# Algebra 1.1:  Solving Simple Equations
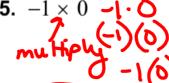
**Warm-Up REVIEW:** No calculators!

**Simplify the expression.**
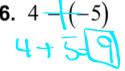
multiply

1. $5 + (-15)$

$5 - 15 = \boxed{-10}$

2. $6 - 7$

$6 + (-7) = \boxed{-1}$

3. $10 \cdot (-1)$

$\boxed{-10}$

4. $\dfrac{-30}{2}$ $\longrightarrow \div$ Divide

$-30 \div 2$

$\boxed{-15}$

5. $-1 \times 0$ $-1 \cdot 0$

multiply $(-1)(0)$

$-1(0)$

$\boxed{0}$

6. $4 - (-5)$
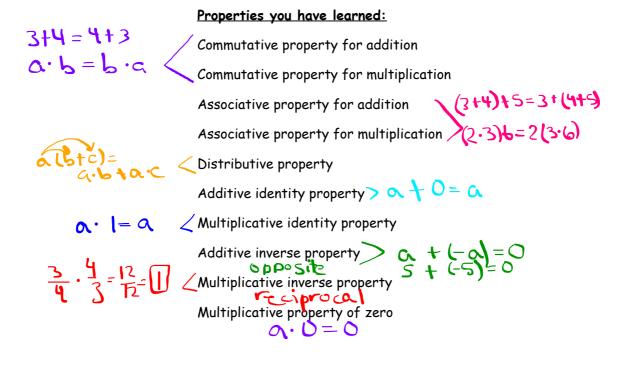
$4 + 5 = \boxed{9}$

Aug 21-2:21 PM

Learning Outcomes:

I can solve linear equations using addition and subtraction.

I can solve linear equations using multiplication and division.

I can use linear equations to solve real-life problems.

Jul 10-12:10 PM

**1.1 Solving Simple Equations with work**

**Properties you have learned:**

$3+4 = 4+3$
$a \cdot b = b \cdot a$

Commutative property for addition

Commutative property for multiplication

Associative property for addition $(3+4)+5 = 3+(4+5)$

Associative property for multiplication $(2 \cdot 3)6 = 2(3 \cdot 6)$

$a(b+c) = a \cdot b + a \cdot c$

Distributive property

Additive identity property $a + 0 = a$

$a \cdot 1 = a$ Multiplicative identity property

Additive inverse property $a + (-a) = 0$
opposite $5 + (-5) = 0$

$\frac{3}{4} \cdot \frac{4}{3} = \frac{12}{12} = \boxed{1}$ Multiplicative inverse property
reciprocal

Multiplicative property of zero
$a \cdot 0 = 0$

Sep 4-8:01 AM

**Review of mathematical properties:**

**Tell which property the statement illustrates.**

**1.** $2 + 4 = 4 + 2$

Commutative property for addition

**2.** $(3 \bullet 7)4 = 3(7 \bullet 4)$

Associative property for multiplication

**3.** $8 + 0 = 8$

Additive identify property

**4.** $7 \bullet \dfrac{1}{7} = 1$

Multiplicative inverse property

**5.** $4 \bullet 0 = 0$

Multiplicative property of zero

**6.** $12(8 + 3) = 12 \bullet 8 + 12 \bullet 3$

Distributive property

Cumulative Warm Up

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**1.1 Solving Simple Equations with work**

## Core Concept

**Addition Property of Equality** (POE)

**Words** Adding the same number to each side of an equation produces an equivalent equation.

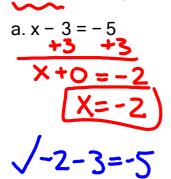**Algebra** If $a = b$, then $a + c = b + c$. (POE)

**Subtraction Property of Equality** (POE)

**Words** Subtracting the same number from each side of an equation produces an equivalent equation.

**Algebra** If $a = b$, then $a - c = b - c$.

## Example 1: Solve and then check!

Solve each equation. Justify each step. Check your answer.

a. $x - 3 = -5$

$$+3 \quad +3$$
$$x + 0 = -2$$
$$\boxed{x = -2}$$

$\checkmark \ -2 - 3 = -5$

b. $0.9 = y + 2.8$ 　　$0.9-2.8$　 $-1.9$

$$-2.8 \quad -2.8$$
$$\boxed{-1.9 = y}$$

$$0.9 = -1.9 + 2.8 \checkmark$$

Core Concept

## Example 2:

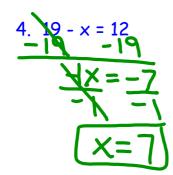Solve the equation. Justify each step. Check your solution.

