



**MINISTRY OF AGRARIAN POLICY
AND FOOD OF UKRAINE**

**Kharkiv Petro Vasylenko National
Technical University of Agriculture**

Methodological guidelines

**Beginning Microsoft Excel 2010
Part 3**

for individual work and laboratory work of disciplines «Informatics»,
«Informatics and information technologies»,
«Information systems and technologies»,
for students with learning in a foreign language

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the Department of Cybernetics
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Beginning Microsoft Excel 2010: Methodological guidelines for laboratory work in ««Informatics», «Informatics and information technologies», «Information systems and technologies», for students with learning in a foreign language – Kh.: KhNTUA, 2016. – 28 p.

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Methodological guidelines are intended to assist students in studying Informatics in English, both in the classroom and individually.

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Laboratory work 4

Formatting and references.

Objective: obtain basic skills in formatting cells and using cell references in Microsoft Excel.

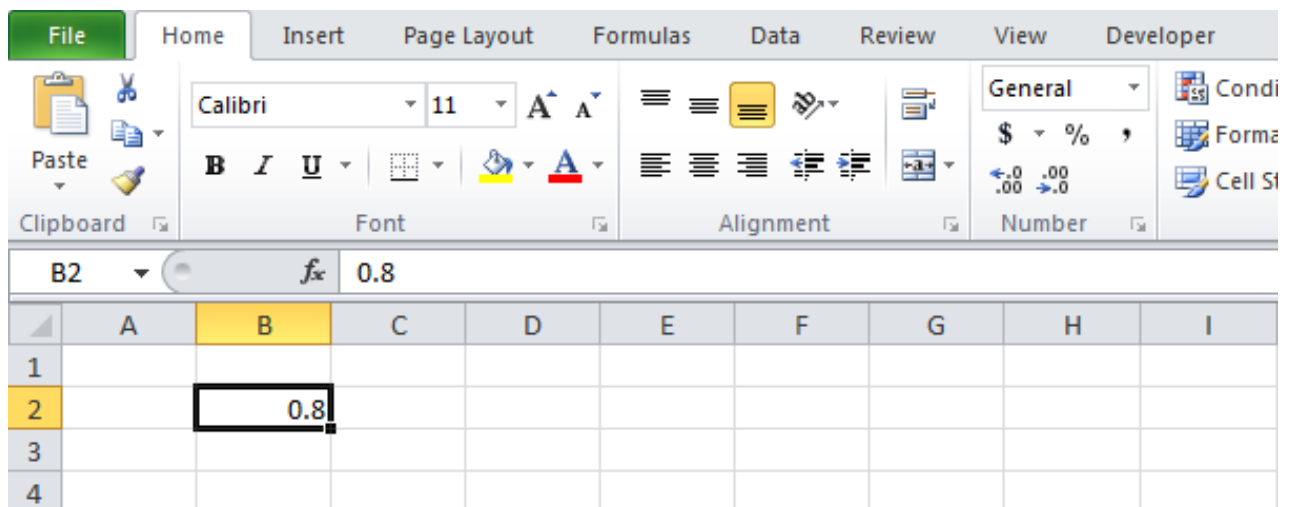
1. How to perform the laboratory work

I. Format Cells

When we format cells in Excel, we change the appearance of a number without changing the number itself. We can apply a number format (0.8, \$0.80, 80%, etc) or other formatting (alignment, font, border, etc).

Note. *Pay attention, that in Ukraine a comma is the separator between the integral and fractional parts, not dot, like in the USA, so you need to enter number like 0,8; 3,14 etc.*

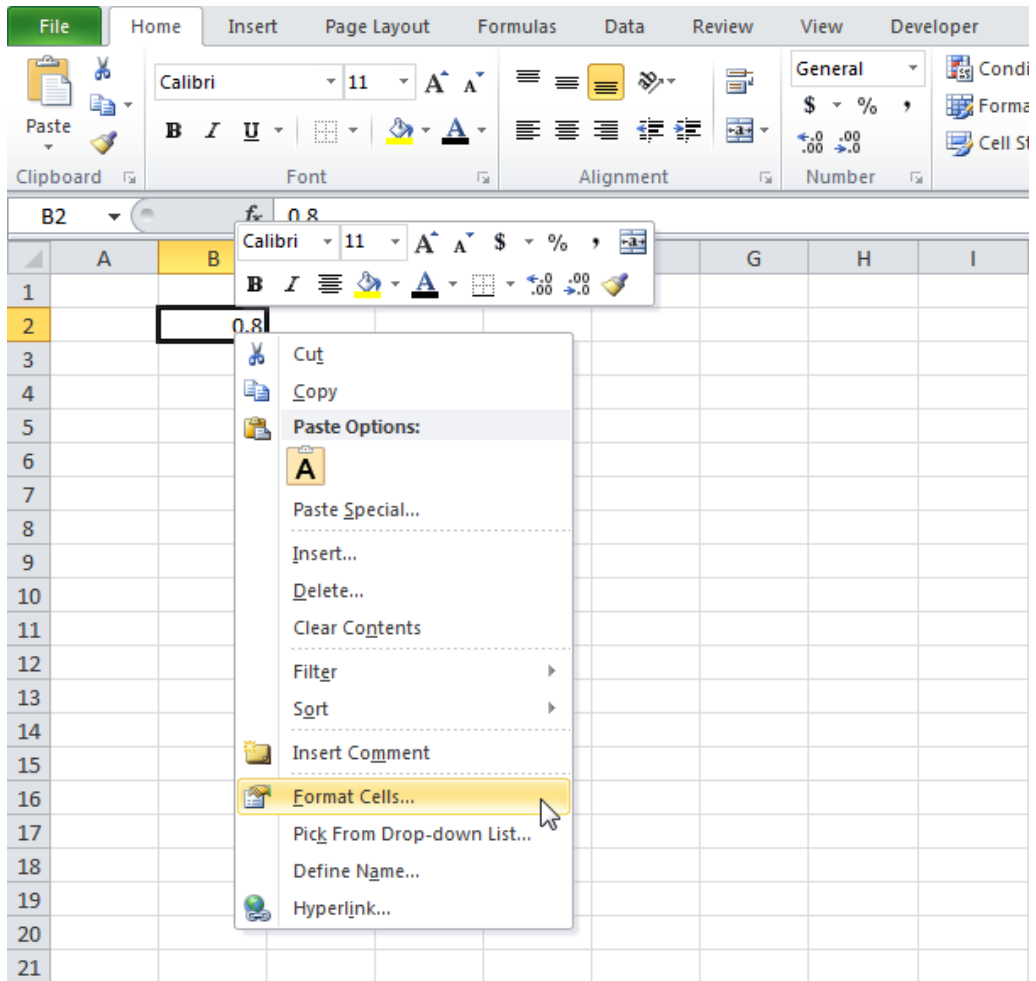
1. Enter the value 0.8 into cell B2.



By default, Excel uses the General format (no specific number format) for numbers. To apply a number format, use the 'Format Cells' dialog box.

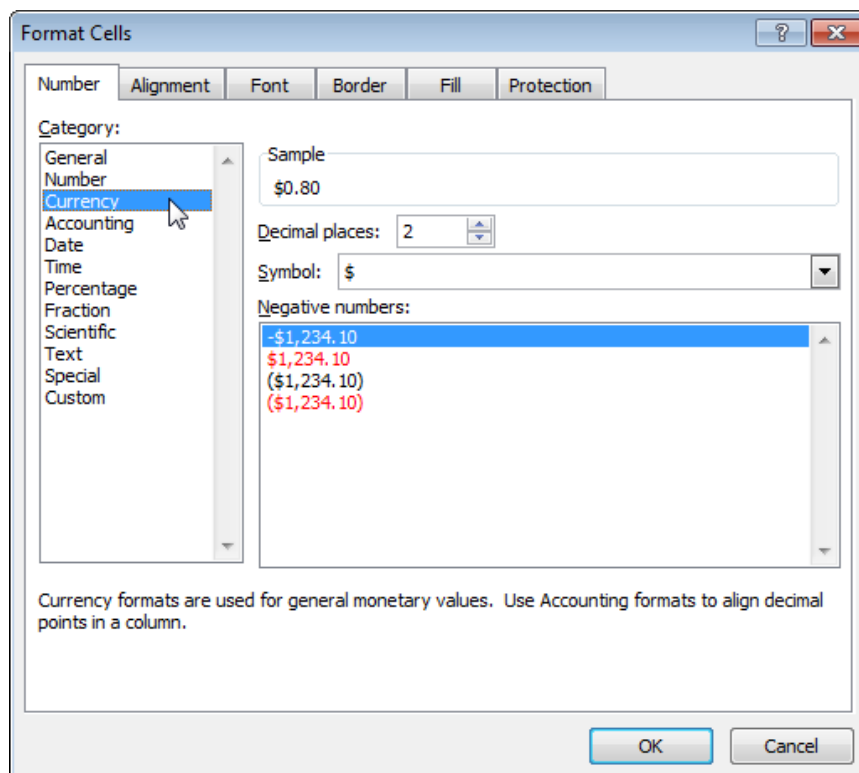
2. Select cell B2.

