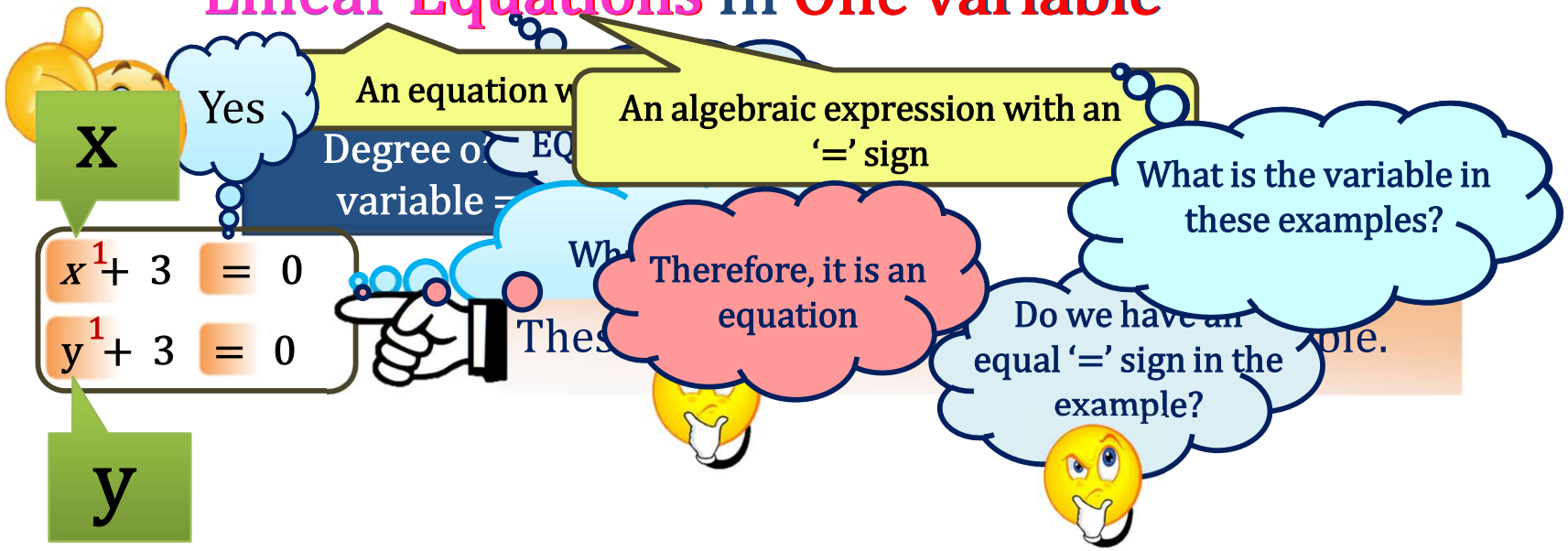
Lecture 01

Module 01

LINEAR EQUATION IN ONE VARIABLES

Linear Equations In One variable



SOLVING EQUATIONS

EXERCISE

1. Solve the equations :

(1) $x - 2 = 7$

As per the principle we h... on one ...ide

To remove – 2, we will add + 2 on both the sides

Sol $x - 2 = 7$

$\therefore \quad x - 2 + 2 = 7 + 2$

$\therefore \quad x = 9$

$\therefore$ The solution of the equation is 9

EXERCISE

1. Solve the equations :

(1) $x - 2 = 7$

Sol $x - 2 = 7$

$\therefore \quad x = 7 + 2$

$\therefore \quad x = 9$

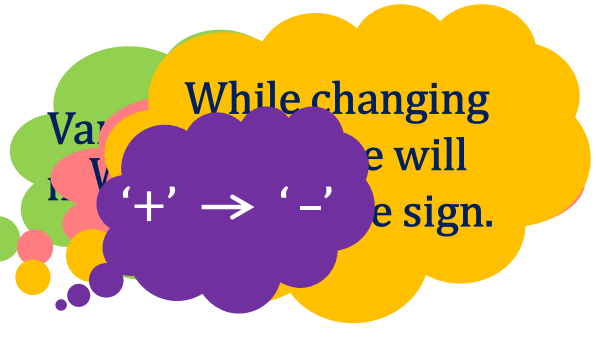
$\therefore$ The solution of the equation is 9

Module 02

EXERCISE

1. Solve the equations :

(2) $y + 3 = 10$



Sol $y + 3 = 10$

$\therefore \quad y = 10 - 3$

$\therefore \quad y = 7$

$\therefore$ The solution of the equation is 7

EXERCISE

1. Solve the equations :

(3) $6 = z + 2$

While changing sides, we will change the sign.

'+' → '−'

Sol $6 = z + 2$

$\therefore \quad 6 - 2 = z$

$\therefore \quad 4 = z$

$\therefore$ The solution of the equation is 4

EXERCISE

1. Solve the equations :

(4) $\frac{3}{7} + x = \frac{17}{7}$

Sol $\frac{3}{7} + x = \frac{17}{7}$

While changing ... we will ... '+' →

∴ we will directly subtract the numerators.

$\therefore \quad x = \frac{17}{7} - \frac{3}{7}$

$\therefore \quad x = \frac{17 - 3}{7}$

$\therefore \quad x = \frac{\cancel{14}^{2}}{\cancel{7}_{1}}$ $\quad 7 \times 2 = 14$, $7 \times 1 = 7$

$\therefore \quad x = 2$

$\therefore$ The solution of the equation is 2

Module 03

EXERCISE

1. Solve the equations :

(5) $6x = 12$

While changing sides, we will change the sign.

Sol $6x = 12$

$\therefore \quad x = \dfrac{\cancel{12}^{\,2}}{\cancel{6}_{\,1}}$

$6 \times 2 = 12$

$6 \times 1 = 6$

$\therefore \quad x = 2$

$\therefore$ The solution of the equation is 2

EXERCISE

1. Solve the equations :

(6) $\frac{t}{5} = 10$

While changing sides, we will change the sign.

Sol $\frac{t}{5} = 10$

$\therefore \quad t = 10 \times 5$

$\therefore \quad t = 50$

$\therefore$ The solution of the equation is 50

EXERCISE

1. Solve the equations :

(7) $\frac{2x}{3} = 18$

Sol $\frac{2x}{3} = 18$

$\therefore \quad 2x = 18 \times 3$

$\therefore \quad 2x = 54$

$\therefore \quad x = \frac{\cancel{54}^{27}}{\cancel{2}_{1}}$

$\therefore \quad x = 27$

$\therefore$ The solution of the equation is 27

While changing
will
'÷'
anging
will
'×' → '÷'
sign.

$2 \times 27 = 54$

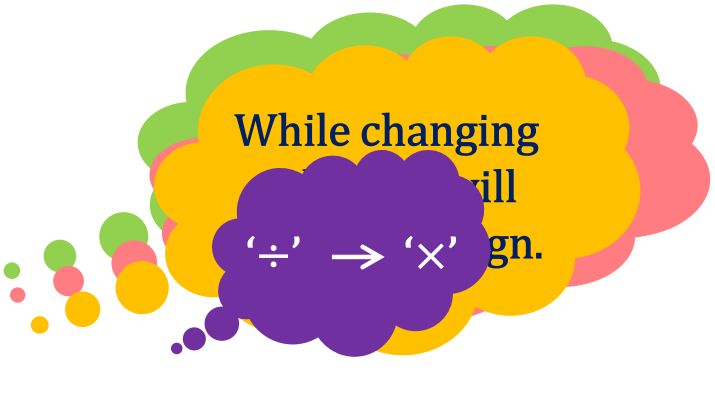
$2 \times 1 = 2$

Module 04

EXERCISE

1. Solve the equations :

(8) $1.6 = \frac{y}{1.5}$



Sol $1.6 = \frac{y}{1.5}$

$\therefore \quad 1.6 \times 1.5 = y$

$\therefore \quad 2.4 = y$

$\therefore$ The solution of the equation is 2.4

EXERCISE

1. Solve the equations :

(9) $7x - 9 = 16$

While changing sides we will change the sign.

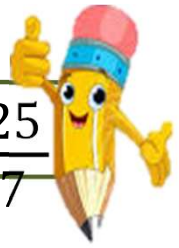
Sol $7x - 9 = 16$

$\therefore \quad 7x = 16 + 9$

$\therefore \quad 7x = 25$

$\therefore \quad x = \frac{25}{7}$

$\therefore$ The solution of the equation is $\frac{25}{7}$



EXERCISE

1. Solve the equations :

(10) $14y - 8 = 13$

While changing sides, we will change the sign.

While changing sides, we will change the sign.

Sol $14y - 8 = 13$

$\therefore \quad 14y = 13 + 8$

$\therefore \quad 14y = 21$

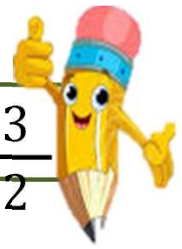
$7 \times 3 = 21$

$7 \times 2 = 14$

$\therefore \quad y = \frac{\cancel{21}^{3}}{\cancel{14}_{2}}$

$\therefore \quad y = \frac{3}{2}$

$\therefore$ The solution of the equation is $\frac{3}{2}$



Module 05

EXERCISE

1. Solve the equations :

(11) $17 + 6p = 9$

Sol $17 + 6p = 9$

$\therefore \quad 6p = 9 - 17$

$\therefore \quad 6p = -8$

$\therefore \quad p = \frac{-8}{6}$ (-4, 3)

$\therefore \quad p = \frac{-4}{3}$

$\therefore$ The solution of the equation is $\frac{-4}{3}$

While changing sides, we will change the sign.

