

Important uses of Microsoft Excel for students

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Working with Cells and Sheets

Format Cells

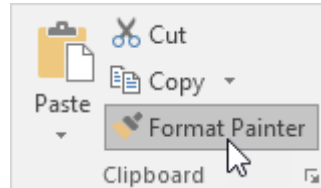
When we format cells in Excel, we change the appearance of a number without changing the number itself. We can apply a number format (0.8, \$0.80, 80%, etc) or other formatting (alignment, font, border, etc).

By default, Excel uses the General format (no specific number format) for numbers. To apply a number format, use the 'Format Cells' dialog box. Select any cell. Right click, and then click Format Cells (or press CTRL + 1).

Format Painter

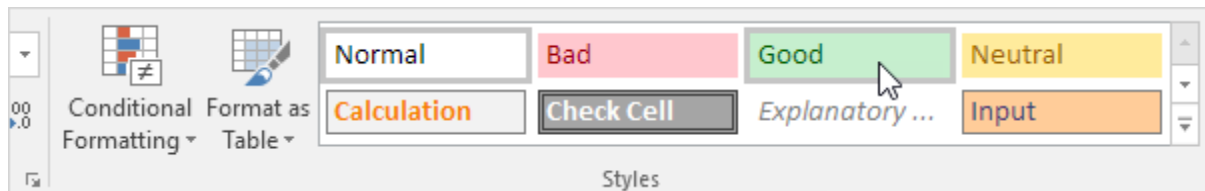
The Format Painter copies formatting from one place and applies it to another. On the Home tab, in the Clipboard group, click Format Painter.

Click Format Painter



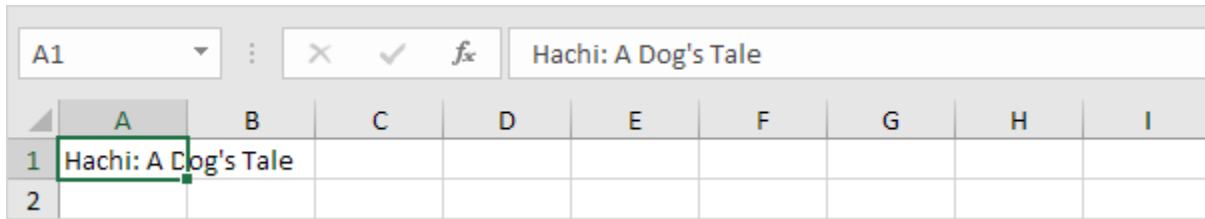
Cell Styles

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

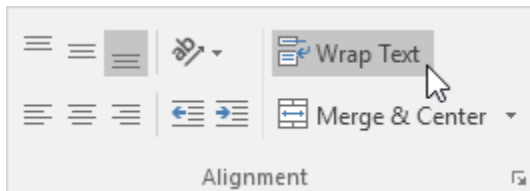


Wrap Text Automatically

1. For example, take a look at the long text string in cell A1 below. Cell B1 is empty.



On the Home tab, in the Alignment group, click Wrap Text.



Result:



Basic Arithmetic Expressions

<https://chandoo.org/wp/top-10-formulas-for-aspiring-analysts/>

Operator	What it does	Example
+ - * /	Basic arithmetic operators. Perform addition, subtraction, multiplication & division	2+3, 7-2, 9*12, 108/3, 2+3*4-2
^	Power of operator. Raises something to the power of other value.	2^3, 9^0.5, PI()^2, EXP(1)^0.5
()	To define precedence in calculations. Anything included in	(2+3)*(4+5) calculates 2+3 first, then 4+5 and multiplies

	parenthesis is calculated first.	both results.
&	To combine 2 text values	"You are " & "awesome" returns "You are awesome"
%	To divide with 100.	2/4% will give 50 as result. Note: (2/4)% will give 0.5% as result.
:	Used to specify ranges	A1:B20 refers to the range from cell A1 to B20
\$	To lock a reference column or row or both	\$A\$1 refers to cell A1 all the time. \$A1 refers to column A, relative row based on where you use it. For more refer to absolute vs. relative references in Excel.
[]	Used to structurally refer to columns in table	ourSales[month] refers to the month column in the ourSales table. Works only in Excel 2007 or above. Know more about Excel Tables.
@	Used to structurally refer to current row values in a table	ourSales[@month] refers to current row's month value in oursales table.
{ }	To specify an inline array of values	{1,2,3,4,5} – refers to a the list of values 1,2,3,4,5
< > <= >=	Comparison operators. Output will always be boolean – ie TRUE or FALSE.	2>3 will be FALSE. 99<101 will be TRUE.
= <>	Equality operators. Check whether 2 values are equal or not equal. Output will TRUE or	2=2, "hello"="hello", 4<>5 will all return TRUE.

FALSE

* ?	Used as wild cards in certain formulas like COUNTIF etc.	COUNTIF(A1:A10, "a*") counts the values in range A1:A10 starting with a. For more on this refer to COUNTIF & SUMIF in Excel
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SPACE Intersection operator. Returns the range at intersection of 2 ranges
A1:C4 B2:D5 refers to the intersection or range A1:C4 and B2:D5 and returns B2:C4. Caution: The output will be an array, so you must use it in another formula which takes arrays, like SUM, COUNT etc.

To select a part of the whole data range

Click on the cell at the top left of the intended range.

Then hold the shift key, now click the right bottom cell of the range.

<https://www.excel-easy.com/basics/keyboard-shortcuts.html>

Keyboard Shortcuts

1. To select the entire range, press CTRL + a (if you press CTRL + a one more time Excel selects the entire sheet).

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707			
3	Production	355081	120655	420045	255503			
4	Logistics	498287	174551	195043	364059			
5								

2. To copy the range, press CTRL + c (to cut a range, press CTRL + x).

3. Select cell A6 and press CTRL + v to paste this range.

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707			
3	Production	355081	120655	420045	255503			
4	Logistics	498287	174551	195043	364059			
5								
6		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
7	Sales	178073	227625	267445	357707			
8	Production	355081	120655	420045	255503			
9	Logistics	498287	174551	195043	364059			
10								
11								

4. To undo this operation, press CTRL + z

Moving

Select cell B2.

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707			
3	Production	355081	120655	420045	255503			
4	Logistics	498287	174551	195043	364059			
5								

1. To quickly move to the bottom of the range, hold down CTRL and press



	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707			
3	Production	355081	120655	420045	255503			
4	Logistics	498287	174551	195043	364059			
5								

2. To quickly move to the right of the range, hold down CTRL and press →

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707			
3	Production	355081	120655	420045	255503			
4	Logistics	498287	174551	195043	364059			
5								

Try it yourself. Hold down CTRL and press the arrow keys to move from edge to edge.

Selecting

Select cell A1.

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707			
3	Production	355081	120655	420045	255503			
4	Logistics	498287	174551	195043	364059			
5								

1. To select cells while moving down, hold down SHIFT and press ↓ a few times.

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707			
3	Production	355081	120655	420045	255503			
4	Logistics	498287	174551	195043	364059			
5								

2. To select cells while moving to the right, hold down SHIFT and press → a few times.

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707			
3	Production	355081	120655	420045	255503			
4	Logistics	498287	174551	195043	364059			
5								

Formulas

Select cell F2.

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707			
3	Production	355081	120655	420045	255503			
4	Logistics	498287	174551	195043	364059			
5								

1. To quickly insert the SUM function, press ATL + =, and press Enter.

3. To fill a formula down, press CTRL + d (down).

F2		=SUM(B2:E2)						
	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707	1030850		
3	Production	355081	120655	420045	255503	1151284		
4	Logistics	498287	174551	195043	364059	1231940		
5								

