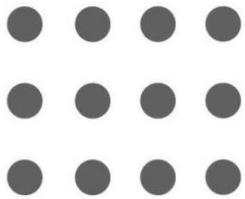
Name: _____ **Commutative and Associative Properties**

Our number system has important properties that make calculating easier.

The **commutative property of addition** says that when we add two numbers, it doesn't matter which number comes first. For example, 3 + 2 has the same value as 2 + 3.

Why?—because it doesn't matter whether we start with 2 of something and 3 more, or start with 3 and add 2 more. Either way we end up with 5.

The **commutative property of multiplication** says that when we multiply two numbers together, it doesn't matter which number comes first. For example, 3 x 4 has the same value as 4 x 3.

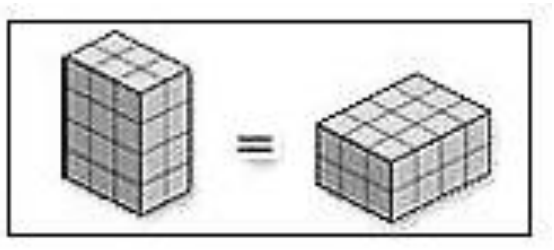


Why?—Look at the diagram on the right. It shows 3 rows with 4 dots each—that's 3 x 4 dots. It also shows 4 columns with 3 dots each—that's 4 x 3 dots. Either way we look at it, there are 12 dots in the diagram.

The **associative property of addition** says that when we add three numbers together, we can add them in whatever order we choose. For example: (2 + 3) + 4 = 2 + (3 + 4). We can add the 2 and 3 together and then add on the 4, or we can add the 3 and 4 together and then add on the 2.

The **associative property of multiplication** says that when we multiply three numbers, we can multiply them in whatever order we choose. For example: (2 x 3) x 4 = 2 x (3 x 4). We can multiply 2 times 3 first and then multiply by 4, or we can multiply 3 times 4 first and then multiply by 2.

Why? Look at this picture: →



On the left, it shows a figure with 4 layers.
Each layer is made up of 2 x 3 = 6 little cubes.

So, how many total cubes in all 4 layers?

(2 x 3) x 4 = **6 x 4 = 24**

When the figure is knocked over, it shows 2 layers. Each layer is now made up of (3 x 4) = 12 little cubes. How many total cubes in both layers?

2 x (3 x 4) = 2 x 12 = 24

Either way, we have the same number of total cubes:

(2 x 3) x 4 = 2 x (3 x 4) = 6 x 4 = 2 x 12 = 24

Name: _____ **Commutative and Associative Properties**

The associative and commutative properties together tell us that whenever we have a string of numbers to add, we can add them in whatever order we choose. Likewise, whenever we have a string of numbers to multiply we can multiply them in whatever order we choose.

Now let's use the two properties to multiply 5 x 30.

5 x 30 = 5 x (3 x 10) = (5 x 3) x 10 = 15 x 1<u>0</u> = 15<u>0</u>

Now, how about 50 x 6?

50 x 6 = (5 x 10) x 6 = 5 x 10 x 6 = (5 x 6) x 10 = 30 x 1<u>0</u> = 30<u>0</u>

1. 9 x 20 =

2. 30 x 8 =

3. 5 x 20 =

4. 60 x 3 =

5. 8 x 50 =

6. 70 x 4 =

7. 3 x 90 =