

## Unit 27 Solving Multi-Step Equations

### 1. Solving multi-step equations

A. Solving multi-step equations requires using more than one opposite operation to isolate the variable. The equation will stay in balance as long as each side changes by an equal amount.

B. Solve  $4x - 5 = 35$

To remove the subtraction of 5, add 5. This will isolate $4x$ .	$\longrightarrow$	$4x - 5 = 35$ $4x - 5 + 5 = 35 + 5$ $4x = 40$
To remove the multiplication by 4, divide by 4. This will isolate $x$ .	$\longrightarrow$	$4x/4 = 40/4$ $x = 10$

C. Solve  $\frac{x}{6} + 4 = 7$

To remove the addition of 4, subtract 4. This will isolate $x/6$ .	$\longrightarrow$	$\frac{x}{6} + 4 = 7$ $\frac{x}{6} + 4 - 4 = 7 - 4$ $\frac{x}{6} = 3$
To remove the division by 6, multiply by 6. This will isolate $x$ .	$\longrightarrow$	$\frac{x}{6}(6) = 3(6)$ $x = 18$

**Check your answer** by substituting the answer of 18 for  $x$  and performing the indicated operations.

$$\frac{x}{6} + 4 = 7$$

$$\frac{18}{6} + 4 = 7$$

$$3 + 4 = 7$$

$$7 = 7$$

### 2. Solving equations with like terms

A. The constants and variables of an equation are called the terms of an equation.

B. Combine (add or subtract) like terms on the same side of the equation.

C. Use opposite operations to isolate the variable term and the constant term on opposite sides of the equation. The variable is usually put on the left side of the equation.

D. Use an opposite operation to solve for the unknown variable.

E. Sample problems

$$3x + 2x = 50$$

$$5x = 50$$

$$5x/5 = 50/5$$

$$x = 10$$

$$5y + 10 - 2y = 49$$

$$3y + 10 = 49$$

$$3y + 10 - 10 = 49 - 10$$

$$3y = 39$$

$$3y/3 = 39/3$$

$$y = 13$$

$$5x + 4 = 3x + 12$$

$$5x + 4 - 4 = 3x + 12 - 4$$

$$5x = 3x + 8$$

$$5x - 3x = 3x + 8 - 3x$$

$$2x = 8$$

$$2x/2 = 8/2$$

$$x = 4$$

### 3. Solving equations with parentheses Example: $5(2x + 3) = 35$

A. Multiplying both terms inside the parentheses by 5.  $\longrightarrow$   $5(2x + 3) = 35$

B. Use subtraction to isolate the variable term.  $\longrightarrow$   $10x + 15 = 35$   
 $10x + 15 - 15 = 35 - 15$

C. Use division to isolate  $x$ .  $\longrightarrow$   $10x = 20$   
 $10x/10 = 20/10$   
 $x = 2$