

Excel 2016

Intro to Formulas

Introduction

One of the most powerful features in Excel is the ability to **calculate** numerical information using **formulas**. Just like a calculator, Excel can add, subtract, multiply, and divide. In this lesson, we'll show you how to use **cell references** to create simple formulas.

Optional: Download our [practice workbook](#).

Watch the video below to learn more about creating formulas in Excel.

*Video removed from printing pages

Mathematical operators

Excel uses standard operators for formulas, such as a **plus sign** for addition (+), a **minus sign** for subtraction (-), an **asterisk** for multiplication (*), a **forward slash** for division (/), and a **caret** (^) for exponents.

Addition	+
Subtraction	-
Multiplication	*
Division	/
Exponents	^

All formulas in Excel must begin with an **equals sign** (=). This is because the cell contains, or is equal to, the formula and the value it calculates.

Understanding cell references

While you can create simple formulas in Excel using numbers (for example, =2+2 or =5*5), most of the time you will use **cell addresses** to create a formula. This is known as making a **cell reference**. Using cell references will ensure that your formulas are always accurate because you can change the value of referenced cells without having to rewrite the formula.

In the formula below, cell A3 adds the values of cells A1 and A2 by making cell references:

	A	B
1	5	
2	2	
3	=A1+A2	
4		

When you press Enter, the formula calculates and displays the answer in cell A3:

	A	B
1	5	
2	2	
3	7	
4		

If the values in the referenced cells change, the formula automatically recalculates:

	A	B
1	6	
2	2	
3	8	
4		

By combining a mathematical operator with cell references, you can create a variety of simple formulas in Excel. Formulas can also include a combination of cell references and numbers, as in the examples below:

=A1+A2	Adds cells A1 and A2
=C4-3	Subtracts 3 from cell C4
=E7/J4	Divides cell E7 by J4
=N10*1.05	Multiplies cell N10 by 1.05
=R5^2	Finds the square of cell R5

To create a formula:

In our example below, we'll use a simple formula and cell references to calculate a budget.

- 1 Select the **cell** that will contain the formula. In our example, we'll select cell **D12**.

	B	C	D
2			
3	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	15	\$8.75	
5	18	\$2.59	
6	9	\$14.25	
7	12	\$2.99	
8			
9			
10		JUNE BUDGET	\$1,200
11		JULY BUDGET	\$1,500
12		TOTAL	+

- 2 Type the **equals sign (=)**. Notice how it appears in both the **cell** and the **formula bar**.

	B	C	D
2			
3	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	15	\$8.75	
5	18	\$2.59	
6	9	\$14.25	
7	12	\$2.99	
8			
9			
10		JUNE BUDGET	\$1,200
11		JULY BUDGET	\$1,500
12		TOTAL	=

- 3 Type the **cell address** of the cell you want to reference first in the formula: cell **D10** in our example. A **blue border** will appear around the referenced cell.

	B	C	D
2			
3	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	15	\$8.75	
5	18	\$2.59	
6	9	\$14.25	
7	12	\$2.99	
8			
9			
10		JUNE BUDGET	\$1,200
11		JULY BUDGET	\$1,500
12		TOTAL	=D10

- 4 Type the **mathematical operator** you want to use. In our example, we'll type the **addition sign (+)**.
- 5 Type the **cell address** of the cell you want to reference second in the formula: cell **D11** in our example. A **red border** will appear around the referenced cell.

	B	C	D
2			
3	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	15	\$8.75	
5	18	\$2.59	
6	9	\$14.25	
7	12	\$2.99	
8			
9			
10		JUNE BUDGET	\$1,200
11		JULY BUDGET	\$1,500
12		TOTAL	=D10+D11

- 6 Press **Enter** on your keyboard. The formula will be **calculated**, and the **value** will be displayed in the cell. If you select the cell again, notice that the cell displays the result, while the formula bar displays the formula.

	B	C	D
2			
3	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	15	\$8.75	
5	18	\$2.59	
6	9	\$14.25	
7	12	\$2.99	
8			
9			
10		JUNE BUDGET	\$1,200
11		JULY BUDGET	\$1,500
12		TOTAL	\$2,700

If the result of a formula is too large to be displayed in a cell, it may appear as **pound signs (#####)** instead of a value. This means the column is not wide enough to display the cell content. Simply **increase the column width** to show the cell content.