$2 \times 4 = 8$

$2 \times 3 = 6$

EXERCISE

1. Solve the equations :

(12) $\frac{x}{3} + 1 = \frac{7}{15}$

Sol

$\frac{x}{3} + 1 = \frac{7}{15}$

While changing sides, we will change the sign.

'+' → '-'

$\therefore \quad \frac{x}{3} = \frac{7}{15} - 1$

$\therefore \quad \frac{x}{3} = \frac{7}{15} - \frac{1 \times 15}{15}$

$\therefore \quad \frac{x}{3} = \frac{7}{15} - \frac{15}{15}$

$\therefore \quad \frac{x}{3} = \frac{7 - 15}{15}$

$\frac{x}{3} = -\frac{8}{15}$

While changing sides, we will change the sign.

'÷' → '×'

$\therefore \quad x = \frac{-8}{15} \times 3^{1}$

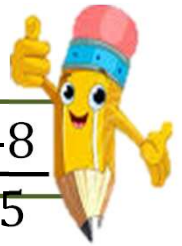
Taking LCM of the denominators

$3 \times 1 = 3$

$3 \times 5 = 15$

Since the denominators are same we will take denominator common and subtract the numerators.

$\therefore$ ...quation is $\frac{-8}{5}$



Lecture 02

Module 06

Solving Equations

With Variables on Both Sides

EXERCISE

1. Solve the equations :

(1) $3x = 2x + 18$

Sol $3x = 2x + 18$

While changing sides, we will change the sign.

'+' → '-'

$\therefore \quad 3x - 2x = 18$

$\therefore \quad 1x = 18$

$\therefore \quad x = 18$

$\therefore$ The solution of the equation is 18

EXERCISE

1. Solve the equations :

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

Sol $5t - 3 = 3t - 5$

$\therefore \quad 5t = 3t - 5 + 3$

$\therefore \quad 5t = 3t - 2$

$\therefore \quad 2t = -2$

$\therefore \quad t = \frac{-2}{2}$ (-1 over -2, 1 over 2)

$\therefore \quad t = -1$

$\therefore$ The solution of the equation is -1

While changing sides, we will change the sign.

'×' → '÷'

$2 \times 1 = 2$

$2 \times 1 = 2$

Module 07

EXERCISE

1. Solve the equations :

(3) $5x + 9 = 5 + 3x$

Sol $5x + 9 = 5 + 3x$

$\therefore \quad 5x = 3x + 5 - 9$

$\therefore \quad 5x = 3x - 4$

$\therefore \quad 2x = -4$

$\therefore \quad x = \frac{-4}{2}$ (-2, 1)

$2 \times 2 = 4$

$2 \times 1 = 2$

$\therefore \quad x = -2$

$\therefore$ The solution of the equation is -2

While changing ...des, we will ...ge the sign.

'×' → '÷'

Module 08

EXERCISE

1. Solve the equations :

(4) $4z + 3 = 6 + 2z$

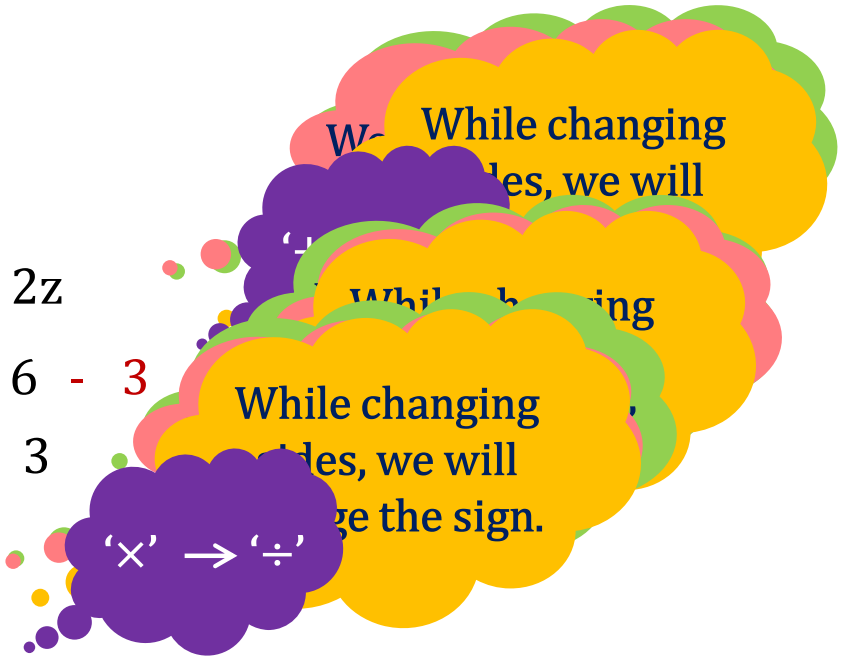
Sol $4z + 3 = 6 + 2z$

$\therefore \quad 4z = 2z + 6 - 3$

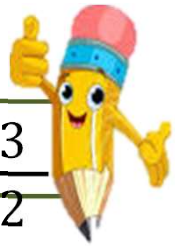
$\therefore \quad 4z = 2z + 3$

$\therefore \quad 2z = 3$

$\therefore \quad z = \frac{3}{2}$



$\therefore$ The solution of the equation is $\frac{3}{2}$



EXERCISE

1. Solve the equations :

(5) $2x - 1 = 14 - x$

Sol $2x - 1 = 14 - x$

$\therefore \quad 2x = -x + 14 + 1$

$\therefore \quad 2x = -x + 15$

$\therefore \quad 3x = 15$

$\therefore \quad x = \frac{\cancel{15}^{5}}{\cancel{3}_{1}}$

$\therefore \quad x = 5$

$\therefore$ The solution of the equation is 5

While changing sides, we will change the sign.

'×' → '÷'

$3 \times 5 = 15$

$3 \times 1 = 3$

Module 09

EXERCISE

1. Solve the equations :

(6) $8x + 4 = 3\,(x - 1) + 7$

Sol

$8x + 4 = 3\,(x - 1) + 7$

$\therefore\ 8x + 4 = 3 \times x - 3 \times 1 +$

$\therefore\ 8x + 4 = 3x - 3 + 7$

$\therefore\ 8x + 4 = 3x + 4$

$\therefore\ 8x = 3x + 4$

$\therefore\ 8x - 3x = 0$

$\therefore\ 5x = 0$

$\therefore\ x = \frac{0}{5}$

$\therefore\ x = 0$

$\therefore$ The solution of the equation is 0

3 will be multiplied by x.

While changing ... we will ... the sign.

'×' → '÷'

Module 10

EXERCISE

1. Solve the equations :

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

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

$\therefore \quad x = \frac{4}{5} \times x + \frac{4}{5} \times 10^{2}$

$\therefore \quad x = \frac{4x}{5} + 8$

$\therefore \quad \frac{x}{1} - \frac{4x}{5} = 8$

$\therefore \quad \frac{x \times 5}{1 \times 5} - \frac{4x}{5} = 8$

$\frac{4}{5}$ will be multiplied by 10

$5 \times 2 = 10$

Since the denominator is 5 we will keep it as it is.

$\therefore \quad \frac{5x}{5} - \frac{4x}{5} = 8$

While changing sides, we will change the sign.

'÷' → '×'

$x = 8$

8×5

and 5

$\times 5 = 5$

The solution of the equation is 40

EXERCISE

1. Solve the equations :

(8) $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

Sol $\frac{2x}{3} + 1 = \frac{7x}{15} + 3$

$\therefore \quad \frac{2x}{3} = \frac{7x}{15} + 3 -$

$\therefore \quad \frac{2x}{3} = \frac{7x}{15}$

$\therefore \quad \frac{2x}{3} - \frac{7x}{15} = 2$

$\therefore \quad \frac{2x \times 5}{3 \times 5} - \frac{7x}{15} = 2$

$\therefore \quad \frac{10x}{15} - \frac{7x}{15} = 2$

$\therefore \quad \frac{3x}{15} = 2$

$\therefore \quad \frac{1x}{5} = 2$

$x = 2 \times 5$

$x = 10$

$\therefore$ The solution of the equation is 10

While changing sides we will

We will shift

While changing we will

$3 \times 1 = 3$

$3 \times 5 = 15$

'÷' → '×'

Whate

Since the denominator is 15 we will keep it an it is.

Module 11

EXERCISE

1. Solve the equations :

(9) $2y + \frac{5}{3} = \frac{26}{3} - y$

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

$\therefore \quad 2y = \frac{26}{3} - \frac{5}{3} - \ldots$

$\therefore \quad 2y = \frac{21}{3} - y$

$\therefore \quad 2y + y = \frac{21}{3}$

$\therefore \quad 3y = \frac{\cancel{21}^{7}}{\cancel{3}_{1}}$

$3 \times 7 = 21$

$3 \times 1 = 3$

We will sh... 5 ...hile changing ...we will ...e sign.

Since the denominators are same we will take denominator common and subtract the numerators.

...des, we w... ...nge the sign.

'-' → '+'

$\therefore$ The solution of the equation is $\frac{7}{3}$

EXERCISE

1. Solve the equations :

(10) $3m = 5m - \frac{8}{5}$

Sol

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

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

$\therefore\ -2m = \frac{-8}{5}$

$\therefore\ -m = \frac{-8}{5} \div 2$

$\therefore\ -m = \frac{\overset{-4}{\cancel{-8}}}{5} \times \frac{1}{\underset{1}{\cancel{2}}}$

While changing ... will ... sign

'+' → '−'

$\therefore -m = \frac{-4}{5}$

While changing ... will ... sign

'×' → '÷'

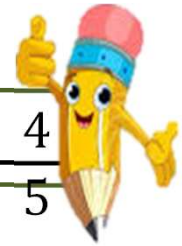
$\therefore m = \frac{4}{5}$

When we change '÷' → '×', we take reciprocal of the number.

