

## ALGEBRAIC PROPERTIES

Algebraic properties define operations that can be performed on any number (except for zero, which hates playing by the rules). Since they apply to all real numbers, they apply to all variables as well.

### IDENTITY PROPERTIES

Identity properties describe operations that can be performed on variables without changing their values.

- IDENTITY PROPERTY OF ADDITION  $a + 0 = a$
- IDENTITY PROPERTY OF MULTIPLICATION  $a * 1 = a$

### COMMUTATIVE PROPERTIES

Commutative properties describe addition and multiplication operations with two values. In simplest terms, order does not matter.

- COMMUTATIVE PROPERTY OF ADDITION  $a + b = b + a$
- COMMUTATIVE PROPERTY OF MULTIPLICATION  $ab = ba$

### ASSOCIATIVE PROPERTIES

Associative properties describe how operations can be grouped together. In other words, groups of 3 or more values can be multiplied or added in any order; the sum or product will be the same.

- ASSOCIATIVE PROPERTY OF ADDITION  $a + (b + c) = (a + b) + c$
- ASSOCIATIVE PROPERTY OF MULTIPLICATION  $a(bc) = ab(c)$

### INVERSE PROPERTIES

Every number (except zero) has a multiplicative and an additive inverse. For any non-zero value given, there will be a number that can be added to it to equal zero, and a number it can be multiplied by to equal 1.

- INVERSE PROPERTY OF ADDITION  $a + -a = 0$
- INVERSE PROPERTY OF MULTIPLICATION  $a * \frac{1}{a} = 1$

### DISTRIBUTIVE PROPERTY

The distributive property is the only property that describes expressions with both addition and multiplication operations. Many algebra problems rely on this property! (For example, the FOIL method) This is the basic property used in factoring.

- DISTRIBUTIVE PROPERTY  $a(b + c) = ab + ac$
- DISTRIBUTIVE PROPERTY (AS USED IN FACTORING)  $ab + ac = a(b + c)$