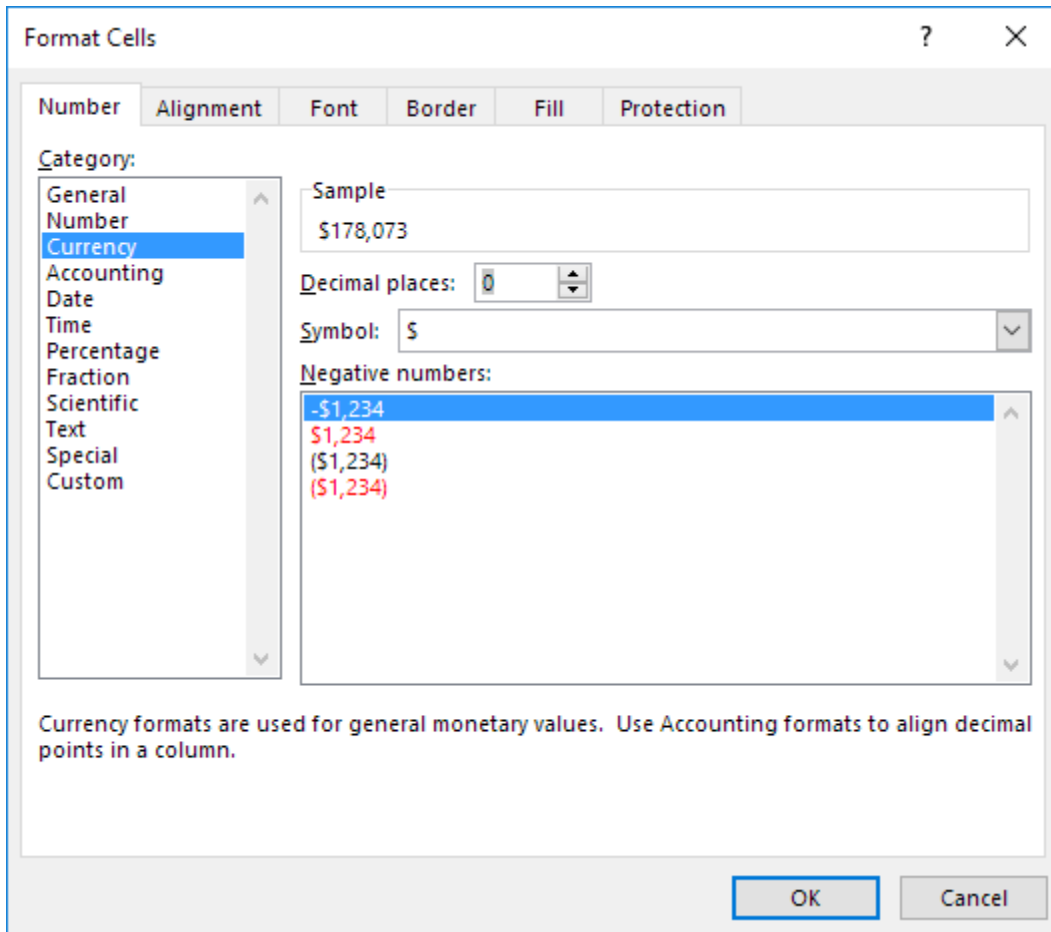
Note: in a similar way, you can fill a formula right by pressing CTRL + r (right).

Formatting

Select the range B2:F4.

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	178073	227625	267445	357707	1030850		
3	Production	355081	120655	420045	255503	1151284		
4	Logistics	498287	174551	195043	364059	1231940		
5								

1. To launch the 'Format cells' dialog box, press CTRL + 1
2. Press TAB and press ↓ two times to select the Currency format.
3. Press TAB and press ↓ two times to set the number of decimal places to 0.



4. Press Enter.

Result:

	A	B	C	D	E	F	G	H
1		Quarter 1	Quarter 2	Quarter 3	Quarter 4			
2	Sales	\$178,073	\$227,625	\$267,445	\$357,707	\$1,030,850		
3	Production	\$355,081	\$120,655	\$420,045	\$255,503	\$1,151,284		
4	Logistics	\$498,287	\$174,551	\$195,043	\$364,059	\$1,231,940		
5								

5. To quickly bold a range, select the range and press CTRL + b

Very Useful Keyboard Shortcuts

<https://chandoo.org/wp/100-excel-tips-resources-to-celebrate-2000-rss-subscribers/>

1. **To format any selected object**, press ctrl+1
2. **To insert current date**, press ctrl+;
3. **To insert current time**, press ctrl+shift+;
4. **To repeat last action**, press F4
5. **To edit a cell comment**, press shift + F2
6. **To autosum selected cells**, press alt + =
7. **To see the suggest drop-down in a cell**, press alt + down arrow
8. **To enter multiple lines in a cell**, press alt+enter
9. **To insert a new sheet**, press shift + F11
10. **To edit active cell**, press F2 (places cursor in the end)
11. **To hide current row**, press ctrl+9
12. **To hide current column**, press ctrl+0
13. **To unhide rows in selected range**, press ctrl+shift+9
14. **To unhide columns in selected range**, press ctrl+shift+0
15. **To recalculate formulas**, press F9
16. **To select data in current region**, press ctrl+shift+8
17. **To see formulas in the worksheet**, press ctrl+`
18. **While editing formulas to change the reference type from absolute to relative vice versa**, press F4
19. **To format a number as currency**, press ctrl+shift+4 (ctrl+\$)

Worksheets

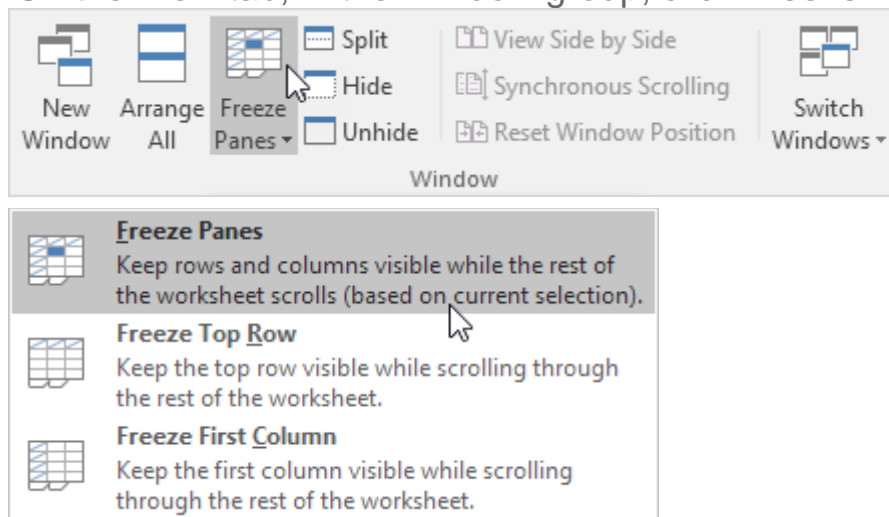
<https://www.excel-easy.com/>

Freeze Panes

If you have a large table of data in Excel, it can be useful to freeze rows or columns. This way you can keep rows or columns visible while scrolling through the rest of the worksheet.

Freeze Top Row, Freeze First Column, Freeze Panes

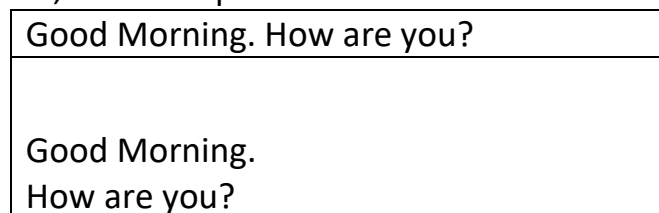
On the View tab, in the Window group, click Freeze Panes.



Line Break (<https://chandoo.org/>)

ALT+Enter to get a line break in a cell

To add space between lines of text in a cell, double-click the cell, click where you want to break the line, and then press ALT+ENTER



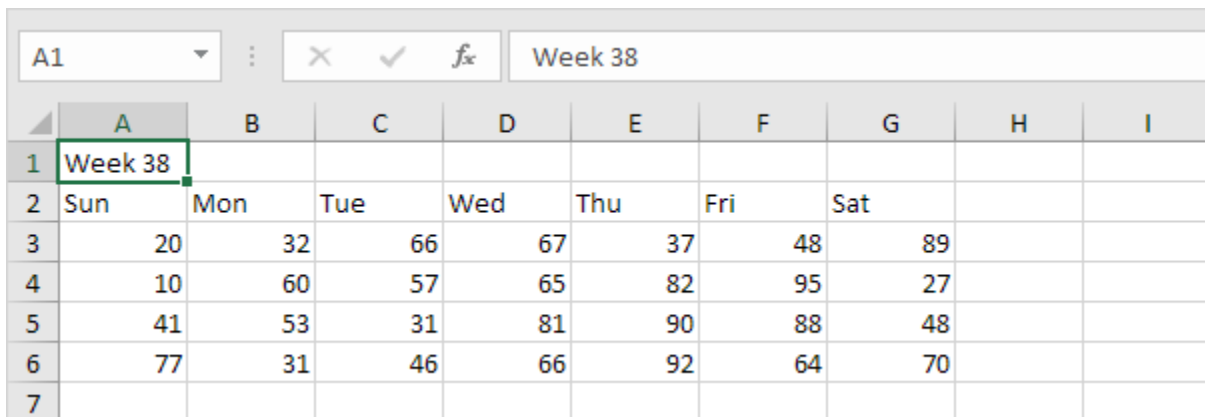
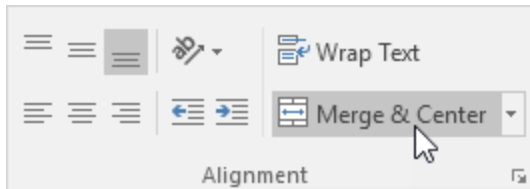
Manual Line Break

To insert a manual line break, execute the following steps.

1. For example, double click cell A1.
2. Place your cursor at the location where you want the line to break.
3. Press Alt + Enter.

