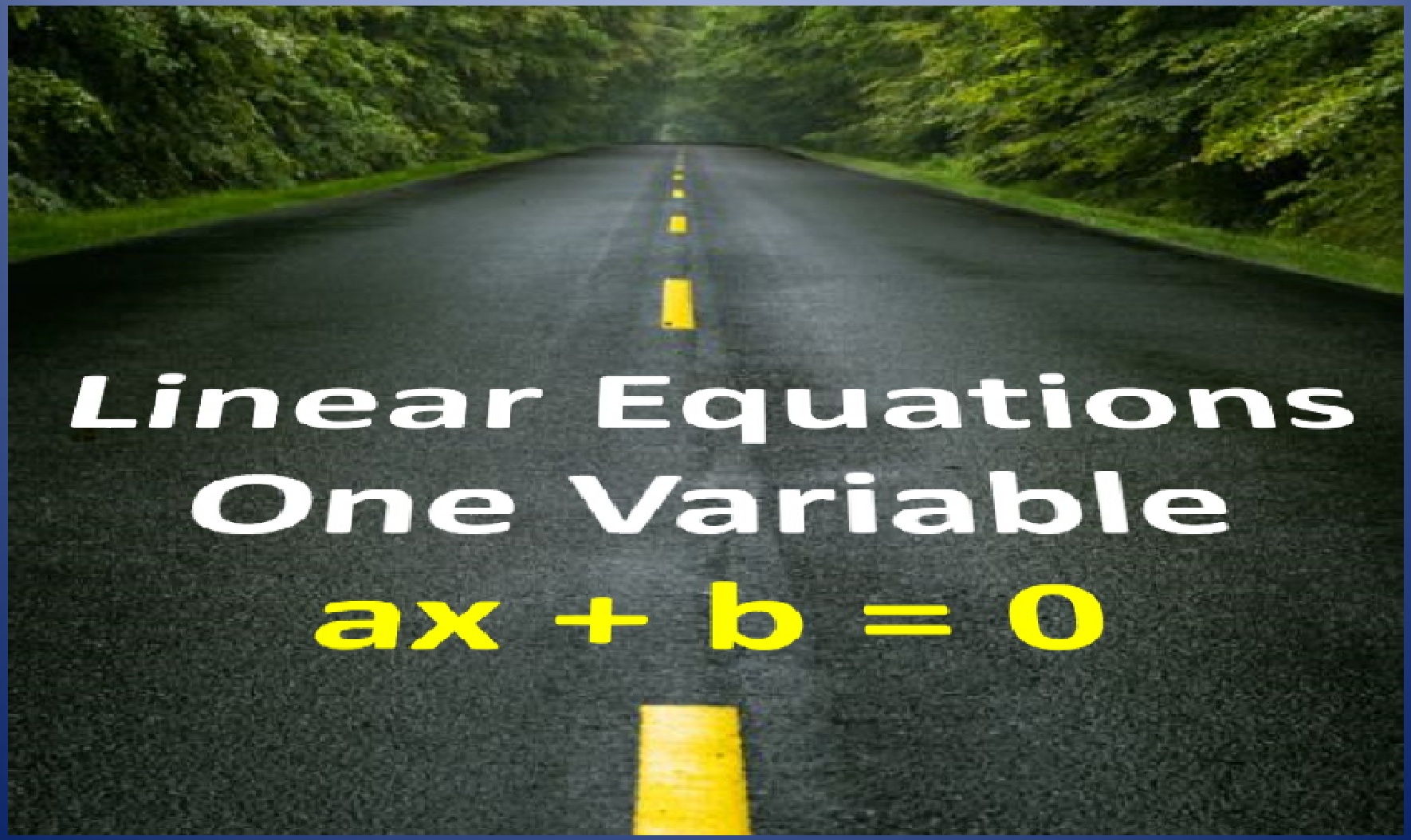
PROJECTION OF LINEAR EQUATION IN ONE VARIABLE CLASS-8



LEARNING OBJECTIVES

IN THIS LESSON, YOU WILL...