3. Right click, and then click Format Cells (or press CTRL + 1).



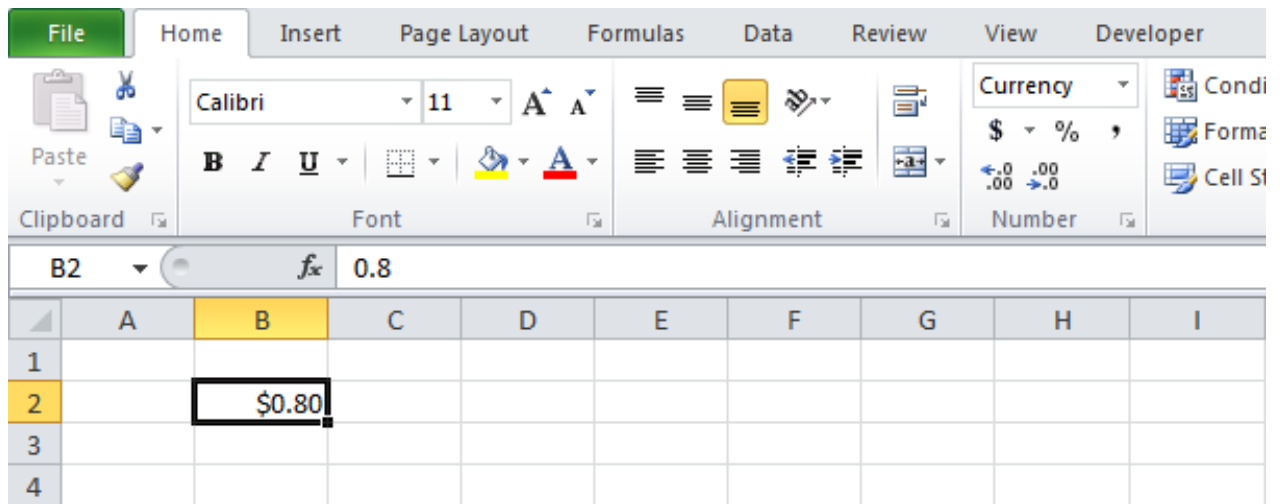
The 'Format Cells' dialog box appears.

4. For example, on the Number tab, select Currency.



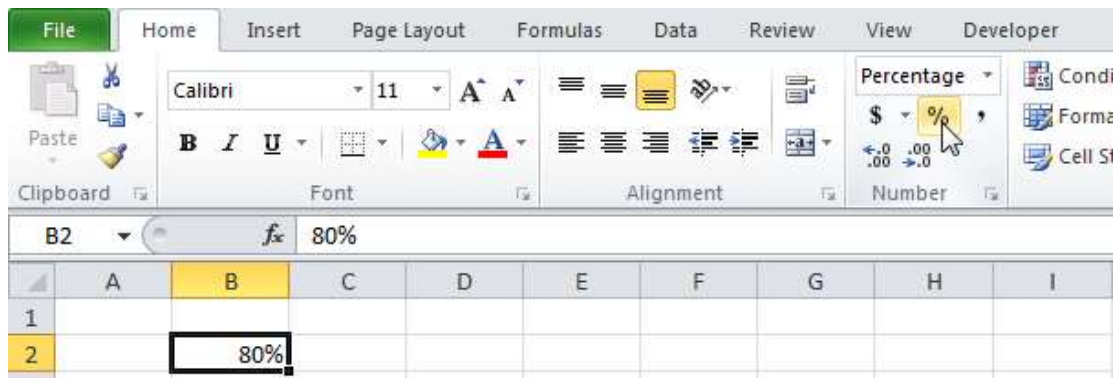
Note: Excel gives you a life preview of how the number will be formatted (under Sample).

5. Click OK.

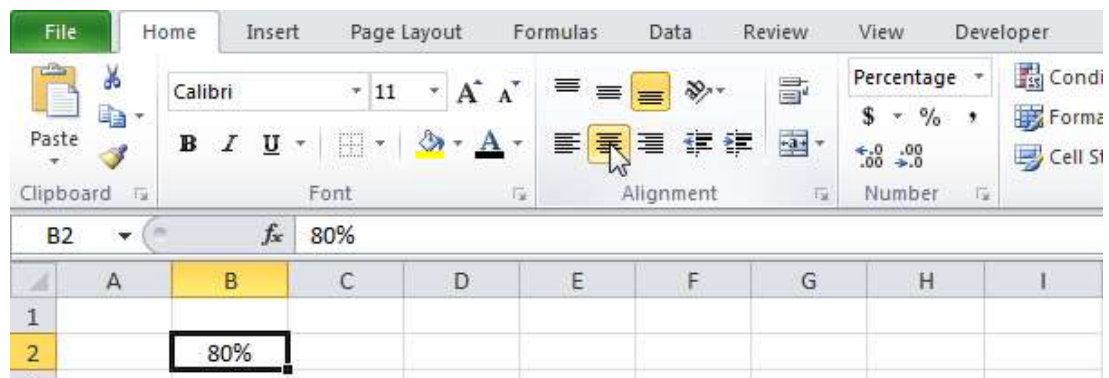


Cell B2 still contains the number 0.8. We only changed the appearance of this number, not the number itself. The most frequently used formatting commands are available on the Home tab.

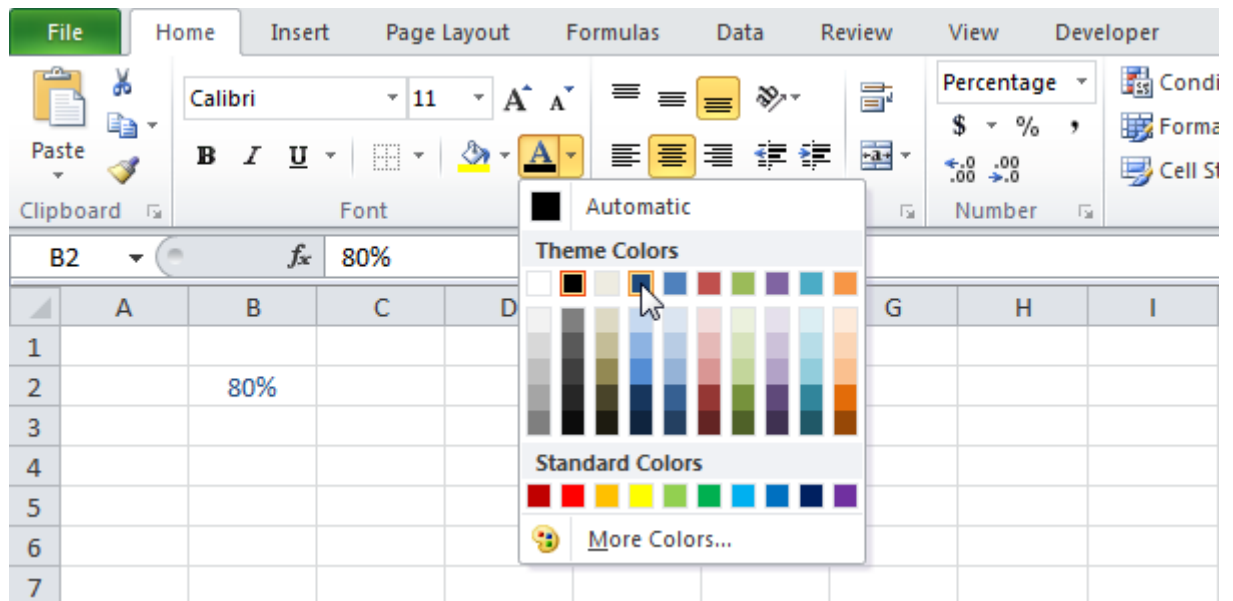
6. On the Home tab, in the Number group, click the Percentage symbol to apply a Percentage format.



