Associative property

Did you know that when you add or multiply real numbers it doesn't matter how those numbers are grouped, and that the answer will always be the same? You probably already knew this, but now you're learning to explain your reasoning in math, and that's where the term "associative property" will come in handy.

Associative Property of Addition	$(a+b)+c=a+(b+c)$
Associative Property of Multiplication	$(a\cdot b)\cdot c=a\cdot(b\cdot c)$

In these formulas, a, b, and c represent numbers. The associative property of addition tells us that it doesn't matter if we first add b to a, and then add c to the result, or if we first add c to b, and then add the result to a. We'll get the same answer both ways.

Similarly, the associative property of multiplication tells us that it doesn't matter if we first multiply a by b, and then multiply the result by c, or if we first multiply b by c, and then multiply a by the result. We'll get the same answer both ways.

Associative comes from the word "associate." Try to remember that "associate," in terms of math, refers to grouping with parentheses. In other words, in an example of the associative property, the numbers will stay in the same order but the parentheses will move.

Example

Use the associative property to write the expression a different way. Don't perform the addition.

$$3 + (6 + 7)$$

We know that when we apply the associative property of addition, the parentheses move but the numbers don't. So we could keep the numbers where they are, but move the parentheses to rewrite $3 + (6 + 7)$ as

$$(3 + 6) + 7$$

We didn't have to perform the addition to solve this problem, but we can also see that the two expressions are equal.

$$3 + (6 + 7) = 3 + (13) = 16$$

$$(3 + 6) + 7 = (9) + 7 = 16$$

We get 16 as the answer both ways!

Let's try another example, this time with the associative property of multiplication.

Example

Is the equation below true or false? Explain your reasoning.

$$(2 \cdot 3) \cdot 5 = 2 \cdot (3 \cdot 5)$$

True, because of the associative property of multiplication. The order of the numbers stayed the same but the parentheses moved.

Also, we can see that the expressions on both sides of the equation simplify to 30.

$$(2 \cdot 3) \cdot 5 = (6) \cdot 5 = 30$$

$$2 \cdot (3 \cdot 5) = 2 \cdot (15) = 30$$