Properties of Multiplication

Mathematics is the study of numbers and the laws on how we can use them. These laws are called **properties**. Some of the most important properties are the ones on this anchor chart.

Vocabulary	
Zero Property	Any number multiplied by zero has the value of 0. 4 x 0 = 0
Identity Property	Any number multiplied by one has the same value. 9 x 1 = 9
Commutative Property	The order of a multiplication expression does not change the value. Ex: 4 x 3 = 3 x 4
Distributive Property	A complex multiplication expression can be split into two expressions with one common factor. Ex: 7 x 6 = (7x5) + (7x1)
Associative Property	Multiplication expressions with more than two factors can be solved in any order. Ex: 4 x 6 x 2 = 4 x (6 x 2)

Zero Property

Any number multiplied by 0 has a value of zero. This is because 0 groups of any number still means 0. Any number of groups with 0 in them still add to 0.

0 x 4 =

8 x 0 =

Identity Property

Any number multiplied by 1 has the same value.

10 x 1 =

1 x 24 =

Commutative Property

The order of a multiplication expression does not change its value.

4 x 6 =

6 x 4 =

Tougher Properties of Multiplication

Two of the more challenging properties of multiplication are the distributive and associative properties. They exist to make multiplication more efficient and accurate.

Distributive Property

A complex multiplication expression can be split into two expressions with one common factor and one split factor.

Shared Common factor – A factor from the original expression that stays the same in the distributive pairs.

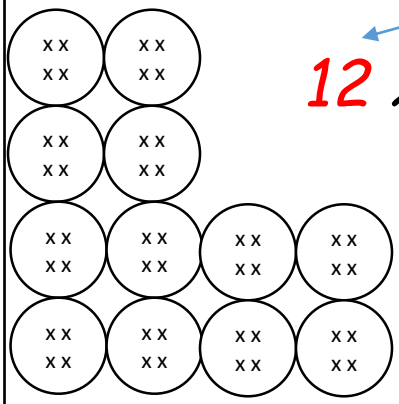
Split factor – A factor from the original expression that is decomposed into smaller factors in the distributive pairs.

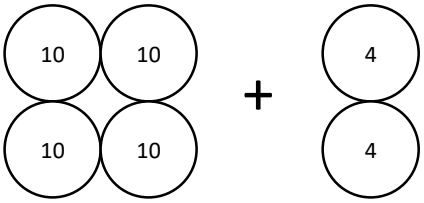
Example

Split Factors

$12 \times \underline{4} = (10 \times \underline{4}) + (2 \times \underline{4})$

Shared Common Factors





Associative Property

Multiplication expressions with more than two factors can be solved in any order without changing the product.

Example

$(6 \times 4) \times 2 = 6 \times (4 \times 2)$

Solve the given equation and explain what property is shown.

$7 \times 7 = (\_\_ \times \_\_) + (\_\_ \times \_\_)$

Solve the given equation and explain what property is shown.

$14 \times 6 = (\_\_ \times \_\_) + (\_\_ \times \_\_)$

$3 \times 12 = (\_\_ \times \_\_) + (\_\_ \times \_\_)$

$3 \times 5 \times 2 = \_\_\_\_\_$

$3 \times 6 \times 3 = \_\_\_\_\_$

$21 \times 4 = (\_\_ \times \_\_) + (\_\_ \times \_\_)$

$7 \times 2 \times 4 = \_\_\_\_\_$

$4 \times 3 \times 2 = \_\_\_\_\_$