

Lesson 8: Replacing Numbers with Letters

Classwork

Opening Exercise

$$4 + 0 = 4$$

$$4 \times 1 = 4$$

$$4 \div 1 = 4$$

$$4 \times 0 = 0$$

$$1 \div 4 = \frac{1}{4}$$

How many of these statements are true?

How many of those statements would be true if the number 4 was replaced with the number 7 in each of the number sentences?

Would the number sentences be true if we were to replace the number 4 with any other number?

What if we replaced the number 4 with the number 0? Would each of the number sentences be true?

What if we replace the number 4 with a letter g ? Please write all 4 expressions below, replacing each 4 with a g .

Are these all true (except for $g = 0$) when dividing?

Example 1: Additive Identity Property of Zero

$$g + 0 = g$$

Remember a letter in a mathematical expression represents a number. Can we replace g with any number?

Choose a value for g , and replace g with that number in the equation. What do you observe?

Repeat this process several times, each time choosing a different number for g .

Will all values of g result in a true number sentence?

Write the mathematical language for this property below.

Example 2: Multiplicative Identity Property of One

$$g \times 1 = g$$

Remember a letter in a mathematical expression represents a number. Can we replace g with any number?

Choose a value for g , and replace g with that number in the equation. What do you observe?

Will all values of g result in a true number sentence? Experiment with different values before making your claim.

Write the mathematical language for this property below.

Example 3: Commutative Property of Addition and Multiplication

$$3 + 4 = 4 + 3$$

$$3 \times 4 = 4 \times 3$$

Replace the 3's in these number sentences with the letter a .

Choose a value for a , and replace a with that number in each of the equations. What do you observe?

Will all values of a result in a true number sentence? Experiment with different values before making your claim.

Now write the equations again, this time replacing the number 4 with a variable, b .

Will all values of a and b result in true number sentences for the first two equations? Experiment with different values before making your claim.

Write the mathematical language for this property below.

Example 4

$$3 + 3 + 3 + 3 = 4 \times 3$$

$$3 \div 4 = \frac{3}{4}$$

Replace the 3's in these number sentences with the letter a .

Choose a value for a and replace a with that number in each of the equations. What do you observe?

Will all values of a result in a true number sentence? Experiment with different values before making your claim.

Now write the equations again, this time replacing the number 4 with a variable, b .

Will all values of a and b result in true number sentences for the equations? Experiment with different values before making your claim.