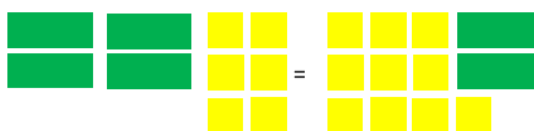


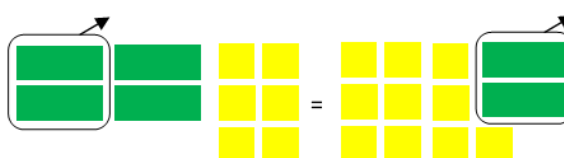
Solving Multi – Step Equations

Use algebra tiles to solve $4x + 6 = 10 + 2x$.

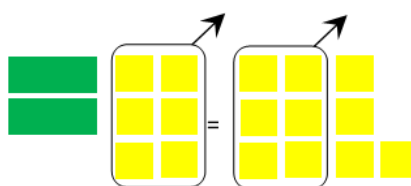
Model $4x + 6 = 10 + 2x$ using algebra tiles



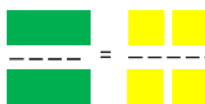
Remove two x-tiles from each side



Remove six 1-tiles from each side



Divide the remaining tiles into two equal groups. Each x-tile is equal to two 1-tiles. So, the solution is 2



You can solve a two-step equation by using two inverse operations.

Step 1: Combine all the like terms

Step 2: Bring all the terms containing the variable to one side, and the constants to the other side

Step 3: Multiply both sides of the equation by the reciprocal of the coefficient of the variable

Example 1: Solve $3x + 7 = -5$. Check your solution.

$$3x + 7 = -5$$

Write original equation.

$$3x + 7 - 7 = -5 - 7$$

Subtract 7 from each side

$$3x = -12$$

Simplify

$$\frac{3x}{3} = \frac{-12}{3}$$

Divide each side by 3

$$x = -4$$

The solution is -4 .

Check: $3x + 7 = -5$

$$3(-4) + 7 = -5$$

$$-5 = -5 \checkmark$$

Write original equation.

Substitute -4 for x .

Solution checks.

Number of solutions

When you solve an equation, you may find that it has no solution or that every number is a solution.

Case 1: An Equation with no Solution

Solve $5(2x + 1) = 10x$

$$\begin{array}{ll} 5(2x + 1) = 10x & \text{Write original equation.} \\ 10x + 5 = 10x & \text{Distributive property.} \end{array}$$

Notice that $10x + 5 = 10x$ is not true because the number $10x$ cannot be equal to 5 more than itself. The equation has no solution. As a check, you can continue solving the equation.

$$\begin{array}{ll} 10x + 5 - 10x = 10x - 10x & \text{Subtract } 10x \text{ from each side} \\ 5 = 0 \quad \times & \text{Simplify} \end{array}$$

The statement $5 = 0$ is not true, so the equation has no solution.

Case 2: Solving an Equation with All Numbers as Solutions

Solve $6x + 2 = 2(3x + 1)$.

$$\begin{array}{ll} 6x + 2 = 2(3x + 1) & \text{Write original equation} \\ 6x + 2 = 6x + 2 & \text{Distributive property} \end{array}$$

Notice that for all values of x , the statement $6x + 2 = 2(3x + 1)$ is true. The equation has every number as a solution.