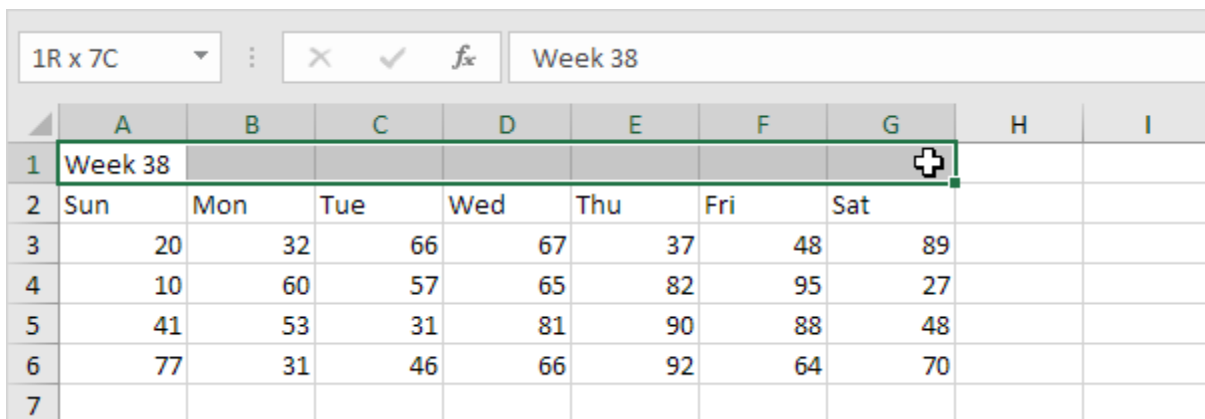
Merge Cells

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



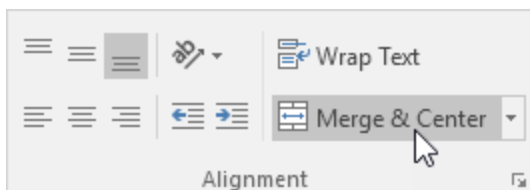
	A	B	C	D	E	F	G	H	I
1	Week 38								
2	Sun	Mon	Tue	Wed	Thu	Fri	Sat		
3	20	32	66	67	37	48	89		
4	10	60	57	65	82	95	27		
5	41	53	31	81	90	88	48		
6	77	31	46	66	92	64	70		
7									

2. Select the range A1:G1.



	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:

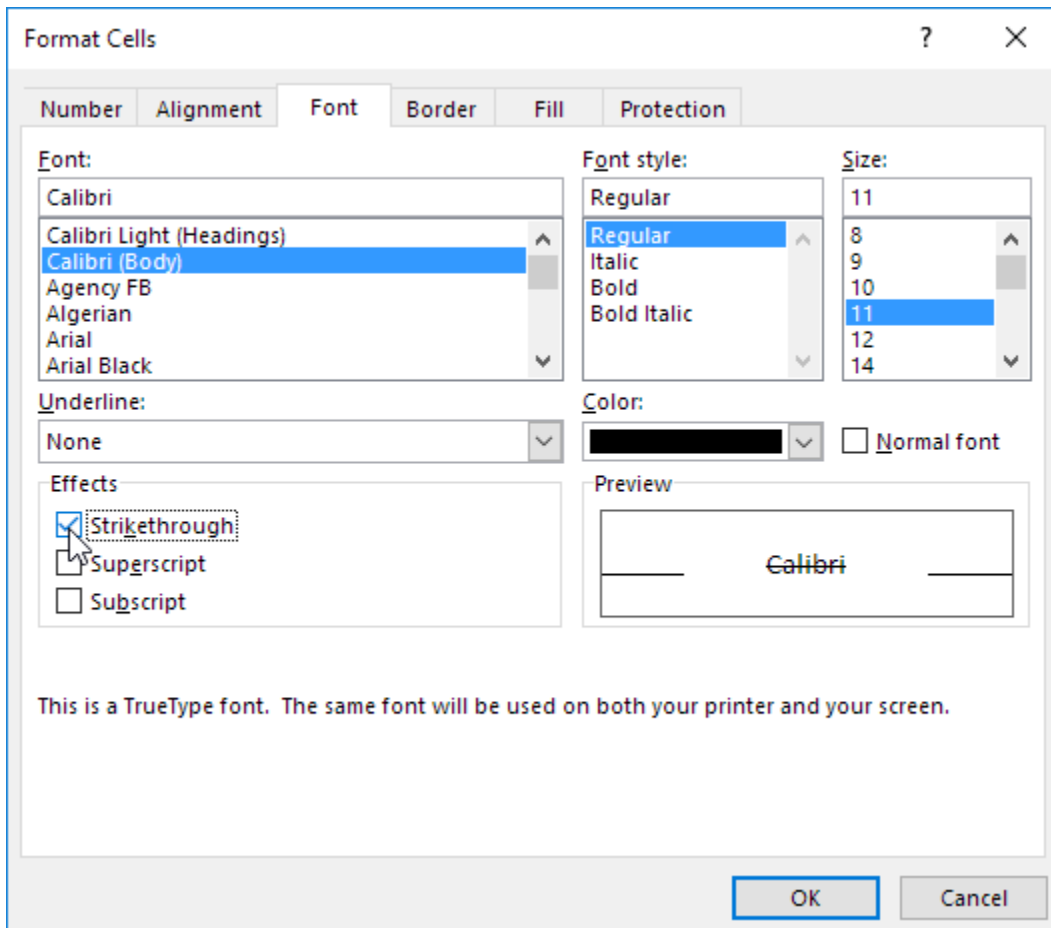
	A	B	C	D	E	F	G	H	I	
1	Week 38									
2	Sun	Mon	Tue	Wed	Thu	Fri	Sat			
3	20	32	66	67	37	48	89			
4	10	60	57	65	82	95	27			
5	41	53	31	81	90	88	48			
6	77	31	46	66	92	64	70			
7										

Note: on the Home tab, in the Alignment group, use the 6 alignment buttons to change the alignment of text in a cell.

Remember, Excel only keeps the value in the upper-left cell and deletes all other values.

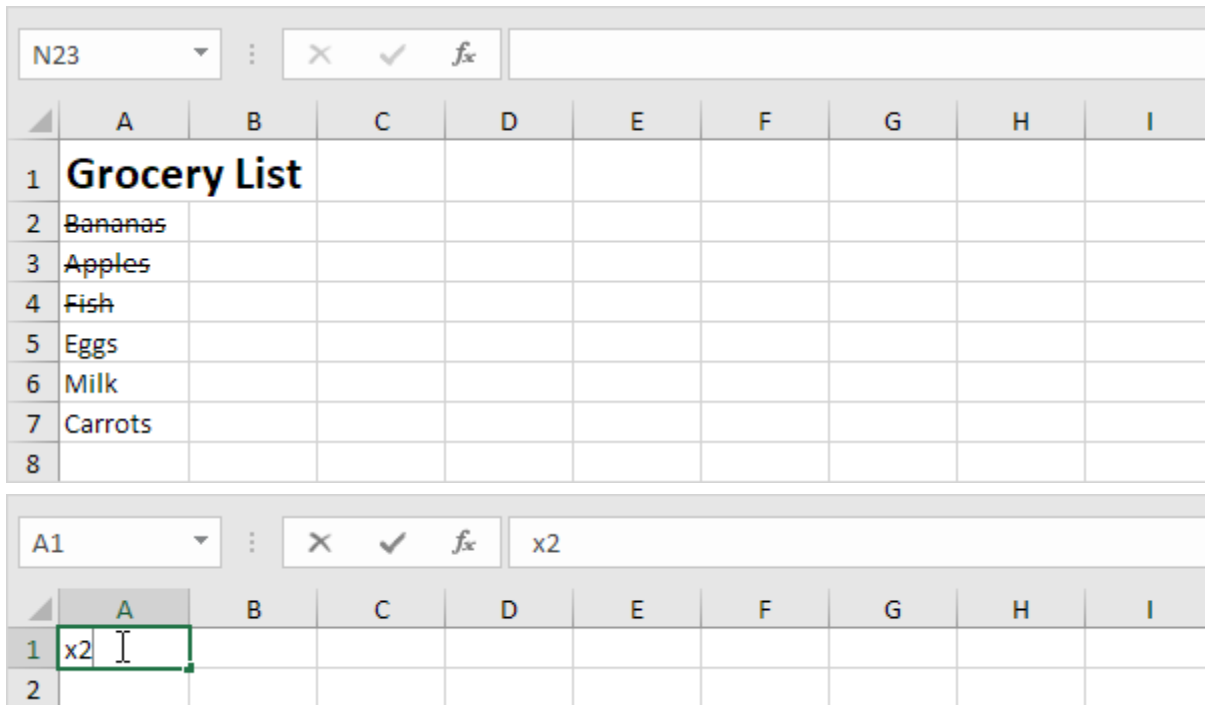
Strikethrough

On the Font tab, under Effects, click Strikethrough.



