

Introduction to Excel

Data Science

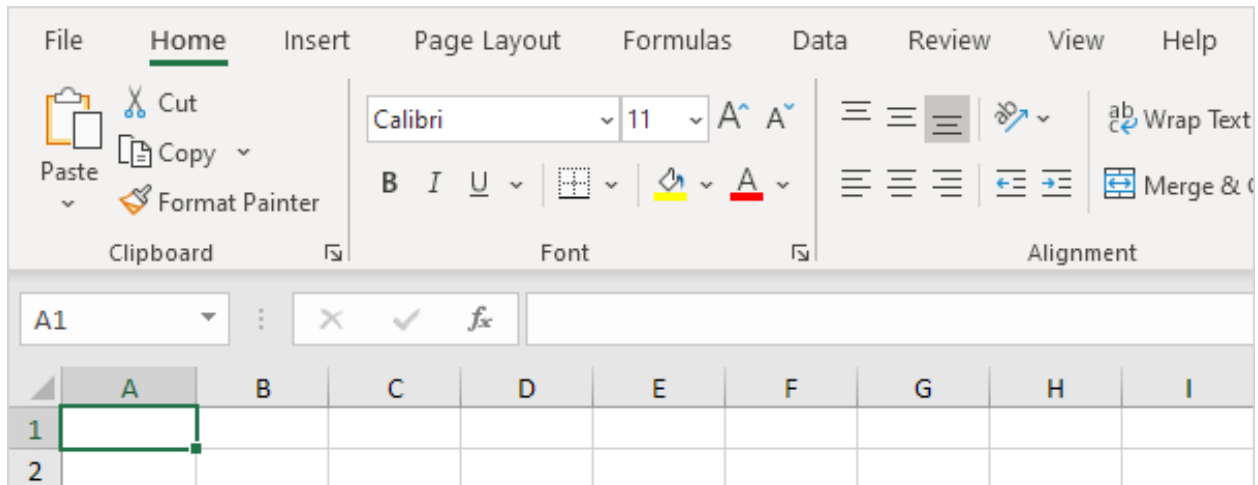
Artificial Intelligence

2025-2026

1- Excel Main Window

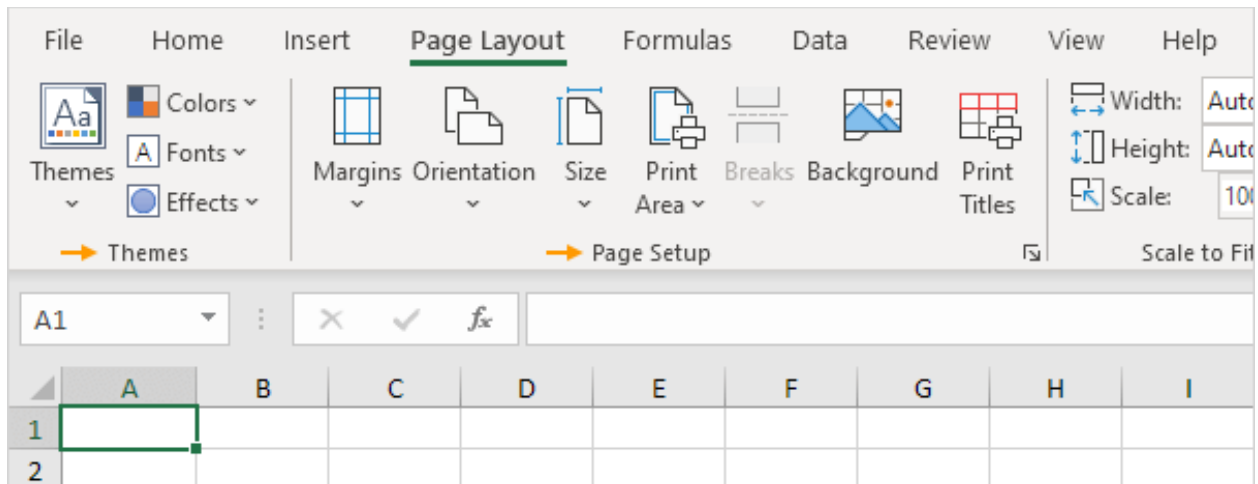
Tabs

The tabs on the ribbon are: File, Home, Insert, Page Layout, Formulas, Data, Review, View and Help. The Home tab contains the most frequently used commands in Excel.



Groups

Each tab contains groups of related commands. For example, the Page Layout tab contains the Themes group, the Page Setup group, etc.



Use the Ribbon

Let's use the ribbon to create a table. Tables allow you to analyze your data in Excel quickly and easily.

1. Open dataset.xlsx.
2. Click any single cell inside the data set.
3. On the Insert tab, in the Tables group, click Table.

FileHomeInsertPage LayoutFormulasDataReviewViewHelp

PivotTable

Recommended
PivotTables

Table

Tables

Pictures

Online Pictures

Shapes

Icons

Illustrations

3D Models

SmartArt

Screenshot

Get Add-ins

My Add-ins

A2

Smith

	A	B	C	D	E	F	G	H	I
1	Last Name	Sales	Country	Quarter					
2	Smith	\$16,753.00	UK	Qtr 3					
3	Johnson	\$14,808.00	USA	Qtr 4					
4	Williams	\$10,644.00	UK	Qtr 2					
5	Jones	\$1,390.00	USA	Qtr 3					
6	Brown	\$4,865.00	USA	Qtr 4					
7	Williams	\$12,438.00	UK	Qtr 1					
8	Johnson	\$9,339.00	UK	Qtr 2					
9	Smith	\$18,919.00	USA	Qtr 3					
10	Jones	\$9,213.00	USA	Qtr 4					
11	Jones	\$7,433.00	UK	Qtr 1					
12	Brown	\$3,255.00	USA	Qtr 2					
13	Williams	\$14,867.00	USA	Qtr 3					
14	Williams	\$19,302.00	UK	Qtr 4					
15	Smith	\$9,698.00	USA	Qtr 1					
16									

The Create Table dialog box appears.

4. Excel automatically selects the data for you. Check 'My table has headers' and click on OK.

Create Table

?

✕

Where is the data for your table?

= \$A\$1:\$D\$15

☒ My table has headers

OK

Cancel

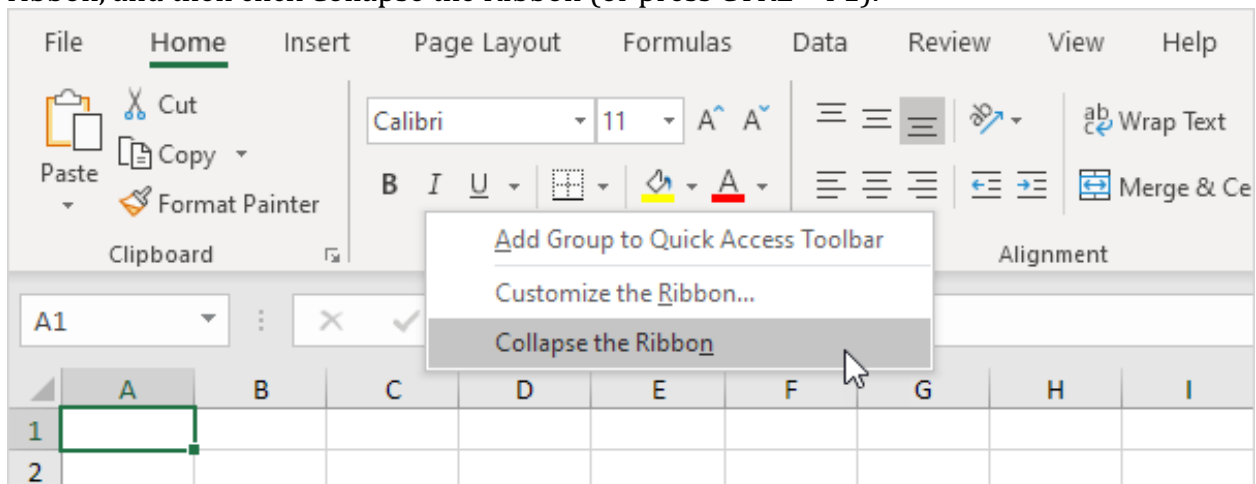
Result: Excel creates a nicely formatted table for you.

	A	B	C	D	E	F	G	H
1	Last Name ▼	Sales ▼	Country ▼	Quarter ▼				
2	Smith	\$16,753.00	UK	Qtr 3				
3	Johnson	\$14,808.00	USA	Qtr 4				
4	Williams	\$10,644.00	UK	Qtr 2				
5	Jones	\$1,390.00	USA	Qtr 3				
6	Brown	\$4,865.00	USA	Qtr 4				
7	Williams	\$12,438.00	UK	Qtr 1				
8	Johnson	\$9,339.00	UK	Qtr 2				
9	Smith	\$18,919.00	USA	Qtr 3				
10	Jones	\$9,213.00	USA	Qtr 4				
11	Jones	\$7,433.00	UK	Qtr 1				
12	Brown	\$3,255.00	USA	Qtr 2				
13	Williams	\$14,867.00	USA	Qtr 3				
14	Williams	\$19,302.00	UK	Qtr 4				
15	Smith	\$9,698.00	USA	Qtr 1				
16								

Note: use the drop-down arrows to quickly sort and filter.

Collapse the Ribbon

You can collapse the ribbon to get extra space on the screen. Right click anywhere on the ribbon, and then click Collapse the Ribbon (or press CTRL + F1).



Result:

File Home Insert Page Layout Formulas Data Review View Help									
A1									
	A	B	C	D	E	F	G	H	I
1									
2									

2- Range in Excel

A range in Excel is a collection of two or more cells. This chapter gives an overview of some very important range operations.