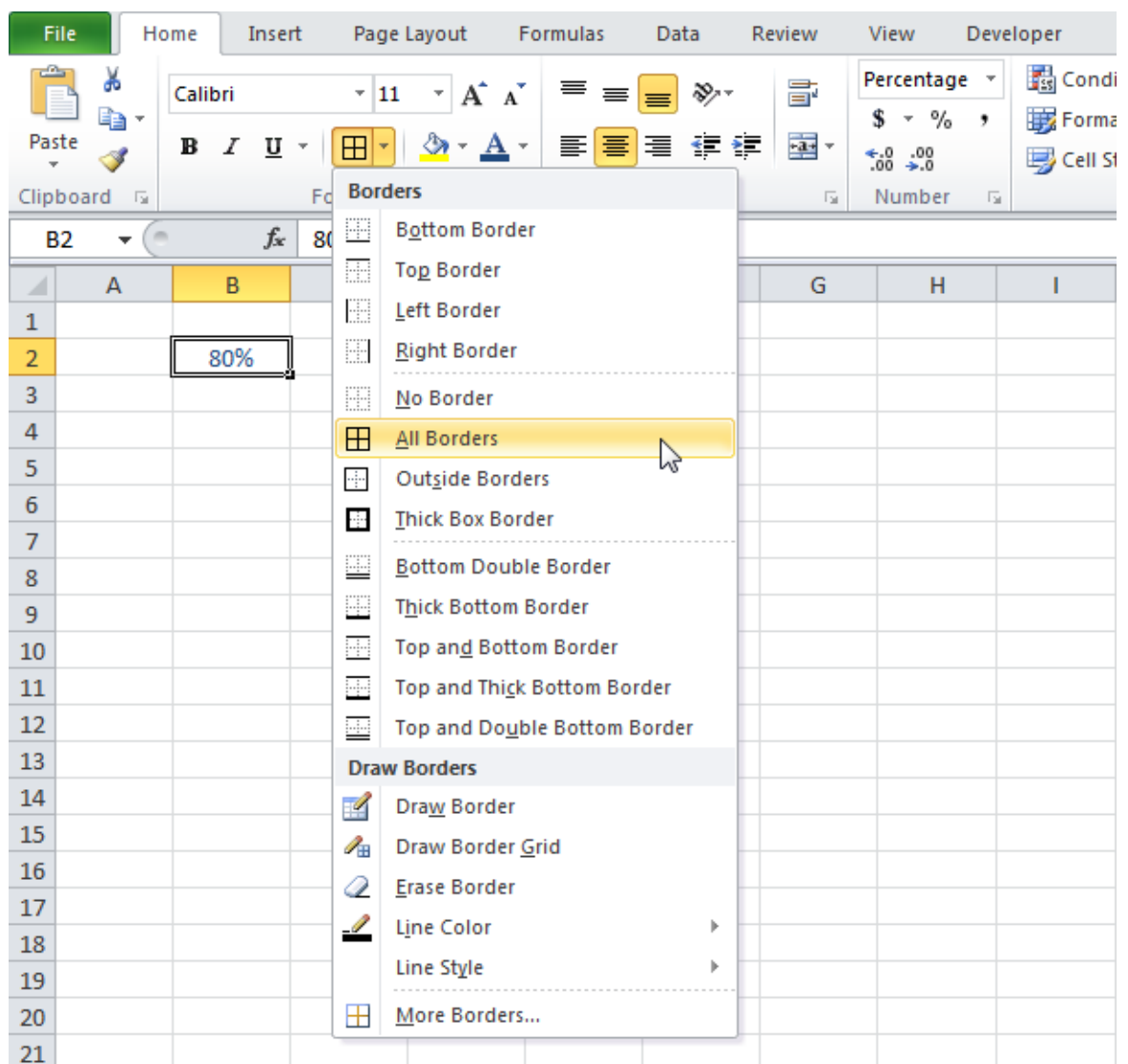
7. On the Home tab, in the Alignment group, center the number.



8. On the Home tab, in the Font group, change the Font color.



9. On the Home tab, in the Font group, add borders.

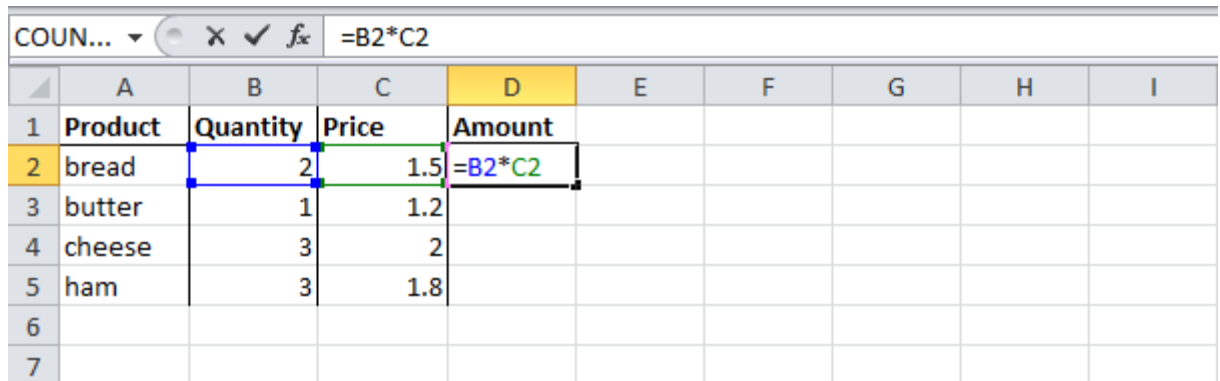


II. Cell References

Cell references in Excel are very important. Understand the difference between relative, absolute and mixed reference, and you are on your way to success.

Relative Reference

By default, Excel uses relative reference. See the formula in cell D2 below. Cell D2 references (points to) cell B2 and cell C2. Both references are relative.

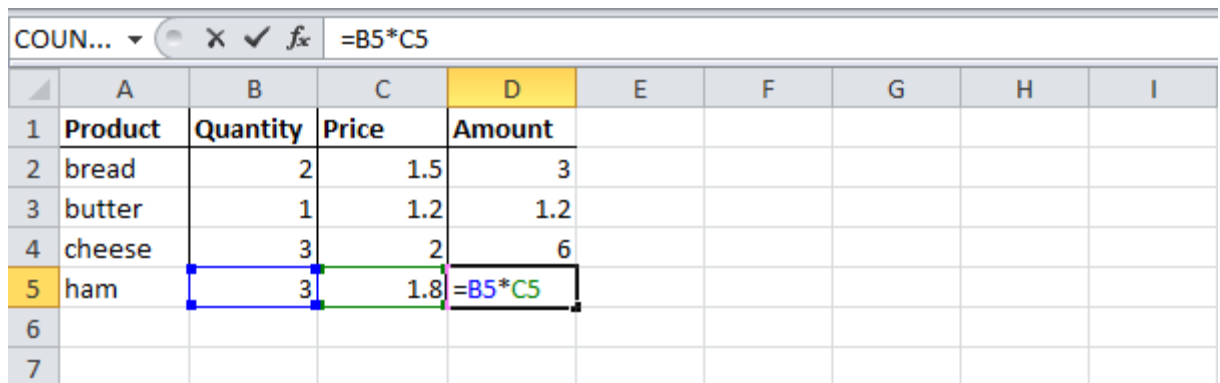


The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I
1	Product	Quantity	Price	Amount					
2	bread	2	1.5	=B2*C2					
3	butter	1	1.2						
4	cheese	3	2						
5	ham	3	1.8						
6									
7									

The formula bar at the top shows the formula in cell D2: `=B2*C2`.

1. Select cell D2, click on the lower right corner of cell D2 and drag it down to cell D5.



The screenshot shows the same Excel spreadsheet as above, but now the formula in cell D2 has been dragged down to cell D5. The formula bar at the top shows the formula in cell D5: `=B5*C5`.