$2 \times 4 = 8$

$2 \times 1 = 2$

The solution of the equation is $\frac{4}{5}$



Module 12

Solve :

Q. $\frac{x+2}{6} - \left(\frac{11-x}{3} - \frac{1}{4}\right) = \frac{3x-4}{12}$

Sol $\frac{x+2}{6} - \left(\frac{11-x}{3} - \frac{1}{4}\right) = \frac{3x-4}{12}$

$\therefore \quad 12\left(\frac{x+2}{6}\right) - 12\left(\frac{11-x}{3} - \frac{1}{4}\right) = 12\left(\frac{3x-4}{12}\right)$

$\therefore \quad 2(x+2) - 12\left(\frac{11-x}{3}\right) + 12 \times \frac{1}{4} = (3x-4)$

$\therefore \quad 2(x+2) - 4(11-x) + 3 = 3x-4$

$\therefore \quad 2x + 4 - 44 + 4x + 3 = 3x - 4$

$\therefore \quad 6x - 37 = 3x - 4$

$\therefore \quad 6x - 3x = -4 + 37$

$\therefore \quad 3x = 33$

$\therefore \quad x = \frac{33}{3}$

$\therefore \quad x = 11$

Multiplying

We will multiply the equation by L.C.M of

Variables on one side, numbers on the other side

Solve :

Q. $(2x+3)^2 + (2x-3)^2 = (8x+6)(x-1) + 22$

$(a-b)^2 = a^2 - 2ab + b^2$

Sol

$(2x+3)^2 + (2x-3)^2 = (8x+6)(x-1) + 22$

$\therefore (2x)^2 + 2(2x)(3) + 3^2 + (2x)^2 - 2(2x)(3) + 3^2 = 8x(x-1) + 6(x-1$

$\therefore 4x^2 + 12x + 9 + 4x^2 - 12x + 9 = 8x^2 - 8x + 6x - 6 +$

$\therefore 8x^2 + 18 = 8x^2 - 2x + 16$

$\therefore 8x^2 - 8x^2 + 2x = 16 - 18$

$\therefore 2x = -2$

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

$\therefore x = -1$

Variables on one side, numbers on the other side

Lecture 03

Module 13

Reducing Equation To Simpler Forms

Q. 1 Solve the following linear equations :

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

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

We will shift $\frac{x}{3}$ to

Whatever we multiply in the denominator the same is multiplied in the numerator.

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

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

$\therefore \frac{3x}{6} - \frac{2x}{6} = \frac{5}{20} + \frac{4}{2}$

$\therefore \frac{1x}{6} = \frac{9}{20}$

$\therefore x = \frac{9}{20} \times 6^{3}$

$\therefore x = \frac{27}{10}$

$2 \times 3 = 6$

$2 \times 10 = 20$

$\therefore$ The solution of the equation $\frac{27}{0}$

Variables on one side, numbers on the other side.

Module 14

Q. 1 Solve the following linear equa

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

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

$\therefore \frac{n \times 6}{2 \times 6} - \frac{3n \times 3}{4 \times 3} - \frac{5n \times 2}{6 \times 2} = 21$

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

$\therefore \frac{-3n}{12} + \frac{10n}{12} = 21$

$\therefore \frac{7n}{12} = 21$

$\therefore 7n = 21 \times 12$

For that, will we take LCM of denominator

Variables on one side, numbers on the other side.

$\therefore n = \frac{\cancel{21}^{3} \times 12}{\cancel{7}_{1}}$

$7 \times 3 = 21$

$7 \times 1 = 7$

3×12

36

ution of the equation is 36

e sign.

Module 15

Q. 1 Solve the following linear equations :

3. $x + 7 - \frac{8x}{3} = \frac{17}{6} - \frac{5x}{2}$

Sol $x + 7 - \frac{8x}{3} = \frac{17}{6} - \frac{5x}{2}$

$\therefore \quad x - \frac{8x}{3} + \frac{5x}{2} = \frac{17}{6} - 7$

$\therefore \quad \frac{x}{1} - \frac{8x}{3} + \frac{5x}{2} = \frac{17}{6} - \frac{7}{1}$

$\therefore \quad \frac{x \times 6}{1 \times 6} - \frac{8x \times 2}{3 \times 2} + \frac{5x \times 3}{2 \times 3} = \frac{17}{6} - \frac{7 \times 6}{1 \times 6}$

$\therefore \quad \frac{6x}{6} - \frac{16x}{6} + \frac{15x}{6} = \frac{17}{6} - \frac{42}{6}$

$-10x$ $\qquad -25$

While changing sides, '÷' → '×'

While changing sides, '×' → '÷'

What terms are to the variable ?

$\therefore \quad 5x = \frac{-25}{6}$

$\therefore \quad 5x = \frac{-25}{6} \times 6$ (1, 1)

Whatever we multiply to the denominator, the same is multiplied in the numerator.

$\therefore \quad 5x = -25$

$\therefore \quad x = \frac{-25}{5}$ (-5, 1)

$\therefore \quad x = -5$

$6 \times 1 = 6$

$6 \times 1 = 6$

$5 \times 5 = 25$

$5 \times 1 = 5$

$\therefore$ The solution of the equation is -5.

Module 16

Q. 1 Solve the following linear equations :

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

Sol

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

$\therefore \quad 5(x-5) = 3(x-3)$

$\therefore \quad 5x - 25 = 3x - 9$

$\therefore \quad 5x = 3x - 9 + 25$

$\therefore \quad 5x = 3x + 16$

$\therefore \quad 5x - 3x = 16$

$\therefore \quad 2x = 16$

$\therefore \quad x = \frac{16}{2}$ (16 → 8, 2 → 1)

$\therefore \quad x = 8$

$\therefore$ The solution of the equation is 8

While changing

'-'

While changing

we will

he sign.

ging

'×' → '÷'

will

the sign.

$2 \times 8 = 16$

$2 \times 1 = 2$

Module 17

Q. 1 Solve the following linear equations :

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

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

$\therefore \frac{(3t-2)}{4} \times 3 - \frac{(2t+3)}{3} \times 4 = \frac{2}{3} \times$ [illegible] $\times 4$

$\therefore (3t-2) \times 3 - (2t+3) \times 4 = 2 \times 4 - t \times$ [illegible]

$\therefore 9t - 6 - 8t - 12 = 8 - 12t$

$\therefore 9t - 8t = 8 - 12t + 6 + 12$

$\therefore 9t - 8t + 12t = 8 + 18$

$\therefore 13t = 26$

$\therefore t = \frac{26}{13}$ [illegible] $13 \times 2 = 26$, $13 \times 1 = 13$

$\therefore t = 2$

$\therefore$ The solution of the equation is 2

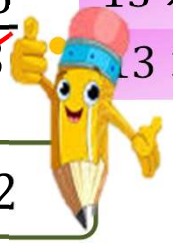
Now, to eliminate the denominators multiply

While changing sid[illegible] will

'+' [illegible] ign.

While [illegible] 3 to the [illegible]e.

'×' → '÷'



Module 18

Q. 1 Solve the following linear equations :

6. $m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$

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

$\therefore m \times 6 - \frac{(m-1)}{2} \times 6 = 1 \times 6 - \frac{(m-2)}{3} \times 6$

$\therefore 6m - 3(m-1) = 6 - 2(m-2)$

$\therefore 6m - 3m + 3 = 6 - 2m + 4$

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

$\therefore 3m + 2m + 3 = 10$

$\therefore 5m = 10 - 3$

$\therefore 5m = 7$

$\therefore m = \frac{7}{5}$

Now, to eliminate the denominators multiply each

-2 will be multiplied

While changing

While changing

While changing

'×' → '÷'

, we will

e the sign.

Lecture 04

Module 19

Q. 1 Solve the following linear equati

7. $3(t-3) = 5(2t+1)$

Sol

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

$\therefore \quad 3 \times t - 3 \times 3 = 5 \times 2t + 5 \times 1$

$\therefore \quad 3t - 9 = 10t + 5$

$\therefore \quad 3t = 10t + 5 + 9$

$\therefore \quad 3t = 10t + 14$

$\therefore \quad 3t - 10t = 14$

$\therefore \quad -7t = 14$

$\therefore \quad t = \frac{-14}{7}$ (-2, 1)

$\therefore \quad t = -2$

$\therefore$ The solution of the equation is -2

3 will b

5 will be

Variables on one side,

e other

While changing

e will

n.

nging

will

sign.

'×' → '÷'

$7 \times 2 = 14$

$7 \times 1 =$

Module 20

Q. 1 **Solve the following linear equations :**

8. $15(y - 4) - 2(y - 9) + 5(y + 6) = 0$

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

$\therefore \quad 15 \times y - 15 \times 4 - 2 \times y - 2 \times 9 + 5 \times y + 5 \times 6 = 0$

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

$\therefore \quad 15y - 2y + 5y - 60 + 18 + 30$

$\therefore \quad 18y + (-12) = 0$

$\therefore \quad 18y = 12$

$\therefore \quad y = \frac{\cancel{12}^{2}}{\cancel{18}_{3}}$

$6 \times 2 = 12$

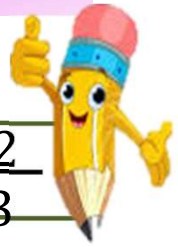
$6 \times 3 = 18$

$\therefore \quad y = \frac{2}{3}$

$\therefore$ The solution of the equation is $\frac{2}{3}$

5 will be multiplied by +6.