Cell, Row, Column

Let's start by selecting a cell, row and column.

1. To select cell C3, click on the box at the intersection of column C and row 3.

	A	B	C	D	E
1					
2					
3					
4					
5					

2. To select column C, click on the column C header.

	A	B	C	D	E
1					
2					
3					
4					
5					

3. To select row 3, click on the row 3 header.

	A	B	C	D	E
1					
2					
3					
4					
5					

Range Examples

A range is a collection of two or more cells.

1. To select the range B2:C4, click on cell B2 and drag it to cell C4.

	A	B	C	D	E
1					
2					
3					
4					
5					

2. To select a range of individual cells, hold down CTRL and click on each cell that you want to include in the range.

	A	B	C	D	E
1					
2					
3					
4					
5					

Fill a Range

To fill a range, execute the following steps.

1a. Enter the value 2 into cell B2.

	A	B	C	D	E
1					
2		2			
3					
4					
5					

1b. Select cell B2, click on the lower right corner of cell B2 and drag it down to cell B8.

	A	B	C	D	E
1					
2		2			
3					
4					
5					
6					
7					
8					
9					
10					

Result:

	A	B	C	D	E
1					
2		2			
3		2			
4		2			
5		2			
6		2			
7		2			
8		2			
9					
10					

This dragging technique is very important and you will use it very often in Excel. Here's another example.

2a. Enter the value 2 into cell B2 and the value 4 into cell B3.

	A	B	C	D	E
1					
2		2			
3		4			
4					
5					

2b. Select cell B2 and cell B3, click on the lower right corner of this range and drag it down.

	A	B	C	D	E
1					
2		2			
3		4			
4		6			
5		8			
6		10			
7		12			
8		14			
9					
10					

Excel automatically fills the range based on the pattern of the first two values.

3a. Enter the date 6/13/2030 into cell B2 and the date 6/16/2030 into cell B3.

	A	B	C	D	E
1					
2		6/13/2030			
3		6/16/2030			
4					
5					

3b. Select cell B2 and cell B3, click on the lower right corner of this range and drag it down.

	A	B	C	D	E
1					
2		6/13/2030			
3		6/16/2030			
4		6/19/2030			
5		6/22/2030			
6		6/25/2030			
7		6/28/2030			
8		7/1/2030			
9					
10					

Move a Range

To move a range, execute the following steps.

1. Select a range and click on the border of the range.

	A	B	C	D	E
1					
2		2			
3		4			
4		6			
5		8			
6		10			
7		12			
8		14			
9					
10					

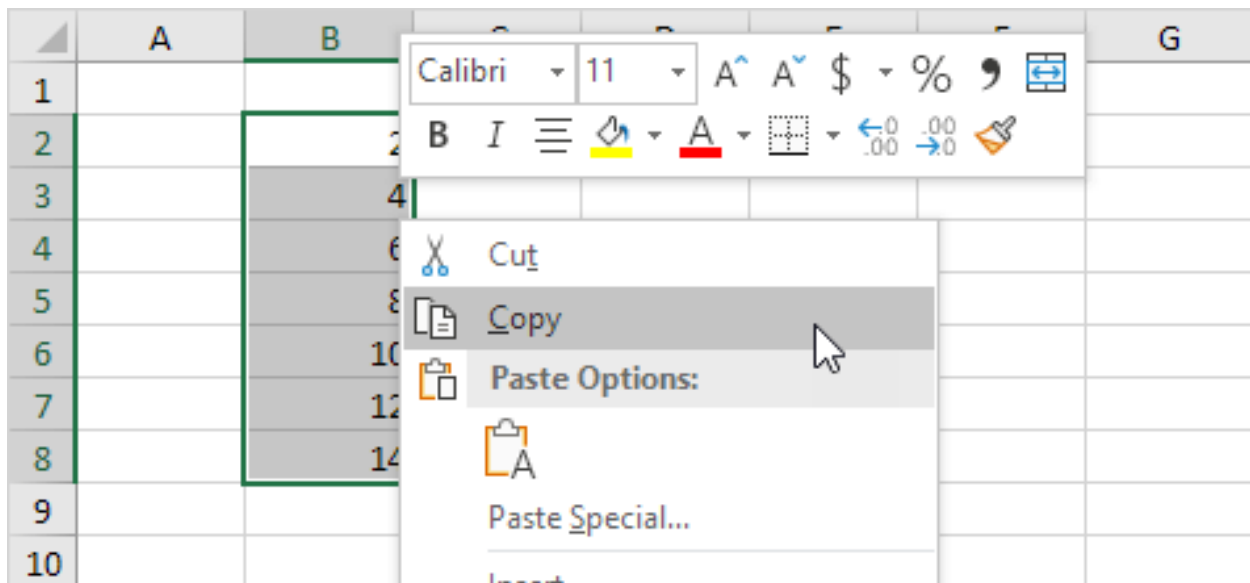
2. Drag the range to its new location.

	A	B	C	D	E
1					
2				2	
3				4	
4				6	
5				8	
6				10	
7				12	
8				14	
9					
10					

Copy/Paste a Range

To copy and paste a range, execute the following steps.

1. Select the range, right click, and then click Copy (or press CTRL + c).



2. Select the cell where you want the first cell of the range to appear, right click, and then click Paste under 'Paste Options:' (or press CTRL + v).

	A	B	C	D	E	F	G
1							
2		2		2			
3		4		4			
4		6		6			
5		8		8			
6		10		10			
7		12		12			
8		14		14			
9							
10							

Paste Options:



Paste (P)

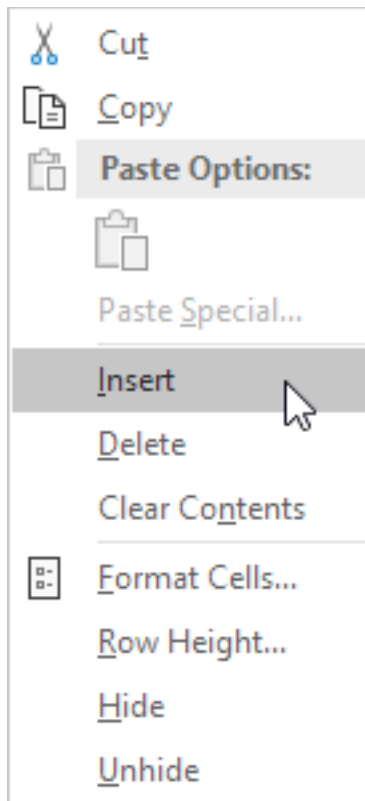
Insert Row, Column

To insert a row between the values 20 and 40 below, execute the following steps.

1. Select row 3.

	A	B	C	D	E
1					
2		20			
3		40			
4		60			
5					

2. Right click, and then click Insert.



Result:

	A	B	C	D	E
1					
2		20			
3					
4		40			
5		60			
6					

The rows below the new row are shifted down. In a similar way, you can insert a column.

3- Formulas and Functions in Excel

A formula is an expression which calculates the value of a cell. Functions are predefined formulas and are already available in Excel.

Cell A3 below contains a formula which adds the value of cell A2 to the value of cell A1.

A3						
	A	B	C	D	E	F
1	2					
2	3					
3	5					
4						

Cell A3 below contains the SUM function which calculates the sum of the range A1:A2.

A3						
	A	B	C	D	E	F
1	2					
2	3					
3	5					
4						

Enter a Formula

To enter a formula, execute the following steps.

1. Select a cell.
2. To let Excel know that you want to enter a formula, type an equal sign (=).
3. For example, type the formula A1+A2.

A3 ✕ ✓ <i>fx</i> =A1+A2						
	A	B	C	D	E	F
1	2					
2	3					
3	5					
4						

Tip: instead of typing A1 and A2, simply select cell A1 and cell A2.

4. Change the value of cell A1 to 3.

A1 ✕ ✓ <i>fx</i> 3						
	A	B	C	D	E	F
1	3					
2	3					
3	6					
4						

Excel automatically recalculates the value of cell A3. This is one of Excel's most powerful features!

Edit a Formula

When you select a cell, Excel shows the value or formula of the cell in the formula bar.

A3 ✕ ✓ <i>fx</i> =A1+A2						
	A	B	C	D	E	F
1	2					
2	3					
3	5					
4						

1. To edit a formula, click in the formula bar and change the formula.

SUMIF ✕ ✓ <i>f_x</i> =A1-A2						
	A	B	C	D	E	F
1	2					
2	3					
3	=A1-A2					
4						

2. Press Enter.

A4 ✕ ✓ <i>f_x</i>						
	A	B	C	D	E	F
1	2					
2	3					
3	-1					
4						
5						

Operator Precedence

Excel uses a default order in which calculations occur. If a part of the formula is in parentheses, that part will be calculated first. It then performs multiplication or division calculations. Once this is complete, Excel will add and subtract the remainder of your formula. See the example below.

A4 ✕ ✓ <i>f_x</i> =A1*A2+A3						
	A	B	C	D	E	F
1	2					
2	2					
3	1					
4	5					
5						

First, Excel performs multiplication ($A1 * A2$). Next, Excel adds the value of cell A3 to this result.

Another example,

	A4					
	A	B	C	D	E	F
1	2					
2	2					
3	1					
4	6					
5						

First, Excel calculates the part in parentheses ($A2+A3$). Next, it multiplies this result by the value of cell A1.