	A	B	C	D	E	F	G	H	I
1	Product	Quantity	Price	Amount					
2	bread	2	1.5	3					
3	butter	1	1.2	1.2					
4	cheese	3	2	6					
5	ham	3	1.8	=B5*C5					
6									
7									

Cell D3 references cell B3 and cell C3. Cell D4 references cell B4 and cell C4. Cell D5 references cell B5 and cell C5. In other words: each cell references its two neighbors on the left.

Absolute Reference

See the formula in cell E3 below.

1. To create an absolute reference to cell H3, place a \$ symbol in front of the column letter and row number of cell H3 (`H3`) in the formula of cell E3.

	A	B	C	D	E	F	G	H	I
1									
2		Length (cm)	Width (cm)		Length (inch)	Width (inch)		Conversion rate	
3		1	10		=B3*\$H\$3			0.3937008	
4		5	10						
5		4	8						
6		2	10						
7									
8									

2. Now we can quickly drag this formula to the other cells.

	A	B	C	D	E	F	G	H	I
1									
2		Length (cm)	Width (cm)		Length (inch)	Width (inch)		Conversion rate	
3		1	10		0.3937008	3.937008		0.3937008	
4		5	10		1.968504	3.937008			
5		4	8		1.5748032	3.1496064			
6		2	10		0.7874016	=C6*\$H\$3			
7									
8									

The reference to cell H3 is fixed (when we drag the formula down and across). As a result, the correct lengths and widths in inches are calculated.

Mixed Reference

Sometimes we need a combination of relative and absolute reference (mixed reference).

1. See the formula in cell F2 below.

	A	B	C	D	E	F	G	H
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans	=B2*(1-B6)		
3	Shirts	30			Shirts			
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								
8								

2. We want to copy this formula to the other cells quickly. Drag cell F2 across one cell, and look at the formula in cell G2.

	A	B	C	D	E	F	G	H
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans	64	=C2*(1-C6)	
3	Shirts	30			Shirts			
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								
8								

Do you see what happens? The reference to the price should be a fixed reference to column B. Solution: place a \$ symbol in front of the column letter of cell B2 (\$B2) in the formula of cell F2. In a similar way, when we drag cell F2 down, the reference to the reduction should be a fixed reference to row 6. Solution: place a \$ symbol in front of the row number of cell B6 (B\$6) in the formula of cell F2.

Result:

	A	B	C	D	E	F	G	H
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans	= \$B2*(1-B\$6)		
3	Shirts	30			Shirts			
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								

Note: we don't place a \$ symbol in front of the row number of B2 (this way we allow the reference to change from B2 (Jeans) to B3 (Shirts) when we drag the formula down). In a similar way, we don't place a \$ symbol in front of the column letter of B6 (this way we allow the reference to change from B6 (Jan) to C6 (Feb) and D6 (Mar) when we drag the formula across).

3. Now we can quickly drag this formula to the other cells.

	A	B	C	D	E	F	G	H
1	Product	Price			Prices / Month	Jan	Feb	Mar
2	Jeans	80			Jeans	64	48	16
3	Shirts	30			Shirts	24	18	= \$B3*(1-D\$6)
4								
5	Month	Jan	Feb	Mar				
6	Reduction	20%	40%	80%				
7								

2. Tasks to Perform

1. Open Microsoft Excel.
2. Open your workbook.
3. Create a new worksheet.
4. Do all exercises from part II this manual to understand using relative, absolute and mixed references.
5. The price in dollars is given, it is necessary to calculate the price in euros, like in table below. The exchange rate is 0,75075 dollar for 1 euro.

	A	B	C	D
1	Date	Total Price(USD)		Total Price(EURO)
2	Jan	15046	0.75075	11293.07622
3	Feb	36151		27133.85607
4	Mar	65967		49512.85119
5	Apr	42942		32230.97694
6	May	61228		45955.89996
7	Jun	36915		27707.29155
8	Jul	20979		15746.20803
9	Aug	37375		28052.55375
10	Sep	30527		22912.65039
11	Oct	14056		10550.01192
12	Nov	19653		14750.95221
13				

6. Calculate the price in euros according the price in pounds, like in table below. Exchange rate is given and equal 1,24 euros for 1 pound.

	A	B	C	D	E	F
1						
2	Exchange Rate £1 buys	€ 1.24				
3						
4	Item	Price	Per unit	Quantity	Total in Euros	Total in £
5	Hotel	€ 166.00	per night	5	€ 830.00	£669.46
6	Car Hire	€ 100.00	per day	5	€ 500.00	£403.29
7	Petrol budget	€ 34.00	per day	5	€ 170.00	£137.12
8	lunch and dinner budget	€ 60.00	per day	5	€ 300.00	£241.97
9	Entertaining clients	€ 140.00	per day	5	€ 700.00	£564.61
10					€ 2,500.00	£2,016.45
11						

7. Fill the table values of the height of students in your group in meters. Count it in feet (1 ft= 0,3048 m), in inches (1 in = 2,45 cm), in yards (1 yd = 0,91 m).

8. Save workbook.
9. Close workbook.
10. Close Excel.

3. Checklist

1. What are the differences between relative, absolute and mixed references?
2. Where do you use the different kinds of references?
3. How can you visually distinguish between different types of references?
4. What parameters can you adjust to format cells?
5. How to change font, font size and font color?
6. How to create the cell borders?
7. How to assign the number in a cell currency or text format?
8. What tabs there are in 'Format Cells' dialog box?

Laboratory work 5

Working with Find & Select block and Data Validation

Objective: obtain basic skills in finding, replacing and selecting of different kind of data types in Microsoft Excel and using these features for selecting some range of cells to applying data validation.

1. How to perform the laboratory work

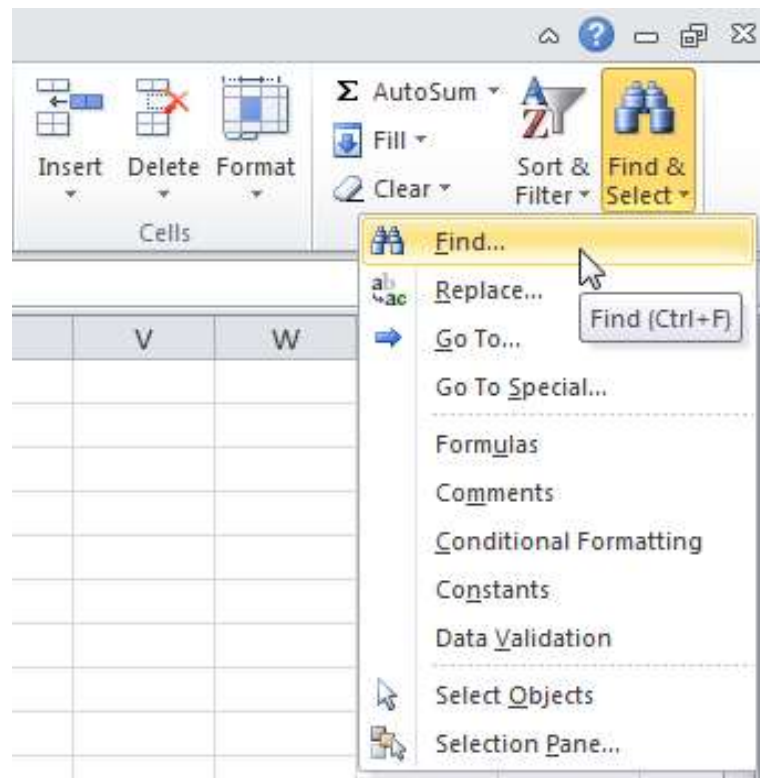
I. Find and Select

You can use Excel's Find (Найти) and Replace (Заменить) feature to quickly find specific text and replace it with other text. You can use Excel's Go To Special (Выделение группы ячеек) feature to quickly select all cells with formulas, comments, conditional formatting, constants, data validation, etc.