Modifying values with cell references

The true advantage of cell references is that they allow you to **update data** in your worksheet without having to rewrite formulas. In the example below, we've modified the value of cell D1 from \$1,200 to \$1,800. The formula in D3 will automatically recalculate and display the new value in cell D3.

	C	D
10	JUNE BUDGET	\$1,800
11	JULY BUDGET	\$1,500
12	TOTAL	\$3,300

Excel **will not always tell you** if your formula contains an error, so it's up to you to check all of your formulas. To learn how to do this, you can read the [Double-Check Your Formulas](#) lesson from our [Excel Formulas](#) tutorial.

To create a formula using the point-and-click method:

Instead of typing cell addresses manually, you can **point and click** the cells you want to include in your formula. This method can save a lot of time and effort when creating formulas. In our example below, we'll create a formula to calculate the cost of ordering several boxes of plastic silverware.

- 1 Select the **cell** that will contain the formula. In our example, we'll select cell **D4**.

	A	B	C	D
1				
	Budget & Paper Supplies			
	Sabrosa Empanadas & More			
	1202 Biscayne Bay Drive			
	Orlando, FL 32804			
2	PAPER SUPPLY ORDERS			
3	ITEM	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	Plastic Silverware (box of 100)	15	\$8.75	+
5	Napkins (box of 250)	18	\$2.59	
6	Plates (box of 50)	9	\$14.25	
7	Plastic Cups (box of 100)	12	\$2.99	
8				

- 2 Type the **equals sign (=)**.
- 3 Select the **cell** you want to reference first in the formula: cell **B4** in our example. The **cell address** will appear in the formula.

ITEM	QUANTITY	PRICE PER UNIT	LINE TOTAL
Plastic Silverware (box of 100)	15	\$8.75	=B4
Napkins (box of 250)	18	\$2.59	
Plates (box of 50)	9	\$14.25	
Plastic Cups (box of 100)	12	\$2.99	

- 4 Type the **mathematical operator** you want to use. In our example, we'll type the **multiplication sign (*)**.
- 5 Select the **cell** you want to reference second in the formula: cell **C4** in our example. The **cell address** will appear in the formula.

ITEM	QUANTITY	PRICE PER UNIT	LINE TOTAL
Plastic Silverware (box of 100)	15	\$8.75	=B4*C4
Napkins (box of 250)	18	\$2.59	
Plates (box of 50)	9	\$14.25	
Plastic Cups (box of 100)	12	\$2.99	

- 6 Press **Enter** on your keyboard. The formula will be **calculated**, and the **value** will be displayed in the cell.

The screenshot shows an Excel spreadsheet with the following content:

ITEM	QUANTITY	PRICE PER UNIT	LINE TOTAL
Plastic Silverware (box of 100)	15	\$8.75	\$131.25
Napkins (box of 250)	18	\$2.59	
Plates (box of 50)	9	\$14.25	
Plastic Cups (box of 100)	12	\$2.99	

Copying formulas with the fill handle

Formulas can also be **copied** to adjacent cells with the **fill handle**, which can save a lot of time and effort if you need to perform the **same calculation** multiple times in a worksheet. The **fill handle** is the small square at the bottom-right corner of the selected cell(s).

- 1 Select the cell containing the formula you want to copy. Click and drag the **fill handle** over the cells you want to fill.

The screenshot shows the Excel spreadsheet with the fill handle (a small square with a plus sign) being dragged from cell D4 down to cell D8. The formula bar still shows '=B4*C4'.

- 2 After you release the mouse, the formula will be copied to the selected cells.

The screenshot shows the Excel spreadsheet after the formula has been copied. The formula bar still shows '=B4*C4'. The cells D5, D6, and D7 now contain the calculated values: \$46.62, \$128.25, and \$35.88 respectively.

QUANTITY	PRICE PER UNIT	LINE TOTAL
15	\$8.75	\$131.25
18	\$2.59	\$46.62
9	\$14.25	\$128.25
12	\$2.99	\$35.88

To edit a formula:

Sometimes you may want to modify an existing formula. In the example below, we've entered an incorrect cell address in our formula, so we'll need to correct it.

