

# 2.4 Variables and Equations

**Goal:** Solve equations with variables.

Expressions  
Simplify  
ex:  $3x + 2x + 7$   
 $5x + 7$

Equations  
Solve  
ex:  $x + 3 = 5$   
 $x = 2$

**Vocabulary**

Equation: **MUST** have an = sign

Solution of an equation: a # or #'s that make an equation true

~~Solving an equation:~~

**Example 1** Writing Verbal Sentences as Equations

Verbal Sentence	Equation
a. The sum of $x$ and 4 is 8.	$x + 4 = 8$
b. The difference of 7 and $y$ is 13.	$7 - y = 13$
c. The product of $-2$ and $p$ is 24.	$-2p = 24$
d. The quotient of $n$ and 3 is 5.	$n \div 3 = 5$ or $\frac{n}{3} = 5$

*Handwritten notes: "is" → equals, "is equals equals", "or"  $\frac{n}{3} = 5$*

**Example 2** Checking Possible Solutions

Tell whether **7** or **8** is a solution of  $x - 3 = 5$ .

a. Substitute 7 for  $x$ .

$x - 3 = 5$

$7 - 3 \stackrel{?}{=} 5$

$4 \neq 5$

**Answer:** 7 **is not** a solution.

**NO**

b. Substitute 8 for  $x$ .

$x - 3 = 5$

$8 - 3 \stackrel{?}{=} 5$

$5 = 5$

**Answer:** 8 **is** a solution.

**yes**

$\neq \rightarrow$  is not equal to

- ① substitute
- ② simplify

✔ **Checkpoint** Write the verbal sentence as an equation.

1. The sum of  $x$  and 7 is 12.

$$x + 7 = 12$$

2. The quotient of  $n$  and 4 is 16.

$$n \div 4 = 16 \text{ or } \frac{n}{4} = 16$$

3. Tell whether 8 or 10 is a solution of  $x - 4 = 6$ .

$8 - 4 \stackrel{?}{=} 6$ $4 \neq 6$ <p style="text-align: center;">NO</p>	$10 - 4 = 6$ $6 = 6$ <p style="text-align: center;">yes</p>
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**Example 3** Solving Equations Using Mental Math

Equation	Question	Solution	Check
a. $x + 4 = 7$	what # plus 4 equals 7?	3	3 + 4 = 7
b. $12 - n = 5$	12 minus what # equals 5?	7	12 - 7 = 5
c. $18 = 3t$	18 equals 3 times what #?	6	18 = 3(6)
d. $\frac{y}{4} = -5$	what # divided by 4 equals -5?	-20	$\frac{-20}{4} = -5$

✔ **Checkpoint** Solve the equation using mental math.

4.  $x - 8 = 10$

$$x = 18$$

5.  $24 = 4m$

$$m = 6$$

6.  $\frac{c}{3} = 9$

$$c = 27$$