Find (Найти)

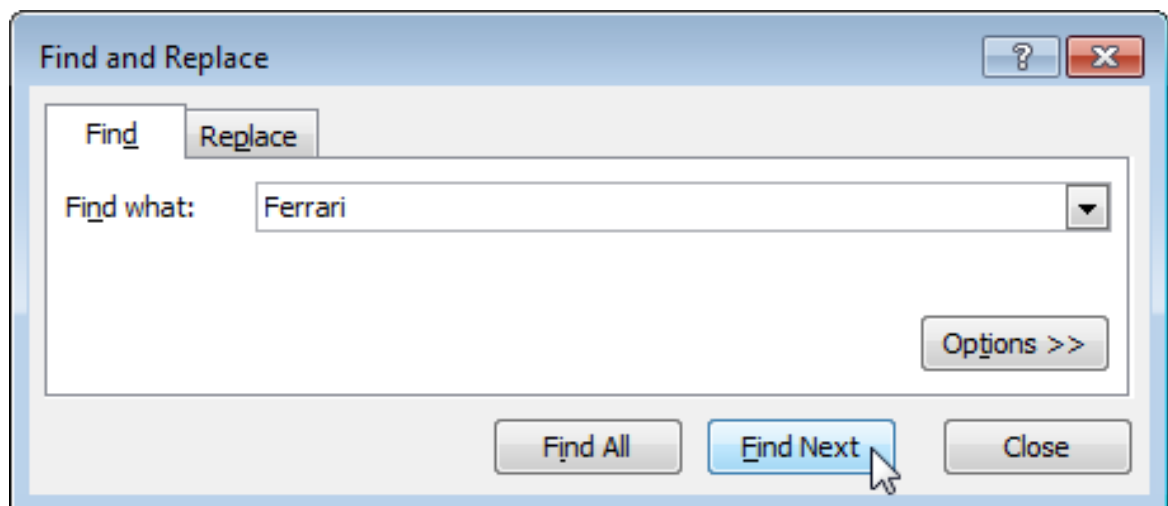
To quickly find specific text, execute the following steps.

1. On the Home (Главная) tab, click Find & Select (Найти и выделить), Find (Найти)...



The 'Find and Replace' dialog box appears.

2. Type the text you want to find. For example, type Ferrari.
3. Click 'Find Next'.



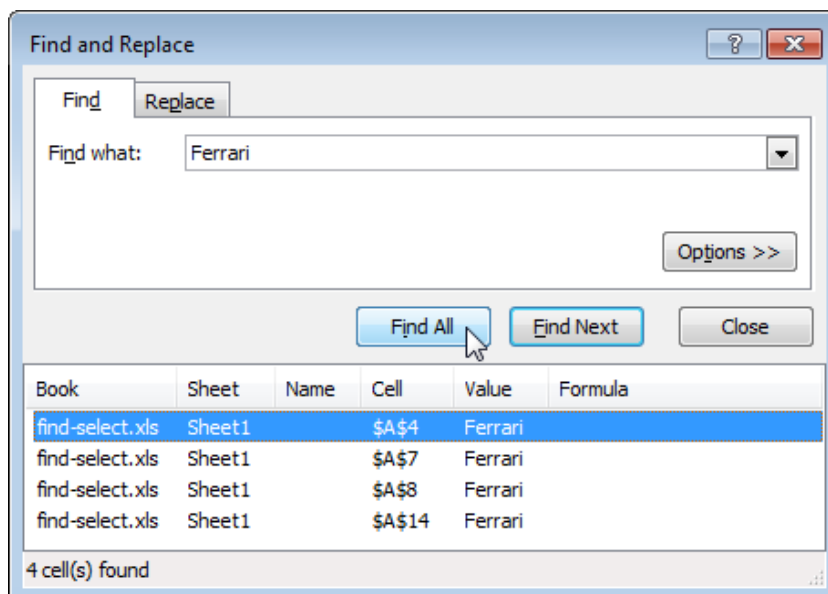
Excel selects the first occurrence.

A4 fx Ferrari					
	A	B	C	D	E
1	Car	Model	Price	Top Speed	
2	Porsche	Carrera	\$593	288	
3	Aston Martin	Vanquish	\$1,397	267	
4	Ferrari	Spider	\$448	363	
5	Lamborghini	Gallardo	\$2,569	342	
6	Maybach	Exelero	\$2,638	256	
7	Ferrari	Enzo	\$223	359	
8	Ferrari	F50	\$1,553	296	
9	Lamborghini	Veneno	\$891	321	
10	Aston Martin	One	\$1,675	273	
11	Porsche	Cayenne	\$929	253	
12	Porsche	911	\$2,669	263	
13	Lamborghini	Aventador	\$732	292	
14	Ferrari	Maranello	\$666	336	
15	Bugatti	Veyron	\$1,642	375	
16					
17		Average	\$1,330	306	
18					
19					

4. Click 'Find Next' to select the second occurrence.

A7 fx Ferrari					
	A	B	C	D	E
1	Car	Model	Price	Top Speed	
2	Porsche	Carrera	\$593	288	
3	Aston Martin	Vanquish	\$1,397	267	
4	Ferrari	Spider	\$448	363	
5	Lamborghini	Gallardo	\$2,569	342	
6	Maybach	Exelero	\$2,638	256	
7	Ferrari	Enzo	\$223	359	
8	Ferrari	F50	\$1,553	296	
9	Lamborghini	Veneno	\$891	321	
10	Aston Martin	One	\$1,675	273	
11	Porsche	Cayenne	\$929	253	
12	Porsche	911	\$2,669	263	
13	Lamborghini	Aventador	\$732	292	
14	Ferrari	Maranello	\$666	336	
15	Bugatti	Veyron	\$1,642	375	
16					
17		Average	\$1,330	306	
18					
19					

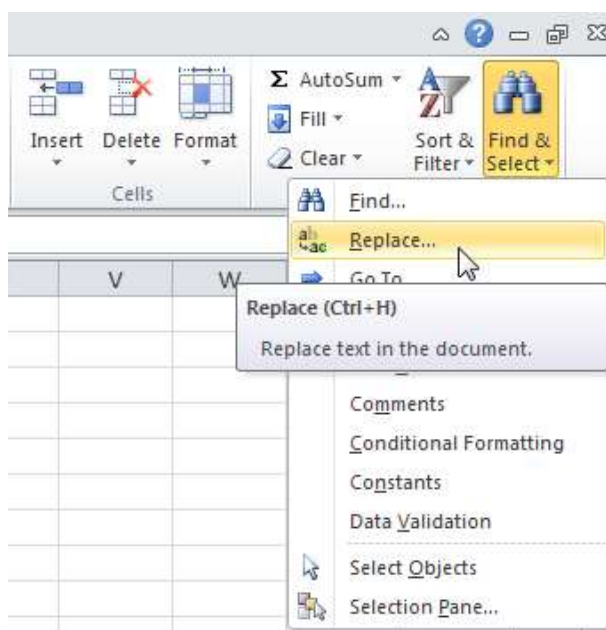
5. To get a list of all the occurrences, click 'Find All'.



Replace (Заменить)

To quickly find specific text and replace it with other text, execute the following steps.

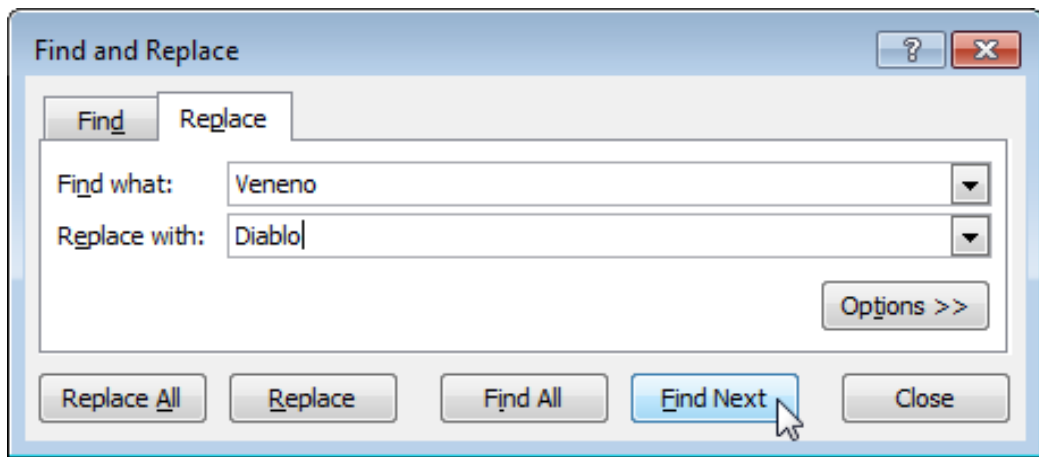
1. On the Home tab, click Find & Select, Replace...



