

Name \_\_\_\_\_

Period \_\_\_\_\_

## PROPERTIES

**Associative Property:** Associate means to group.

Addition:  $a + (b + c) = (a + b) + c$

Multiplication:  $a \times (b \times c) = (a \times b) \times c$  or . . .  $a(bc) = (ab)c$

When you regroup addition or multiplication problems you are using the associative property.

Another example:  $2 + (4 + 6) = (2 + 4) + 6$   
 $12 = 12$

**Commutative Property:** Commute means to move around.

Addition:  $a + b = b + a$

Multiplication:  $a \times b = b \times a$  or . . .  $(ab = ba)$

When you change the order of addition problems or multiplication problems you are using the commutative property.

Another example:  $2 \times 4 \times 6 = 4 \times 6 \times 2$   
 $48 = 48$

**Identity Property:** Identity means to stay the same number.

Addition:  $a + 0 = a$       Zero is the identity for addition.

Multiplication:  $a \times 1 = a$       One is the identity for multiplication.

When you want a number to keep its identity you are using the Identity property. Zero added to a number does not change the number. One multiplied by a number does not change the number. These are the identity elements.

Another example:  $5 + 0 = 5$        $5 \times 1 = 5$

**Distributive Property:** Distribute means to take a number through a parentheses or to factor something out of a parentheses.

Addition & multiplication: They share one rule:

Taking a number through parentheses:  $a(b + c) = ab + ac$

Factoring a number out of parentheses:  $xy + xz = x(y + z)$

Other examples:  $3(s + t) = 3s + 3t$

$6x - 12 = 6(x - 2)$

**Inverse Property:** the additive inverse and the multiplicative inverse

**Addition:** the additive inverse is the same number with the opposite sign:

$$a + -a = 0$$

When a number and its opposite are added the result will always = zero

**Multiplication:** the multiplicative inverse is the reciprocal of the number:

$$a \times \frac{1}{a} = 1$$

When a number and its reciprocal are multiplied the result will always = one

Other examples:  $9 + -9 = 0$  additive inverse

$$\frac{3}{5} \times \frac{5}{3} = 1 \quad \text{multiplicative inverse}$$