'×' → '÷'



Module 21

Q. Solve the following linear equations :

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

We will first open the brackets.

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

$\therefore \quad 3 \times 5z - 3 \times 7 - 2 \times 9z + 2 \times 11 = 4 \times 8z - 4 \times 13 - 17$

Variables on one side, numbers on the other side

$\therefore \quad 15z - 21 - 18z + 22 = 32z - 52$

$\therefore \quad -3z + 1 = 32z - 69$

$\therefore \quad -3z - 32z = -69 - 1$

$\therefore \quad -35z = -70$

$\therefore \quad z = \frac{-\cancel{70}^{2}}{-\cancel{35}_{1}}$

$\therefore \quad z = 2$

$\therefore$ The solution of the equation is 2

Module 22

Q. Solve the following linear equations :

10. $0.25(4f - 3) = 0.05(10f - 9)$

Sol $0.25(4f - 3) = 0.05(10f - 9)$

We will first open the bracket

Variables on one side, numbers on the other side

$\therefore\ 0.25 \times 4f - 0.25 \times 3 = 0.05 \times 10f - 0.05$

$\therefore\ 1f - 0.75 = 0.5f - 0.45$

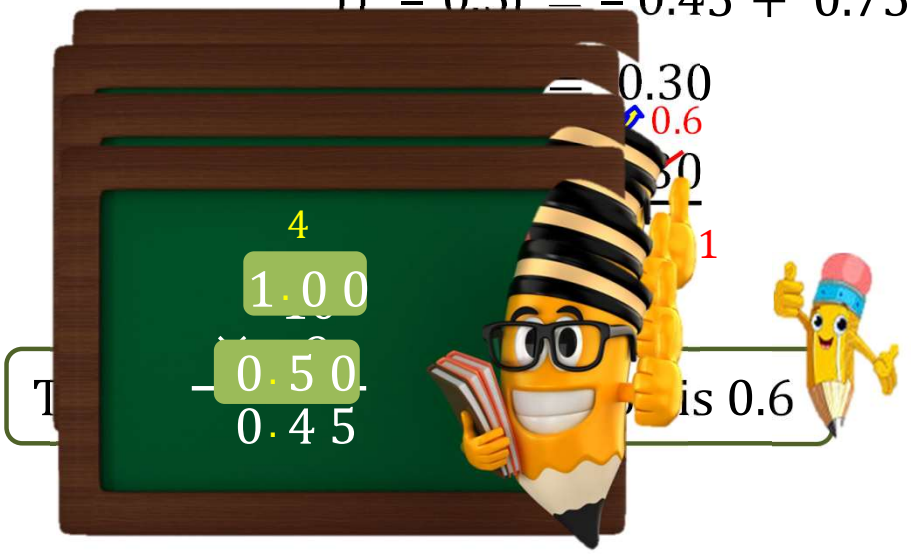
$\therefore\ 1f - 0.5f = -0.45 + 0.75$

$\therefore\ = 0.30$

$\therefore$

$\therefore$

$\therefore$ T is 0.6



Module 23

Equation Reducible To The Linear Form

Q. 1 Solve the following linear equati…

1. $\dfrac{9x}{7-6x} = 15$

Sol $\dfrac{9x}{7-6x} = 15$

$\therefore \quad 9x = 15 \times (7 - 6x)$

$\therefore \quad 9x = 105 - 90x$

$\therefore \quad 9x + 90x = 105$

$\therefore \quad 99x = 105$

$\therefore \quad x = \dfrac{\cancel{105}^{35}}{\cancel{99}_{33}}$

$\therefore \quad x = \dfrac{35}{33}$

$\therefore$ The solution of the equation is $\dfrac{35}{33}$

15 will be multiplied by 7 – 6x.

…ide, numbers on the other side.

…changing …ve will …the sign.

'×' → '÷'

$3 \times 35 = 105$

$3 \times 33 = 99$

Q. 1 Solve the following linear equations :

2. $\frac{z}{z+15} = \frac{4}{9}$

Sol

$$\frac{z}{z+15} = \frac{4}{9}$$

$\therefore \quad 9\,(z) = 4\,(z+15)$

$\therefore \quad 9z = 4z + 60$

$\therefore \quad 9z - 4z = 60$

$\therefore \quad 5z = 60$

$\therefore \quad z = \frac{\cancel{60}^{12}}{\cancel{5}_{1}}$

$5 \times 12 = 60$

$5 \times 1 = 5$

$\therefore \quad z = 12$

$\therefore$ The solution of the equation is 12

While changing we will ... the sign.

'+' → '−'

... changing ... we will ... the sign.

'×' → '÷'

Module 24

Q. Solve the following equation:

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

To solve this we will first make it linear by cross multiplying

Variables on one side, numbers on the other side.

Sol

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

$$\therefore \quad 8x - 3 = 2 \times 3x$$

$$\therefore \quad 8x - 3 = 6x$$

$$\therefore \quad 8x - 6x = 3$$

$$\therefore \quad 2x = 3$$

$$\therefore \quad x = \frac{3}{2}$$

$\therefore$ The solution of the equation is $\frac{3}{2}$

Q. Solve the following equation:

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

Sol

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

To solve this we will first make it linear by cross multiplying

...n one side, numbers on the other side.

$\therefore \quad 3\,(7y+4) = -4\,(y+2)$

$\therefore \quad 21y + 12 = -4y - 8$

$\therefore \quad 21y + 4y = -8 - 12$

$\therefore \quad 25y = -20$

$\therefore \quad y = \dfrac{-20}{25}$ (−4 / 5)

$\therefore \quad y = \dfrac{-4}{5}$

$\therefore$ The solution of the equation is $\dfrac{-4}{5}$

Lecture 05

Module 25

Some Applications

Making An Equation By Writing A Mathematical Statement :

Example :

The length of a rectangle is three more than two times its breadth. Find the length and the breadth.

Let the breath of the rectangle x cm

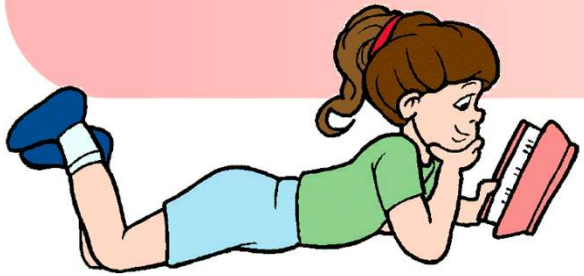
$\therefore$ Length of rectangle $= 2(x) + 3$

$= (2x + 3)$

Here breadth is the second unknown quantity. So it is denoted by any variable (alphabet).

young $\longrightarrow$ '–'

difference $\longrightarrow$ '–'



SOME MORE HINTS

Equal to sign (=) :	Equals, gives, is, yields, amounts to, is the same as
Addition (+) :	More than
Subtraction (-) :	Less than
Multiplication (×) :	Times
Division (÷) :	Quotient

1. The perimeter of a rectangular swimming pool is 154 m. Its length is 2r[illegible] breadth. What are the [illegible] and the breadth of

Sol [illegible] he pool be x m

Sum of all the sides

Twice means × 2

Formula

What do we

$\therefore$ [illegible] pool $2x$ m [illegible] 25m

Now, Perimeter of a rectangle $2(l$ [illegible] $2x + 2$

$\therefore \quad 154 = 2(2x + x$ [illegible] $= 2 \times 25 + 2$

2 will be multiplied by $2x$.

$\therefore \quad 154 = 2(3x$ [illegible] $50 + 2$

$\therefore \quad 154 = 6x + 4$ [illegible] $= 52$

While changing sides, we will change the sign.

$\therefore \quad 154 - 4 = 6x$

$\therefore \quad 150 = 6x$

$\therefore \quad \frac{\cancel{150}^{25}}{\cancel{6}_{1}} = x$

$6 \times 25 = 150$

$6 \times 1 = 6$

$\therefore \quad 25 = x$

$\therefore$ The length and the breadth of the pool are 52m and 25 m respectively.

Module 26

Q. There is a narrow rectangular plot, reserved for a school, in Mahuli village. The length and breadth of the plot are in the ratio 11:4. At the rate Rs. 100 per meter it will cost the village panchayat Rs 75,000 to fence the plot. What are the dimensions of the plot?

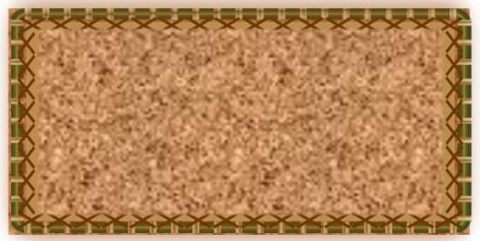
Sol Let the leng[t] ectangular plot be $11x$ and $4x$ respectively.