The 'Find and Replace' dialog box appears (with the Replace tab selected).

2. Type the text you want to find (Veneno) and replace it with (Diablo).

3. Click 'Find Next'.



	A	B	C	D	E
1	Car	Model	Price	Top Speed	
2	Porsche	Carrera	\$593	288	
3	Aston Martin	Vanquish	\$1,397	267	
4	Ferrari	Spider	\$448	363	
5	Lamborghini	Gallardo	\$2,569	342	
6	Maybach	Exelero	\$2,638	256	
7	Ferrari	Enzo	\$223	359	
8	Ferrari	F50	\$1,553	296	
9	Lamborghini	Veneno	\$891	321	
10	Aston Martin	One	\$1,675	273	
11	Porsche	Cayenne	\$929	253	
12	Porsche	911	\$2,669	263	
13	Lamborghini	Aventador	\$732	292	
14	Ferrari	Maranello	\$666	336	
15	Bugatti	Veyron	\$1,642	375	
16					
17		Average	\$1,330	306	
18					
19					

4. Click 'Replace' to make a single replacement.

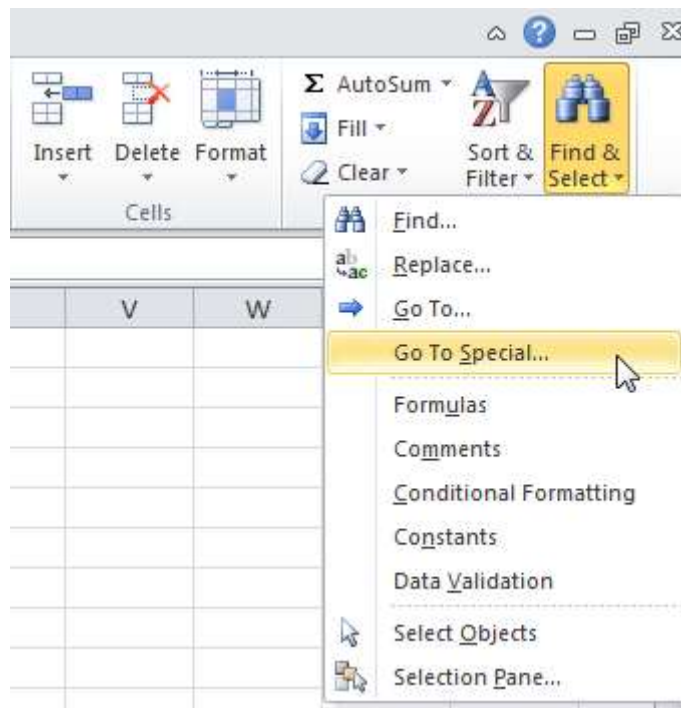
	A	B	C	D	E
1	Car	Model	Price	Top Speed	
2	Porsche	Carrera	\$593	288	
3	Aston Martin	Vanquish	\$1,397	267	
4	Ferrari	Spider	\$448	363	
5	Lamborghini	Gallardo	\$2,569	342	
6	Maybach	Exelero	\$2,638	256	
7	Ferrari	Enzo	\$223	359	
8	Ferrari	F50	\$1,553	296	
9	Lamborghini	Diablo	\$891	321	
10	Aston Martin	One	\$1,675	273	
11	Porsche	Cayenne	\$929	253	
12	Porsche	911	\$2,669	263	
13	Lamborghini	Aventador	\$732	292	
14	Ferrari	Maranello	\$666	336	
15	Bugatti	Veyron	\$1,642	375	
16					
17		Average	\$1,330	306	
18					
19					

Note: use 'Replace All' to replace all occurrences.

Go To Special (Выделение группы ячеек)

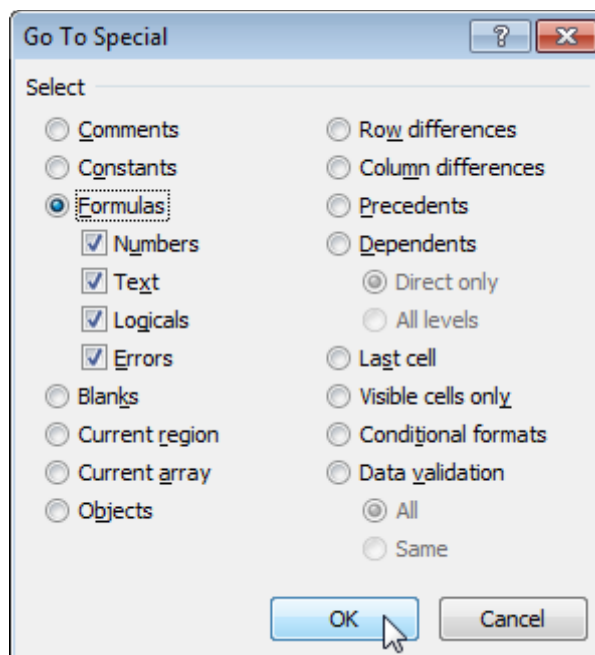
You can use Excel's Go To Special feature to quickly select all cells with formulas, comments, conditional formatting, constants, data validation, etc. For example, to select all cells with formulas, execute the following steps.

1. Select a single cell.
2. On the Home tab, click Find & Select, Go To Special...



Note: Formulas, Comments, Conditional formatting, Constants and Data Validation are shortcuts. They can also be found under Go To Special.

3. Select Formulas and click OK.



Note: you can search for cells with formulas that return Numbers, Text, Logicals (TRUE and FALSE) and Errors. These check boxes are also available if you select Constants.

Excel selects all cells with formulas.

C17		fx =AVERAGE(C2:C15)			
	A	B	C	D	E
1	Car	Model	Price	Top Speed	
2	Porsche	Carrera	\$593	288	
3	Aston Martin	Vanquish	\$1,397	267	
4	Ferrari	Spider	\$448	363	
5	Lamborghini	Gallardo	\$2,569	342	
6	Maybach	Exelero	\$2,638	256	
7	Ferrari	Enzo	\$223	359	
8	Ferrari	F50	\$1,553	296	
9	Lamborghini	Diablo	\$891	321	
10	Aston Martin	One	\$1,675	273	
11	Porsche	Cayenne	\$929	253	
12	Porsche	911	\$2,669	263	
13	Lamborghini	Aventador	\$732	292	
14	Ferrari	Maranello	\$666	336	
15	Bugatti	Veyron	\$1,642	375	
16					
17		Average	\$1,330	306	
18					
19					

General note: if you select a single cell before you click Find, Replace or Go To Special, Excel searches the entire worksheet. To search a range of cells, first select a range of cells.

II. Data Validation (Проверка данных)

You use data validation to control the type of data or the values that users enter into a cell. For example, you may want to restrict data entry to a certain range of dates, limit choices by using a list, or make sure that only positive whole numbers are entered.

What is data validation?

Data validation is an Excel feature that you can use to define restrictions on what data can or should be entered in a cell. You can configure data validation to prevent users from entering data that is not valid. If you prefer, you can allow users to enter invalid data but warn them when they try to type it in the cell. You can also provide messages to define what input you expect for the cell, and instructions to help users correct any errors.

For example, in a marketing workbook, you can set up a cell to allow only account numbers that are exactly three characters long. When users select the cell, you can show them a message such as this one:

3	Employee Costs	
4	110 Payroll	
5	120 IRS/FICA/Wk comp/State/SDI	
6	140 Retirement Plan	
7	<input type="text"/>	Commissions/Bonuses
8		
9	Subtotal	Services
10		
11		
12		
13	Total	


Account Number
 Enter a three-digit account number from the chart of accounts, which you can find at <http://Finance/documents> on the intranet.

If users ignore this message and type invalid data in the cell, such as a two-digit or five-digit number, you can show them an actual error message.

In a slightly more advanced scenario, you might use data validation to calculate the maximum allowed value in a cell based on a value elsewhere in the workbook. In the following example, the user has typed \$4,000 in cell E7, which exceeds the maximum limit specified for commissions and bonuses.

