 1)$$

By cross multiplication

$$\Rightarrow 9x + 9 = 10x - 10$$

$$\Rightarrow x = 19 \text{ km/h}$$

$$\text{Distance between the ports} = 9(19 + 1) = 180 \text{ km}$$

Question: 20

The distance between

Solution:

Let the speed of motorcyclists be x km/h and y km/h

According to the question

$$x + 7 = y \text{ (A)}$$

$$\text{And } 2y + 2x + 34 = 300$$

Putting (A) we get

$$\Rightarrow 2(x + 7) + 2x + 34 = 300$$

$$\Rightarrow 2x + 14 + 2x = 300 - 34$$

$$\Rightarrow 4x = 266 - 14$$

$$\Rightarrow x = \frac{252}{4} = 63 \text{ km/h}$$

$$\Rightarrow y = x + 7 = 63 \frac{\text{km}}{\text{h}} + 7 = 70 \text{ km/h}$$

Checking the answer:

$$2(70) + 2(63) + 34 = 140 + 126 + 34 = 300 = \text{Distance between them}$$

Hence, verified .

Question: 21

Divide 150 into t

Solution:

Let the first part be x of 150

According to the question second part is $\frac{5}{6}x$

And the third part is $\frac{4}{5} \left(\frac{5}{6}x \right)$

Adding all of them

$$x + \frac{5}{6}x + \frac{20}{30}x = 150$$

Taking LCM of 6 and 30 = 30

$$\Rightarrow \frac{30x + 25x + 20x}{30} = 150$$

$$\Rightarrow 75x = 150 \times 30$$

$$\Rightarrow x = \frac{4500}{75} = 60$$

$$\text{Second part} = \frac{5}{6}x = 50$$

$$\text{Third part} = \frac{4}{5} \left(\frac{5}{6}x \right) = 40$$

Question: 22

Divide 4500 into

Solution:

Let the first part and second part be x and y respectively

According to the question

$$\frac{5}{100}x = \frac{10}{100}y$$

$$\Rightarrow y = \frac{5}{10}x = \frac{1}{2}x$$

Adding them

$$x + \frac{1}{2}x = 4500$$

$$\Rightarrow \frac{3x}{2} = 4500$$

$$\Rightarrow 3x = 4500 \times 2$$

$$\Rightarrow x = \frac{9000}{3} = 3000$$

$$\text{Second part} = \frac{1}{2}x = 1500$$

Question: 23

Rakhi's moth

Solution:

Let the age of Rakhi and Rakhi's mother be x and $4x$ respectively

According to the question

$$(4x + 5) = 3(x + 5)$$

$$\Rightarrow 4x - 3x = 15 - 5$$

So, Rakhi' age = $x = 10$ Years

and Rakhi' s mother is $4x = 40$ years

Question: 24

Monu's fathe

Solution:

Let the age of Monu's father be x years

According to the question

Age of Monu = $x - 29$ years

And age of Monu's grandfather = $x + 26$

Adding all of these,

$$x + x - 29 + x + 26 = 135$$

$$\Rightarrow 3x = 135 + 3$$

$$\Rightarrow x = \frac{138}{3} = 46$$

So, Monu' s father is 46 Years

and Monu is $46 - 29 = 17$ years

Monu's grandfather is $46 + 26 = 72$ years

Question: 25

A man is 10 times

Solution:

Let the age of man be x years

According to the question

$$\text{Age of his grandson} = \frac{1}{10}x$$

Also,

$$x - \frac{1}{10}x = 54$$

taking LCM of 1 and 10 = 10

$$\Rightarrow 9x = 540$$

$$\Rightarrow x = \frac{540}{9} = 60$$

So, Man is 60 Years

and Grandson is $\frac{1}{10}x = 6$ years

Question: 26

The difference be

Solution:

Let the ages of cousins be x years and x - 10 years

According to the question

$$x - 15 = 2(x - 10 - 15)$$

By cross multiplication

$$\Rightarrow x - 15 = 2x - 50$$

$$\Rightarrow x = 35$$

So, cousins are 35 Years and 25 years in age

Question: 27

Half of a herd of

Solution:

Let the number of deer in the herd be x.