Perimeter of the plot

$$\therefore \text{Perimeter of the rectangular plot} = \frac{\text{Total Cost}}{\text{Rate}} = \frac{75000}{100} = 750 \text{ m}$$

Perimeter of rectangula[r] $4x$)

Total cost = Perimeter × Rate



According to the [g]

$30x = 750$

$\therefore \quad x = \frac{750}{30}$

$\therefore \quad x = 25$

$\therefore \quad 11x = 11 \times 25 = 275$

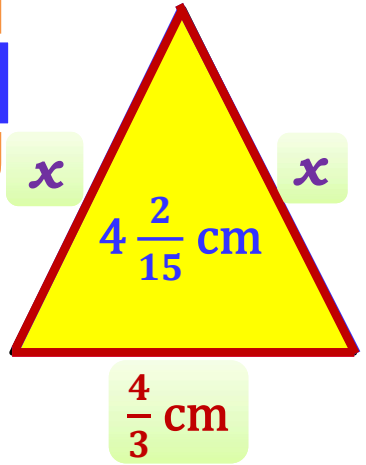
$\therefore \quad 4x = 4 \times 25 = 100$

$\therefore$ The length and breadth of the plot are 275m and 100m respectively.

Module 27

Q. The base of an isosceles triangles is $\frac{4}{3}$ cm. The perimeter of the triangle is $4\frac{2}{15}$ cm. What is the length of eithe equal sides ?

Sum of all the sides



Sol Let the length of either of the remai n

Base of isosceles triangle = $\frac{4}{3}$ c

Perimeter of the triangle = $4\frac{2}{15}$ cm

L.C.M of 3 and 15 ∴ is 15.

According to the given condition,

$$x + x + \frac{4}{3} = 4\frac{2}{15}$$

$$\therefore \quad 2x + \frac{4}{3} = \frac{62}{15}$$

$$\therefore \quad 2x = \frac{62}{15} - \frac{4}{3}$$

$$\therefore \quad 2x = \frac{62}{15} - \frac{4 \times 5}{3 \times 5}$$

Variables on one side, numbers on the other side.

$$\therefore \quad x = \frac{7}{5}$$

$\therefore$ The length of the equal sides is $\frac{7}{5}$ cm.

Module 28

Q. 1 Solve the following linear equations :

3. $\dfrac{3y+4}{2-6y} = \dfrac{-2}{5}$

Sol

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

$\therefore$ $5\,(3y+4) = -2\,(2-6y)$

$\therefore$ $15y + 20 = -4 + 12y$

$\therefore$ $15y = 12y - 4 - 20$

$\therefore$ $15y = 12y - 24$

$\therefore$ $15y - 12y = -24$

$\therefore$ $3y = -24$

$\therefore$ $y = \dfrac{-24}{3}$ $\quad -8 \quad 1$

$\therefore$ $y = -8$

$\therefore$ The solution of the equation is -8

While changing

While changing we will

'×' → '÷'

$3 \times 8 = 24$

$3 \times 1 = 2$

4. The denominator of a rational number is greater than is numerator by 8. If the numerator is increased by 17 and ′ + ′ inator is ′ + 8′ by 1, the number obtained is $\frac{3}{2}$. Find the rational number.

′ − 1′

Sol L erator be x

Denominator = $x + 8$

New numerator = $(x$

New denominator = $(x + 8)$ - 1 $x + 7$

According to the condition,

$$\frac{\text{New numerator}}{\text{denominator}} = \frac{3}{2}$$

$$\therefore \quad \frac{x + 17}{x + 7} = \frac{3}{2}$$

$$\therefore \quad 2\ (x + 17) = 3\ (x + 7)$$

$$\therefore \quad 2x + 34 = 3x + 21$$

While cha sides change '+' → '-'

3 will be

While changing ve will Then '+' → '-'

$$\therefore \quad 2x = 3x + 21 - 34$$

$$\therefore \quad 2x = 3x - 13$$

Here we have - 3x denominator and numerator.

$$\therefore \quad 2x - 3x = -13$$

$$\therefore \quad -x = -13$$

$$\therefore \quad x = 13$$

$$\therefore \quad \text{Numerator} = 13$$

$$\therefore \quad \text{Denominator} = x + 8$$

$$= 13 + 8$$

$$= 21$$

$$\therefore \quad \text{The solution of the equation is } \frac{13}{21}$$

Module 29

2. If you subtract $\frac{1}{2}$ from a number and multiply the result by $\frac{1}{2}$, you get $\frac{1}{8}$. W… means $x - \frac{1}{2}$ …ber $x - \frac{1}{2}$ $x - \frac{1}{2}$

Sol Let the no. be x

As per the given c…

$$\left(x - \frac{1}{2}\right) \times \frac{1}{2}$$

While changing sides chang… '÷' → '×'

…Will be multiplied by …

$$\therefore \quad x \times \frac{1}{2} - \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$$

$$\therefore \quad \frac{x}{2} - \frac{1}{4} = \frac{1}{8}$$

$$\therefore \quad \frac{x}{2} = \frac{1}{8} + \frac{1}{4}$$

$$\therefore \quad \frac{x}{2} = \frac{1}{8} + \frac{1 \times 2}{4 \times 2}$$

$$\therefore \quad \frac{x}{2} = \frac{1}{8} + \frac{2}{8}$$

$$\therefore \quad \frac{x}{2} = \frac{1+2}{8}$$

…tever we multiply in the denominator the same is multiplied in the numerator.

$$\therefore \quad \frac{x}{2} = \frac{3}{8}$$

$$\therefore \quad x = \frac{3}{8} \times 2$$

$$\therefore \quad x = \frac{3}{4}$$

$2 \times 4 = 8$

$2 \times 1 = 2$

∴ The solution of the equation is $\frac{3}{4}$

Module 30

3. Sum of two numbers is 95. If one exceeds the other by 15, find the nu

' + '

' + '

Sol Let the smaller no. be x

$\therefore$ the bigger no. $= (x + 15)$

As per the given condition

$x + x + 15 = 95$

$\therefore \quad 2x + 15 = 95$

$\therefore \quad 2x = 95 - 15$

$\therefore \quad 2x = 80$

$\therefore \quad x = \frac{\overset{40}{\cancel{80}}}{\underset{1}{\cancel{2}}}$

$2 \times 40 = 80$

$2 \times 1 = 2$

$\therefore \quad x = 40$

$\therefore$ the smaller no. $= 40$

While changing ... we will ... '+' ... '−'

While changing ... will ... '×' → '÷' ... sign.

We assume the smaller Number to be 'x'.

$\therefore$ the bigger no. $= (x + 15)$

$= 40 + 15$

... ber will be ... n the other. $= 55$

$\therefore$ The smaller number and bigger number is 40 and 55.

5. Two numbers are in the ratio 5:3. If they differ by 18, what are the numbers?

Sol Let the smaller

$\therefore$ the bigger n

As per the giv

$$\frac{\text{Bigger No.}}{\text{Smaller No.}} = \frac{5}{3}$$

$$\therefore \quad \frac{(x+18)}{(x)} = \frac{5}{3}$$

$$\therefore \quad 3\,(x+18) = 5\,(x)$$

$$\therefore \quad 3 \times x + 3 \times 18 = 5x$$

$$\therefore \quad 3x + 54 = 5x$$

$$\therefore \quad 3x - 5x = -54$$

While ch… sides, … change t… ‘×’ → ‘÷’

…nd ?.

$$-2x = -54$$

$$\therefore \quad x = \frac{-54}{-2} = 27$$

$2 \times 27 = 54$

$2 \times 1 = 2$

…nd

x = 27

5 will be multiplied by x.

$\therefore$ the smaller no. = 27

$\therefore$ the bigger no. $= (x + 18)$

$= 27 + 18$

$= 45$

Wh… changing … we will … the sign. ‘+’ → ‘-’

$\therefore$ The smaller number and bigger number is 27 and 45.

Module 31

Q. Amina thinks of a number and subtracts $\frac{5}{2}$ from it. She multiplies the result by 8. The result now obtained is 3 times the same number she thought of. What is the number?

Sol Let the required number be x

As per the given condition,

$$\left(x - \frac{5}{2}\right) \times 8 = 3 \times x$$

$$\therefore \quad 8x - \frac{40}{2}^{20} = 3x$$

$$\therefore \quad 8x - 20 = 3x$$

$$\therefore \quad 8x - 3x = 20$$

$$\therefore \quad 5x = 20$$

$$\therefore \quad x = \frac{20}{5}^{4}_{1}$$

$$\therefore \quad x = 4$$

$\therefore$ The required number is 4

We will first open the ... at do we ...eed to find ?

Variables on one side, numbers on the other side.

Lecture 06

Module 32

9. A positive number is 5 times another number. If 21 is added to both the numbers, then one of the new numbers becomes twice the other new number. What are the numbers?

Sol Let the another positive number be x.

$\therefore$ The given positive number $= 5x$

$\therefore$ Adding 21 to the number, we have

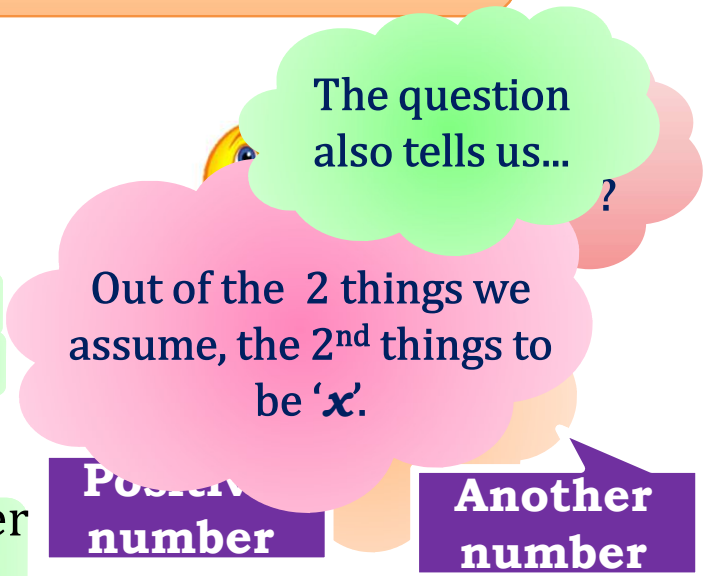
$\therefore$ New another number $= x + 21$

$\therefore$ New positive number $= 5x + 21$

As per the given condition,

$\therefore$ New positive number $= 2 \times$ new another number

$$5x + 21 = 2(x + 21)$$



9. A positive number is 5 times another number. If 21 is added to both the numbers, then one of the new num… the other new number. What are the numbers?