	A	B	C	D	E	F
1		Budget Input -- Marketing				
2		Account		Actual	Projected	
3		Employee Costs				
4		110 Payroll		45,328	60,000	
5		120 IRS/FICA/Wk comp/State/SDI		15,997	25,000	
6		140 Retirement Plan		6,249	8,000	
7		160 Commissions/Bonuses		2,720	4000	
8						
9						
10						
11						
12						
13						
14						
15						

Over budget ✖

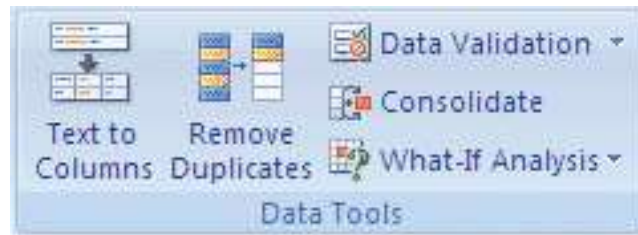
 Commissions and bonuses cannot exceed \$3600 (6% of payroll).

Continue?

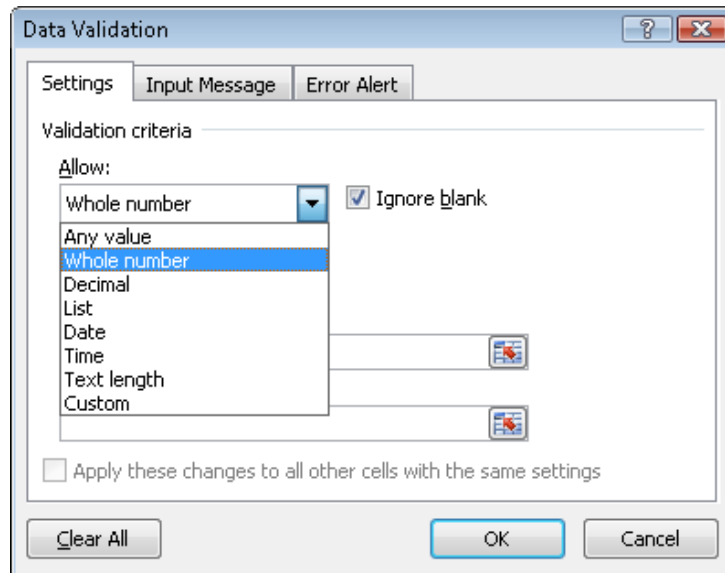
[Was this information helpful?](#)

If the payroll budget were to increase or decrease, the allowed maximum in E7 would automatically increase or decrease with it.

Data validation options are located in the **Data Tools** group.



You configure data validation in the **Data Validation** dialog box.

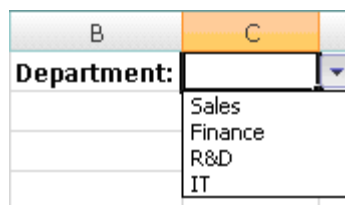


When is data validation useful?

Data validation is invaluable when you want to share a workbook with others in your organization, and you want the data entered in the workbook to be accurate and consistent.

Among other things, you can use data validation to do the following:

- **Restrict data to predefined items in a list.** For example, you can limit types of departments to Sales, Finance, R&D, and IT. Similarly, you can create a list of values from a range of cells elsewhere in the worksheet.



- **Restrict numbers outside a specified range.** For example, you can specify a minimum limit of deductions to two times the number of children in a particular cell.

- **Restrict dates outside a certain time frame.** For example, you can specify a time frame between today's date and 3 days from today's date.

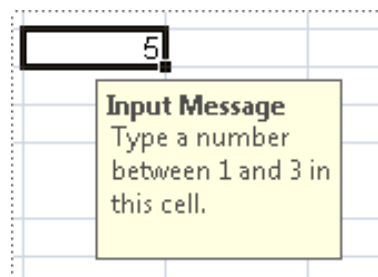
- **Restrict times outside a certain time frame.** For example, you can specify a time frame for serving breakfast between the time when the restaurant opens and 5 hours after the restaurant opens.

- **Limit the number of text characters.** For example, you can limit the allowed text in a cell to 10 or fewer characters. Similarly, you can set the specific length for a full name field (C1) to be the current length of a first name field (A1) and a last name field (B1), plus 10 characters.

- **Validate data based on formulas or values in other cells.** For example, you can use data validation to set a maximum limit for commissions and bonuses of \$3,600, based on the overall projected payroll value. If users enter more than \$3,600 in the cell, they see a validation message.

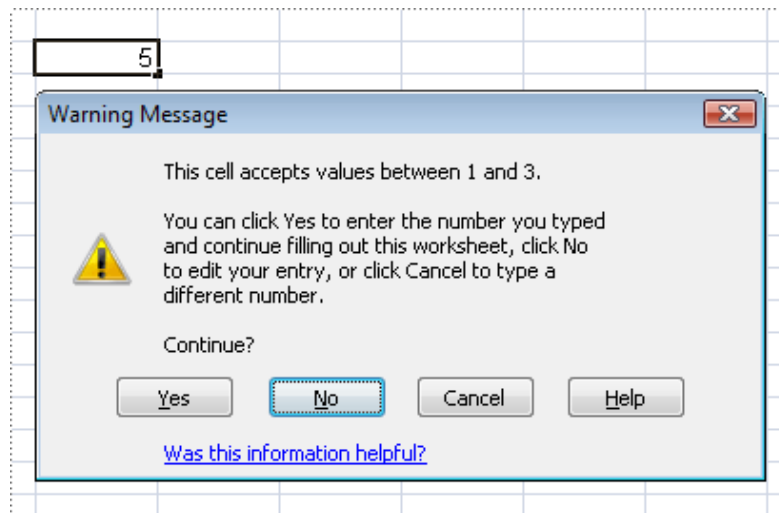
Data validation messages

What users see when they enter invalid data into a cell depends on how you have configured the data validation. You can choose to show an *input message* when the user selects the cell. This type of message appears near the cell. You can move this message, if you want to, and it remains until you move to another cell or press ESC.






Input messages are generally used to offer users guidance about the type of data that you want entered in the cell.

You can also choose to show an *error alert* that appears only after users enter invalid data.



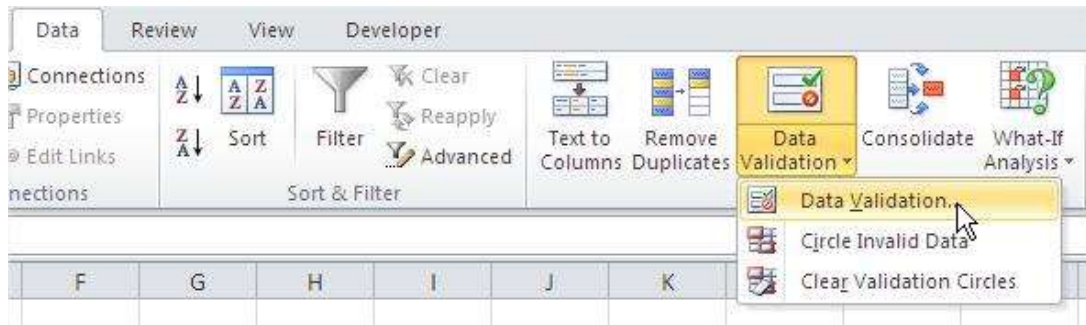
You can choose from three types of error alerts:

Icon	Type	Use to
	Stop	Prevent users from entering invalid data in a cell. A Stop alert message has two options:Retry or Cancel.
	Warning	Warn users that the data they entered is invalid, without preventing them from entering it. When a Warning alert message appears, users can click Yes to accept the invalid entry, Noto edit the invalid entry, or Cancel to remove the invalid entry.
	Information	Inform users that the data they entered is invalid, without preventing them from entering it. This type of error alert is the most flexible. When an Information alert message appears, users can click OK to accept the invalid value or Cancel to reject it.

Create Data Validation (Проверка данных) Rule

To create the data validation rule, execute the following steps.

1. Select single cell or a range (in this example the cell A1 was selected).
2. On the Data (Данные) tab, click Data Validation (Проверка данных).



On the Settings (Параметры) tab:

3. In the Allow (Тип данных) list, click Whole number (Любое значение).
4. In the Data (Значение) list, click greater than.
5. Enter the Minimum values.