Number of those who are grazing = $\frac{x}{2}$

Remaining = $\frac{x}{2}$

Number of those who are playing =

$$\left(\frac{3}{4} \times \frac{x}{2}\right) = \frac{3x}{8}$$

$$\therefore \frac{x}{2} + \frac{3x}{8} + 9 = x.$$

$$\Rightarrow \frac{4x + 3x + 72}{8} = x$$

$$\Rightarrow 7x + 72 = 8x \Rightarrow 72 = x$$

Exercise : 8C

Question: 1

If $2x - 3 = x + 2$

Solution:

$$2x - 3 = x + 2$$

By transposing x and 3

$$\Rightarrow 2x - x = 3 + 2$$

$$\Rightarrow x = 5$$

Question: 2

If $5x - \frac{3}{2}x = -14 - \frac{7}{2}$

By cross multiplication

$$\Rightarrow 5x - \frac{3}{2}x = -14 - \frac{7}{2}$$

Taking LCM of 1 and 2 = 2

$$\Rightarrow \frac{10x - 3x}{2} = \frac{-28 - 7}{2}$$

$$\Rightarrow 7x = -35$$

$$\Rightarrow x = -5$$

Question: 3

If $z = \frac{4}{5}(z + 10)$

Solution:

$$z = \frac{4}{5}(z + 10)$$

By cross multiplication, $z - \frac{4}{5}z = \frac{40}{5}$

Taking LCM of 1 and 5 = 5

$$\Rightarrow \frac{z}{5} = \frac{40}{5}$$

$$\Rightarrow z = 40$$

Question: 4

If $3m = 5m - \frac{8}{5}$

Solution:

$$3m = 5m - \frac{8}{5}$$

By cross multiplication, $5m - 3m = \frac{8}{5}$

$$\Rightarrow 2m = \frac{8}{5}$$

$$\Rightarrow m = \frac{4}{5}$$

Question: 5

If $5t - 3 = 3t - 5$

Solution:

$$5t - 3 = 3t - 5 \quad \dots (1)$$

By transposition of -3 on RHS we get, $5t = 3t - 5 + 3$ By transposition of 3t on LHS we get, $5t - 3t = -2$

$$\Rightarrow 2t = -2$$

$$\Rightarrow t = -1 \quad \text{Check: Put the value of t in (1), LHS } 5(-1) - 3 = -5 - 3 = -8 \quad \text{RHS } 3(-1) - 5 = -3 - 5 = -8 \quad \text{As LHS = RHS The value t = -1 is correct.}$$

