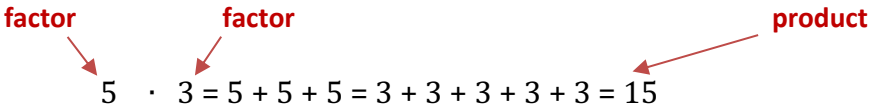
Math 4 b. Homework 2.

1. **Factors**

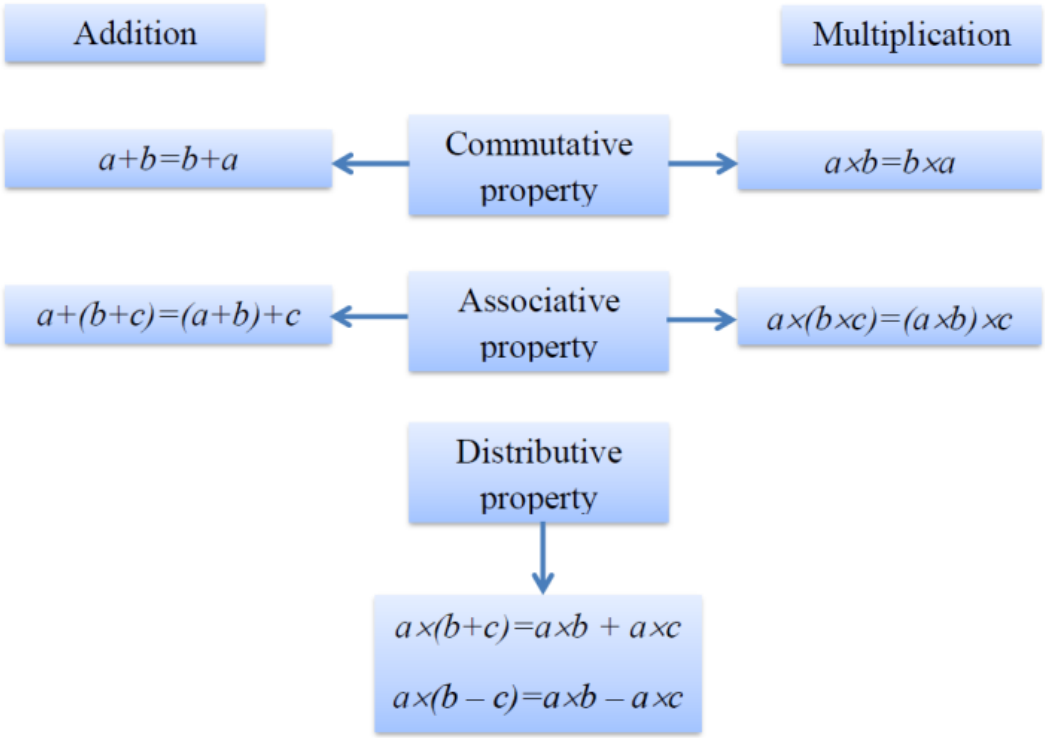
Multiplication is a shorter way to write the addition of the same quantity:



Numbers which are multiplied are called *factors*, the result of the operation is called *product*.
Also, we can tell that 15 can be factorized, represented as a product of 3 and 5.

Factorization is a decomposition of one number into a product of two or more numbers

2. Properties of the arithmetic operations.



The distributive property can be explained with the definition of multiplication.

Let's have an example:

$$2 \cdot (3 + 7) = (3 + 7) + (3 + 7) = 3 + 3 + 7 + 7 = 2 \cdot 3 + 2 \cdot 7$$

We can do it the other way around as well:

$$2 \cdot 3 + 2 \cdot 7 = 3 + 3 + 7 + 7 = 3 + 7 + 3 + 7 = (3 + 7) + (3 + 7) = 2 \cdot (3 + 7)$$

The distributive property can be illustrated by the following problems:

Farmer put green and red grapes into boxes. Each box contains 5lb of grapes. How many pounds of green and red grapes altogether did farmer put into boxes if he had 10 boxes of green and 8 boxes of red grapes? Is there any difference between 2 following expressions?

We can represent the problem with either of the following expressions:

$$5 \cdot (10 + 8) \text{ or } 5 \cdot 10 + 5 \cdot 8$$

Another example:

For the party John bought 7 identical boxes of chocolates, 20 candies in each box. Guests ate 12 candies from each box. How many chocolates are left after the party?

Again, two numerical expression can be written to describe the problem:

$$7 \cdot (20 - 12) \text{ and } 7 \cdot 20 - 7 \cdot 12.$$

For both examples we can write the equality:

$$7 \cdot (20 - 12) = 7 \cdot 20 - 7 \cdot 12$$
$$5 \cdot (10 + 8) = 5 \cdot 10 + 5 \cdot 8$$

These equalities are numerical representation of the distributive property, which can be written in the general form as

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

And $a \cdot b + a \cdot c = a \cdot (b + c)$ is also true. This way of writing the distributive property is called the **factoring the common factor out (of the parenthesis).**

Homework problems

1. Compute (what is the best way to compute it?). Hint: use the distributive property.

   a) $23 \times 15 + 15 \times 77;$

   b) $79 \times 21 - 69 \times 21;$

   c) $340 \times 7 + 16 \times 70;$

   d) $250 \times 61 - 25 \times 390;$

   e) $67 \times 58 + 33 \times 58;$

   f) $55 \times 682 - 45 \times 682;$

2. Give several (two or more) examples of factorization (the representation of a number as product of two or more factors) for the numbers:
   Example: 120=1·120=30·4=15·2·4=15·8

   a) 50 *b*) 35 *c*) 49 *d*) 60 *e*) 48

3. Using the distributive property fill the empty spaces:

   Example: 5·(□+7) = 40+□

   In your notebook: 5· (8+7) =5·8+5·7=40+35

   a) (□−□)·2=18−8

   b) 11·(2+□)=□+77;

   c) □+10=2·(2+□);

   d) □·(35−5)=70−□

   e) 34−□=17·(□−1)

4. How many vans are needed to take 32 students on a field trip if a van can take 6 students? What is the maximal number of vans that can be fully occupied by these students?

5. The summer vacation is 73 days long. Which day of the week will be last day of vacations if the first day was Tuesday?

6. You have a 3-gallon and a 5-gallon jug that you can fill from a fountain of water. How you can fill one of the jugs with *exactly* 4 gallons of water?