# Algebra 1A

### Lesson 3.4 Solve Equations with Variables on Both Sides

## Warm-Up

Solve.

(a) 
$$\frac{a}{4} + 6 = -3$$
  
 $-6 - 6$   
 $A = -9 \cdot 4$   
 $a = -36$ 

(b) 
$$-25 = -3y - 2y$$

(c) 
$$2m-6+4m=12$$

$$6m-6=12$$
 $+6+6$ 
 $6m=18$ 
 $6=6$ 
 $m=3$ 

(d) 
$$6x+5(x-1)=11$$
  
 $6x-5x+5=1$ 

## Steps for Solving

- 1. Use the Distributive Property to get rid of grouping symbols
- 2. Simplify on each side of the equal side (combine like terms)
- 3. Collect all variables on one side and all constants on the other side
- 4. Use OPPOSITE operations in the OPPOSITE order
- 5. Give your answer as an x = (or y =, t =, etc.)

# **Example 1. Solve an Equation with Variables on Both Sides**

Solve. (a) 
$$13+5x=2x-8$$

$$\frac{-2x-2x}{13+3x=-8}$$

$$-13 \qquad -13$$

$$\frac{3x=-21}{3}$$

(b) 
$$24-3m=5m + 3m + 3m$$

$$\frac{24-8m}{8}$$

$$3=m$$

# **Example 2. Solve an Equation with Grouping Symbols**

Solve.

(a) 
$$5z-2=2(3z-4)$$

$$-12-2=-8$$
 $+2$ 
 $+2$ 
 $-12=-6$ 

$$4x-5=1x+4$$
 $-1x$ 
 $-1x$ 

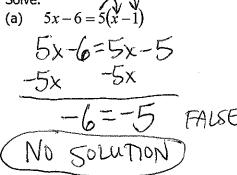


(a) 
$$8t+5=6t+1$$
 $-6t-6t$ 
 $2t+5=1$ 
 $-5-5$ 
 $2t=-4$ 
 $1=-7$ 

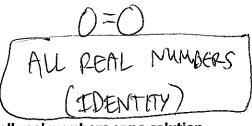
(b) 
$$3-4a=5(a-3)$$
  
 $3-4a=5(a-3)$   
 $3-4a=5a-15$   
 $4a + 4a$   
 $3=9a-15$   
 $15 + 15$   
 $18=9a$   
 $a=2$   
 $2=a$ 

(c)	$8y - 6 = \frac{2}{3} \left( \frac{6y + 15}{1} \right)$
. (	$3y-6=\frac{12}{3}y+\frac{30}{3}$
-4	y-6= 4y+10
Ž	ty-6=10 +6+6
	4y=16

**Example 4. Identify the Number of Solutions** 



4(3x+2)=2(6x+4)12x+8=12x+8



Try It!

Solve if possible. Answer with: the value of the solution, all real numbers or no solution. 3(2b+2)=2(3b+3)

(b)

(a) 
$$5(1+4m)=2(3+10m)$$

(c) 
$$7w+1=8w+1$$
  
 $-7w$   $-7w$ 

$$6b + 6 = 6b + 6$$

**Assignment:** Pages 157 - 158 (4 – 42) even

#### Review:

- 1, A local computer center charges nonmembers \$5 per session to use the media center. If you pay a membership fee of \$25, you pay only \$3 per session. Write an equation that can help you decide whether to become a member. Then solve the equation and interpret the solution.
- 2. A rock-climbing gym charges nonmembers \$16 per day to use the gym and \$8 per day for equipment rental. Members pay a yearly fee of \$450 for unlimited climbing and \$6 per day for equipment rental. Write and solve an equation to find how many times you must use the gym to justify becoming a member.