Worksheet -10   Subject: - Mathematics   Class: - VIII   Teacher: - Ms. Neeru

Name: _____ Class & Sec: _____ Roll No. _____ Date: 05.05.2020

34 MATHEMATICS

4. $\dfrac{x-5}{3} = \dfrac{x-3}{5}$ **5.** $\dfrac{3t-2}{4} - \dfrac{2t+3}{3} = \dfrac{2}{3} - t$ **6.** $m - \dfrac{m-1}{2} = 1 - \dfrac{m-2}{3}$

Simplify and solve the following linear equations.

7. $3(t-3) = 5(2t+1)$ **8.** $15(y-4) - 2(y-9) + 5(y+6) = 0$

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

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

2.7 Equations Reducible to the Linear Form

Example 18: Solve $\dfrac{x+1}{2x+3} = \dfrac{3}{8}$

Solution: Observe that the equation is not a linear equation, since the expression on its LHS is not linear. But we can put it into the form of a linear equation. We multiply both sides of the equation by $(2x+3)$,

$$\left(\dfrac{x+1}{2x+3}\right) \times (2x+3) = \dfrac{3}{8} \times (2x+3)$$

Note that
$2x+3 \neq 0$ *(Why?)*

Notice that $(2x+3)$ gets cancelled on the LHS We have then,
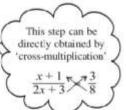
$$x+1 = \dfrac{3(2x+3)}{8}$$

We have now a linear equation which we know how to solve.
Multiplying both sides by 8

$$8(x+1) = 3(2x+3)$$

This step can be directly obtained by 'cross-multiplication'

$$\dfrac{x+1}{2x+3} \times \dfrac{3}{8}$$

or $8x + 8 = 6x + 9$

or $8x = 6x + 9 - 8$

or $8x = 6x + 1$

or $8x - 6x = 1$

or $2x = 1$

or $x = \dfrac{1}{2}$

The solution is $x = \dfrac{1}{2}$.

Check : Numerator of LHS $= \dfrac{1}{2} + 1 = \dfrac{1+2}{2} = \dfrac{3}{2}$

Denominator of LHS $= 2x + 3 = 2 \times \dfrac{1}{2} + 3 = 1 + 3 = 4$

LHS = numerator ÷ denominator = $\dfrac{3}{2} \div 4 = \dfrac{3}{2} \times \dfrac{1}{4} = \dfrac{3}{8}$

LHS = RHS.

Example 19: Present ages of Anu and Raj are in the ratio 4:5. Eight years from now the ratio of their ages will be 5:6. Find their present ages.

Solution: Let the present ages of Anu and Raj be $4x$ years and $5x$ years respectively.

After eight years. Anu's age = $(4x + 8)$ years;

After eight years, Raj's age = $(5x + 8)$ years.

Therefore, the ratio of their ages after eight years = $\dfrac{4x + 8}{5x + 8}$

This is given to be 5 : 6

Therefore, $\dfrac{4x + 8}{5x + 8} = \dfrac{5}{6}$

Cross-multiplication gives $\quad 6\,(4x + 8) = 5\,(5x + 8)$

or $\qquad\qquad\qquad 24x + 48 = 25x + 40$

or $\qquad\qquad\quad 24x + 48 - 40 = 25x$

or $\qquad\qquad\qquad 24x + 8 = 25x$

or $\qquad\qquad\qquad\qquad 8 = 25x - 24x$

or $\qquad\qquad\qquad\qquad 8 = x$

Therefore, $\qquad$ Anu's present age = $4x = 4 \times 8 = 32$ years

$\qquad\qquad\qquad$ Raj's present age = $5x = 5 \times 8 = 40$ years

EXERCISE 2.6

Solve the following equations.

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

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

3. $\dfrac{z}{z + 15} = \dfrac{4}{9}$

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

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

6. 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.

7. The denominator of a rational number is greater than its numerator by 8. If the numerator is increased by 17 and the denominator is decreased by 1, the number obtained is $\dfrac{3}{2}$. Find the rational number.

Linear Equations in One Variable Exercise 2.6

Solve the following equations.

Ex 2.6 Class 8 Maths Question 1.