Question: 6

If $\frac{2y+1}{3} = \frac{26-5}{3}$

By cross multiplication,

$$2y + 1 = \frac{26-5}{3}$$

$$\Rightarrow 3y = 7$$

$$\Rightarrow y = \frac{7}{3}$$

Question: 7

If $\frac{6x+1+3}{3} = \frac{x-3}{6}$

Taking LCM of 1 and 3 = 3,

$$\frac{6x+1+3}{3} = \frac{x-3}{6}$$

$$\Rightarrow 2(6x + 4) = (x - 3)$$

$$\Rightarrow 12x - x = -3 - 8$$

$$\Rightarrow x = -1$$

Question: 8

If $\frac{n}{2} - \frac{3n}{4} + \frac{5n}{6} = 21$

Taking LCM of 2, 4, 6 = 12

$$\frac{6n - 9n + 10n}{12} = 21$$

$$\Rightarrow 7n = 21 \times 12$$

$$\Rightarrow n = 36$$

Question: 9

if $\frac{x+1}{2x+3} = \frac{3}{8}$

By cross multiplication, $8(x + 1) = 3(2x + 3)$

$$\Rightarrow 8x - 6x = 9 - 8$$

$$\Rightarrow 2x = 1$$

$$\Rightarrow x = \frac{1}{2}$$

Question: 10

If $\frac{6(4x+8)}{5} = \frac{5(5x+8)}{5}$

By cross multiplication,

$$6(4x + 8) = 5(5x + 8)$$

$$\Rightarrow 24x - 25x = 40 - 48$$

$$\Rightarrow -x = -8$$

$$\Rightarrow x = 8$$

Question: 11

$$\text{If } \frac{n}{n+15} = \frac{4}{9}$$

By cross multiplication,

$$9n = 4(n + 15)$$

$$\Rightarrow 5n = 60$$

$$\Rightarrow n = 12$$

Question: 12

$$\text{If } 3(t - 3) = 5(2$$

Solution:

$$3(t - 3) = 5(2t + 1)$$

Opening the brackets,

$$3t - 9 = 10t + 5 \Rightarrow 3t - 10t = 5 + 9 \Rightarrow -7t = 14 \Rightarrow 7t = -14$$

$$\Rightarrow t = -2$$

Question: 13

Four - fifths of

Solution:

$$\frac{4}{5}x - \frac{3}{4}x = 4$$

$$\Rightarrow \frac{16x - 15x}{20} = 4$$

$$\Rightarrow x = 80$$

Question: 14

The ages of A and

Solution:

Let the ages of A and B be 5x and 7x

$$\Rightarrow \frac{5x + 4}{7x + 4} = \frac{3}{4}$$

By cross multiplication

$$\Rightarrow 4(5x + 4) = 3(7x + 4)$$

$$\Rightarrow 21x - 20x = 16 - 12$$

$$\Rightarrow x = 4$$

$$\text{Age of B} = 7x = 28 \text{ years}$$

Question: 15

The base of an is

Solution:

Let the length of equal sides be x cm.

We know that, Perimeter = 16 cm

$$\Rightarrow x + x + 6 = 16$$

$$\Rightarrow 2x = 10$$

$$\Rightarrow x = 5\text{cm}$$

Question: 16

Sum of three cons

Solution:

Let the consecutive integers be x , $x + 1$ and $x + 2$

$$x + x + 1 + x + 2 = 51$$

$$\Rightarrow 3x = 51 - 3$$

$$\Rightarrow x = \frac{48}{3} = 16$$

$$\text{Middle one} = x + 1 = 16 + 1 = 17$$

Question: 17

The sum of two nu

Solution:

Let the numbers be x and $95 - x$

$$\Rightarrow 95 - x - x = 15$$

By cross multiplication

$$\Rightarrow -2x = -80$$

$$\Rightarrow x = 40$$

$$\text{So, the numbers are } 40 \text{ and } 95 - 40 = 55$$

Question: 18

Number of boys an

Solution:

Let the number of girls and boys be $5x$ and $7x$ respectively

According to the question

$$7x = 8 + 5x$$

$$\Rightarrow 2x = 8$$

$$\Rightarrow x = 4$$

$$\text{Boys} = 7x = 28$$

$$\text{Girls} = 5x = 20$$

$$\text{Total strength} = 20 + 28 = 48$$

Exercise : CCE TEST PAPER-8

Question: 1

Subtract $4a^2$

Solution:

$$(2a^2 - 3b^2 - 4c^2 - 5) - (4a^2 + 5b^2 - 6c^2 + 8)$$

$$= 2a^2 - 3b^2 - 4c^2 - 5 - 4a^2 - 5b^2 + 6c^2 - 8$$

$$= -2a^2 - 8b^2 + 2c^2 - 13$$

Question: 2

Find each of the

Solution:

$$(4a + 5b) \times (5a - 6b)$$

$$= 4a(5a - 6b) + 5b(5a - 6b)$$

$$= 20a^2 - 24ab + 25ab - 30b^2$$

$$= 20a^2 + ab - 30b^2$$

$$(ii) (6x^2 - x + 8) \times (x^2 - 3)$$

$$(6x^2 - x + 8) \times (x^2 - 3)$$

$$= x^2(6x^2 - x + 8) - 3(6x^2 - x + 8)$$

$$= 6x^4 - x^3 + 8x^2 - 18x^2 + 3x - 24$$

$$6x^4 - x^3 - 10x^2 + 3x - 24$$

Question: 3

Divide $(5a^3 - 4a^2 + 3a + 18) \div (a^2 - 2a + 3)$

Solution:

$$(5a^3 - 4a^2 + 3a + 18) \div (a^2 - 2a + 3) = (5a + 6)$$

On dividing

$$\frac{(5a + 6)(a^2 - 2a + 3)}{(a^2 - 2a + 3)} = (5a + 6)$$

Question: 4

$$\text{If } x - \frac{1}{x} = 4$$

Squaring both the sides,

$$\left(x - \frac{1}{x}\right)^2 = 4^2$$

Using the identity, $(a - b)^2 = a^2 - 2ab + b^2$

$$x^2 - 2 + \frac{1}{x^2} = 4^2$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 16 + 2 = 18 \text{ -----(1)}$$

(ii) Squaring equation (1) using the identities, $(a + b)^2 = a^2 + 2ab + b^2$

$$\Rightarrow x^4 + 2 + \frac{1}{x^4} = 324$$

$$\Rightarrow x^4 + \frac{1}{x^4} = 324 - 2 = 322$$

Question: 5

Evaluate $\{(83)^2 - (17)^2\}$

Solution:

Using the identity: $a^2 - b^2 = (a + b)(a - b)$

$$\{(83)^2 - (17)^2\} = (83 - 17)(83 + 17)$$

$$= 66 \times 100 = 6600$$

Question: 6

Factorize:

Solution:

(i) $x^3 - 3x^2 + x - 3$

By hit and trial method we find that $x = 3$ is a factor of it

So, on dividing $x^3 - 3x^2 + x - 3$ by $(x^2 + 1)$ we get $(x^2 + 1)$

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

(ii) $63x^2y^2 - 7$

$$= 7(9x^2y^2 - 1) = 7(3xy - 1)(3xy + 1) \quad \{ \text{Using the identity : } a^2 - b^2 = (a + b)(a - b) \}$$

(iii) $1 - 6x + 9x^2$

Using the identity : $a^2 + b^2 - 2ab = (a - b)^2$

$$1 - 6x + 9x^2 = (3x - 1)^2$$

(iv) $7x^2 - 19x - 6$

Using middle term splitting, we get

$$7x^2 - (21 - 2)x - 6 = 7x^2 - 21x + 2x - 6 = 7x(x - 3) + 2(x - 3) = (7x + 2)(x - 3)$$

Question: 7

Solve:

Solution:

$$\frac{2x + 7}{3x + 5} = \frac{15}{17}$$

By cross multiplication, $17(2x + 7) = 15(3x + 5)$

$$\Rightarrow (34x + 119) = 45x + 75$$

$$\Rightarrow 11x = 44$$

$$\Rightarrow x = 4$$

Question: 8

5 years ago a man

Solution:

Let the age of son be $\frac{1}{7}x$ years, 5 years ago and that of father be x years

According to the question

$$x + 10 = 3\left(\frac{1}{7}x + 10\right)$$

Taking LCM of 1 and 7 = 7

$$\Rightarrow \frac{7x - 3x}{7} = 30 - 10$$

$$\Rightarrow 4x = 140$$

$$\Rightarrow x = 35$$

So the present age of father = $35 + 5 = 40$ years and that of son is $\frac{1}{7}x + 5 = 5 + 5 = 10$ years

Question: 9

$$ab - a - b + 1 =$$

Solution:

$ab - a - b + 1$ Taking 'a' as common from first two terms of the above polynomial.