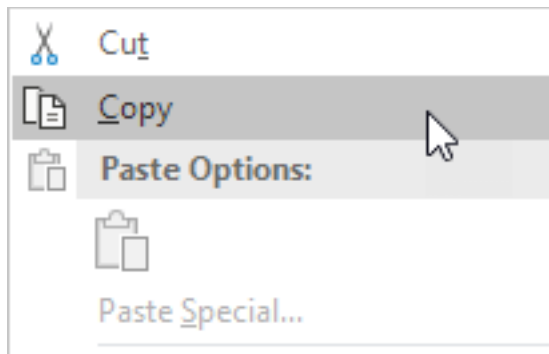
Copy/Paste a Formula

When you copy a formula, Excel automatically adjusts the cell references for each new cell the formula is copied to. To understand this, execute the following steps.

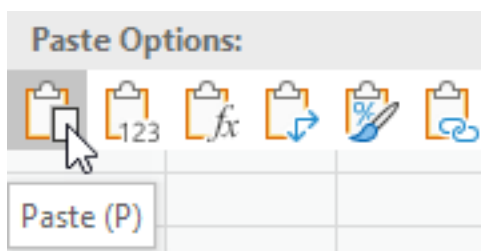
1. Enter the formula shown below into cell A4.

	A4					
	A	B	C	D	E	F
1	2	5				
2	2	6				
3	1	4				
4	6					
5						

2a. Select cell A4, right click, and then click Copy (or press CTRL + c)...



...next, select cell B4, right click, and then click Paste under 'Paste Options:' (or press CTRL + v).



2b. You can also drag the formula to cell B4. Select cell A4, click on the lower right corner of cell A4 and drag it across to cell B4. This is much easier and gives the exact same result!

	A	B	C	D	E	F
1	2	5				
2	2	6				
3	1	4				
4	6					
5						

Result: the formula in cell B4 references the values in column B.

B4 ✕ ✓ <i>f_x</i> =B1*(B2+B3)						
	A	B	C	D	E	F
1	2	5				
2	2	6				
3	1	4				
4	6	50				
5						

Insert Function

Every function has the same structure. For example, SUM(A1:A4). The name of this function is SUM. The part between the brackets (arguments) means we give Excel the range A1:A4 as input. This function adds the values in cells A1, A2, A3 and A4. It's not easy to remember which function and which arguments to use for each task. Fortunately, the Insert Function feature in Excel helps you with this.

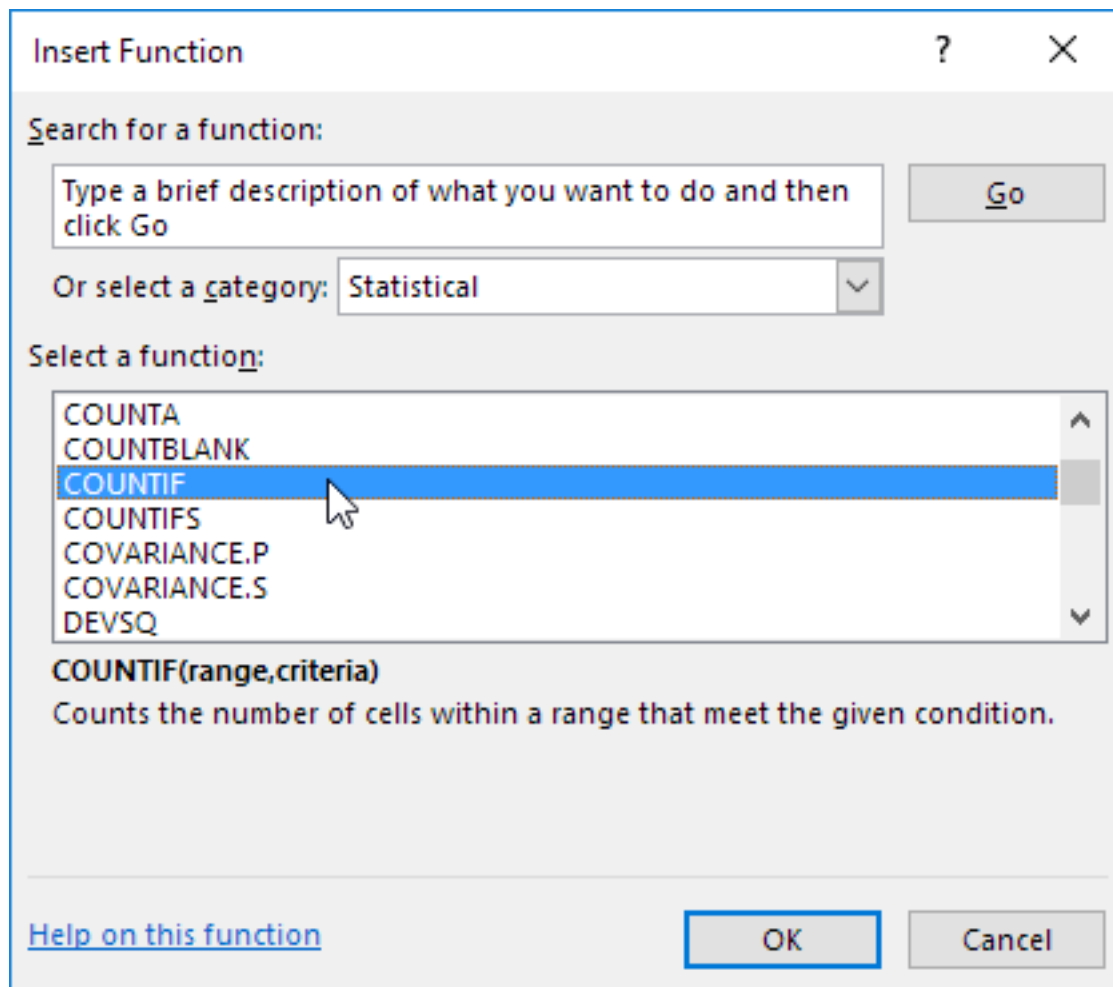
To insert a function, execute the following steps.

1. Select a cell.
2. Click the Insert Function button.

D1 ✕ ✓ <i>f_x</i>						
	A	B	C	D	E	F
1	3	8	6			
2	10	5	4			
3						

The 'Insert Function' dialog box appears.

3. Search for a function or select a function from a category. For example, choose COUNTIF from the Statistical category.



4. Click OK.

The 'Function Arguments' dialog box appears.

5. Click in the Range box and select the range A1:C2.

6. Click in the Criteria box and type >5.

7. Click OK.

Function Arguments

COUNTIF

Range: A1:C2 = {3,8,6;10,5,4}

Criteria: >5 =

Counts the number of cells within a range that meet the given condition.

Criteria is the condition in the form of a number, expression, or text that defines which cells will be counted.

Formula result =

[Help on this function](#)

OK Cancel

Result: the COUNTIF function counts the number of cells that are greater than 5.

	A	B	C	D	E	F
1	3	8	6	3		
2	10	5	4			
3						

Note: instead of using the Insert Function feature, simply type =COUNTIF(A1:C2,">5").
When you arrive at: =COUNTIF(instead of typing A1:C2, simply select the range A1:C2.

4- 10 Most Used Functions in Excel

Let's check out the 10 most used Excel functions.

1. COUNT

To count the number of cells that contain numbers, use the COUNT function in Excel.

A9									
	A	B	C	D	E	F	G	H	I
1	2								
2	sun								
3	moon								
4	TRUE								
5									
6	7								
7	5								
8									
9	3								
10									
11									

Note: use COUNTA to count all cells that are not empty. COUNTA stands for count all.

2. SUM

To sum a range of cells, use the SUM function in Excel. The SUM function below sums all values in column A.

D2									
	A	B	C	D	E	F	G	H	I
1	10								
2	10		Sum	41					
3	10								
4	10								
5									
98									
99	1								
100									

Note: you can also use the SUM function to sum an entire row. For example, =SUM(5:5) sums all values in the 5th row.

3. IF

The IF function checks whether a condition is met, and returns one value if true and another value if false.

C2 : ✕ ✓ <i>fx</i> =IF(B2>=60,"Pass","Fail")									
	A	B	C	D	E	F	G	H	I
1	Name	Score	Result						
2	Richard	93	Pass						
3	Jennifer	60	Pass						
4	James	58	Fail						
5	Lisa	79	Pass						
6	Sharon	41	Fail						
7									

Explanation: if the score is greater than or equal to 60, the if function shown above returns Pass, else it returns Fail. To quickly copy this formula to the other cells, click on the lower right corner of cell C2 and drag it down to cell C6.

4. AVERAGE

To calculate the average of a group of numbers, use the AVERAGE function (no rocket science here). The formula below calculates the average of the top 3 numbers in the range A1:A6.

A8 : ✕ ✓ <i>fx</i> =AVERAGE(LARGE(A1:A6,{1,2,3}))									
	A	B	C	D	E	F	G	H	I
1	9								
2	15								
3	2								
4	10								
5	1								
6	20								
7									
8	15								
9									

Explanation: the LARGE function returns the array constant {20,15,10}. This array constant is used as an argument for the AVERAGE function, giving a result of 15.

5. COUNTIF

The COUNTIF function below counts the number of cells that contain exactly star + a series of zero or more characters.

A9		✕ ✓ f _x		=COUNTIF(A1:A7,"star*")					
	A	B	C	D	E	F	G	H	I
1	star								
2	moon								
3	stars								
4	9								
5	star								
6	star								
7	star12								
8									
9	4								
10									

Explanation: an asterisk (*) matches a series of zero or more characters.

6. SUMIF

The SUMIF function below sums values in the range B1:B5 if the corresponding cells in the range A1:A5 contain exactly circle + 1 character.

B7		✕ ✓ f _x		=SUMIF(A1:A5,"circle?",B1:B5)					
	A	B	C	D	E	F	G	H	I
1	circle6	10							
2	triangle	1							
3	circle	7							
4	circle8	20							
5	triangle5	3							
6									
7		30							
8									

Explanation: a question mark (?) matches exactly one character.