4. Click OK.

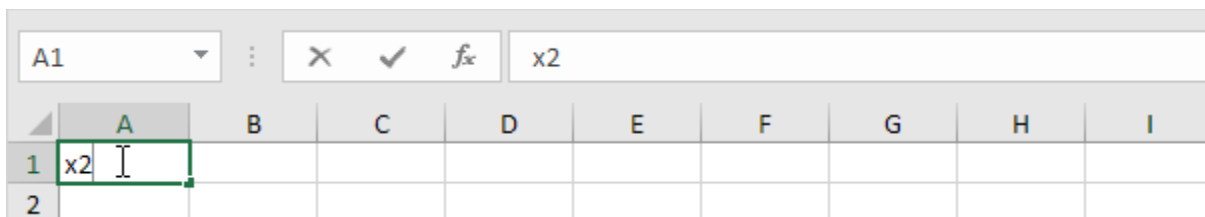
Result:

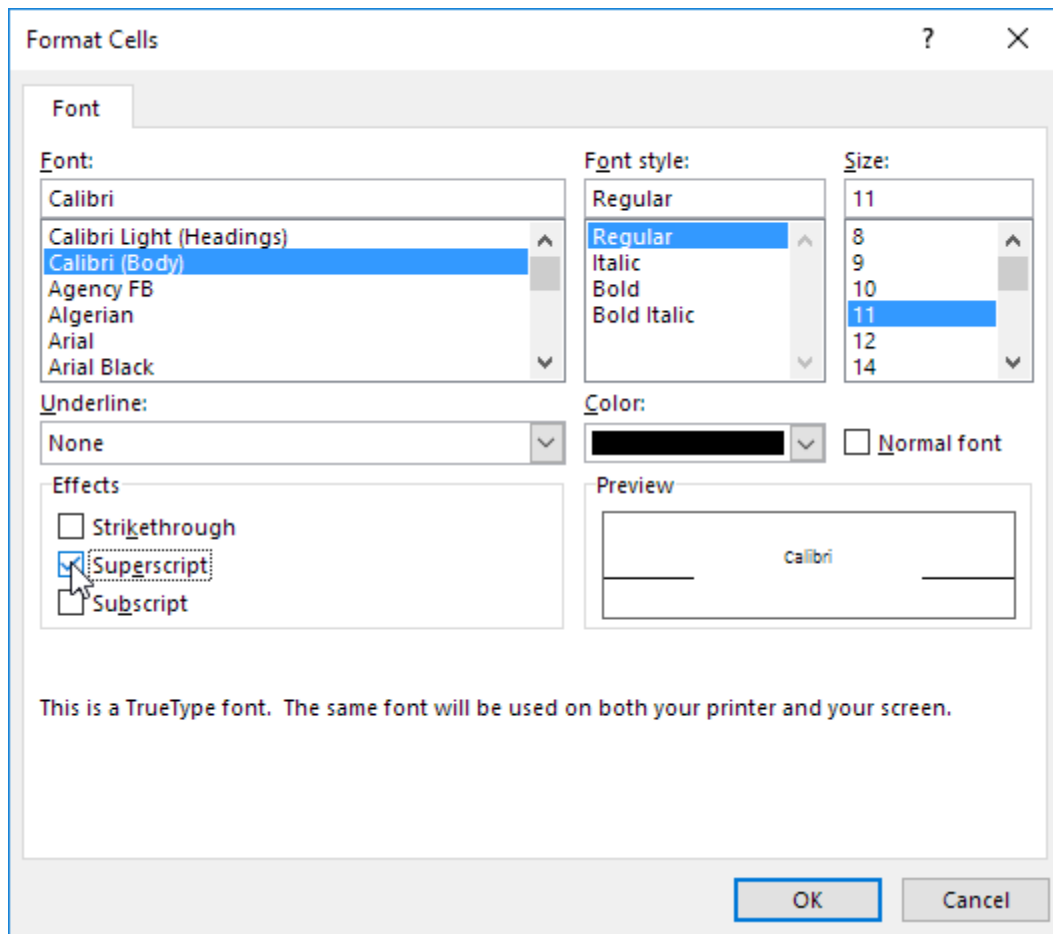


Superscript and Subscript

It's easy to format a character as superscript (slightly above the baseline) or subscript (slightly below the baseline) in Excel.

For example, double click cell A1.





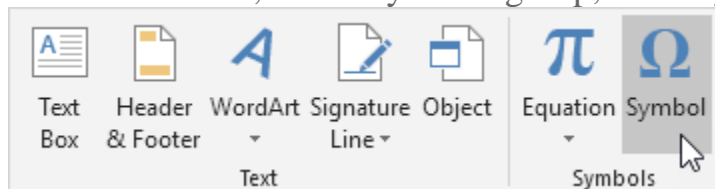
Click OK.

Result:

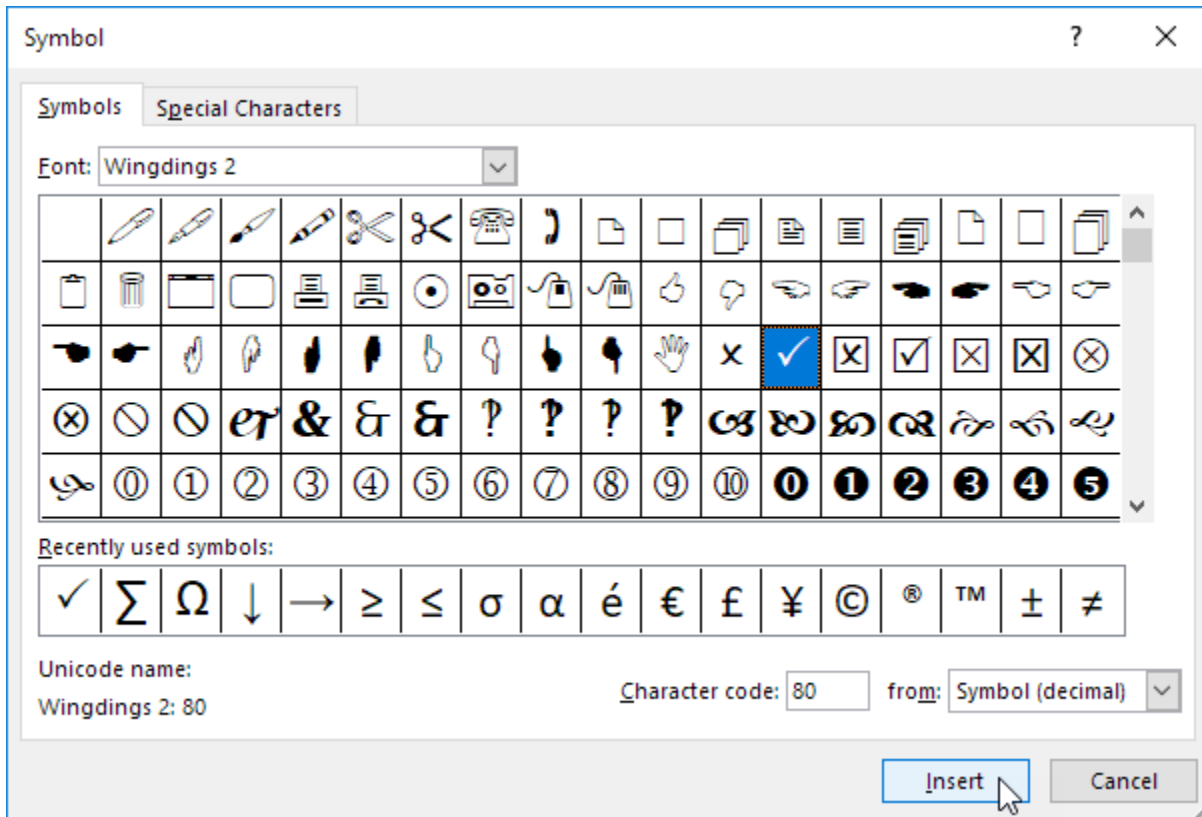
	A	B	C	D	E	F	G	H	I
1	x ²								
2									

Check Mark

On the Insert tab, in the Symbols group, click Symbol.



7. Select Wingdings 2 from the drop-down list, select a check mark and click Insert.



Note: you can also insert a check mark symbol with a box around it (see picture above). After inserting one check mark, you can use the Recently used symbols to quickly insert another check mark.

Now you can create a nice to-do list that uses check marks. Use CTRL + c and CTRL + v to copy/paste a check mark or red X.

	A	B	C	D	E	F	G	H
1	Task	Status						
2	Pay Bills	✓						
3	Finish Assignment	✓						
4	Wash Car	✓						
5	Book Conference Room	✗						
6	Call Mom	✗						
7	Buy Groceries	✓						
8	Bake Cake	✗						
9								

Auto Fitting rows and columns

Resizing rows and columns is easy. But AutoFitting them is even easier.

AutoFit adjusts row height and column width so every value in the row or columns fits perfectly.

This is great if you don't know how long every value is, and you don't want to scroll through all of them.

The best part is how simple it is. **All you have to do is double-click on the boundary of the row or column you want to AutoFit.**

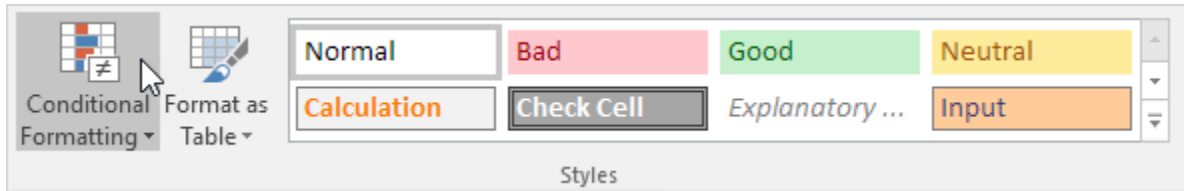
Resizing multiple rows or columns

First, select all columns by clicking. Now, click and drag either column boundary to resize it.

