

## Formulas in excel

Using formulas, the calculated value is entered into the cell. The formula can contain the following elements:

cell references; numbers; signs of arithmetic operations: +, -, /, \*, ^,  
functions, comparison signs: >, <, <>(≠), => (≥), <= (≤).

### Basic rule

1. The formula starts with the equal sign =. For example, = B3\*5.
2. Cell addresses should be entered in the formula with click on the desired cell (not with the keyboard).
3. The operations order in the formula (without brackets): calculating the value of a function, ^, \* and /, + and -.
4. To calculate the value of a function call the Function Wizard (fx button with the image on the Standard toolbar or command ВСТАВКА - ФУНКЦИЯ). Master features works by steps. At each step of the wizard, a dialog box for the consistent implementation of actions that lead to the final result.
5. Comment: the function name can be entered directly from the keyboard, but the wizard functions make it much easier.

## Formula copying

Direct appointment Excel - carrying out the same type of calculations over large data sets. Formally, this means that the same formula should work for different persons of the list.

To avoid repeating the formula input for each person in the list, Excel automates this process by using the *formula copy procedure*: for the first person in the list we create a calculation formula, which is then copied by stretching down a special fill marker along the list (a black cross in the lower right corner of the cell). So, shift down the fill marker to one position automatically displaces the cell addresses of the arguments down by one line.

Sometimes there are data in formulas that are the same for all persons in the list and, therefore, their addresses should remain the same when you copy formulas. For example, the rate of the drug per kilogram of the patient's weight is a constant.

Excel uses absolute and relative addresses to distinguish between relative and absolute references. When you move or copy a formula, the absolute references are not changed, and the relative references are automatically updated based on the new position of the formula. To create an absolute reference, a dollar sign ( \$ ) is placed before the column header and row number. For example, \$B\$2 is an absolute reference to a cell that is at the intersection of column B and row 2, and B2 - relative reference to the same cell.

To set the dollar sign, use the F4 key, pressing it until you reach the desired reference type.

In cases \$B2 or B\$2 the reference is called mixed. The part of the address that is preceded by the dollar sign does not change when you copy the formula, and the part where there is no dollar is adjusted to a new formula location.

### Procedure for copying formulas

1. For the first record of the list, place the cursor in a free cell, that is, determine the place of formula creation. Typing with the keyboard sign =.
2. Typing the formula, the variables in it are the addresses of the cells with the data for the first record.
3. Analyze the created formula to mark its addresses (absolute, relative or mixed). Absolute and mixed addresses are specified using the F4 key.
4. Press ENTER, the cursor moved to the second (next) line of the list.
5. Go back up to the formula, copy it along the list by stretching down fill marker (a black cross in the lower right corner of the cell).

## The use of Index Kettle to analyze the degree of overweight in young people group

1. Create the initial data table:

№	ФАМИЛИЯ	ИМЯ	AGE	SEX	GROWTH, sm	WEIGHT, kg	GROWTH, m	Kettle
1	Serova	Амина	18	female	166	65		
2	Kruglova	Екатерина	16	female	153	48		
3	Stukov	Артур	12	male	149	38		
4	Popova	Мария	15	female	169	61		
5	Shakhov	Олег	15	male	172	50		
6	Ivanova	Мария	16	female	164	54		
7	Rakova	Рината	16	female	161	51		
8	Nosova	Юлия	17	female	169	70		
9	Zorin	Евгений	16	male	178	65		
10	Butova	Екатерина	15	female	175	60		
11	Serov	Юрий	16	male	178	70		
12	Gorin	Дмитрий	17	male	172	62		
13	Sidorov	Юрий	14	male	159	50		
14	Ognev	Александр	12	male	164	56		
15	Savin	Денис	16	male	185	64		
16	Chazova	Кристина	14	female	160	53		
17	Belova	Марина	16	female	170	50		
18	Krutova	Наталья	10	female	137	36		
19	Elagin	Александр	17	male	186	70		
20	Fomina	Валентина	10	female	144	29		
21	Sadov	Андрей	14	male	172	55		
22	Beglova	Анастасия	14	female	164	60		
23	Turov	Виктор	14	male	166	51		
24	Beketova	Анна	16	female	167	59		
25	Basova	Юлия	12	female	172	72		
<b>СРЕДНИЕ</b>								

In additional row «СРЕДНИЕ» give the average values for the *numerical* data.

2. To calculate the index Kettle having prepared the necessary data in advance.

$$KETTLE = \frac{WEIGHT, kg}{(GROWTH, m)^2}$$

The results of the computations are presented in the Kettle column, retaining two decimal places.

3. Complete the table with three new columns, each of which calculate the prescribed dose of the drug using the table of standards:

Drug	«drug 1»	«drug 2»	«drug 3»
<b>standard dose</b>	2,5 mg/ kg	6,5 mg/ sm	1,5 mg/ year

Pay particular attention to the dollar sign, which may be present in the cell addresses. Component of the address (line number and / or column), preceded by a dollar, does not change when copied.

4. Find the total amount of each drug consumed by the entire group of patients in one day. The results should be placed under the column with the appropriate drug name.

5. In the additional column "degree of obesity" to carry out diagnostics according to the rule:

<b>Index Kettle:</b>	<b>&lt;18</b>	<b>norma</b>
	<b>18 - 20</b>	<b>1-2 degree of obesity</b>
	<b>&gt;20</b>	<b>3 degree of obesity</b>

Note: use the logical function ЕСЛИ():

= IF(logical expression; the value if true; the value if false)

Here **logical expression** - test condition; the value if true - the value returned for a true condition; the value if false - the value returned for a false condition.

6. Building up the histogram representing the value of index Kettle. The x-axis represents the patient's name.

7. Find the number of patients in each group by degree of obesity.

Note: use the logical function СЧЁТЕСЛИ().

8. Based on the original table, we construct two new, dividing the data by the value of the column SEX: one table for female patients, the other – for male. Procedure:

8.1. Select column SEX (with its header).

8.2. Command ДАННЫЕ – ФИЛЬТР – АВТОФИЛЬТР.

8.3. From the drop-down list, select a filter condition, first "female".

8.4. Copy the filter result to the free area of the sheet, sign.

Note: To avoid copying formulas use «Специальная вставка», variant «Значения».

8.5. Return the table to its original form - flag « all » in the filter condition. Repeat the same steps for the SEX "male". Remove AUTOFILTER.

9. Display the relationship between GROWTH and WEIGHT variables separately for female and male patients. For this select in the table the corresponding data, then input the command ВСТАВКА – ДИАГРАММА – ТОЧЕЧНАЯ. To format, choosing proper values for the axes scales, label the axis, title the graph.

10. You should find the linear trend for approximation description of dependence GROWTH – WEIGHT of the patient. For this

10.1. Select by clicking the mouse any point of GROWTH – WEIGHT diagram.

10.2. From the context menu select a command ДОБАВИТЬ ЛИНИЮ ТРЕНДА.

10.3. In the dialog box to specify the type "LINEAR", and set flags for the options «Показать уравнение на диаграмме» и «Поместить на диаграмму величину достоверности аппроксимации ( $R^2$ )». The closer the value of the coefficient  $R^2$  is to unity, the better the linear approximation of GROWTH – WEIGHT dependence.

**Indication to the work.** Each stage of studying the dependence GROWTH-WEIGHT of the patient should be accompanied by a brief conclusion that will reflect the essence of the results obtained in this particular paragraph.