

# Associative Property of Multiplication

Changing the grouping of factors does not change their product.  
It is also called the *Grouping Property of Multiplication*.

*Example:* For all numbers  $a$ ,  $b$ , and  $c$ ,  
$$a \times (b \times c) = (a \times b) \times c.$$

# Commutative Property of Multiplication

Changing the order of factors does not change their product. It is also called the *Order Property of Multiplication*.

*Example:* For all numbers  $a$  and  $b$ ,  $a \times b = b \times a$ .

# **compatible numbers**

Numbers that are easy to work with mentally and are used in place of actual numbers to get an estimate.

# Distributive Property

When two addends are multiplied by a factor, the product is the same as if each addend was multiplied by the factor and whose products were added.

$$\textit{Example: } a \times (b + c) = (a \times b) + (a \times c)$$

# divisible

One number is divisible by another if the quotient is a whole number and there is a remainder of 0.

# estimate

A number close to an exact amount. An estimate tells *about how much* or *about how many*.

# factor

Two or more numbers that are multiplied to give a product.

*Example:*  $46 \times 3 = 138$



# front-end estimation

Estimation by looking at the digits in the greatest place of each number.

*Example: 3,745 would be 3,000 using front-end estimation.*

# Identity Property of Multiplication

The property which states that the product of any number and 1 is that number.

$$\textit{Example: } a \times 1 = 1 \times a = a$$

# order of operations

Rules for performing operations in order to simplify expressions.

The *order of operations* is:

- parentheses
- exponents
- multiplication and division, from left to right
- addition and subtraction, from left to right.

# partial product

In multiplication of numbers with two or more digits, the product of each digit in one factor and the other number.

$$\begin{array}{r} 48 \\ \times 23 \\ \hline 144 \\ + 960 \\ \hline 1,104 \end{array}$$

← partial products

# quotient

The result in division.

*Example:*  $65 \div 13 = 5$

↑  
quotient

# remainder

The number that is left over after one whole number is divided by another.

*Example:*  $49 \div 8 = 6 \text{ R}1$

↑  
remainder

# Zero Property of Multiplication

The property which states that the product of any number and 0 is 0.

$$\textit{Example: } a \times 0 = 0 \times a = 0$$