- ✓ translate word problems into linear equations with one variable.
- ✓ solve the linear equations and answer the question in the problem.

2.1 – Linear Equations in One Variable

Algebraic ***equation*** is a statement that two expressions have equal value.

Solving algebraic equations involves finding values for a variable that make the equation true.

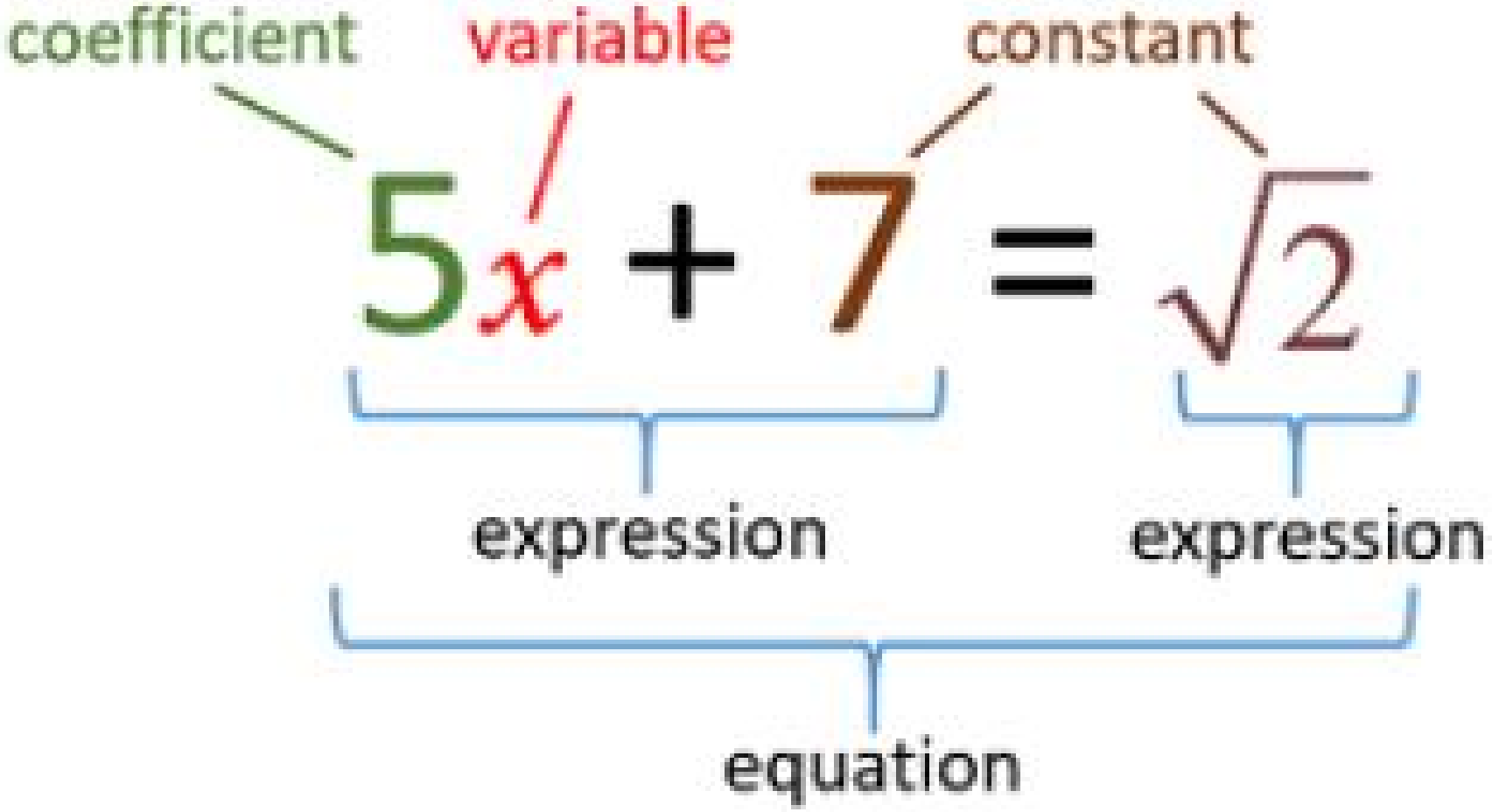
Linear equation in one variable can be written in the form:

$$ax + b = c, \quad a \neq 0.$$

Equivalent equations are equations with the same solutions in the form of:

variable = number, $x = 3$, or

number = variable, $3 = x$.