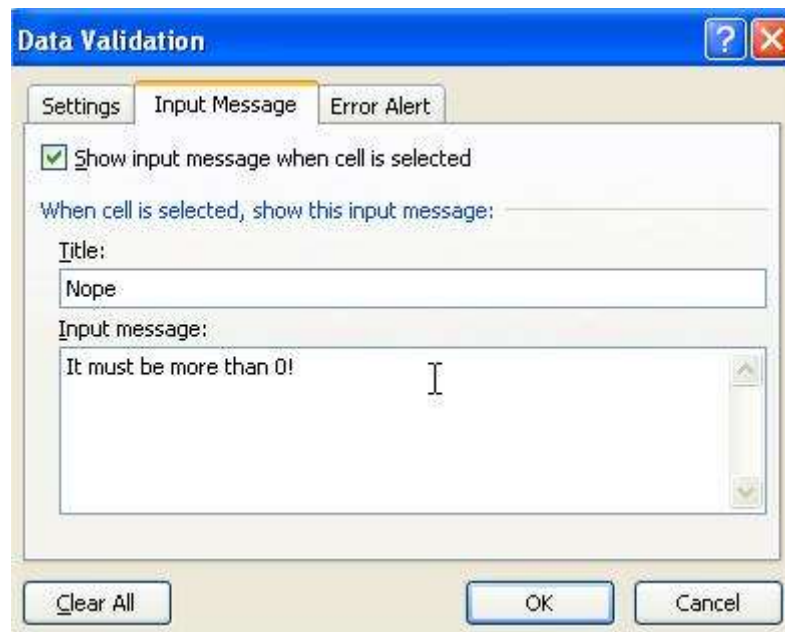


Input Message (Сообщение для ввода)

Input messages appear when the user selects the cell and tell the user what to enter.

On the Input Message tab:

1. Check 'Show input message when cell is selected' (Отображать подсказку, если ячейка является текущей).
2. Enter a title (Заголовок).
3. Enter an input message (Сообщение).



Error Alert (Сообщение об ошибке)

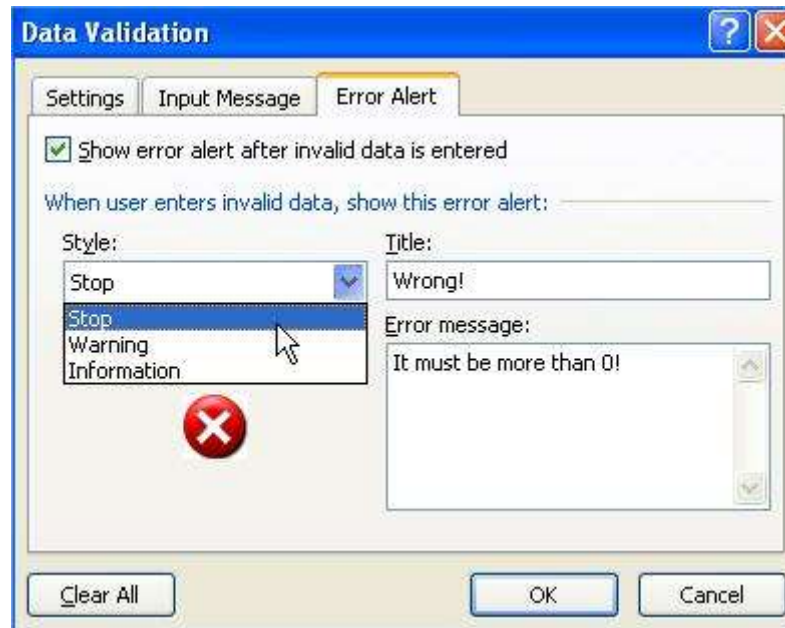
If users ignore the input message and enter a number that is not valid, you can show them an error alert.

On the Error Alert tab:

1. Check 'Show error alert after invalid data is entered' (Выводить сообщение об ошибке).
2. Enter a title.
3. Enter an error message.



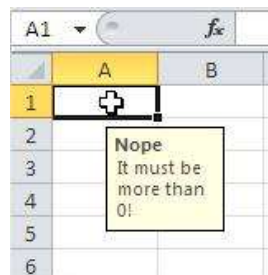
You can also set the Style, which is a reaction to the validation. Excel provides three styles: Stop, Information and Warning. Only Stop is a way to not allow the user entered an invalid value.



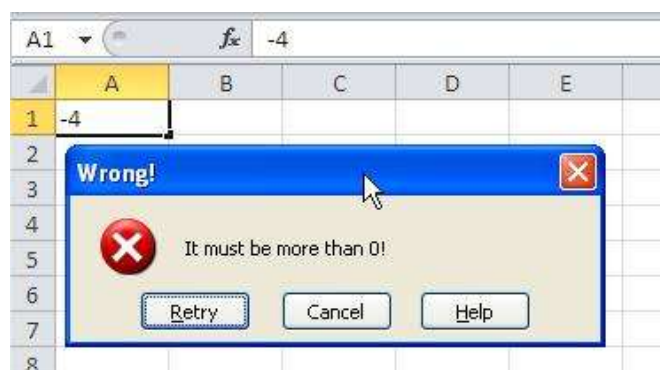
4. Click OK.

Data Validation Result

Let's see how it looks in your worksheet. Now you see a comment in the cell.



After entering the number which is less than 0 appears alert message. Data Validation does stop the possibility of entering an incorrect value.



Note: to remove data validation from a cell, select the cell, on the Data tab, click Data Validation, and then click Clear All. You can use Excel's Go To Special feature to quickly select all cells with data validation.

2. Tasks to Perform

11. Open Microsoft Excel.
12. Open your workbook.
13. Create a new worksheet.
14. Do all exercises from part 1 this manual to understand using all features and functions.
15. Enter a list of students' progress like below. At first fill student's names and subjects.

	A	B	C	D	E	F	G	H	I	J	K
1		Steven	Mary	Ann	Raymond	Mark	Paul	Eliza	Kelly		Averages
2	Maths	76	89	43	48	51	76	87	56		65.75
3	English	55	85	78	61	47	87	91	73		72.13
4	Science	65	82	39	58	52	65	57	45		57.88
5	History	45	91	56	72	49	56	78	56		62.88
6	Geography	51	84	54	64	47	64	67	67		62.25
7	Art	43	63	49	62	39	89	64	63		59.00
8	Computer Studies	63	95	45	59	41	92	89	52		67.00
9	French	35	91	65	26	28	51	92	56		55.50
10											
11	Overall Average	54.13	85.00	53.63	56.25	44.25	72.50	78.13	58.50		
12											
13		Steven	Mary	Ann	Raymond	Mark	Paul	Eliza	Kelly		
14	Maths	B	A	D	C	C	B	A	C		
15	English	C	A	B	B	C	A	A	B		
16	Science	B	A	D	C	C	B	C	C		
17	History	C	A	C	B	C	C	B	C		
18	Geography	C	A	C	B	C	B	B	B		
19	Art	D	B	C	B	D	A	B	B		
20	Computer Studies	B	A	C	C	D	A	A	C		
21	French	D	A	B	Fail	Fail	C	A	C		
22											

16. Using Go To Special feature select all filled cells (radio button Constants).
17. Find subject "History" and replace all examples to "Computer science".
18. For the range B2:I9 create the data validation rule: all cells can get values between 0 and 100. For the range B14:I21 create the data validation rule: the value in cells can be just one symbol.
19. Fill the range B2:I9 by corresponding value.
20. Count in range B11:I11 overall average appropriate students' overall average and in range K2:K9 average rating by subjects.
21. Fill the range B14:I21 by corresponding value.
22. Select all cells with formulas (using Go To Special) and formatting its value using the font Arial 12, bold, italic, red color.

23. Select all cells with data validation and formatting its value using font Courier 14, italic.
24. Save workbook.
25. Close workbook.
26. Close Excel.

3. Checklist

9. What features are located in block Find & Select?
10. What is difference between features Find and Replace?
11. How to select all cells with formulas?
12. How to select all cells with data validation?
13. What kind of contents can you select using Go To Special?
14. What is the data validation?
15. When is data validation useful?
16. What types of Error Alert can you use?
17. How to create the data validation rule?
18. What type of Error Alert does not allow the user entered an invalid value?

Educational edition

METHODOLOGICAL GUIDELINES

Beginning Microsoft Excel 2016
Part 3

for individual work and laboratory work of disciplines «Informatics», «Informatics and information technologies», «Information systems and technologies», for students with learning in a foreign language

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