

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Block: \_\_\_\_\_

## Outcome D Part 1 Study Guide

Solving linear equations in one variable (multi-step and variables on both sides)

Steps – 1. Apply the Distributive Property.

2. Combine like terms.

3. Add/subtract on both sides.

4. Multiply/divide on both sides

**Note: You might not need to do all of these steps!**

Special Cases – 1. Infinitely many solutions – when solving your equation, you get results like

$0=0$ ,  $7=7$ ,  $-5=-5$ , etc. These solutions are identities.

2. No solution – when solving your equation, you get results like  $0=7$ ,  $4=-5$ , etc.

These solutions are not identities.

Examples

1.  $9x + 4 = 9(x + 1)$

$$9x + 4 = 9x + 9$$

$$4 = 9$$

Apply the Distributive Property.

Subtract **9x** from both sides.

This is not an identity. There is **no solution**.

2.  $7x + 3 = 3(x + 1) + 4x$

$$7x + 3 = 3x + 3 + 4x$$

$$7x + 3 = 7x + 3$$

$$3 = 3$$

Apply the Distributive Property.

Combine like terms.

Subtract **7x** from both sides.

This is an identity. There are **infinitely many solutions**.

3.  $15x + 11 = 19x + 3$

$$11 = 4x + 3$$

$$8 = 4x$$

$$2 = x$$

Subtract **15x** from both sides.

Subtract **3** from both sides.

Divide by **4** on both sides.

There is one solution. **The solution is  $x = 2$ .**

Practice: Solve for the variable.

1)  $4t - 5t + 9 = 5t - 9$

2)  $-5m + 5m = 9 - 15$

3)  $3x - 9 + 6x = 4x - 6 + 5x - 3$

4)  $9(m - 1) = 9m + 3$

5)  $\frac{1}{2} + 3x = \frac{1}{3}(6x - 12)$

6)  $4.1 = \frac{x}{5.2} + 2.3$

### Writing equations to fit a given number of solutions

**One solution** – two expressions in  $mx + b$  form should have different slopes ( $m$ )

**No solution** – two expressions in  $mx + b$  form should have the same slope ( $m$ ) and different  $y$ -intercepts ( $b$ )

**Infinitely many solutions** – two expressions in  $mx + b$  should have the same slope ( $m$ ) and the same  $y$ -intercept ( $b$ )

Examples

1. **No solution:**  $5x - 1 = \underline{\hspace{1cm}}x + \underline{\hspace{1cm}}$   $m=5$ ,  $b$  can be anything except for  $-1$

2. **One solution:**  $5x - 1 = \underline{\hspace{1cm}}x + \underline{\hspace{1cm}}$   $m \neq 5$ ,  $b$  can be anything

3. **Infinitely many solutions:**  $5x - 1 = \underline{\hspace{1cm}}x + \underline{\hspace{1cm}}$   $m=5$ ,  $b=-1$

Practice

1. **No solution:**  $-3x + 8 = \underline{\hspace{1cm}}x + \underline{\hspace{1cm}}$

2. **One solution:**  $-3x + 8 = \underline{\hspace{1cm}}x + \underline{\hspace{1cm}}$

3. **Infinitely many solutions:**  $-3x + 8 = \underline{\hspace{1cm}}x + \underline{\hspace{1cm}}$

Find the number of solutions for the following equations:

1)  $5 - 3x = -3x + 8$

2)  $4x + 5 - 6 = 3(x + 3)$

3)  $5(2x - 7) = 7x + 3x + 7$

4)  $4x + 2x - 2 = 6x - 3 + 1$

# Outcome D Study Guide

## Combining Like Terms

\*Simplify the following expressions by combining like terms

$$3X - 4 - 2X + 5$$

$$5 - 2X + 5X - 8$$

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## Distributive Property

\*Simplify the following expressions by using the distributive property

$$4(X + 5)$$

$$6(2X - 3)$$

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## One-Step Equations

\*Solve for the variable

$$4X = 12$$

$$X - 6 = 8$$

## Two-Step Equations

\*Solve for the variable

$$2X - 3 = 13$$

$$3X + 6 = 24$$

## Multi-Step Equations

\*Get like terms on the same side of the equation and solve for the variable

$$3X - 8 = 2X + 2$$

$$2X + 4 = -3X + 14$$

## One Solution, No Solution, Infinite Many Solutions

\*Determine the type of solution

$$5X + 6 = 5X$$

$$-3X + 10 = 2X - 5X + 10$$

## Practice Problems

\*Fill in the blank to complete the following solutions

1) No Solution

$$4X + 4 = \underline{\hspace{2cm}} X + \underline{\hspace{2cm}}$$

2) Infinite Many Solutions

$$7X - 3 = \underline{\hspace{2cm}} X + \underline{\hspace{2cm}}$$

3) One Solution

$$2X + 8 = \underline{\hspace{2cm}} X + \underline{\hspace{2cm}}$$

\*Solve for the variable

4)  $-4X + 3 = 5X - 6$

5)  $3(X - 2) = 7X - 14$

6)  $-3X + 5 = -3X - 2$