10. SUMPRODUCT

To calculate the sum of the products of corresponding numbers in one or more ranges, use Excel's powerful SUMPRODUCT function.

C7 ✕ ✓ <i>fx</i> =SUMPRODUCT(B2:B5,C2:C5)									
	A	B	C	D	E	F	G	H	I
1	Product	Quantity	Price						
2	Computer	2	1000						
3	Keyboard	4	250						
4	Mouse	4	100						
5	Printer	2	50						
6									
7		Total	3500						
8									

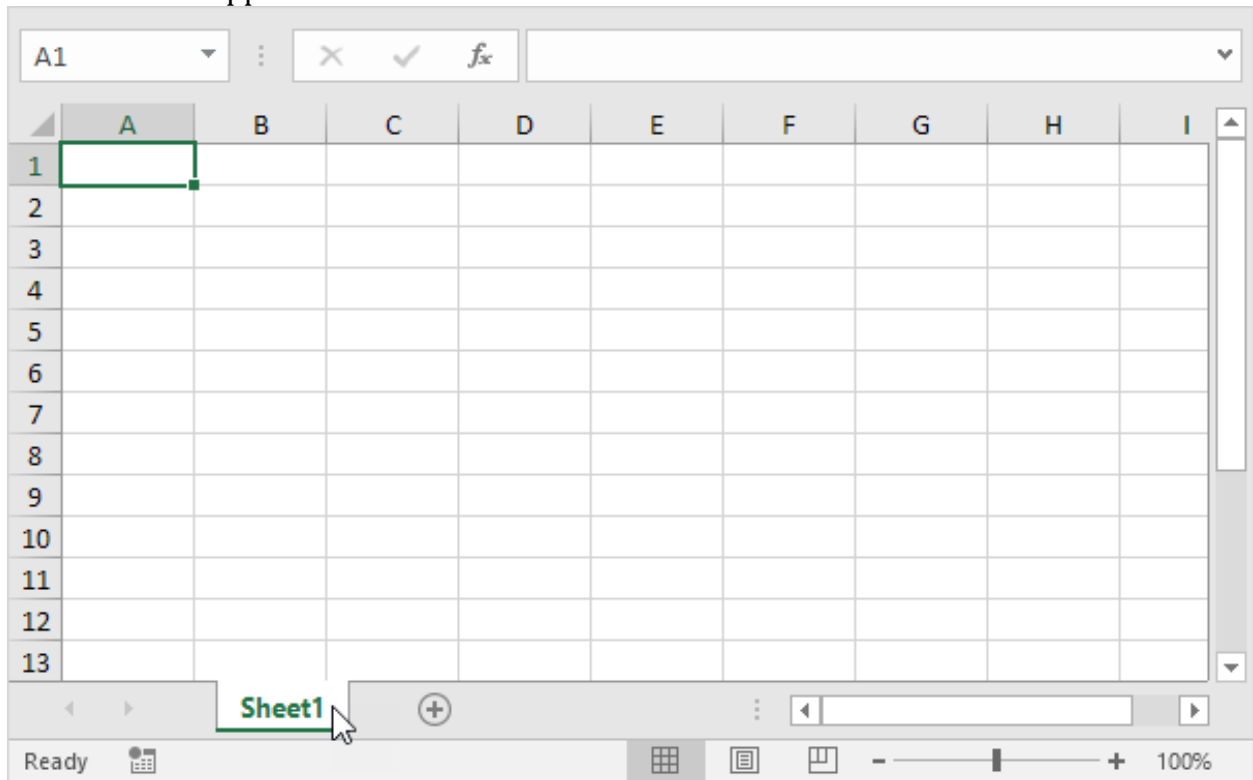
Explanation: the SUMPRODUCT function performs this calculation: $(2 * 1000) + (4 * 250) + (4 * 100) + (2 * 50) = 3500$.

5- Worksheets in Excel

A worksheet is a collection of cells where you keep and manipulate the data. Each Excel workbook can contain multiple worksheets.

Select a Worksheet

When you open an Excel workbook, Excel automatically selects Sheet1 for you. The name of the worksheet appears on its sheet tab at the bottom of the document window.

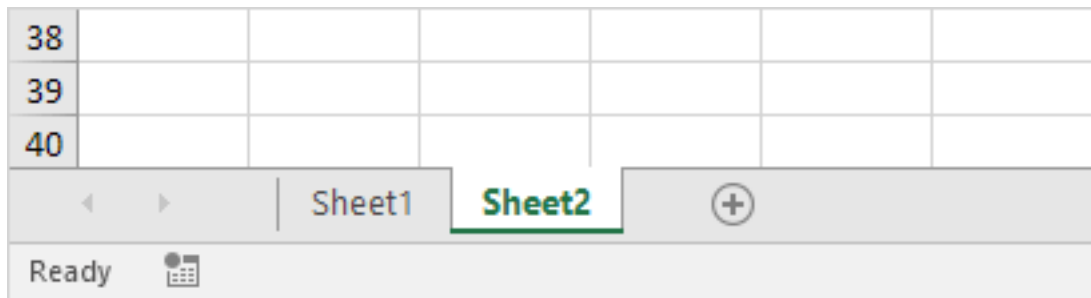


Insert a Worksheet

You can insert as many worksheets as you want. To quickly insert a new sheet, click the plus sign at the bottom of the document window.



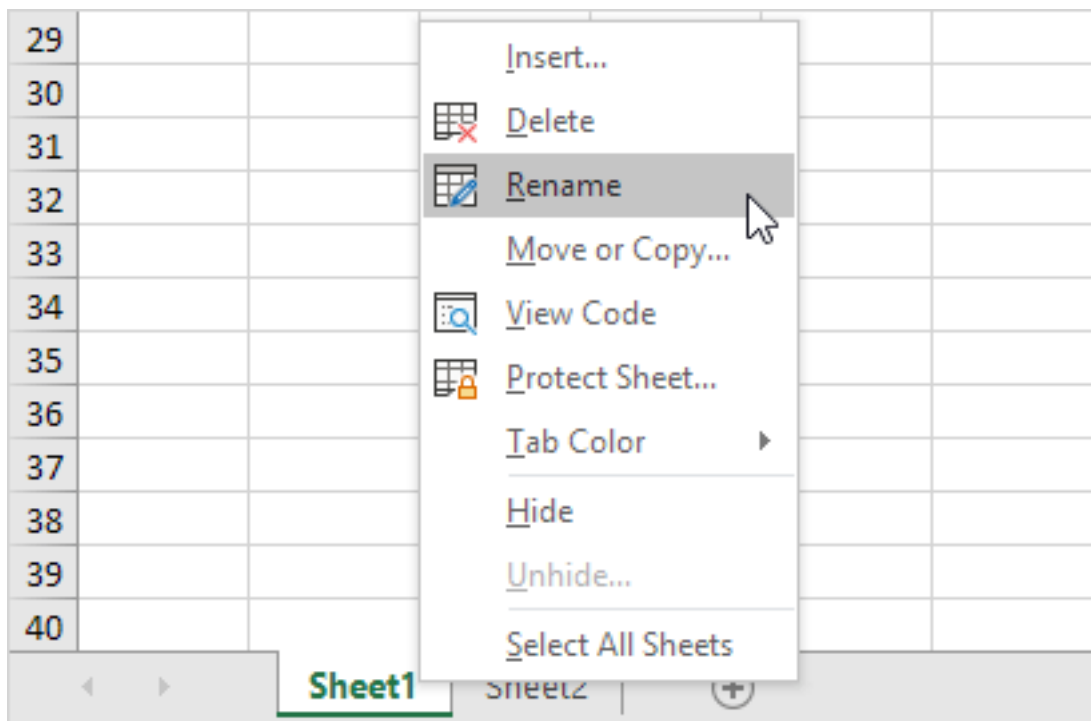
Result:



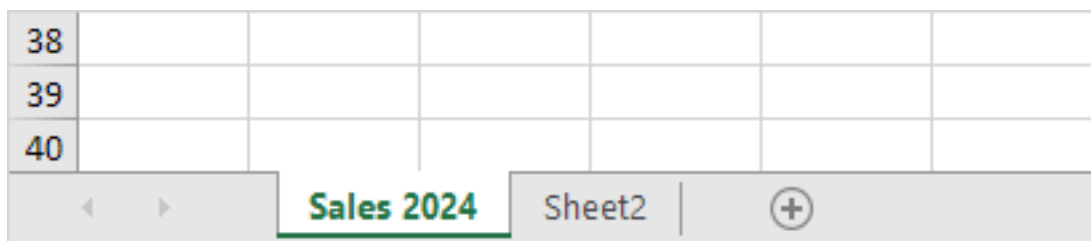
Rename a Worksheet

To give a worksheet a more specific name, execute the following steps.

1. Right click on the sheet tab of Sheet1.
2. Choose Rename.



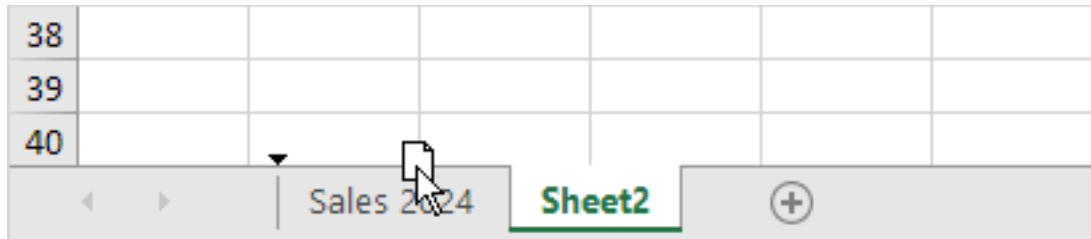
3. For example, type Sales 2024.