Sol

$$5x + 21 = 2(x + 21)$$

$$\therefore \quad 5x + 21 = 2 \times x + 2 \times 21$$

$$\therefore \quad 5x + 21 = 2x + 42$$

$$\therefore \quad 5x = 2x + 42 - 21$$

$$\therefore \quad 5x - 2x = 21$$

$$\therefore \quad 3x = 21$$

$$\therefore \quad x = \frac{\cancel{21}^{7}}{\cancel{3}_{1}}$$

$$\therefore \quad x = 7$$

Another no. is 7

$3 \times 7 = 21$

$3 \times 1 = 3$

2 will be multiplied by 21.

While changing sides, we will change the sign.

Positive no $= 5x = 5 \times 7 = 35$

10. The number of boys and girls in a class are in the ratio 7:5. The number of boys is 8 more than the number of girls. What is the total class stren

Sol Let the number of girls b

$\therefore$ the number of

As per the gi

$$\frac{\text{No of boys}}{\text{No of girl}} = \frac{}{5}$$

$$\therefore \quad \frac{(x+8)}{(x)} = \frac{7}{5}$$

$$\therefore \quad 5\,(x+8) = 7\,(x)$$

$$\therefore \quad 5 \times x + 5 \times 8 = 7x$$

$$\therefore \quad 5x + 40 = 7x$$

′ + 8′

While c sides change t

‘×’ → ‘÷’

5

7 will be multiplied by

While changing e will e sign.

‘+’ → ‘-’

$$\therefore \quad 5x - 7x = -40$$

$$\therefore \quad -2x = -40$$

$$\therefore \quad x = \frac{-40}{-2}$$

$$\therefore \quad x = 20$$

Number of girls $= 20$

Number of boys $= x + 8$

$= 20 + 8$

$= 28$

$\therefore$ Number of girls and boys is 20 and 28.

Out of the 2 quantities we assume the 2nd quantity to be ‘x’

20

1

$2 \times 20 = 40$

$2 \times 1 = 2$

Here the 2nd quantity is the number of girl

Module 33

13. A rational number is such that when you multiply it by $\frac{5}{2}$ and add $\frac{2}{3}$ to the product, you get $\frac{-7}{12}$. What is the number?

$x \times \frac{5}{2}$

$\left(x \times \frac{5}{2}\right) + \frac{2}{3}$

Sol Let th x

As per the giv

$\left(x \times \frac{5}{2}\right) + \frac{2}{3} = \frac{-7}{12}$

While sid chang '÷' → '×'

$\therefore \quad \frac{5x}{2} + \frac{2}{3} = \frac{-7}{12}$

$\therefore \quad \frac{5x}{2} = \frac{-7}{12} - \frac{2}{3}$

$\therefore \quad \frac{5x}{2} = \frac{-7}{12} - \frac{2 \times 4}{3 \times 4}$

A *rational*

$\therefore \quad \frac{5x}{2} = \frac{-7}{12} + \frac{-8}{12}$

whatever we have to find will be considered an 'x'.

$\therefore \quad \frac{5x}{2} = \frac{-7 - 8}{12}$

$\therefore \quad \frac{5x}{2} = \frac{-15}{12}$

For that we will

$3 \times 5 = 15$

$3 \times 4 = 12$

$\therefore \quad x = \frac{-15}{12} \times \frac{2}{5}$

We keep as it is.

$2 \times 1 = 2$

$2 \times 2 = 4$

$\therefore \quad x = \frac{-1}{2}$

$\therefore$ The number is $\frac{-1}{2}$

Module 34

5. The sum of three consecutive multiples of 8 is 888. Find the mul

' + '

Mutiples of 8 which come one after the other.

The question also tells us...

Sol Let the first c

second consecutive multiple be $x + 8$,

third consecutive multiple be $x + 8 + 8 = x + 16$

As per the given condition,

$x + x + 8 + x + 16 = 888$

$\therefore \quad 3x + 24 = 888$

$\therefore \quad 3x = 888 - 24$

$\therefore \quad 3x = 864$

$\therefore \quad x = \frac{\cancel{864}^{288}}{\cancel{3}_{1}}$

$3 \times 288 = 864$

$3 \times 1 = 3$

$\therefore \quad x = 288$

$\therefore$ The first multiple $= 288$

changing

e changing we will

'×' → '÷'

$\therefore$ The second multiple $= x + 8$

$= 288 + 8$

$= 296$

$\therefore$ The third multiple $= x + 16$

$= 288 + 16$

$= 304$

$\therefore$ The three consecutive multiples are 288, 296 and 304.

6. Three consecutive integers are such that when they are taken in increasing order and multiplied by 2, 3 and 4 respectively, they add up to 74. Find these numbers.

Sol Let the first integer be 'x'

Second integer be $x + 1$,

Third integer be $x + 1 + 1 =$

As per the given condition,

$$2x + 3 \times (x+1) + 4\,(x+2) = 74$$

$$\therefore \quad 2x + 3x + 3 + 4x + 8 = 74$$

$$\therefore \quad 9x + 11 = 74$$

$$\therefore \quad 9x = 74 - 11$$

$$9x = 63$$

$$\therefore \quad x = \frac{\cancel{63}^{7}}{\cancel{9}_{1}}$$

$$\therefore \quad x = 7$$

x mutiplied by 2

$x + 1$ multiplied by 3

4 will be multiplied by x.

While changing sides will change sign.

'×' → '÷'

The question also tells us:

$\therefore$ The first integer $= 7$

$\therefore$ The second integer $= x + 1$

$= 7 + 1$

$= 8$

$\therefore$ The third integer $= x + 2$

$= 7 + 2$

$= 9$

$9 \times 7 = 63$

$9 \times 1 = 9$

The three consecutive integers are 7, 8 and 9.

Module 35

Q. One of the two digits of a two-digit number is three times the other digit. If you interchange the digits of this two-digit number and add the resulting number to the original number, you get 88. What is the original number?

Sol Let the unit's place digit of a two-digit number be x.

$\therefore$ The tens place digit $= 3 \times x = 3x$

$\therefore$ Original number $= 10 \times 3x + x = 31x$

$\therefore$ Number obtained by interchanging digit we

A two digit number has

3 5

T U

$10 \times 3 + 1 \times 5$

$= 30 + 5$

$= 35$

$3x \quad x$

T U

$10 \times 3x + 1 \times x$

$= 30x + x$

$= 31x$

$\therefore$ $31x = 88$

$\therefore$ $x = \frac{88}{31}$

$\therefore$ $x = 2$

$\therefore$ Original number $= 31x = 31 \times 2 = 62$

$\therefore$ The Original number is 62

Q. Three consecutive integers add up to 51. What are these integers?

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

According to the given condition

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

$$\therefore \quad 3x + 3 = 51$$

$$\therefore \quad 3x = 51 - 3$$

$$\therefore \quad 3x = 48$$

$$\therefore \quad x = \frac{\cancel{48}^{16}}{\cancel{3}_{1}}$$

$$\therefore \quad x = 16$$

$$\therefore \quad x + 1 = 16 + 1 = 17$$

$$\therefore \quad x + 2 = 16 + 2 = 18$$

$\therefore$ Three consecutive integers are 16, 17 and 18

If 1st integer is x.
2nd integer will be
$x + 1$

3rd integer will be
$x + 1 + 1 = x + 2$

Module 36

8. Sum of the digits of a two-digit number is 9. When we interchange lting new number is greater than s the two -digit number

tens digit + units digit = 9

2 digit

Sol Let the digit in units place be x

$\therefore$ The digit in ten's place is $= (9 - x)$

$\therefore$ The two-digit number $= 10 \times (9 - x) + x$

$= 90 - 9x$

$\therefore$ The new number $= 10 \times x + 9 - x$

$= 9x + 9$

The digit in the ten's place will be multiplied by 10 to get the number

nit

$10 \times (9 - x)$ x

$10 \times$

As per the given condition,

$9x + 9 = 90 - 9x + 27$

8. Sum of the digits of a two-digit number is 9. When we interchange the digits, it is found that the resulting new ... an the original number by 27. What is the tw...

We ... Variables on one side, ... the other

While changing ...

... hanging ... ve will ... e the sign.

'×' → '÷'

Sol

$$9x + 9 = 90 - 9x + 27$$

$$\therefore 9x + 9x + 9 = 90 + 27$$

$$\therefore 9x + 9x = 90 + 27 - 9$$

$$\therefore 18x = 108$$

$$\therefore x = \frac{\cancel{108}^{6}}{\cancel{18}_{1}}$$

$18 \times 6 = 108$

$18 \times 1 = 18$

$$\therefore x = 6$$

The two digit number $= 90 - 9x$

$= 90 - 9(6)$

$= 90 - 54$

$= 36$

7. The ages of Rahul and Haroon are in the ratio 5:7. Four years later the sum of their ages will be 56 years. What are their presents ages?

