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All about Multiplication

Multiplication is really repeated addition. The times sign (x) is used.

$$4 \times 3 = 12 = 4 + 4 + 4$$

Numbers that are multiplied together are called **factors**.

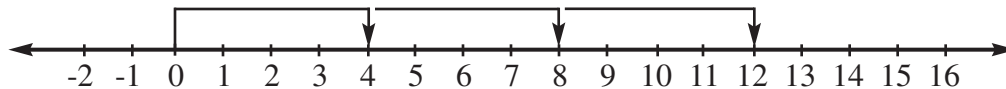
The answer to a multiplication problem is called the **product**.

If you have three or more numbers, write them across: $4 \times 2 \times 2 = 16$

In the problem $4 \times 3 = 12$, 4 and 3 are the factors and 12 is the product.

$$\begin{array}{r} 4 \text{ factor} \\ \underline{x} \ 3 \text{ factor} \\ 12 \text{ product} \end{array}$$

A number line can be used to show multiplication. The above problem can be shown by counting by 4's three times (or by 3's four times).



Of course, adding numbers over and over again isn't really practical. That's why it's important to learn how to multiply and to memorize your multiplication facts! Use the table below to check yourself or as a reference if you forget a fact.

MULTIPLICATION TABLE

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Properties of Multiplication

These properties, or characteristics, of arithmetic can help you solve multiplication problems.

Commutative, or Order, Property

Changing the order of the factors does not change the product.

$$4 \times 6 = 24 \quad 6 \times 4 = 24$$

Associative, or Grouping, Property

Changing the grouping of the factors does not change the product. (Note: Always perform the operation in the parentheses first.)

$$(5 \times 3) \times 4 = (3 \times 4) \times 5$$

Zero Property

Zero means none; therefore, the product of any number and zero is zero.

$$25 \times 0 = 0 \quad 4 \times 0 = 0$$

One Property

The product of any number and 1 is that number.

$$687 \times 1 = 687 \quad 5 \times 1 = 5$$

Distributive Property

The product of a number and the sum of 2 numbers equals the sum of the products of the number times each of the other numbers.

$$2 \times (3 + 4) = (2 \times 3) + (2 \times 4)$$

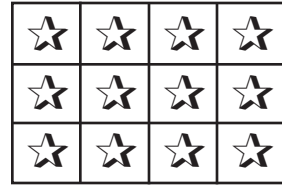
For each problem, write the name of the property that is shown: Commutative (Order), Associative (Grouping), Distributive, One, or Zero.

- $4 \times 3 = 3 \times 4$ _____
- $29 \times 0 = 0$ _____
- $569 \times 1 = 569$ _____
- $(3 \times 4) \times 2 = (2 \times 4) \times 3$ _____
- $3 \times (5 + 4) = (3 \times 5) + (3 \times 4)$ _____
- Write another statement to show the commutative (order) property of multiplication.
 $5 \times 4 = 20$ _____
- Write another multiplication statement to show the associative (grouping) property.
 $(5 \times 2) \times 3 = 30$ _____
- Write another multiplication statement to show the distributive property of multiplication.
 $3 \times (2 + 5) = 21$ _____
- Write a multiplication statement to show the zero property. _____
- Write a multiplication statement to show the one property. _____

Arrays, Another Way to Multiply Facts

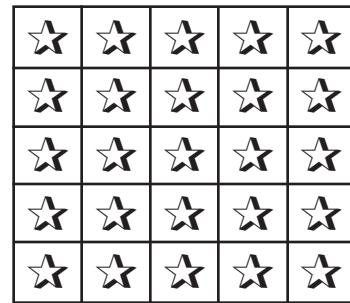
An array is an arrangement of rows and columns and forms either a rectangle or a square. An array can be created and used to find a product of two factors.

Suppose you are told that there are three rows of stars and that there are four stars in each. You might draw an array similar to the one on the right to figure out how many stars there are.



$$4 \times 3 = 12$$

When both factors in a multiplication sentence are the same, the product is called a **square number**. An array created for this multiplication sentence will always be a square. To the right is an array for 5×5 .



Make an array for each of the following problems and give the product for each. Circle any square numbers. Write a multiplication sentence for each array.

1. $4 \times 4 =$

2. $3 \times 6 =$