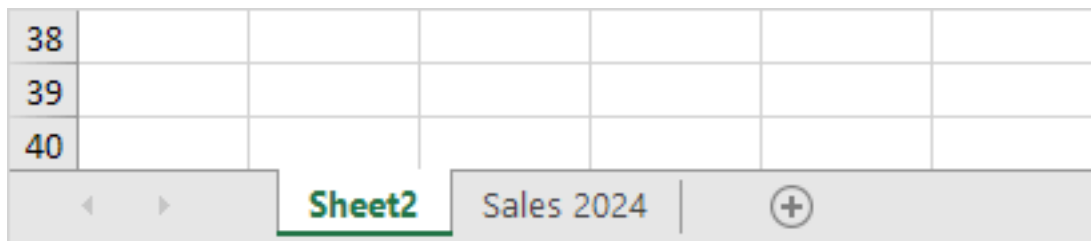
Move a Worksheet

To move a worksheet, click on the sheet tab of the worksheet you want to move and drag it into the new position.

1. For example, click on the sheet tab of Sheet2 and drag it before Sales 2024.



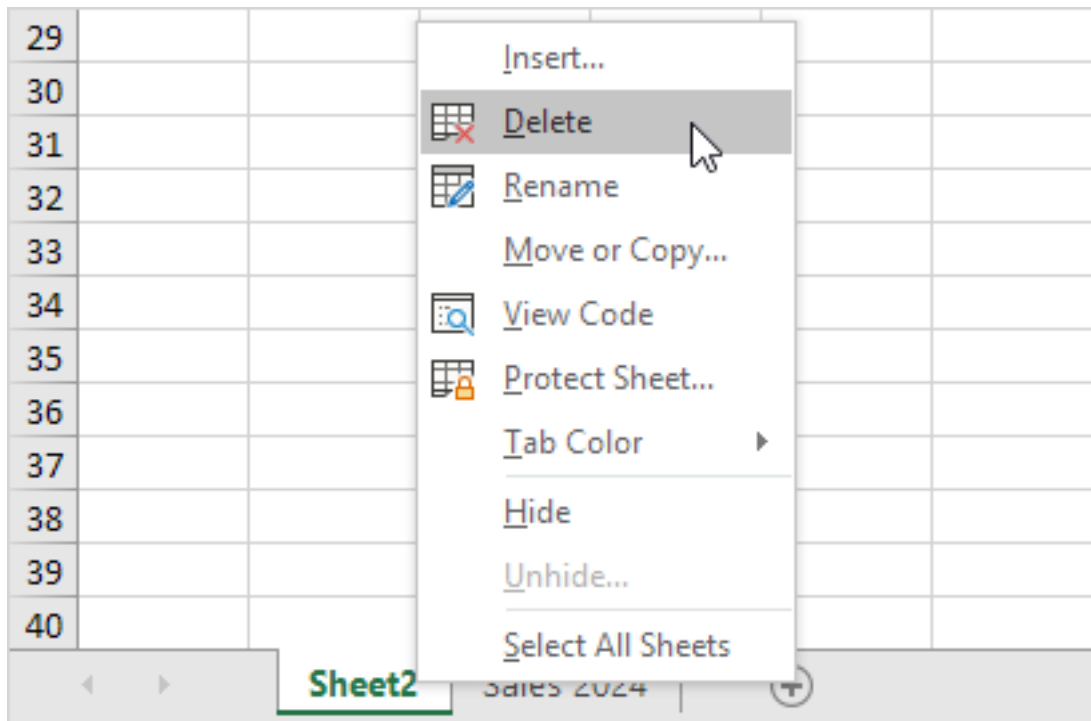
Result:



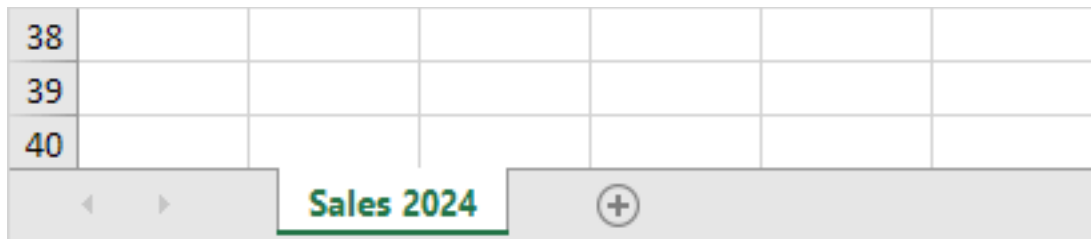
Delete a Worksheet

To delete a worksheet, right click on a sheet tab and choose Delete.

1. For example, delete Sheet2.



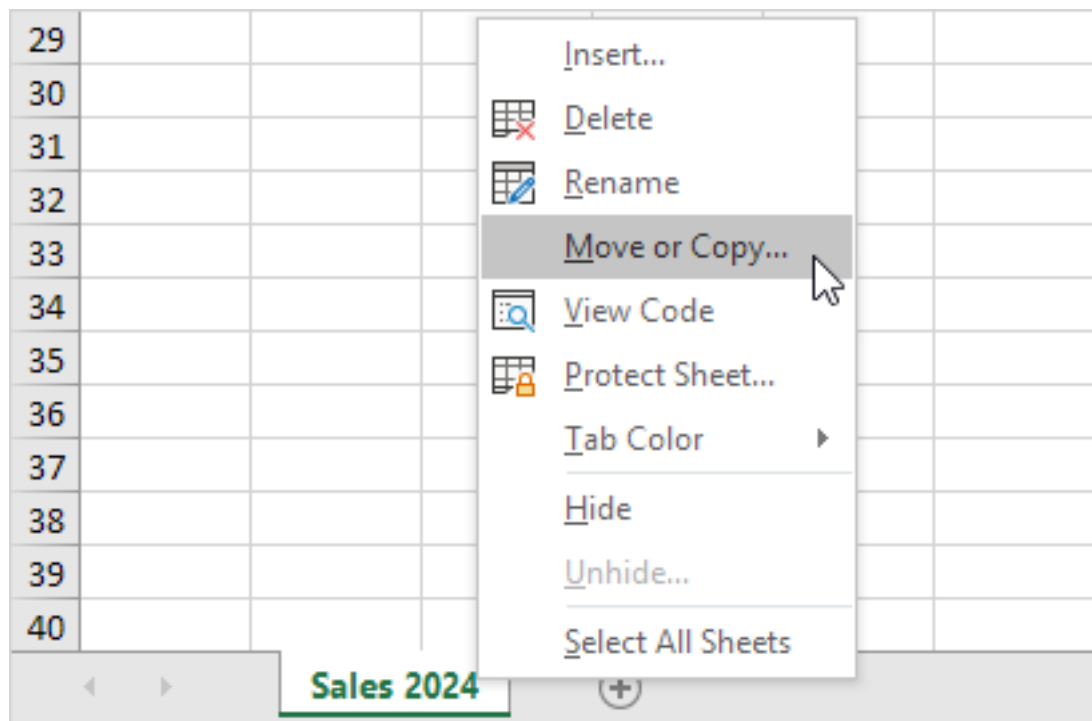
Result:



Copy a Worksheet

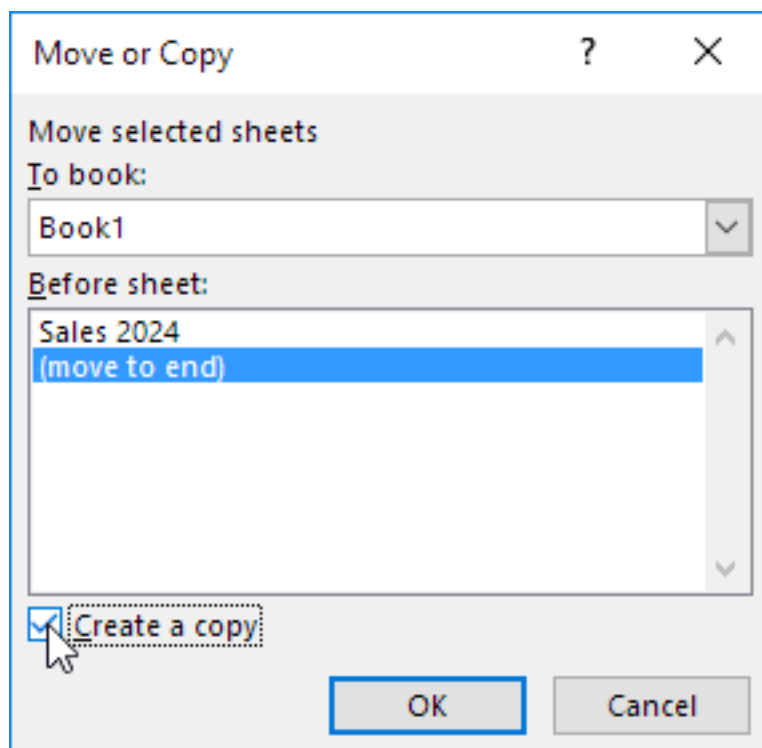
Imagine, you have the sales for 2024 ready and want to create the exact same sheet for 2025, but with different data. You can recreate the worksheet, but this is time-consuming. It's a lot easier to copy the entire worksheet and only change the numbers.

1. Right click on the sheet tab of Sales 2024.
2. Choose Move or Copy.



The 'Move or Copy' dialog box appears.