Sol Le ' + ' non multiple be x

The present age of Rahul $= 5x$ years

The present age of Haroon are $= 7x$ years

Four years later :

$\therefore$ Rahul's age will be $= (5x + 4)$ years

$\therefore$ Rahul's age will be $= (7x + 4)$ years

$\therefore \quad 5x + 4 + 7x + 4 = 56$

$\therefore \quad 12x + 8 = 56$

$\therefore \quad 12x = 56 - 8$

$\therefore \quad 12x = 48$

$\therefore \quad x = \frac{\cancel{48}^{4}}{\cancel{12}_{1}}$

$12 \times 4 = 48$

$12 \times 1 = 12$

The question also tells us..

$x = 4$

Rahul's present age $= 4$

Haroon's present age $= 7x$

$= 7 \times 4$

$= 28$

nging

e changing

we will

e the sign.

'×' → '÷'

The ages of Rahul and Haroon is 4 and 28

Lecture 07

Module 37

11. Baichung's father is 26 years younger than Baichung's grandfather and 29 years older than Baichung. The sum of the ages of all the three is 135 years. What is the age of ea hem?

' + '

Sol Let Baichung's father's age be x years.

Baichung's grandfather's age $= (x + 26)$ years

Baichung's age $= (x - 29)$ years

As per the given condition,

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

$$3x - 3 = 135$$

$$\therefore \quad 3x = 135 + 3$$

$$\therefore \quad 3x = 138$$

$$\therefore \quad x = \frac{\cancel{138}^{46}}{\cancel{3}_{1}}$$

$$\therefore \quad x = 46$$

$3 \times 46 = 138$

$3 \times 1 = 3$

Therefore we assume s the Baichung's father 's rs be 'x' ng' s

ging

e changing we will e the sign.

'×' → '÷'

er

hung's ather's age + 26

age = Baichung's father's age - 29

11. Baichung's father is 26 years younger than Baichung's grandfather and 29 years older than Baichung. The sum of the ages of all the three is 135 years. What is the age of each one of them?

Sol

$\therefore \quad x = 46$

$\therefore$ Baichung' father's age $= 46$

$\therefore$ Baichung's age $= x - 29$

$= 46 - 29$

$= 17$

$\therefore$ Baichung's grandfather's age $= x + 26$

$= 46 + 26$

$= 72$

$\therefore$ The Baichung's age and Baichung's grandfather's age is 17 and 72.

Module 38

Q. Fifteen years from now Ravi's age will be four times his present age. What is Ravi's present age?

Sol Let Ravi's present age be x

$\therefore$ After fifteen years Ravi's age =

Fifteen years from now

According to given co

$$4x = x + 15$$

$$\therefore \quad 4x - x = 15$$

$$\therefore \quad 3x = 15$$

$$\therefore \quad x = \frac{15}{3}$$

$$\therefore \quad x = 5$$

$\therefore$ Ravi's present age is 5 years.

Variables on one s
numbers on the ot
side.

Since both are Ravi's age fifteen years from now, So both will be equal

If Ravi

What wil
age fift

What will be his age fifteen years from now

$5 + 15 = 20$ years

Q. Shobo's mother's present age is six times Shobo's present age. Shobo's age five years from now will be one third of his mother's present age. What are their present age?

Sol Let Shobo's present age be x years

$\therefore$ Shobo's mother's present age $= 6 \times x = 6x$ years

$\therefore$ Shobo's age five year from now $= (x + 5)$ years

According to condition

$$x + 5 = \frac{1}{\cancel{3}_{1}} \times \cancel{6}^{2}x$$

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

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

$\therefore$ $2x - x = 5$

$\therefore$ $x = 5$

$\therefore$ $6x = 6 \times 5 = 30$

$\therefore$ Shobo's present age is 5 years and Shobo's mother's present age is 30 years

In a comparative statement whatever comes later is assumed as 'x'

Variables on one side, numbers on the other side.

Module 39

Q. A grandfather is ten times older than his granddaughter. He is also 54 years older than her. Find their present ages.

Sol Let present age of granddaughter be x

$\therefore$ Grandfather's Present age = $10x$

According to given condition,

$$10x = x + 54$$

$$\therefore \quad 10x - x = 54$$

$$\therefore \quad 9x = 54$$

$$\therefore \quad x = \frac{54}{9} \quad \begin{matrix} 6 \\ 1 \end{matrix}$$

$$\therefore \quad x = 6$$

$$\therefore \quad 10x = 10 \times 6 = 60$$

$\therefore$ The present age of grandfather is 60 years and that of his granddaughter is 6 years.

Variables on one side, numbers on the other side.

What do we need to find ?

In a comparative statement whatever comes later is assumed as 'x'

Q. Aman's age is three times his son's age. Ten years ago he was five times his son's age. Find their present ages.

Sol Let the present age of Aman's son be x years.

$\therefore$ Aman's present age $= 3 \times x =$ $3x$ years

$\therefore$ Aman's son's age ten years ago $=$ $(x - 10)$ years

$\therefore$ Aman's age ten years ago $=$ $(3x - 10)$ years

What do we need to find ?

According to the given condition,

$3x - 10 = 5(x - 10)$

$\therefore \quad 3x - 10 = 5x - 50$

$\therefore \quad 3x - 5x = -50 + 10$

$\therefore \quad -2x = -40$

$\therefore \quad x = \frac{-40}{-2} = 20$

$\therefore \quad 3x = 3 \times 20 = 60$

In a comparative statement whatever comes later is assumed as 'x'

$\therefore$ The present age of Aman is 60 years and that of his son is 20 years.

Module 40

Q. The ages of Hari and Harry are in the ratio 5:7. Four years from now the ratio of their ages will be 3:4. Find their present ages.

The question also tells us...

Sol I ' ÷ ' common multiple be x

The present age of Hari= $5x$ years

The present age of Harry = $7x$ years

Four years from now:

$\therefore$ Hari's age will be = $(5x + 4)$ years

$\therefore$ Harry's age will be = (years

According to given condit e,

ne other

To solve this we will first make it linear by cross multiplying

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

$$\therefore \quad 4\,(5x + 4) = 3\,(7x + 4)$$

$$\therefore \quad 20x + 16 = 21x + 12$$

$$\therefore \quad 20x - 21x = 12 - 16$$

$\therefore$ $5x = 5 \times 4 = 20$ years

$\therefore$ $7x = 7 \times 4 = 28$ years

$\therefore$ The present age of Hari is 20 yers and present age of Harry is 28 years

Module 41

Q. **Divide Rs.1380 among Ahmed, John and Babita so that the amount Ahmed receives is 5 times as much as Babita's share and is 3 times as much as John's share.**

Sol Let Babita's share be Rs.x

Then, Ahmed's share = Rs.5x

∴ John's share = Total amount – (Babita's share + Ahmed's share)

∴ John's share = 1380 – (x + 5x) = Rs.(1380 – 6x)

∴ Ahmed's share = Rs.3(1380 – 6x)

Out of the all things we assume, the last thing to be '*x*'.

$$5x = 3(1380 - 6x)$$

$$\therefore \quad 5x = 4140 - 18x$$

$$\therefore \quad 5x + 18x = 4140$$

$$\therefore \quad 23x = 4140$$

$$\therefore \quad x = \frac{4140}{23}$$

$$\therefore \quad x = 180$$

∴ **Babita's share = Rs.180**

Ahmed's share = Rs.(5 × 180) = Rs.900

John's share = Rs.(1380 – 6 × 180)

= Rs.300

Module 42

Q. Saurabh has Rs 34 fifty paise and twenty-five paise coins. If the number of 25 paise coins be twice the number of 50 paise coins, how many coins of each kind does he have?

Sol Let the number of 50 paise coins be x

Then number of 25 paise coins will be 2x

Total value of the money is Rs 34

assume, the 2 ... is be '*x*'.

$\therefore$ Value of x fifty paise coins = $(50 \times x)$ paise $= \frac{50 \times x}{100}$ Rupees $= \frac{x}{2}$ Rupees

$\therefore$ Value of 2x twenty-five paise coins = $(25 \times 2x)$ paise $= \frac{25 \times 2x}{100}$ Rupees $= \frac{x}{2}$ Rupees

As per the given condition,

$$\frac{x}{2} + \frac{x}{2} = 34$$

Value of 50 paise coins + value of 25 paise coins = Total value

$$\frac{2x}{2} = 34$$

$$\therefore \quad x = 34$$

Thus, number of 50 paise coins = 34

Number of twenty five paise coins $= 2x = 2 \times 34 = 68$

Lecture 08

Module 43

Q. I have a total of Rs 300 in coins of denomination Rs 1, Rs 2 and Rs 5. The number of Rs 2 coins is 3 times the number of Rs 5 coins. The total number of coins is 1(many coins of each denomination are with me?

× 3

Sol Let the number of Rs 5 coins be x

$\therefore$ The number of Rs 2 coins $= 3x$

$\therefore$ The number of Re 1 coins $= (160 - 4x)$

No. of 1 Re coins + No. of 2 Rs coins + No. of 5 Rs coi

$\therefore$ No. of 1 Re coins $+ 3x + x = 160$

$\therefore$ $\therefore$ No. of 1 Re coins $+ 4x = 160$

$\therefore$ $\therefore$ No. of 1 Re coins $= 160 - 4x$

2 RS coin **5 RS coin**

$\therefore$ 40

$\therefore$ $x = \frac{140}{7}$ (20, 1)

$\therefore$ $x = 20$

$\therefore$ Number

$\therefore$ Nu Variab

How do we calculate total amount.