- 1 Select the **cell** containing the formula you want to edit. In our example, we'll select cell **D12**.

	B	C	D
2			
3		QUANTITY	PRICE PER UNIT
4		15	\$8.75
5		18	\$2.59
6		9	\$14.25
7		12	\$2.99
8			
9			
10		JUNE BUDGET	\$1,200
11		JULY BUDGET	\$1,500
12		TOTAL	\$1,500

- 2 Click the **formula bar** to edit the formula. You can also **double-click** the cell to view and edit the formula directly within the cell.

	B	C	D
2			
3		QUANTITY	PRICE PER UNIT
4		15	\$8.75
5		18	\$2.59
6		9	\$14.25
7		12	\$2.99
8			
9			
10		JUNE BUDGET	\$1,200
11		JULY BUDGET	\$1,500
12		TOTAL	\$1,500

- 3 A **border** will appear around any referenced cells. In our example, we'll change the first part of the formula to reference cell **D10** instead of cell **D9**.

	B	C	D
2			
3	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	15	\$8.75	\$131.25
5	18	\$2.59	\$46.62
6	9	\$14.25	\$128.25
7	12	\$2.99	\$35.88
8			
9			
10	JUNE BUDGET		\$1,200
11	JULY BUDGET		\$1,500
12	TOTAL		=D9+D11

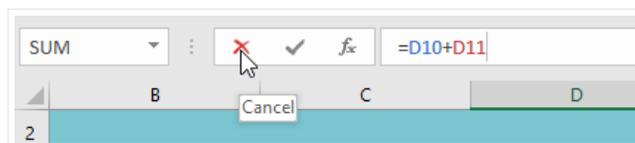
- 4 When you're finished, press **Enter** on your keyboard or select the **Enter** command in the formula bar.

	B	C	D
2			
3	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	15	\$8.75	\$131.25
5	18	\$2.59	\$46.62
6	9	\$14.25	\$128.25
7	12	\$2.99	\$35.88
8			
9			
10	JUNE BUDGET		\$1,200
11	JULY BUDGET		\$1,500
12	TOTAL		=D10+D11

- 5 The formula will be **updated**, and the **new value** will be displayed in the cell.

	B	C	D
2			
3	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	15	\$8.75	\$131.25
5	18	\$2.59	\$46.62
6	9	\$14.25	\$128.25
7	12	\$2.99	\$35.88
8			
9			
10	JUNE BUDGET		\$1,200
11	JULY BUDGET		\$1,500
12	TOTAL		\$2,700

If you change your mind, you can press the **Esc** key on your keyboard or click the **Cancel** command in the formula bar to avoid accidentally making changes to your formula.



To show all of the formulas in a spreadsheet, you can hold the **Ctrl** key and press **`** (grave accent). The grave accent key is usually located in the top-left corner of the keyboard. You can press **Ctrl+`** again to switch back to the normal view.

Challenge!

- 1 Open our [practice workbook](#).
- 2 Click the **Challenge** tab in the bottom-left of the workbook.
- 3 Create a formula in cell **D4** that multiplies the quantity in **B4** by the price per unit in cell **C4**.
- 4 Use the **fill handle** to copy the formula in cell **D4** to cells **D5:D7**.
- 5 Change the price per unit for the fried plantains in cell **C6** to \$2.25. Notice that the line total automatically changes as well.
- 6 Edit the formula for the total in cell **D8** so it also adds cell **D7**.
- 7 When you're finished, your workbook should look like this:

	A	B	C	D
1		Customer Invoice		
		Sabrosa Empanadas & More 1202 Biscayne Bay Drive Orlando, FL 32804		
2	Customer Invoice #19480			
3	ITEM	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	Empanadas: Braised Short Rib	15	\$3.75	\$56.25
5	Empanadas: Nutella and Banana	18	\$2.59	\$46.62
6	Sides: Fried Plantains	15	\$2.25	\$33.75
7	Sides: Rice and Black Beans	12	\$2.15	\$25.80
8	TOTAL			\$162.42