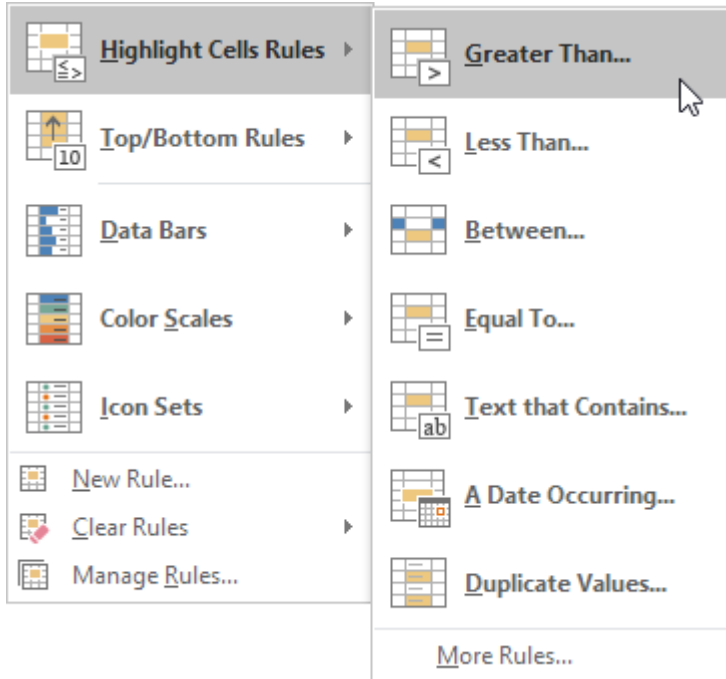
Conditional Formatting

	A	B
1	14	
2	6	
3	39	
4	43	
5	2	
6	95	
7	5	
8	11	
9	86	
10	57	
11		

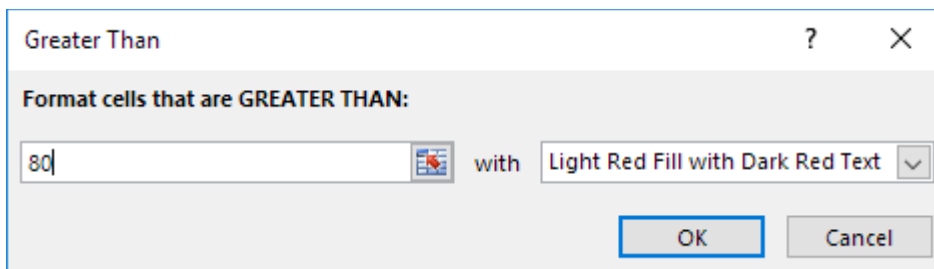
On the Home tab, in the Styles group, click Conditional Formatting.



3. Click Highlight Cells Rules, Greater Than.



4. Enter the value 80 and select a formatting style.



5. Click OK.

Result. Excel highlights the cells that are greater than 80.

	A	B
1	14	
2	6	
3	39	
4	43	
5	2	
6	95	
7	5	
8	11	
9	86	
10	57	
11		

Data Validation

Use data validation in Excel to make sure that users enter certain values into a cell.

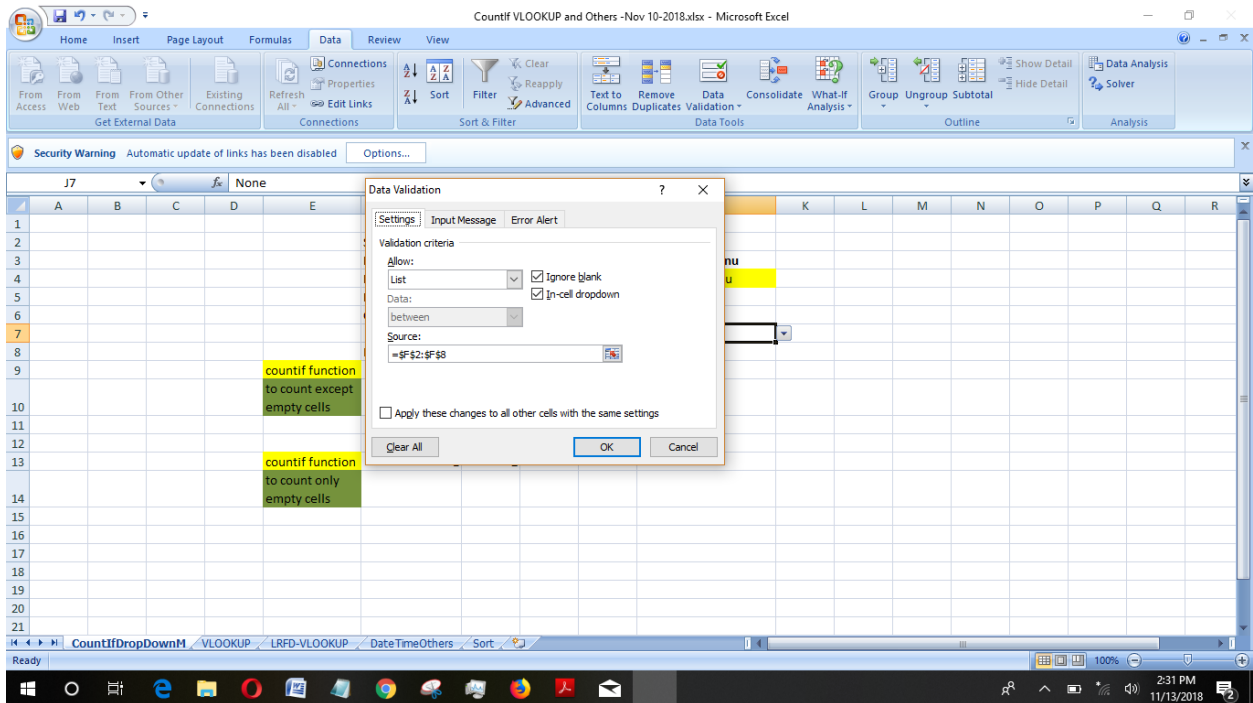
<https://www.howtoexcel.org/tips-and-tricks/11-awesome-examples-of-data-validation/>

Creating Dropdown Lists (DROPDOWN MENU)

Creating drop down lists is the reason most people become familiar with the Data Validation feature. Creating lists is a simple and effective way of controlling data entry.

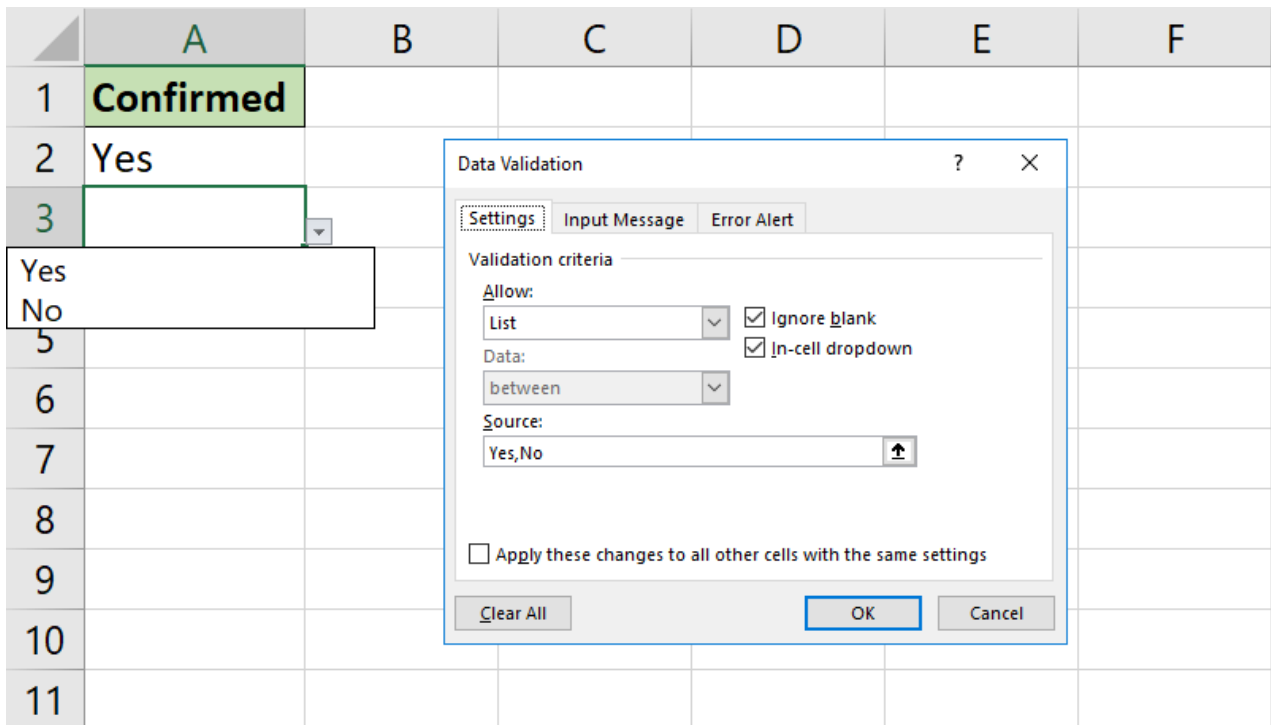
1. To create the list in cells A1:A4...
2. Select cell e.g., E3..
3. Choose **Validation** from **Data Menu**
4. Choose or Select **List** from the **Allow option's** drop down list
5. Click the **Source Control** and drag to highlight the cells A1:A4...
6. Make sure the **In-Cell Dropdown** option is checked.