3. Select (move to end) and check Create a copy.



4. Click OK.

Result:

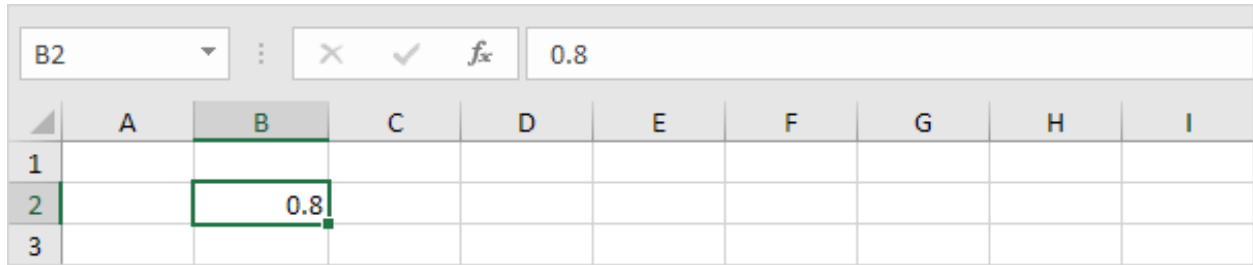
38						
39						
40						
◀ ▶ Sales 2024 Sales 2024 (2) +						

Note: you can even copy a worksheet to another Excel workbook by selecting the specific workbook from the drop-down list (see the dialog box shown earlier).

6- Format Cells in Excel

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).

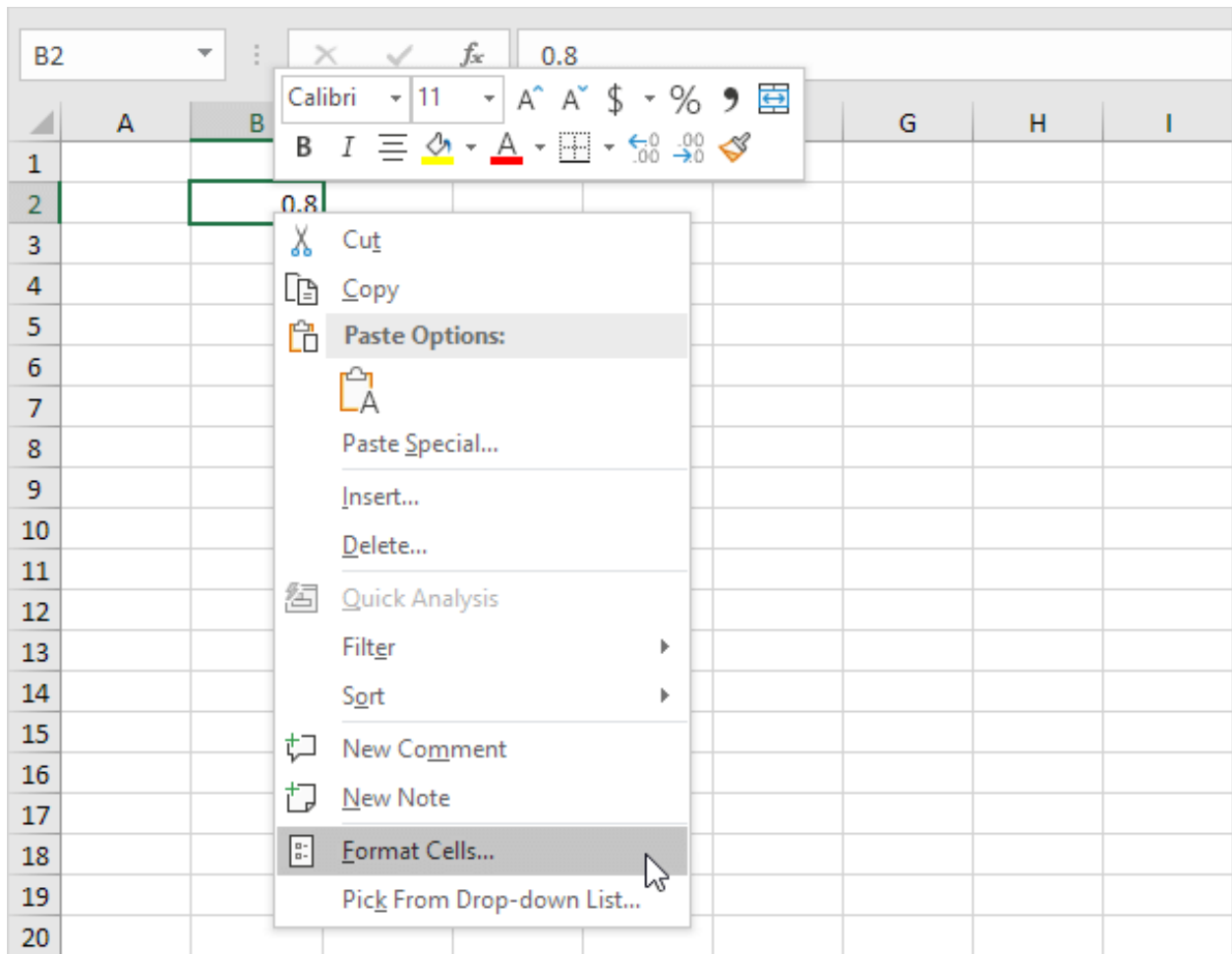
1. Enter the value 0.8 into cell B2.



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

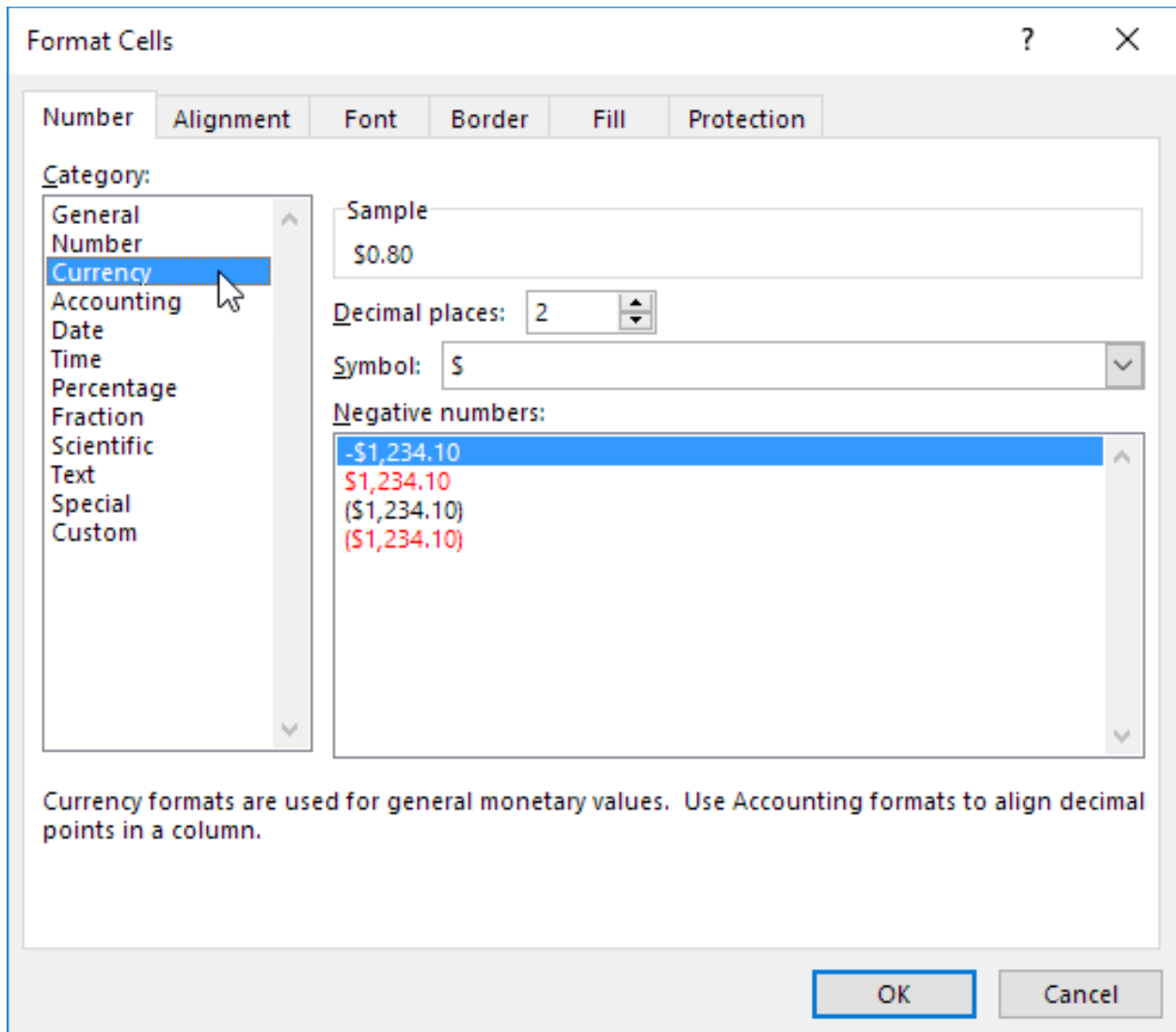
2. Select cell B2.

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



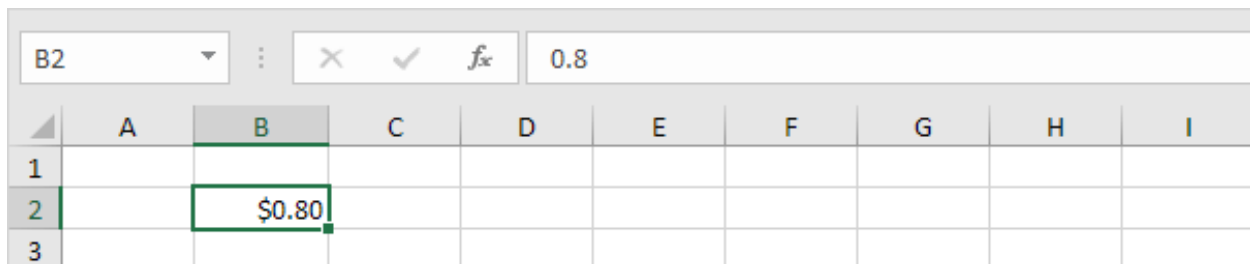
The 'Format Cells' dialog box appears.

