

Exercise 2.6

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Solve the following equations.

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

Solution:

$$\begin{aligned}\frac{(8x - 3)}{3x} &= 2 \\ \Rightarrow \frac{8x}{3x} - \frac{3}{3x} &= 2 \\ \Rightarrow \frac{8}{3} - \frac{1}{x} &= 2 \\ \Rightarrow \frac{8}{3} - 2 &= \frac{1}{x} \\ \Rightarrow \frac{(8-6)}{3} &= \frac{1}{x} \\ \Rightarrow \frac{2}{3} &= \frac{1}{x} \\ \Rightarrow x &= \frac{3}{2}\end{aligned}$$

2. $\frac{9x}{(7-6x)} = 15$

Solution:

$$\begin{aligned}\frac{9x}{(7-6x)} &= 15 \\ \Rightarrow 9x &= 15(7 - 6x) \\ \Rightarrow 9x &= 105 - 90x \\ \Rightarrow 9x + 90x &= 105 \\ \Rightarrow 99x &= 105 \\ \Rightarrow x &= \frac{105}{99} = \frac{35}{33}\end{aligned}$$

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

Solution:

$$\begin{aligned}\frac{z}{z+15} &= \frac{4}{9} \\ \Rightarrow z &= \frac{4}{9}(z + 15) \\ \Rightarrow 9z &= 4(z + 15) \\ \Rightarrow 9z &= 4z + 60 \\ \Rightarrow 9z - 4z &= 60 \\ \Rightarrow 5z &= 60 \\ \Rightarrow z &= 12\end{aligned}$$

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

Solution:

$$\begin{aligned}\frac{3y+4}{2-6y} &= \frac{-2}{5} \\ \Rightarrow 3y + 4 &= \frac{-2}{5} (2 - 6y) \\ \Rightarrow 5(3y + 4) &= -2(2 - 6y) \\ \Rightarrow 15y + 20 &= -4 + 12y \\ \Rightarrow 15y - 12y &= -4 - 20 \\ \Rightarrow 3y &= -24 \\ \Rightarrow y &= -8\end{aligned}$$

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

Solution:

$$\begin{aligned}\frac{7y+4}{y+2} &= \frac{-4}{3} \\ \Rightarrow 7y + 4 &= \frac{-4}{3} (y + 2) \\ \Rightarrow 3(7y + 4) &= -4(y + 2) \\ \Rightarrow 21y + 12 &= -4y - 8 \\ \Rightarrow 21y + 4y &= -8 - 12 \\ \Rightarrow 25y &= -20 \\ \Rightarrow y &= \frac{-20}{25} = \frac{-4}{5}\end{aligned}$$

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.

Solution:

Let the age of Hari be $5x$ and Harry be $7x$.

4 years later,

$$\text{Age of Hari} = 5x + 4$$

$$\text{Age of Harry} = 7x + 4$$

According to the question,

$$\begin{aligned}\frac{5x+4}{7x+4} &= \frac{3}{4} \\ \Rightarrow 4(5x + 4) &= 3(7x + 4) \\ \Rightarrow 20x + 16 &= 21x + 12 \\ \Rightarrow 21x - 20x &= 16 - 12 \\ \Rightarrow x &= 4\end{aligned}$$

$$\text{Hari age} = 5x = 5 \times 4 = 20 \text{ years}$$

$$\text{Harry age} = 7x = 7 \times 4 = 28 \text{ years}$$

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 be x then denominator will be $(x + 8)$.

According to the question,

$$\begin{aligned}\frac{(x+17)}{(x+8-1)} &= \frac{3}{2} \\ \Rightarrow \frac{(x+17)}{(x+7)} &= \frac{3}{2} \\ \Rightarrow 2(x+17) &= 3(x+7) \\ \Rightarrow 2x+34 &= 3x+21 \\ \Rightarrow 34-21 &= 3x-2x \\ \Rightarrow 13 &= x\end{aligned}$$

The rational number is $\frac{x}{x+8} = \frac{13}{21}$