(courtesy: www.Techrepublic.com/)

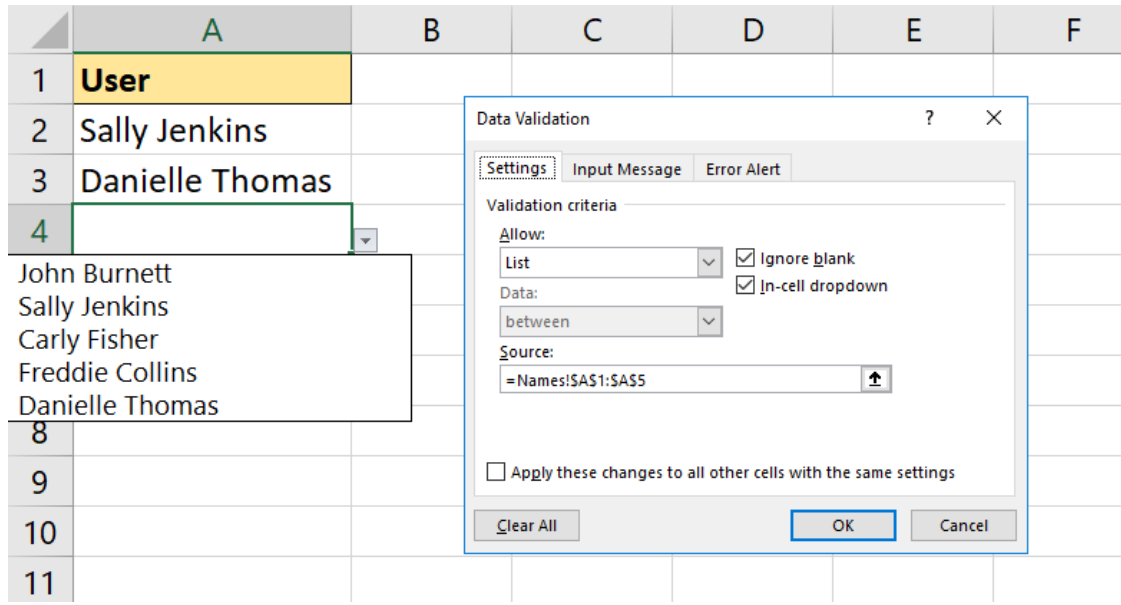


You can then either type the list items directly into the Source box separated by a comma, or refer to a range of cells that contain the list items.

When you need a simple list such as Open and Closed, or Yes and No, then typing the entries in makes sense.



When you need a more dynamic list for items that change over time such as lists of products, places and people, then referring to a range makes sense.



For this list, click in the Source box and then go and select the cells that contain the items.

In this example, the items were in range A1:A5 of a sheet called Names.

<https://www.guru99.com/excel-validation-filters-grouping.html>

Let's assume you are recording student exam marks and you know the minimum is 0 and the maximum is 100. You can take advantage of validation features to ensure that only values between 0 and 100 are entered.

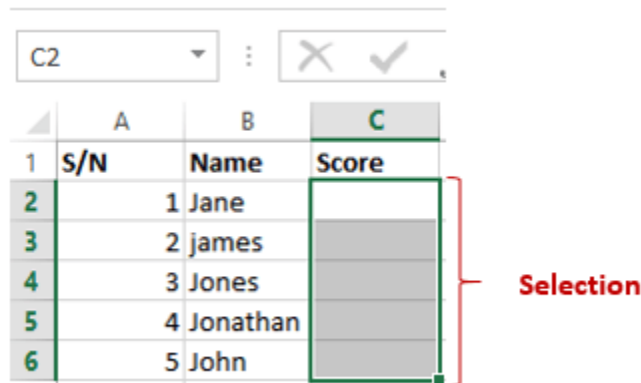
Add a new sheet in your workbook by clicking on the plus button at the bottom of the worksheet.

Add a column for S/N, Name and Score. Your sheet should look as follows

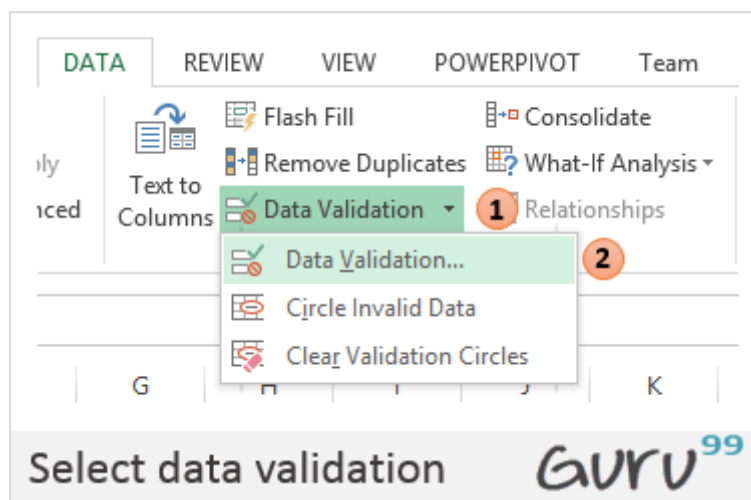
S/N	Name	Score
1	Jane	
2	James	

3	Jones
4	Jonathan
5	John

- Click on the DATA tab
- Select the cells C2 to C6 (The cells that will be used to record the scores)



- Click on Data validation drop down list.
- Click on Data validation.



- You will get the following dialogue window

Data Validation

Settings | Input Message | Error Alert

Validation criteria

Allow: Whole number Ignore blank

Data: between

Minimum: 0

Maximum: 100

Apply these changes to all other cells with the same settings

Clear All OK Cancel

1. Select whole number

2. Select between

3. Set 0 as Minimum & 100 Maximum

4. Click here when done

Set data validation rules **GURU⁹⁹**

- Click on Error Alert tab
- Enter the alert title and message as shown in the diagram below.

Data Validation

Settings | Input Message | Error Alert

Show error alert after invalid data is entered

When user enters invalid data, show this error alert:

Style: Stop

Title: Outside range error

Error message: Please enter a value between 0 and 100.

Alert box title

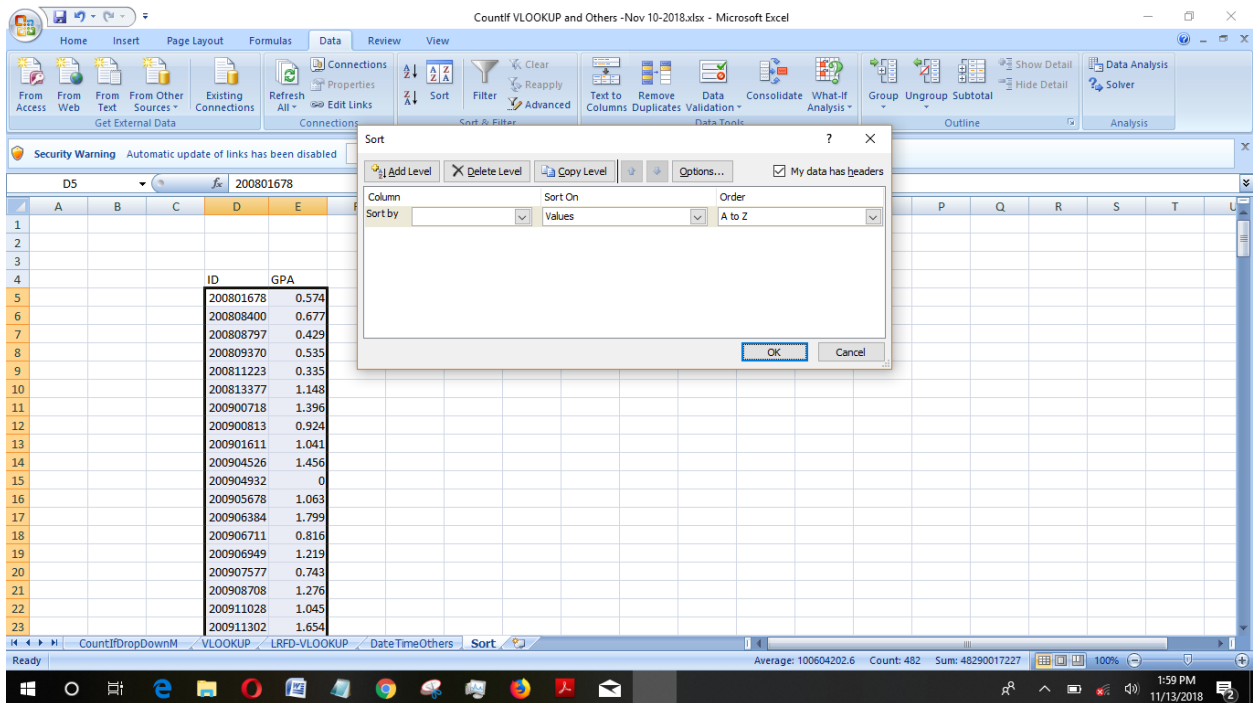
Alert message

Clear All OK Cancel

Set data validation rules **GURU⁹⁹**

SORT

1. Select the range
2. Select **Data** tab on the Ribbon, then click **Sort** command
3. The sorting dialogue box will appear
4. Decide sorting order, then click OK