4. For example, select Currency.



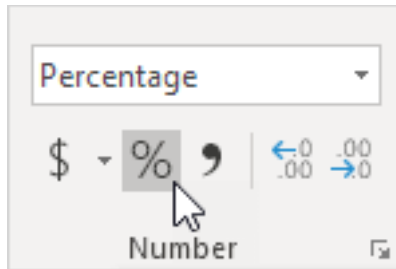
Note: Excel gives you a live preview of how the number will be formatted (under Sample).

5. Click OK.

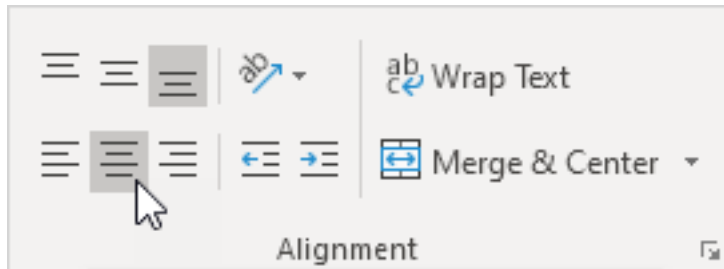


Cell B2 still contains the number 0.8. We only changed the appearance of this number. The most frequently used formatting commands are available on the Home tab.

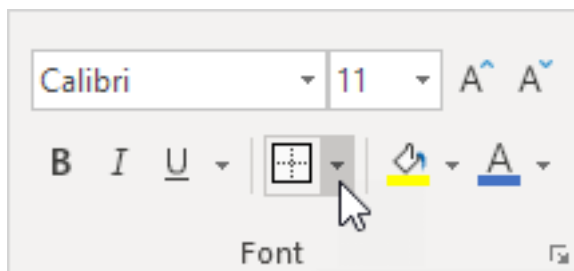
6. On the Home tab, click the percentage symbol to apply a Percentage format.



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



8. On the Home tab, in the Font group, add outside borders and change the font color to blue.



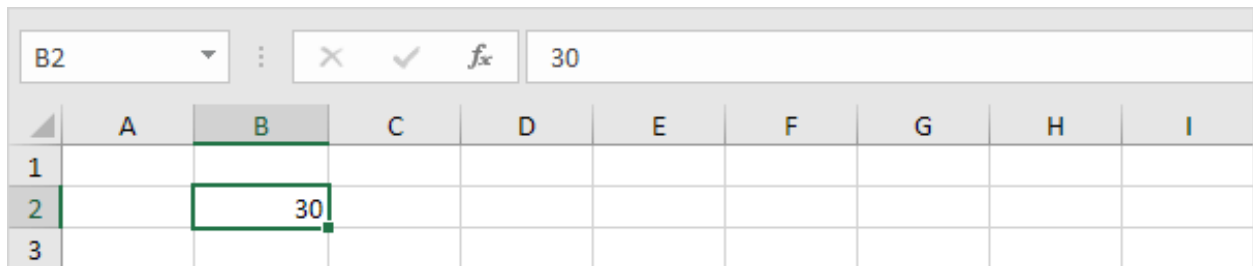
Result:

	A	B	C	D	E	F	G	H	I
1									
2		80%							
3									

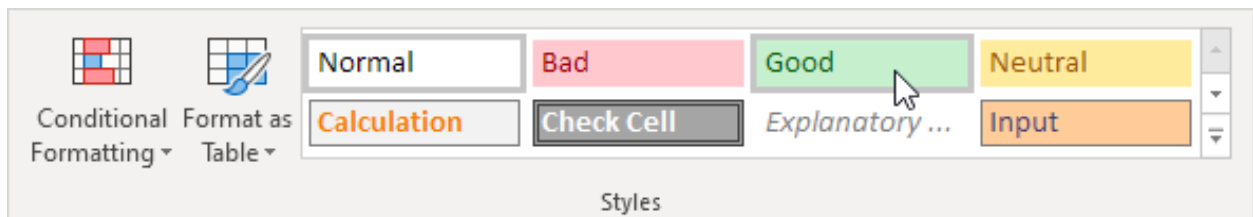
7- Cell Styles in Excel

Quickly format a cell by choosing a cell style. You can also create your own cell style in Excel.

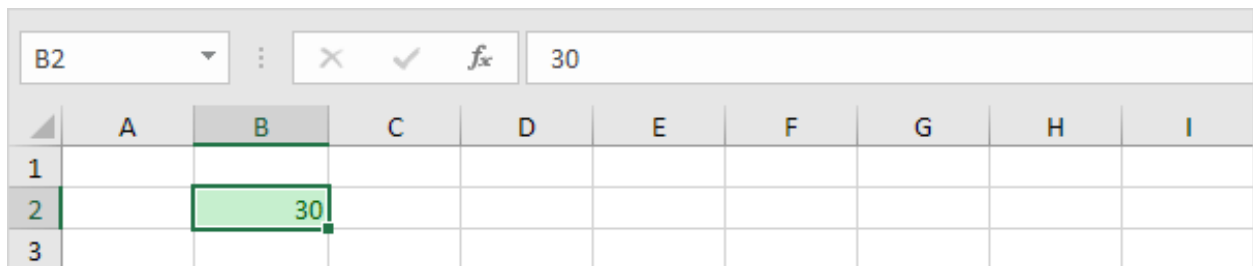
1. For example, select cell B2 below.



2. On the Home tab, in the Styles group, choose a cell style.

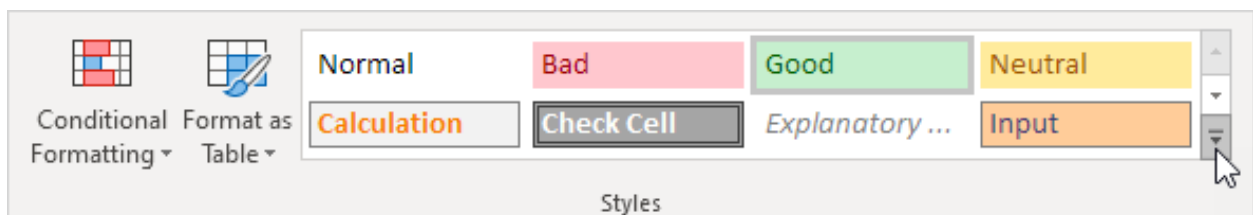


Result:



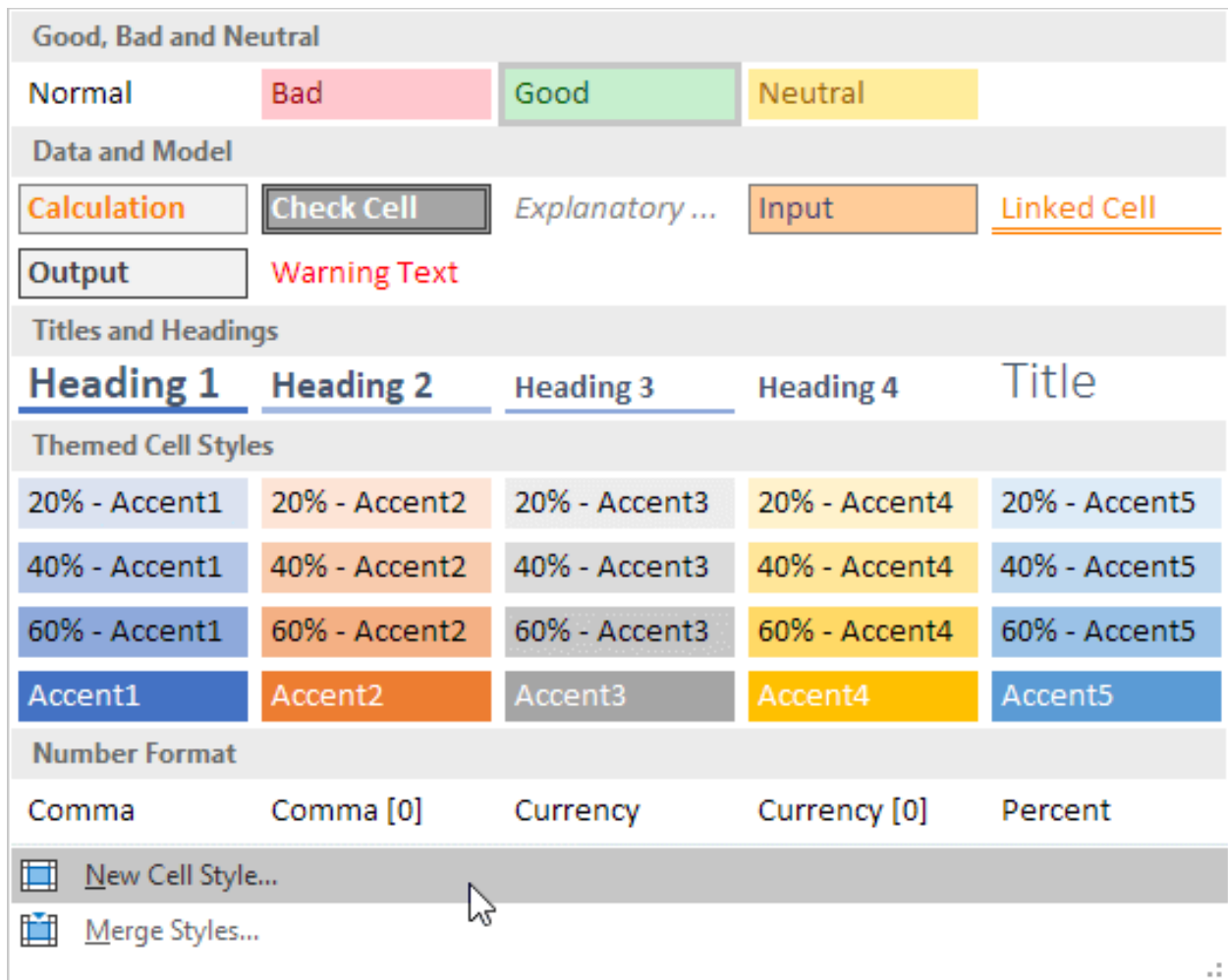
To create your own cell style, execute the following steps.

