# Algebra 1

Our Goal: To learn to solve equations with the variable on both sides

Warm Up: You will need your homework, notebook, and computer
Everything else, bags etc. on the shelves, thank you
To vote in NJ you need to be how old?

## Today's Homework

1.3 Exercises, p.23-24: 4-40 (evens)

## Previous Homework

1.2 Exercises, p.16-18: 6-54 (multiples of 3)

$ax + b = c$ ; for $x$

$= b \quad = -b$

$ax = c - b$ ✓

$x = \frac{c-b}{a}$

$= \frac{c}{a} - \frac{b}{a}$ ✓

$$\frac{3}{2}b + b + b + (2b - 90) + 90 + 45 = 540$$

$$5\frac{1}{2}b + 45 = 540$$

$$5\frac{1}{2}b = 495$$

$$b = 495 \div 5\frac{1}{2}$$

$$495 \div \frac{11}{2}$$

$$495 \cdot \frac{2}{11}$$

$$45 \cdot 2 = 90$$

$$a = 3400t + 600$$

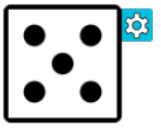
$$21{,}000 = 3{,}400t + 6000$$

**Use the Distributive Property to simplify the expression.**

**1.** $5(u - 5)$

**2.** $17(2 + n)$

**3.** $-5(e - 4)$



**4.** $-3(t + 7)$

**5.** $4(v - 6)$

**6.** $4(a + 5)$

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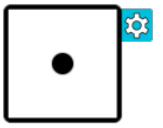
**Simplify the expression.**

**1.** −1 + (−1) + (−1)



**2.** (10)(−10)(−10)(10)

**3.** −6 − (−6)

**Simplify the expression.**

**4.** $\frac{300}{-3} \div \frac{300}{3}$

**5.** 4 + 4 − 4 + 4 − 4 + 4

**6.** 2(10 − 2)(2 − 8)(6 − 2)(2 − 4)(2 − 2)

## Core Concept

### Solving Equations with Variables on Both Sides

To solve an equation with variables on both sides, simplify one or both sides of the equation, if necessary. Then use inverse operations to collect the variable terms on one side, collect the constant terms on the other side, and isolate the variable.

Solve $10 - 4x = -9x$. Check your solution.

Solve $3(3x-4)=\frac{1}{4}(32x+56)$.

**Solve the equation. Check your solution.**

**1.** $-2x = 3x + 10$

$3x + 10 = -2x$

$-3x \quad\quad -3x$

$10 = -5x$

$\frac{10}{-5} = \frac{-5x}{-5}$

$x = -2$

**2.** $\frac{1}{2}(6h - 4) = -5h + 1$

**3.** $-\frac{3}{4}(8n + 12) = 3(n - 3)$

## Core Concept

### Special Solutions of Linear Equations

Equations do not always have one solution. An equation that is true for all values of the variable is an **identity** and has *infinitely many solutions*. An equation that is not true for any value of the variable has *no solution*.

Solve each equation.

**a.** $3(5x + 2) = 15x$

**b.** $-2(4y + 1) = -8y - 2$

$3(5x+2)=15x$

$15x+6=15x$

$-15x \quad -15x$

$6 \neq 0$

$\rightarrow \emptyset$ empty set

no solution

no sol.

Solve each equation.

**a.** $3(5x + 2) = 15x$

**b.** $-2(4y + 1) = -8y - 2$

$8y - 8y - 2 = -8y$

$-2 = -2 + 8y$

$\emptyset$

real

all^numbers

$\mathbb{N}$ $\mathbb{Z}$ $\mathbb{R}$

$\mathbb{P}$ → infinitely many

identity

**Solve the equation.**

**4.** $4(1 - p) = -4p + 4$

**5.** $6m - m = \frac{5}{6}(6m - 10)$

**6.** $10k + 7 = -3 - 10k$

**7.** $3(2a - 2) = 2(3a - 3)$

# Concept Summary

## Steps for Solving Linear Equations

Here are several steps you can use to solve a linear equation. Depending on the equation, you may not need to use some steps.

**Step 1** Use the Distributive Property to remove any grouping symbols.

**Step 2** Simplify the expression on each side of the equation.

**Step 3** Collect the variable terms on one side of the equation and the constant terms on the other side.

**Step 4** Isolate the variable.

**Step 5** Check your solution.

A boat leaves New Orleans and travels upstream on the Mississippi River for 4 hours. The return trip takes only 2.8 hours because the boat travels 3 miles per hour faster downstream due to the current. How far does the boat travel upstream?

**8.** A boat travels upstream on the Mississippi River for 3.5 hours. The return trip only takes 2.5 hours because the boat travels 2 miles per hour faster downstream due to the current. How far does the boat travel upstream?