

## Solving Equations with Variables on Both Sides

Consider the equation  $x - 6 = -2x + 3$ . To isolate the variable, we need to get all the variable terms to one side and the constant terms to the other side. Next, we combine like terms and then isolate the variable by multiplying or dividing.

**Example:**

$$\text{Solve } x - 6 = -2x + 3$$

**Solution:**

**Step 1:** Get all the variable terms to one side and the constant terms to the other side.

$$x - 6 = -2x + 3$$

$$x - 6 + 2x + 6 = -2x + 3 + 2x + 6 \text{ (Add } 2x \text{ \& } 6 \text{ to both sides)}$$

**Step 2:** Combine like terms

$$2x + x = 3 + 6$$

$$3x = 9$$

**Step 3:** Divide or multiply to isolate the variable

$$3x = 9 \text{ (Divide by 3)}$$

$$x = 3$$

**Check:**

$$x - 6 = -2x + 3$$

$$3 - 6 = -2 \cdot 3 + 3 \text{ (substitute } x = 3 \text{ into the original equation)}$$

$$-3 = -3$$

Consider the equation  $6x - 4 = 3x + 2$ . To isolate the variable, we need to get all the variable terms to one side and the constant terms to the other side. Next, we combine like terms and then isolate the variable by multiplying or dividing.

Example:

Solve  $6x - 4 = 3x + 2$

Solution:

Step 1: Get all the variable terms to one side and the constant terms to the other side.

$$\underline{6x - 4 = 3x + 2}$$

$$\underline{6x - 4 - 3x + 4 = 3x + 2 - 3x + 4 \text{ (Subtract } 3x \text{ \& add } 4 \text{ to both sides)}}$$

Step 2: Combine like terms

$$\underline{6x - 3x = 2 + 4}$$

$$\underline{3x = 6}$$

Step 3: Divide or multiply to isolate the variable

$$\underline{3x = 6 \text{ (Divide by } 3)}$$

$$\underline{x = 2}$$

Check:

$$\underline{6x - 4 = 3x + 2 \text{ (substitute } x = 2 \text{ into the original equation)}}$$

$$\underline{6 \cdot 2 - 4 = 3 \cdot 2 + 2}$$

$$\underline{8 = 8}$$