Terms: $5x$, 7, $\sqrt{2}$

Linear Equation in One Variable

$$\underbrace{4x+8}_{\text{LHS}} = \underbrace{16}_{\text{RHS}}$$

(Left Hand Side) (Right Hand Side)

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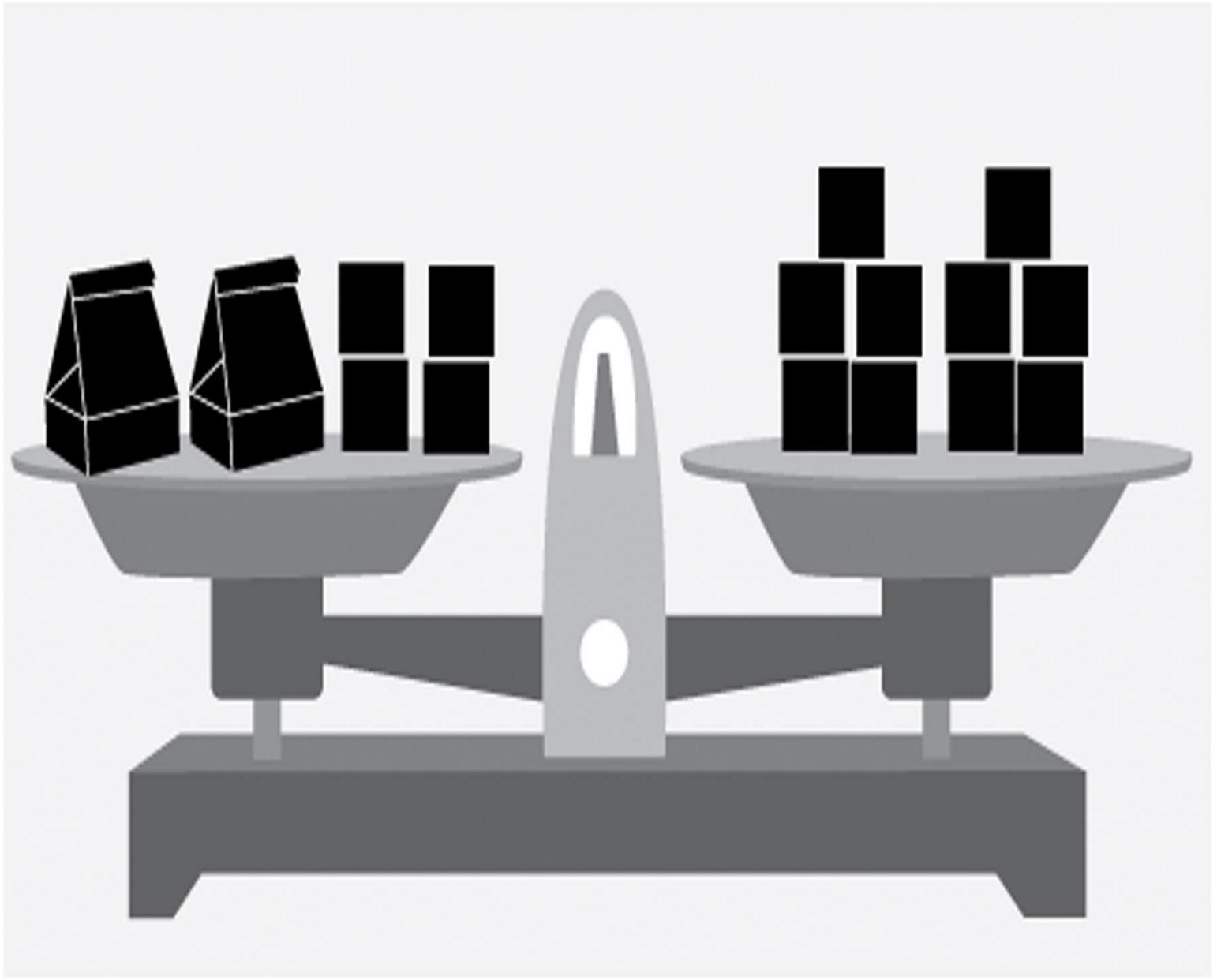
Class Eighth Math

