

Have you ever seen a game of three-card monte? It is that scam where a hustler reveals one of three cards and bets that the player cannot find the card after a quick shuffle. No matter how the cards are mixed, the result is always the same—the player cannot find the card.

The commutative property is similar, but without the con artists. The commutative property states that when calculating addition or multiplication problems, you will arrive at the same answer no matter what order the terms are arranged in.

For example, both  $3 + 4 + 5$  and  $5 + 3 + 4$  equal 12. The commutative property does not apply to subtraction and division problems, which must be carried out in the order that they were given. You will find that the commutative property is a great way to reorganize cluttered equations.

Be careful not to confuse the commutative property with the associative property, which deals with how the terms are grouped. You can read more about the associative property on page 29.

The associative property states that when calculating addition or multiplication problems, you will arrive at the same answer no matter what order the operations are performed in. For example, both  $(2 \times 5) \times 6$  and  $2 \times (5 \times 6)$  equal 60.

The following scenario illustrates the associative property. Ruben, Nicky and Beverly each decide to give five cans of food to the local food bank. Ruben could take his five cans along with Nicky's five cans and meet Beverly with her five cans at the food bank, or Beverly could pick up Nicky's donation and meet Ruben at the food bank. No matter how the donations arrive at the food bank,

the total donation will be 15 cans. That is the associative property in a nutshell.

The associative property does not apply to subtraction and division. The order in which you subtract or divide numbers, as defined by grouping symbols, will change the results.

The associative property is handy when you need to reorganize cluttered equations. Be careful, though, not to confuse the associative property with the commutative property, which deals with the order in which terms are arranged. You can read more about the commutative property on page 28.

**Numbers**

$$2 + 3 = 5$$

$$3 + 2 = 5$$
  

$$2 \times 3 = 6$$

$$3 \times 2 = 6$$
  

$$2 \times 3 \times 4 = 24$$

$$3 \times 4 \times 2 = 24$$

$$4 \times 2 \times 3 = 24$$

**Variables**

$$x + y = y + x$$

$$x \times y = y \times x$$
  

$$a + b + c = c + a + b = b + c + a$$
  

$$a \times b \times c = c \times a \times b = b \times c \times a$$

**Numbers**

$$(2 + 4) + 5 = 6 + 5 = 11$$

$$2 + (4 + 5) = 2 + 9 = 11$$
  

$$(3 + 2) + 7 = 5 + 7 = 12$$

$$3 + (2 + 7) = 3 + 9 = 12$$
  

$$(2 \times 3) \times 4 = 6 \times 4 = 24$$

$$2 \times (3 \times 4) = 2 \times 12 = 24$$

**Variables**

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

$$(4 + a) + b = 4 + (a + b)$$
  

$$a \times (b \times c) = (a \times b) \times c$$
  

$$x \times (2 \times y) = (x \times 2) \times y$$

- When you add or multiply two or more numbers together, the order in which you add or multiply the numbers will not change the result. This is known as the commutative property of addition and multiplication.

- For example, whether you add  $2 + 3$  or  $3 + 2$ , the answer is always 5.

- As with numbers, when you add or multiply two or more variables, the order in which you add or multiply the variables will not change the result. A variable is a letter, such as  $x$  or  $y$ , which represents an unknown number.

- For example,  $x + y$  is equal to  $y + x$ .

- When you either add or multiply more than two numbers together, the order in which you either add or multiply the numbers as defined by the grouping symbols, such as  $( )$ , will not change the result. This is known as the associative property of addition and multiplication.

Note: When you see grouping symbols, such as parentheses  $( )$ , you should always work with the numbers inside the grouping symbols first. For more information on grouping symbols, see page 25.

- As with numbers, when you add or multiply more than two variables together, the order in which you add or multiply the variables as defined by the grouping symbols, such as  $( )$ , will not change the result.

- A variable is a letter, such as  $x$  or  $y$ , which represents an unknown number.