

## Solving Equations – Applying Properties

**STRAND: Patterns, Functions and Algebra**

**STRAND CONCEPT:** Equality/Solving Equations

**SOL 6.13, 7.12**

### Remediation Plan Summary

Students review and apply the properties of real numbers and properties of equality to solve equations. Students should be familiar with the properties of real numbers and properties of equality prior to working through this lesson.

### Common Errors and Misconceptions

- Students may get the additive identity and additive inverse properties confused because they both use addition.
- Students may get the multiplicative identity and multiplicative inverse properties confused because they both use multiplication.
- Students may confuse the multiplicative property of zero and additive identity properties confused because they both have a zero in the expression.

### Materials

- What's the Cost warm up activity
- activity sheet
- You Are the Teacher activity sheet

### Introductory Activity

Distribute the “What’s the Cost” warm up activity sheet. Ask students how they solved the problem listening for the strategies used. Some students may write an equation and solve it. Others may make a diagram or chart where they subtract the cost of popcorn first. Allow students to share their strategies and make connections between the different methods.

### Plan for Instruction

The focus of the lesson is the application of the properties, not memorizing the names of the properties.

1. Tell the class that opening a door and closing a door are inverse operations. Ask students to name some other real-life inverse operations. Allow students to share their ideas and explain that today we will be using inverse operations to solve equations. Remind students that there are properties that allow us to use inverse operations to solve equations. Review the names of the properties of equality with students.
2. Distribute the activity sheet. Allow students to work with a partner to complete the activity. Students may need to refer to the algebraic properties of equality. As students work, address any concerns or student misconceptions.
3. After pairs have finished the activity, go over the activity sheet as a class. Have several pairs share for each problem and compare answers. Discuss common errors that students found and share your experiences with student incorrectly applying properties.

***Pulling It All Together (Reflection)***

Have students complete the “Exit Slip” worksheet.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

Virginia Department of Education 2018

**Name:** .

### **What's the Cost?**

You and three friends go to the movie and get a large popcorn to share. The total cost for the four of you was \$37. The large popcorn cost \$5. How much did each ticket for the movie cost?

Solve the problem any way you choose and explain how you know your answer is correct.

Name: \_\_\_\_\_

### You Are the Teacher

Mr. Wright needs your help grading his students' work. Below are problems that students worked and their answers. They showed their work, so your job is to decide who is correct and where the other student made a mistake in using the either Properties of Real Numbers or the Properties of Equality.

Julie's work:		Ramey's work:	
Step 1	$x - 3 = 5$	Step 1	$x + 6 = -4$
Step 2	$x - 3 + 3 = 5 - 3$	Step 2	$x + 6 - 6 = -4 - 6$
Step 3	$x = 2$	Step 3	$x = -10$

Who is correct? \_\_\_\_\_

In what step was the error made by the other student? \_\_\_\_\_ What error was made?

\_\_\_\_\_

\_\_\_\_\_

Julie's work:		Ramey's work:	
Step 1	$-3x = -4$	Step 1	$\frac{x}{4} = -3$
Step 2	$\frac{-3x}{-3} = \frac{-4}{-3}$	Step 2	$(-4)\frac{x}{4} = -3(-4)$
Step 3	$x = \frac{4}{3}$	Step 3	$x = 12$

Who is correct? \_\_\_\_\_

In what step was the error made by the other student? \_\_\_\_\_ What error was made?

\_\_\_\_\_

\_\_\_\_\_

Julie's work:		Ramey's work:	
Step 1	$\frac{x}{7} + 1 = 36$	Step 1	$\frac{x}{7} + 1 = 36$
Step 2	$\frac{x}{7} + 1 - 1 = 36 - 1$	Step 2	$\frac{x}{7} + 1 - 1 = 36 - 1$
Step 3	$7 \cdot \frac{x}{7} = 7 \cdot 35$	Step 3	$7 \cdot \frac{x}{7} = \frac{35}{7}$
Step 4	$x = 245$	Step 4	$x = 5$

In what step was the error made by the other student? \_\_\_\_\_ What error was made?

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Julie's work:		Ramey's work:	
Step 1	$x - (-8) = -5$	Step 1	$6 = x - (-4)$
Step 2	$x - (-8) + 8 = -5 + 8$	Step 2	$6 - 4 = x - (-4) - 4$
Step 3	$x = 3$	Step 3	$x = 2$

Who is correct? \_\_\_\_\_

In what step was the error made by the other student? \_\_\_\_\_ What error was made?

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Name: \_\_\_\_\_

**Exit Slip**

$$x - (-1) = -7$$

What would be the first step in solving this equation?

Is there another way to solve the equation?

What error do you think students make?