1. $n + 3 = -7$

$$-3 \quad -3$$
$$\boxed{n = -10}$$

2. $g - \dfrac{1}{3} = -\dfrac{2}{3}$

$$+\tfrac{1}{3} \quad +\tfrac{1}{3}$$
$$\boxed{g = \dfrac{-1}{3}}$$

3. $-6.5 = p + 3.9$

$$-3.9 \quad -3.9$$
$$\boxed{10.4 = p}$$

## Practice 2: What about these? **No sign means +.**

4. $19 - x = 12$

$$-19 \quad -19$$
$$-x = -7$$
$$\dfrac{-x}{-1} = \dfrac{-7}{-1}$$
$$\boxed{x = 7}$$

5. $-3 - y = 14$

$$+3 \quad +3$$
$$-y = 17$$
$$\dfrac{-y}{-1} = \dfrac{17}{-1}$$
$$\boxed{y = -17}$$

Monitoring Progress 1-3

**3**

## 1.1 Solving Simple Equations with work

### Core Concept

**Multiplication Property of Equality**

**Words** Multiplying each side of an equation by the same nonzero number produces an equivalent equation.

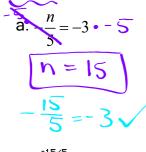**Algebra** If $a = b$, then $a \cdot c = b \cdot c, c \neq 0$.

**Division Property of Equality**

**Words** Dividing each side of an equation by the same nonzero number produces an equivalent equation.

**Algebra** If $a = b$, then $a \div c = b \div c, c \neq 0$.

## Example 3:

Solve each equation. Justify each step. Check your answer.

a. $\dfrac{n}{5} = -3 \cdot -5$

$$n = 15$$

$-\dfrac{15}{5} = -3 \checkmark$

-15/5     -3

b. $\pi x = -2\pi$

$$x = -2$$

c. $1.3z = 5.2$

$\dfrac{1.3}{1.3} \quad \dfrac{1.3}{}$

$$z = 4$$

Core Concept

## Practice 3:

Solve the equation. Justify each step. Check your solution.

4. $\dfrac{y}{3} = -6 \cdot 3$

$$y = -18$$

5. $9\pi = \pi x$

$\dfrac{}{\pi} \quad \dfrac{}{\pi}$

$$9 = x$$

6. $0.05w = 1.4$

$\dfrac{}{0.05} \quad \dfrac{}{0.05}$

$$w = 28$$

Monitoring Progress 4-6

## Example 4:

In the 2012 Olympics, Usain Bolt won the 200-meter dash with a time of 19.32 seconds. Write and solve an equation to find his average speed to the nearest hundredth of a meter per second. **( d = r t)**

$$\frac{200}{19.32} = \frac{r\ (19.32)}{19.32}$$

$$10.35 = r$$

$$\boxed{10.35 \ m/s}$$

## Practice 4:

7. Suppose Usain Bolt ran 400 meters at the same average speed that he ran the 200 meters. How long would it take him to run 400 meters? Round your answer to the nearest hundredth of a second.

Monitoring Progress 7

• Describe in words how to solve a one-step equation.

The goal is to get the variable alone. So, we use opposite operations to get the variable by itself.

• Solve for x:     $-13.8 = x - 4.3$

$$+4.3 \qquad +4.3$$

$$\boxed{-9.5 = x}$$

Closure

## HW: Pg. 8

A: 4, 11, 14 - 16, 29, 30, 34, 37, 40 - 44, 46, 57 - 61

B: 2, 4, 5 - 43 (o), 58 - 61

### 🌀 Core Concept

**Four-Step Approach to Problem Solving**

1. **Understand the Problem** What is the unknown? What information is being given? What is being asked?
2. **Make a Plan** This plan might involve one or more of the problem-solving strategies shown on the next page.
3. **Solve the Problem** Carry out your plan. Check that each step is correct.
4. **Look Back** Examine your solution. Check that your solution makes sense in the original statement of the problem.

Core Concept

**1.1 Solving Simple Equations with work**

### Core Concept

**Common Problem-Solving Strategies**

| | |
|---|---|
| Use a verbal model. | Guess, check, and revise. |
| Draw a diagram. | Sketch a graph or number line. |
| Write an equation. | Make a table. |
| Look for a pattern. | Make a list. |
| Work backward. | Break the problem into parts. |

## Practice 5:

8. You thought the balance in your checking account was $68. When your bank statement arrives, you realize that you forgot to record a check. The bank statement lists your balance as $26. Write and solve an equation to find the amount of the check that you forgot to record.

Core Concept