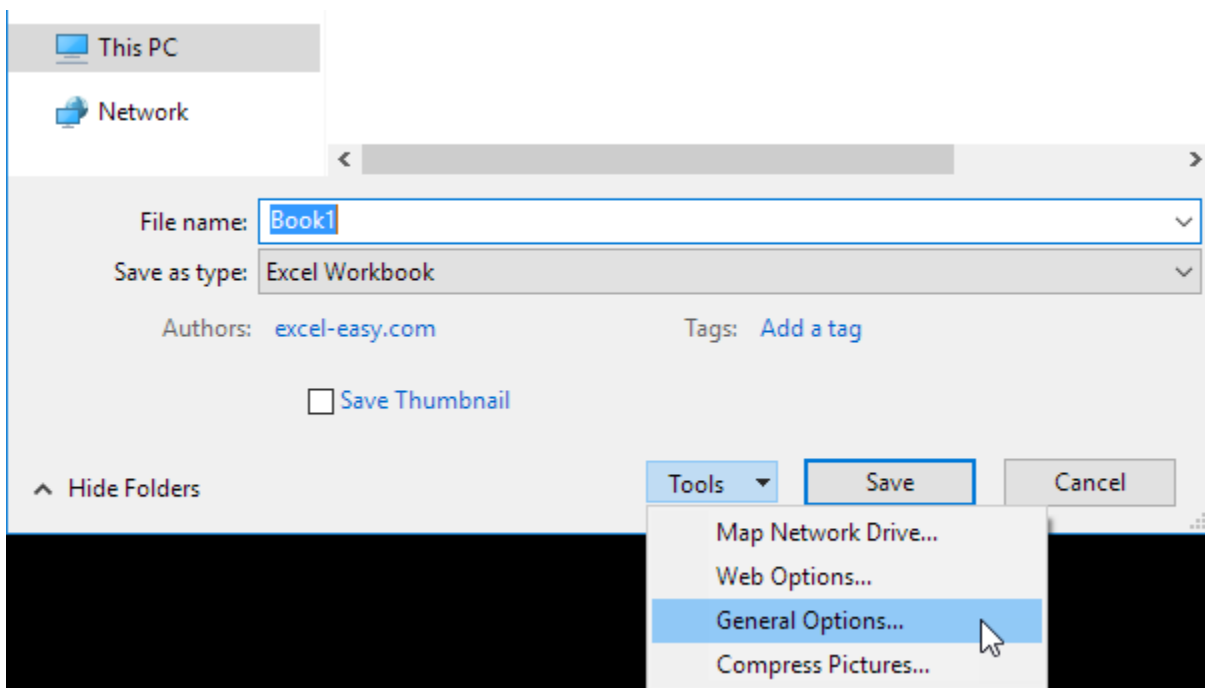
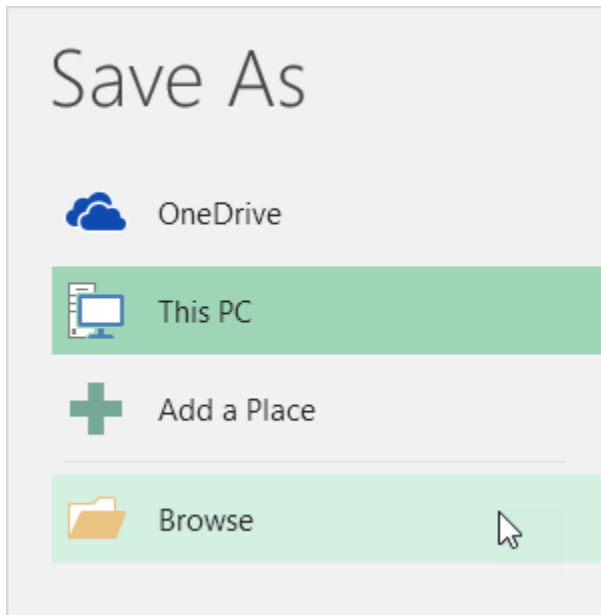


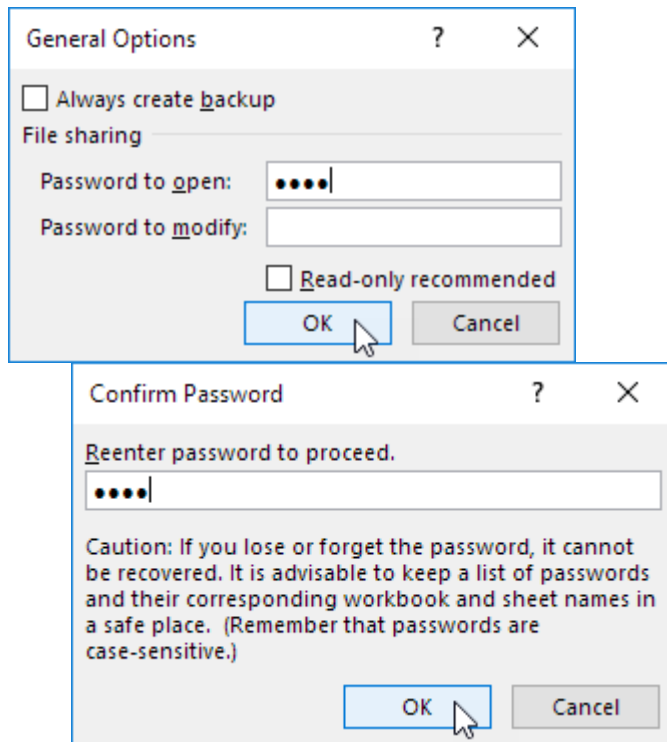
<https://www.excel-easy.com/basics/protect.html>

Protect the Excel File with Password

Encrypt an Excel file with a password so that it requires a password to open it.

1. Open a workbook.
2. On the File tab, click Save As.
3. Click Browse.



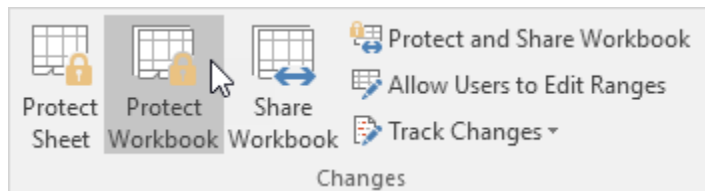


<https://www.excel-easy.com/examples/protect-workbook.html>

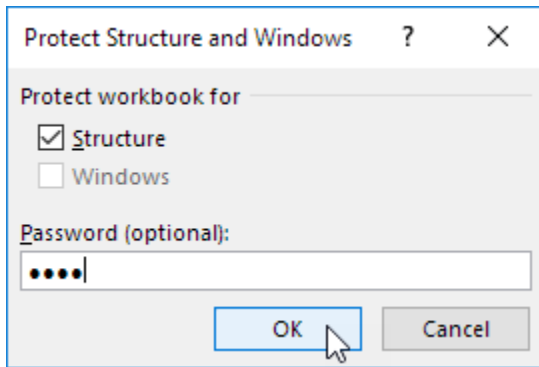
Protect Workbook

This example teaches you how to protect the workbook structure in Excel. If you protect the workbook structure, users cannot insert, delete, rename, move, copy, hide or unhide worksheets anymore.

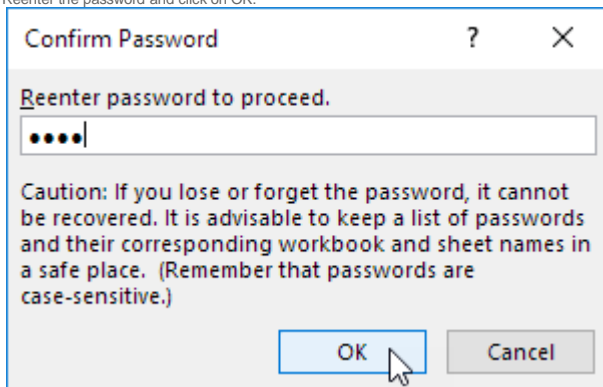
1. Open a workbook.
2. On the Review tab, in the Changes group, click Protect Workbook.



3. Check Structure, enter a password and click OK.



Reenter the password and click on OK.