Total amount = No. of coins × denomination

$= 3 \times 20$

$x)$

$= 160 - 4 \times 20$

$= 160 - 80$

$= 80$

Number of coins of Rs 1, Rs 2 and Rs 5 are 80, 60 and 20 respectively

Module 44

14. Lakshmi is a cashier in a bank. She has currency notes of denominations Rs 100, Rs 50 and Rs 10, respectively. The ratio of the number of these notes is 2:3:5. The total cash with Lakshmi is Rs 4,00,000. How many notes of each denomination does she have?

Sol Let the common multiple be x.

$\therefore$ Number of Rs.100 notes $= 2x$

$\therefore$ Number of Rs.50 notes $= 3x$

$\therefore$ Number of Rs.10 notes $= 5x$

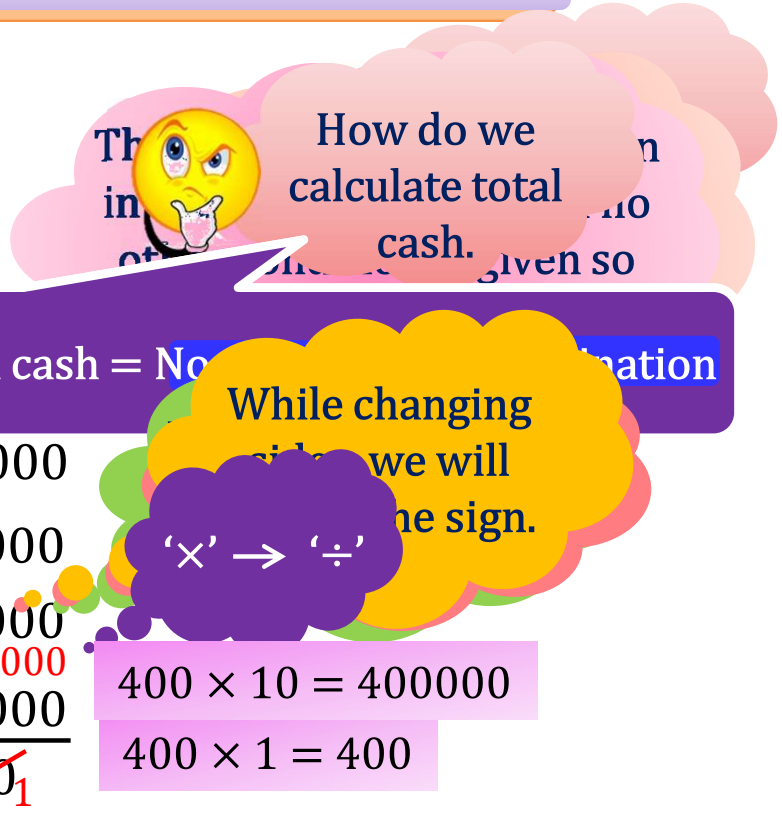
As per the given condition,

$$2x(100) + 3x(50) + 5x(10) = 4{,}00{,}000$$

$$\therefore \quad 200x + 150x + 50x = 4{,}00{,}000$$

$$\therefore \quad 400x = 4{,}00{,}000$$

$$\therefore \quad x = \frac{4{,}00{,}000}{400} \quad (\div 1000)$$



14. Lakshmi is a cashier in a bank. She has currency notes of denominations Rs 100, Rs 50 and Rs 10, respectively. The ratio of the number of these notes is 2:3:5. The total cash with Lakshmi is Rs 4,00,000. How many notes of each denomination does she have?

Sol

$\therefore \quad x = 1000$

$\therefore$ Number of Rs.100 notes $= 2x$

$= 2 \times 1000$

$= 2000$

$\therefore$ Number of Rs.50 notes $= 3x$

$= 3 \times 1000$

$= 3000$

$\therefore$ Number of Rs.10 notes $= 5x$

$= 5 \times 1000$

$= 5000$

Module 45

Q. Hasan buys two kinds of cloth materials for school uniforms, shirt material that costs him Rs.50 per metre and trouser material that costs him Rs.90 per metre. For every 2 metres of the trouser material he buys 3 metres of the shirt material. He sells the materials at 12% and 10% profit respectively. His total sale is Rs.36,600. How much trouser material did he buy?

Sol Let the length of shirt material and trouser material be $3x$ and $2x$

According to the given condition,

Total S.P. of shirt Material + Total S.P. of Trouser Material = Rs.36,600

$\therefore \quad 56 \times 3x + 99 \times 2x = 36{,}600$

$\therefore \quad 168x + 198x = 36{,}600$

$\therefore \quad 366x = 36{,}600$

$\therefore \quad x = 100$

$\therefore$ Trouser material $= 2x$

$= 2 \times 100$

$= 200$

$\therefore$ Hasan buys 200 metres of trouser material.

Ratio of shirt material to trouser material is 3 : 2

Length of shirt material $= 3x$

Length of trouser material $= 2x$

	Shirt material	Trouser material
Length	$3x$	$2x$
Cost price	Rs. 50 per metre	Rs. 90 per metre
% profit	12 %	10 %
Profit	$\frac{12}{100} \times 50 = 6$	$\frac{10}{100} \times 90 = 9$
S.P.	50 + 6 = 56	90 + 9 = 99

Module 46

Q. The organisers of an essay competition decide that a winner in the competition gets a prize of Rs 100 and a participant who does not win gets a prize of Rs 25. The total prize money distributed is Rs 3,000. Find the number of winners, if the total number of participant

What do we need to find ?

Sol Let the number of winners be x

$\therefore$ The number of participants who do not win $= (63 -$

As per the given condition,

$$100x + (63 - x)\,25 = 3000$$

Total prize = No. of participants × Prize amount

$\therefore$ $100x + 1575 - 25x = 3000$

	Participants who win	Participants who do not win
Number	x	$(63 - x)$
Prize	100	25
Total Prize	$100x$	$+ \quad (63 - x)\,25$ = 3000

$\therefore$ $x = 19$

$\therefore$ The number of winners is 19.

Module 47

Q. Half of a herd of deer are grazing in the field and three fourths of the remaining are playing nearby. The rest 9 are drinking water from the pond. Find the number of deer in the herd.

Sol Let the total number of deer in the herd be x.

No. of deers who are grazi... $= \frac{1}{2}x$

No. of deers who are pl... $= \frac{3}{4}\left(x - \frac{x}{2}\right)$

No. of deers who are drinking water $= 9$

To solve this denomitors need to be same

Total no. of deers − No. of deers in the herd who are grazing

According to given condition,

$$x = \frac{x}{2} + \frac{3}{4} \times \left(x - \frac{x}{2}\right) + 9$$

$$\therefore \quad x = \frac{x}{2} + \frac{3}{4}\left(\frac{2x - x}{2}\right) + 9$$

$$\therefore \quad x = \frac{x}{2} + \frac{3}{4} \times \frac{x}{2} + 9$$

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

$$\therefore \quad x - \frac{x}{2} - \frac{3x}{8} = 9$$

$$\therefore \quad \frac{8x}{8} - \frac{4x}{8} - \frac{3x}{8} = 9$$

$$\therefore \quad \frac{8x - 4x - 3x}{8} = 9$$

$$\therefore \quad \frac{x}{8} = 9$$

$$\therefore \quad x = 9 \times 8 = 72$$

The total number of deer in the herd is 72.

Module 48

Q. How much pure alcohol be added to 400 ml of a 15% solution to make its strength 32%?

Sol Let x ml of pure alcohol be added to 400ml of 15% solution.

15% means 15 per 100

Quantity of alcohol in 100ml solution = 15ml

$\therefore$ Quantity of alcohol in 1ml solution = $\frac{15}{100}$ ml

$\therefore$ Quantity of alcohol in 400ml solution = $\frac{15}{100} \times 400 = 60$ml

To make strength of 32% we add x ml of pur

(60 + x)ml of alcohol in (400 + x)ml of solution gives 32% strength

$\therefore$ Total quantity of the solution = (400 + x)ml

$\therefore$ Total quantity of alcohol in (400 + x)ml solution = (60 + x)ml

$$\frac{(60 + x)}{(400 + x)} = 32\%$$

$$\therefore \frac{(60 + x)}{(400 + x)} = \frac{32}{100}$$

Q. How much pure alcohol be added to 400 ml of a 15% solution to make its strength 32%?

Sol $\therefore \quad \frac{(60 + x)}{(400 + x)} = \frac{32}{100}$

$\therefore \quad 100(60 + x) = 32(400 + x)$

$\therefore \quad 6000 + 100x = 12800 + 32x$

$\therefore \quad 100x - 32x = 12800 - 6000$

$\therefore \quad 68x = 6800$

$\therefore \quad x = \frac{6800}{68}$

$\therefore \quad x = 100$

Thus, 100ml of alcohol must be added to make strength of solution 32%

Module 49

Q. There are 90 multiple choice questions in a test. Suppose you get two marks for every correct answer and for every question you leave unattempt or answer wrongly, one mark is deducted from your total score of correct answer. If you get 60 marks in the test, then how many questions did you answer correctly?

Sol Let the number of questions answer correctly be x

Then the number of wrong answers and unattempted question will be (90 – x)

As per the given condition,

$$2x - 1\times(90 - x) = 60$$

$$\therefore \quad 2x - 90 + x = 60$$

$$\therefore \quad 3x = 60 + 90$$

$$\therefore \quad 3x = 150$$

$$\therefore \quad x = \frac{150}{3}$$

$$\therefore \quad x = 50$$

Thus, number of questions answer correctly is 50

Thank you...☺