

Content and Language Objective:

Students will explore the different properties that are used in algebra that allow problems to be solve correctly and be able to identify the different properties.

Warm-Up

Questions over the classwork from yesterday.

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Keywords:

- **Identity Properties**
- **Communtative Properties**
- **Associative Properties**
- **Distributive Properties**

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Algebra Essentials

Identity Property of 0 states that if 0 is added to any real number a , the result is a .

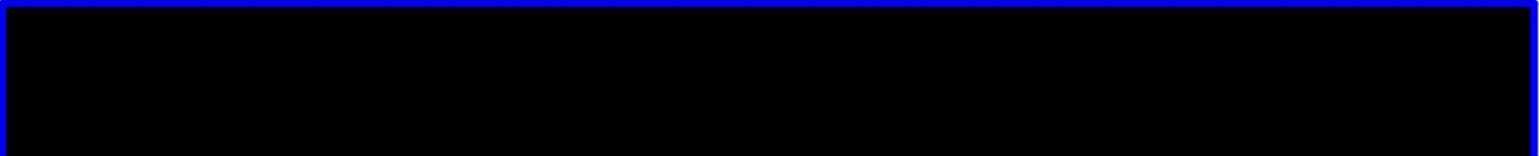
0 is called the ADDITIVE IDENTITY

Example: $-3 + 0 = -3$ or $0 + 18 = 18$

Identity Property of 1 states that if any number a is multiplied by 1, the result is a .

1 is called the MULTIPLICATIVE IDENTITY

Example: $-7 * 1 = -7$ or $1 * 9 = 9$



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Algebra Essentials

Commutative Property for Addition states that two numbers, a and b , can be added together in any order and the result is the same.

Example: $5 + 7 = 7 + 5 = 12$

Commutative Property for Multiplication states that two numbers a and b , can be mulitplied in any order and the result is the same.

Example: $3 * 5 = 5 * 3 = 15$



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Algebra Essentials

Associative Property of Addition means that we are changing the way values are grouped and adding them together

Example: $(3 + 4) + 2 = 7 + 2 = 9$
 $3 + (4 + 2) = 3 + 6 = 9$

Associative Property of Multiplication means that we are changing the way values are grouped and mulitplied.

Example: $(3 * 4) * 2 = 12 * 2 = 24$
 $3 * (4 * 2) = 3 * 8 = 24$



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Algebra Essentials

Distributive Properties are used frequently in Algebra to simplify expressions.

Example: $3 (6 + 5) = 3 * 6 + 3 * 5$

Try It!

$$3 (6 - 5) = ?$$

$18 - 15 = 3$

Multiplication is commutative so distribution can be written as the following:

$$(3+5)4 = 3 \cdot 4 + 5 \cdot 4$$

$$(3-2)2 = 3 \cdot 2 - 2 \cdot 2$$

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Practice:

State the property of real numbers that justifies each statement.

1. $4 * (3x) = (4 * 3)x$ Assoc. of multiplication
 $4 \cdot (3 \cdot x) = (4 \cdot 3) \cdot x$

2. $(1 * 5) * 4 = 5 * 4$
Identity prop. of 1

3. $5 + ab = ab + 5$
Commu. prop. of add.

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Practice:

Apply a distributive property to each expression.

1. $5(4 + x)$ $20 + 5x$
 $5 \cdot 4 + 5 \cdot x$

2. $10 - 1(1 + a)$ $10 - 1 - a$
 $10 - (1 \cdot 1) - (1 \cdot a) \rightarrow 9 - a$

3. $9x - 5x$
 $x(9 - 5) = 4x$

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

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Use properties of real numbers to simplify each expression.

1. $52 + 37 + 48 + 63$

$$\begin{aligned} & (37+63) + (52+48) \\ & \quad 100 + 100 \\ & \quad \quad 200 \end{aligned}$$

Commutative

2. $30 * 97$

$$\begin{aligned} & 30(100-3) \\ & 30 \cdot 100 - 30 \cdot 3 \\ & \quad 3000 - 90 \\ & \quad \quad 2910 \end{aligned}$$

Distributive