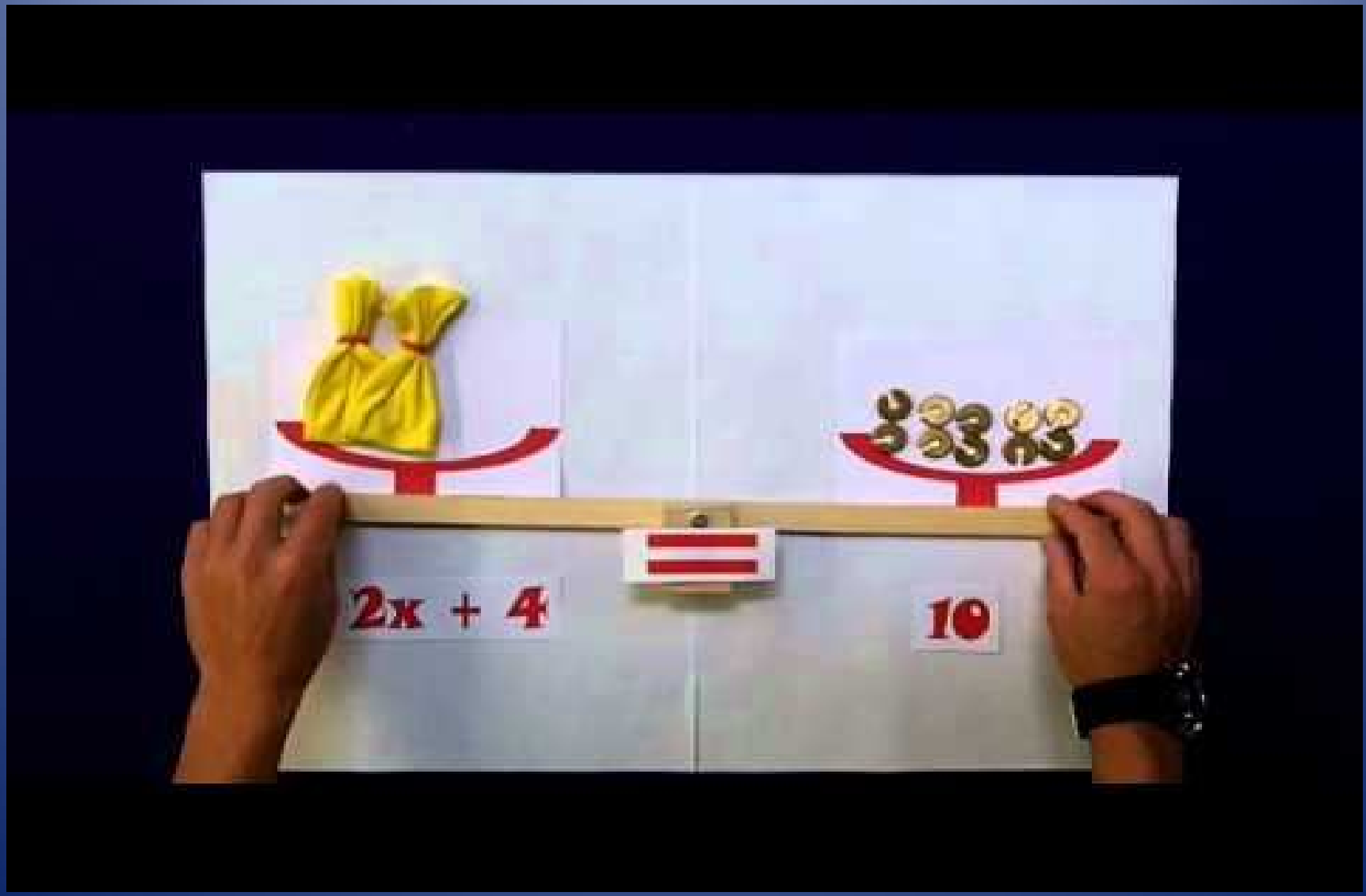
x

y

$$12x + 5y = 150$$



ACTIVITY



$x - 5 = 0$

$x = 5$ is the solution

$y + 8 = 2$

$y = -6$ is the solution

$5x = 0$

$x = 0$ is the solution

Solving simple two-step equations

To solve an equation, find the value that makes the equation true.

Solve $2x + 3 = 13$

This means: $x \xrightarrow{\times 2} \xrightarrow{+ 3} = 13$

To solve, we reverse the process:

$x \xrightarrow{\times 2} \xrightarrow{+ 3} 13$

$x \xleftarrow{\div 2} \xleftarrow{- 3} 13$

Use the opposite (inverse) operation and undo in reverse order.

$$\begin{aligned} 2x + 3 &= 13 && \\ 2x &= 10 && - 3 \\ x &= 5 && \div 2 \end{aligned}$$

We have solved the equation when we get to a single value of x (here, $x = 5$).

Solve $4x + 6 = 14$

$$\begin{aligned} 4x + 6 &= 14 && \\ 4x &= 8 && - 6 \\ x &= 2 && \div 4 \end{aligned}$$

Solve $3x - 8 = 19$

$$\begin{aligned} 3x - 8 &= 19 && \\ 3x &= 27 && + 8 \\ x &= 9 && \div 3 \end{aligned}$$

EQUATIONS WITH FRACTIONS CAN BE SIMPLIFIED BY MULTIPLYING BOTH SIDES BY A COMMON DENOMINATOR.

Example: Solve $\frac{1}{2}x+\frac{2}{3}=\frac{1}{3}(x+4)$

The lowest common denominator of all fractions in the equation is 6.