3. On the Home tab, in the Styles group, click the bottom right down arrow.



Here you can find many more cell styles.

4. Click New Cell Style.



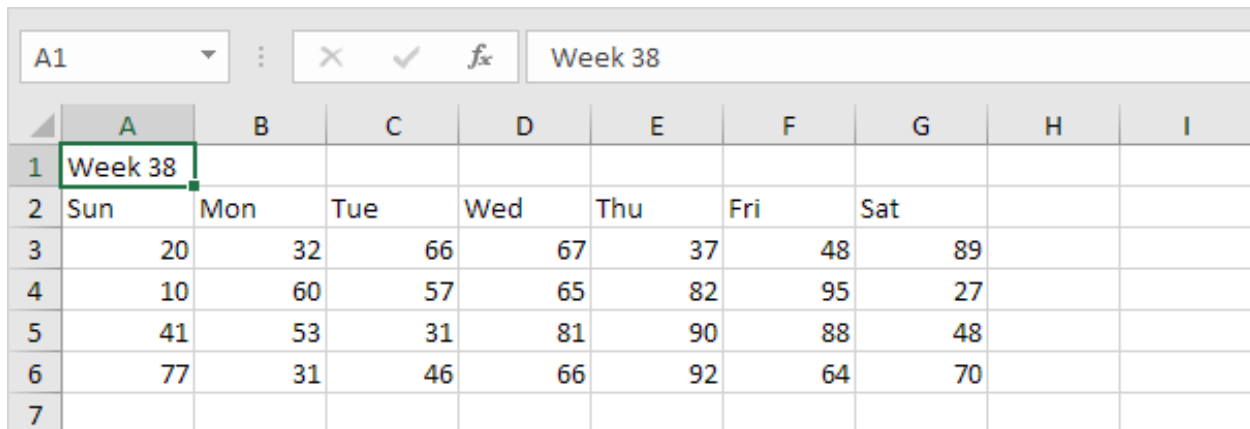
5. Enter a name and click the Format button to define the Number Format, Alignment, Font, Border, Fill and Protection of your cell style. Simply uncheck a check box if you don't want to control this type of formatting.

6. Click OK.

8- Merge Cells in Excel

Merge cells into one large cell to make clear that a label in Excel applies to multiple columns. Use CONCATENATE, TEXTJOIN or Flash Fill to merge cells without losing data.

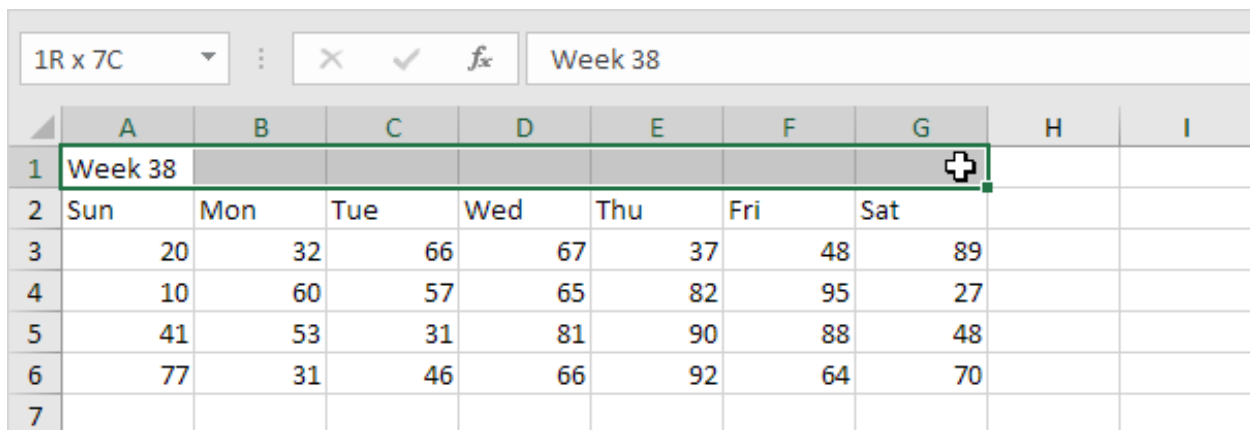
1. We start simple. Enter a label in cell A1.



The screenshot shows an Excel spreadsheet with the formula bar displaying 'Week 38'. The spreadsheet has columns A through I and rows 1 through 7. Cell A1 contains the text 'Week 38'. The rest of the spreadsheet is empty.

	A	B	C	D	E	F	G	H	I
1	Week 38								
2	Sun	Mon	Tue	Wed	Thu	Fri	Sat		
3	20	32	66	67	37	48	89		
4	10	60	57	65	82	95	27		
5	41	53	31	81	90	88	48		
6	77	31	46	66	92	64	70		
7									

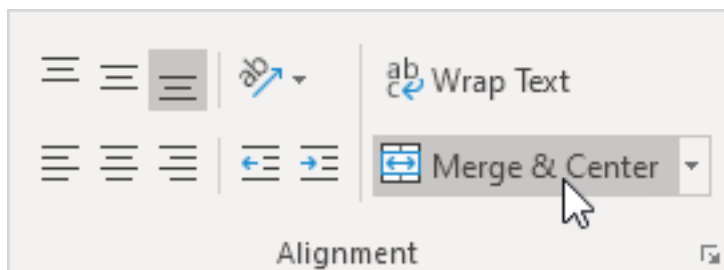
2. Select the range A1:G1.



The screenshot shows the same Excel spreadsheet as before, but now the range A1:G1 is selected, indicated by a green border around the cells. The formula bar still shows 'Week 38'.

	A	B	C	D	E	F	G	H	I
1	Week 38								
2	Sun	Mon	Tue	Wed	Thu	Fri	Sat		
3	20	32	66	67	37	48	89		
4	10	60	57	65	82	95	27		
5	41	53	31	81	90	88	48		
6	77	31	46	66	92	64	70		
7									

3. On the Home tab, in the Alignment group, click Merge & Center.



Result:

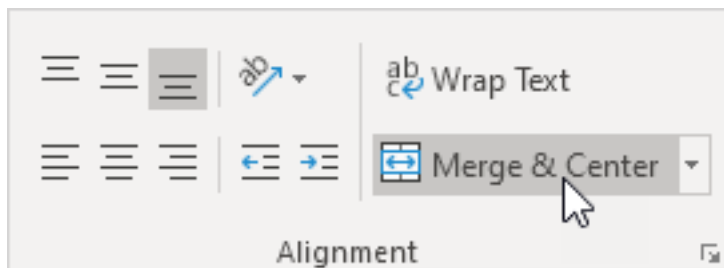
A1									
	A	B	C	D	E	F	G	H	I
1	Week 38								
2	Sun	Mon	Tue	Wed	Thu	Fri	Sat		
3	20	32	66	67	37	48	89		
4	10	60	57	65	82	95	27		
5	41	53	31	81	90	88	48		
6	77	31	46	66	92	64	70		
7									

This feature only keeps the value in the upper-left cell and deletes all other values!

4. For example, enter a label in cell A1, B1 and C1 and select these cells.

1R x 3C									
	A	B	C	D	E	F	G	H	I
1	Week 38	Week 39	Week 40						
2									

5. On the Home tab, in the Alignment group, click Merge & Center.



Result:

A1									
	A	B	C	D	E	F	G	H	I
1	Week 38								
2									

Note: click Merge & Center again to unmerge cells (cell B1 and C1 will be empty). Press Ctrl + z to undo this action.

6. Use the CONCATENATE function in Excel to merge cells without losing data.

C1 ✕ ✓ <i>fx</i> =CONCATENATE(A1," ",B1)								
	A	B	C	D	E	F	G	H
1	Tom	Brady	Tom Brady					
2								

Explanation: this function concatenates (joins) the string in cell A1, a space, and the string in cell B1.

7. If you're using Excel 2016 or later, use TEXTJOIN to merge cells. This function ignores empty cells (if the second argument is set to TRUE).

E2 ✕ ✓ <i>fx</i> =TEXTJOIN(" ",TRUE,A2:D2)								
	A	B	C	D	E	F	G	H
1	Title	First Name	Middle Name	Last Name	Full Name			
2	Dr.	Tom	F.	Brady	Dr. Tom F. Brady			
3		Peyton		Manning	Peyton Manning			
4		Adrian	D.	Peterson	Adrian D. Peterson			
5	Mr.	Ray		Lewis	Mr. Ray Lewis			
6		Ed		Reed	Ed Reed			
7		Troy	E.	Polamalu	Troy E. Polamalu			
8		Andre		Johnson	Andre Johnson			
9		Darrelle		Revis	Darrelle Revis			
10	Dr.	Drew	Q.	Brees	Dr. Drew Q. Brees			
11		Julius		Peppers	Julius Peppers			
12								