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

Solution:

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

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

$\Rightarrow$ 8x − 3 = 2 × 3x (Cross-multiplication)

$\Rightarrow$ 8x − 3 = 6x

$\Rightarrow$ 8x − 6x = 3 (Transposing 6x to LHS and 3 to RHS)

$\Rightarrow$ 2x = 3

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

5 Class 8 Maths Question 2.

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

Solution:

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

$\Rightarrow \frac{9x}{7-6x} = \frac{15}{1}$

$\Rightarrow$ 9x = 15(7 − 6x) (Cross-multiplication)

$\Rightarrow$ 9x = 105 − 90x (Solving the bracket)

$\Rightarrow$ 9x + 90x = 105 (Transposing 90x to LHS)

$\Rightarrow$ 99x = 105

$\Rightarrow$ X = $\frac{105}{99}$

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

Ex 2.6 Class 8 Maths Question 3.

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

Solution:

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

$\Rightarrow$ 9z = 4 (z + 15) (Cross-multiplication)

$\Rightarrow$ 9z = 4z + 60 (Solving the bracket)

$\Rightarrow$ 9z − 42 = 60

$\Rightarrow$ 9z − 42 = 60

$\Rightarrow$ 5z = 60

$\Rightarrow$ z = 12

Ex 2.6 Class 8 Maths Question 4.

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

Solution:

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

$\Rightarrow$ 5(3y + 4) = -2(2 − 6y) (Cross-multiplication)

$\Rightarrow$ 15y + 20 = -4 + 12y (Solving the bracket)

$\Rightarrow$ 15y − 12y = -4 − 20 (Transposing 12y to LHS and 20 to RHS)

$\Rightarrow$ 3y = -24 (Transposing 3 to RHS) -24

$\Rightarrow$ y = -8

Ex 2.6 Class 8 Maths Question 5.

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

Solution:

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

⇒ 3(7y + 4) = -4 (y + 2) (Corss-multiplication)

⇒ 21y + 12 = -4y − 8 [Solving the bracket]

⇒ 21y + 4y = -12 − 8 [Transposing 4y to LHS and 12 to RHS]

⇒ 25y = -20 [Transposing 25 to RHS]

⇒ y = $\frac{-4}{5}$

5 Class 8 Maths Question 6.

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

Solution:

Let the present ages of Hari and Harry be 5x years and 7x years respectively.

After 4 years Hari's age will be (5x + 4) years and Harry's age will be (7x + 4) years.

As per the conditions, we have

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

⇒ 4(5x + 4) = 3(7x + 4) (Cross-multiplication)

⇒ 20x + 16 = 21x + 12 (Solving the bracket)

⇒ 20x − 21x = 12 − 16 (Transposing 21x to LHS and 16 to RHS)

⇒ -x = -4

⇒ x = 4

Hence the present ages of Hari and Harry are 5 4 = 20years and 7 × 4 = 28years respectively.

Ex 2.6 Class 8 Maths Question 7.

The denominator of a rational number is greater

than its numerator by 8. If the numerator is

increased by 17 and the denominator is

decreased by 1, the number obtained is $\frac{3}{2}$. Find

the rational number.

Solution:

Let the numerator of the rational number be x.

Denominator = (x + 8)

As per the conditions, we have

$$\frac{x+17}{x+8-1} = \frac{3}{2} \Rightarrow \frac{x+17}{x+7} = \frac{3}{2}$$

⇒ 2(x + 17) = 3(x + 7) (Cross-multiplication)

⇒ 2x + 34 = 3x + 21 (Solving the bracket)

As per the conditions, we have

$$\frac{x+17}{x+8-1} = \frac{3}{2} \Rightarrow \frac{x+17}{x+7} = \frac{3}{2}$$

⇒ 2(x + 17) = 3(x + 7) (Cross-multiplication)

⇒ 2x + 34 = 3x + 21 (Solving the bracket)

⇒ 2x − 3x = 21 − 34 (Transposing 3x to LHS a 34 to RHS)

⇒ -x = -13

⇒ x = 13

Thus, numerator = 13

and denominator = 13 + 8 = 21

Hence the rational number is $\frac{13}{21}$.