$6\left(\frac{1}{2}x+\frac{2}{3}\right)=6\left(\frac{1}{3}(x+4)\right)$ Multiply by 6.

$3x + 4 = 2x + 8$ Simplify.

$3x = 2x + 4$ Subtract 4.

$x = 4$ Subtract 2x.

$\frac{1}{2}(4)+\frac{2}{3}=\frac{1}{3}((4)+4)$ Check.

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

$\frac{8}{3}=\frac{8}{3}$ True

The 4 Steps of Equation Solving

1. Simplify both sides of the equation.
2. Move all parts of the equation that contain the variable you're solving for to the same side.
3. Isolate the variable using multiplication, division, exponentiation, or by taking roots.
4. Check your solution!

The sum of two numbers is 45 and their ratio is 7:8. Find the numbers.

Solution:

Let one of the numbers be x.

Then the other number will be 45 - x

By the given condition,

$$\frac{x}{45-x} = \frac{7}{8}$$

By cross multiplying , we have

$8x = 7(45 - x)$

$8x = 315 - 7x$

$8x + 7x = 315$ (Transposing – 7x)

$15x = 315$

$\frac{15x}{15} = \frac{315}{15}$ (Dividing both sides by 15)

$x = \frac{315}{15} = 21$

$x = 21$

Thus, one number is 21 and the other number is 45 - 21 = 24

Check: (1) Sum of the two numbers = 21 + 24 = 45

(2) Ratio of the two number = $\frac{21}{24} = \frac{7}{8}$