**What is the commutative property?**

The commutativity of multiplication indicates that **no matter what order the factors are placed in, the product will be the same**. In an array, a number of rows multiplied by a number of columns will have the same answer as a number of columns multiplied by a number of rows.

That means that **rows of a certain number of columns is equal to a certain number of columns of rows**.

Consider the factors 3 and 4. We know that these factors have a product of 12.

3 rows of 4 can be written as 3 x 4 = 12.

Likewise, 4 columns of 3 can be written as 4 x 3 = 12.

Therefore, **the commutativity of multiplication allows the same product of the same factor pair multiplied in any order**.

For example:

**3 x 4**

**3 rows of 4**



The array contains 12 dots altogether.

This is the same with:

**4 x 3**

**4 rows of 3**



 The array also contains 12 dots altogether.

Thus, **3 x 4** and **4 x 3** are **both equal to 12**.

Draw 4 rows of 5.



What is the total? 20

Draw 5 rows of 4



What is the total? 20

**Time to think**

1. What are the expressions of the two previous arrays?

The two expressions are 4 x 5 and 5 x 4 respectively.

1. Describe the relationship between the two expressions.

Both expressions have a product of 20. Therefore, they are equal to each other.

Count by twos 5 times.

2, 4, 6, 8, 10

Fill in the groups with the correct size of each group:



5 x 2 = 10

Count by fives 2 times.

5, 10

Fill in the groups with the correct size of each group:



2 x 5 = 10

What do you notice with the two previous equations?

The factors have a different order but they still produce the same answer.

What happened to the equal groups representation?

For the first one, the number of groups is 5 and the size of the group is 2. Meanwhile, the second one makes 5 as the size and 2 as the number of groups.

Count by threes 6 times.

3, 6, 9, 12, 15, 18

Draw an array to represent the expression:

6 x 3 = 18

Count by sixes 3 times.

6, 12, 18

Draw an array to represent the expression:

3 x 6 = 18

What do you notice about the two arrays?

The orientation changed from vertical to horizontal.

**Time to Think**

Does interchanging the order of two factors change the product?

The order of the factors does not change the product.

There is an ice tray that can freeze 2 rows of 8 ice cubes. How many ice cubes can it produce?

Draw 2 rows of 8 ice cubes.

Draw 8 rows of 2 ice cubes.





There are 16 ice cubes.

Hazel wants to group 6 coins in 3 purses. How many coins does she have altogether?

**Time to Think**

Using what we learned about the commutativity of multiplication, answer these word problems:

1. Jerry keeps 5 pieces of cheese in a bag. He has 4 bags. How many pieces of cheese does he have? Draw the two possible equal groups.



 4 x 5 = 5 x 4 = 20 pieces of cheese

1. Nico placed 7 cups into two rows. How many cups did he place all in all? Draw the two possible array models.





2 x 7 = 7 x 2 = 14 cups