$$= a(b - 1) - (b - 1)$$

Taking $(b - 1)$ as common, in the above equation

$$= (b - 1)(a - 1) = (a - 1)(b - 1)$$

Question: 10

$$3 + 23x - 8x^2$$

Solution:

$$3 + 23x - 8x^2$$

By using Splitting the middle term

$$= 3 + 23x - 8x^2$$

$$= 3 + (24 - 1)x - 8x^2$$

$$= 3(1 + 8x) - x(1 + 8x)$$

$$= (1 + 8x)(3 - x)$$

Question: 11

$$7x^2 -$$

Solution:

$$7x^2 - 19x - 6$$

By using splitting the middle term

$$= 7x^2 - 19x - 6$$

$$= 7x^2 + (-21 + 2)x - 6$$

$$= 7x(x - 3) + 2(x - 3)$$

$$= (x - 3)(7x + 2)$$

Question: 12

$$12x^2 +$$

Solution:

$$12x^2 + 60x + 75$$

By using Splitting the middle term

$$12x^2 + 60x + 75$$

$$= 3(4x^2 + (10 + 10)x + 25)$$

$$= 3(2x(2x + 5) + 5(2x + 5))$$

$$= 3(2x + 5)(2x + 5)$$

Question: 13

$$10p^2 +$$

Solution:

$$10p^2 + 11p + 3$$

By using Splitting the middle term

$$\begin{aligned}
& 10p^2 + 11p + 3 \\
&= 10p^2 + (5 + 6)p + 3 \\
&= 5p(2p + 1) + 3(2p + 1) \\
&= (2p + 1)(5p + 3)
\end{aligned}$$

Question: 14

$$8x^3 -$$

Solution:

$$8x^3 - 2x$$

Using the identity: $a^2 - b^2 = (a + b)(a - b)$

$$\begin{aligned}
& 8x^3 - 2x \\
&= 2x(4x^2 - 1) \\
&= 2x(2x - 1)(2x + 1)
\end{aligned}$$

Question: 15

Solution:

$$\frac{x + 5}{2} + \frac{x - 5}{3} = \frac{25}{6}$$

Taking LCM of 2 and 3 = 6

$$\frac{3(x + 5) + 2(x - 5)}{6} = \frac{25}{6}$$

$$\Rightarrow 5x + 5 = 25$$

$$\Rightarrow x = 4$$

Question: 16

Fill in the blank

Solution:

Using the identity : $a^2 - b^2 = (a + b)(a - b)$

$$(i) x^2 - 18x + 81 = x^2 - (9x) + 81 = (x - 9)(x - 9) = (x - 9)^2$$

$$(ii) (4 - 36x^2) = 4(1 - 9x^2) = 4(1 - 3x)(1 + 3x)$$

$$(iii) x^2 - 14x + 13 = x^2 - (13 + 1)x + 13 = x(x - 13) - 1(x - 13) = (x - 13)(x - 1)$$

$$(iv) 9z^2 - x^2 - 4y^2 + 4xy = 9z^2 - (x - 2y)^2 = (3z - x + 2y)(3z + x - 2y)$$

$$(v) abc - ab - c + 1 = ab(c - 1) - (c - 1) = (ab - 1)(c - 1)$$

Question: 17

Write 'T' for True and 'F' for False

Solution:

(i) True

It has two terms so binomial.

(ii) True

It has single term so monomial.

(iii) False

$$(5a - 9b) - (-6a + 2b) = 5a + 6a - 9b - 2b = 11a - 11b$$

(iv) True

$$\frac{-8}{7}x^3y^4 = \frac{-8}{7} \times 8 \times 1 = \frac{-64}{7}$$

(v) True

Taking the LCM of 4,6 and 2 = 12

$$\frac{3x + 2x - 6x}{12} = \frac{3}{4}$$

$$\Rightarrow -4x = 36$$

$$\Rightarrow x = -9$$

(vi) False

$$2x - 5 = 0$$

$$\Rightarrow x = \frac{5}{2}$$