

**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.**

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**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!**

**$3 ( 6 - 5 ) = ?$   $3 \cdot 6 - 3 \cdot 5$**

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#### Practice:

State the property of real numbers that justifies each statement.

1.  $4 * (3x) = (4 * 3)x$  *Associative*

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

3.  $5 + ab = ab + 5$  *commutative*



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**Practice:**

**Apply a distributive property to each expression.**

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

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

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

4.  $5x + 2x - 3x$       $x(5+2-3)$



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Use properties of real numbers to simplify each expression.

1.  $52 + 37 + 48 + 63$

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

2.  $30 \cdot 97$

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