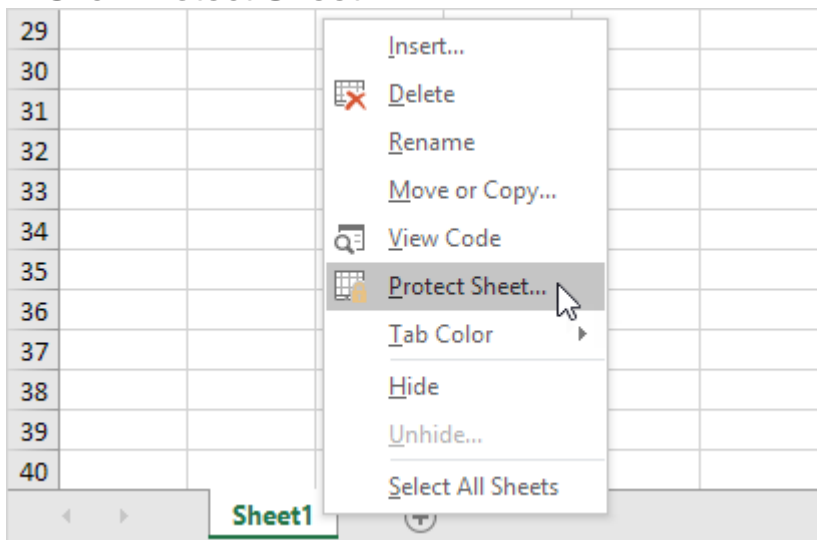


Users cannot insert, delete, rename, move, copy, hide or unhide worksheets anymore

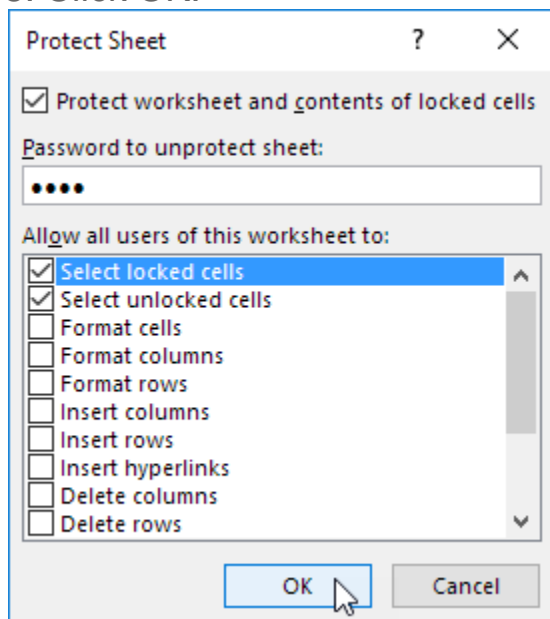
Protect Sheet

When you share an Excel file with other users, you may want to protect a worksheet to help prevent it from being changed.

1. Right click a worksheet tab.
2. Click Protect Sheet.



3. Enter a password.
4. Check the actions you allow the users of your worksheet to perform.
5. Click OK.



Note: if you don't check any action, users can only view the Excel file!

6. Confirm the password and click OK.

Count

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

	A	B	C	D	E	F	G	H	I
1	10								
2	1								
3	7								
4	20								
5	3								
6									
7	5								
8									

Countif

To count cells based on one criteria (for example, greater than 9), use the following COUNTIF function.

	A	B	C	D	E	F	G	H	I
1	10								
2	1								
3	7								
4	20								
5	3								
6									
7	2								
8									

Countifs

To count cells based on multiple criteria (for example, green and greater than 9), use the following COUNTIFS function.

	A	B	C	D	E	F	G	H	I
1	red	10							
2	green	1							
3	red	7							
4	green	20							
5	red	3							
6									
7		1							
8									

Sum

To sum a range of cells, use the SUM function.

	A	B	C	D	E	F	G	H	I
1	10								
2	1								
3	7								
4	20								
5	3								
6									
7	41								
8									

Sumif

To sum cells based on one criteria (for example, greater than 9), use the following SUMIF function (two arguments).

	A	B	C	D	E	F	G	H	I
1		10							
2		1							
3		7							
4		20							
5		3							
6									
7		30							
8									

General note: in a similar way, you can use the AVERAGEIF and AVERAGEIFS function to average cells based on one or multiple criteria.

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. A question mark (?) matches exactly one character.

	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									

Sumproduct

Basic Use

1. For example, the SUMPRODUCT function below calculates the total amount spent.

	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									

Countif

Numbers

1. The COUNTIF function below counts the number of cells that contain the value 20.

	A	B	C	D	E	F	G	H	I
1	10								
2	1								
3	7								
4	20								
5	3								
6									
7	1								
8									

Count Blank/Nonblank Cells

This example shows you how to count the number of blank and nonblank cells in Excel.

1. The COUNTBLANK function counts the number of blank cells.

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

2. The COUNTA function counts the number of nonblank cells. COUNTA stands for count all.

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

Count Cells with Text

This page illustrates multiple ways to count cells with text in Excel. Visit our page about the COUNTIF function to count cells that contain specific text.

1. Use the COUNTIF function and the asterisk symbol (*) to count cells with text.

	A	B	C	D	E	F	G	H	I
1	100								
2	golf								
3	baseball								
4									
5	tennis								
6									
7	3								
8									

Cell References

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 (\$H\$3) 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									

	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									

Vlookup

What is VLOOKUP?

Vlookup (V stands for 'Vertical') is an in-built function in excel which allows establishing a relationship between different columns of excel. In other words, it allows you to find (look up) a value from one column of data and returns it's respective or corresponding value from another column.

The VLOOKUP (Vertical lookup) function looks for a value in the leftmost column of a table, and then returns a value in the same row from another column you specify.

A parameter of FALSE means that VLOOKUP is looking for an EXACT match for the value of say, 10251. A parameter of TRUE means that a "close" match will be returned.

(<https://www.techonthenet.com/excel/formulas/vlookup.php>)

1. Insert the VLOOKUP function shown below.

	A	B	C	D	E	F	G	H	I
1	ID	Product							
2	104	Printer							
3	103				ID	Brand	Product		
4	104				101	Dell	Computer		
5	101				102	Logitech	Keyboard		
6	102				103	Logitech	Mouse		
7	103				104	HP	Printer		
8	101								
9	104								
10	101								
11	102								
12									

Calculate Letter Grade Based On Numeric Score With VLOOKUP Function

<https://www.extendoffice.com/documents/excel/3706-excel-calculate-letter-grade.html>

		=VLOOKUP(B2,\$F\$1:\$G\$10,2,TRUE)					
	A	B	C	D	E	F	G
1	Name	Score	Grade			Score	Grade
2	Kerry	75	C+			0	F
3	Rachel	34	F			60	D
4	David	98	A+			65	D+
5	Tommy	70	C			70	C
6	Nancy	89	B+			75	C+
7	Ruby	100	A+			80	B
8	Jack	54	F			85	B+
9	Rose	60	D			90	A
10	Emily	69	D+			95	A+
11	Thomas	90	A				
12	Kerry	82	B				
13	Wendy	70	C				
14	Engel	51	F				
15	Cloudy	82	B				
16	Susie	55	F				
17	Makrini	43	F				
18	Henrik	70	C				
19	Tedi	79	C+				
20	Sherrill	82	B				
21	Patrick	93	A				
22							

Hlookup

In a similar way, you can use the HLOOKUP (Horizontal lookup) function.

IF Function

Grade Calculation

<https://www.extendoffice.com/documents/excel/3706-excel-calculate-letter-grade.html>

Enter this formula: `=IF(E2>=90,"A",IF(E2>=80,"B",IF(E2>=70,"C",IF(E2>=60,"D","F"))))` into a blank cell next to your score data where you want to locate the letter grade, F2, for instance, and then drag the fill handle down to the cells that you want to contain this formula, and the letter grade has been displayed in each cell as follows:

C	D	E	F	G	H
	Name	Score	Grade		
	Kerry	75	C		
	Rachel	34	F		
	David	98	A		
	Tommy	79	C		
	Nancy	89	B		
	Ruby	100	A		
	Jack	54	F		
	Rose	60	D		
	Emily	69	D		
	Thomas	90	A		
	Kerry	82	B		
	Wendy	70	C		
	Engel	51	F		
	Cloudy	82	B		

Standard Deviation

What is Standard Deviation?

Standard deviation is a number that tells you how far numbers are from their mean.

The numbers below also have a mean (average) of 10.

	A	B	C	D	E	F	G	H	I
1	11								
2	9								
3	10								
4	9								
5	11								
6	1								
7									

Explanation: the numbers are close to the mean. As a result, the numbers have a low standard deviation.

3. The numbers below also have a mean (average) of 10.

	A	B	C	D	E	F	G	H	I
1	0								
2	20								
3	1								
4	27								
5	2								
6	12.58968								
7									

What is the Coefficient of Variation?

<https://www.statisticshowto.datasciencecentral.com/probability-and-statistics/how-to-find-a-coefficient-of-variation/>

The coefficient of variation (CV) is a measure of relative variability. It is the ratio of the standard deviation to the mean (average). For example, the expression “The standard deviation is 15% of the mean” is a CV.

The **formula for the coefficient of variation** is:

Coefficient of Variation = (Standard Deviation / Mean) * 100.

How to find a coefficient of variation in Excel.

You can calculate the coefficient of variation in Excel using the formulas for standard deviation and mean. For a given column of data (i.e. A1:A10), you could enter: “=stdev(A1:A10)/average(A1:A10)) then multiply by 100.

Charts + Graphs

Creating Graphs

<http://bowlesphysics.com/images/EGN1006 - Excel - Graphical Analysis.pdf>

Creating graphs in Excel is a simple process Follow these steps: Select the block of cells containing the data to be plotted. You may include headings!

The “X” axis data column should always be to the left of the “Y” axis. For example, place x-axis data in column A and y-axis data in column B.

X	Y
1	7
2	19
3	27

Click on the INSERT tab

Choose the graph type from the CHARTS area (In engineering and science, SCATTER is most often used.

The data an engineer collects could reveal: Spatial profile Time history Cause and effect relationship System output as a function of input Mathematical expressions are then used to CAPTURE the relationship shown in the data

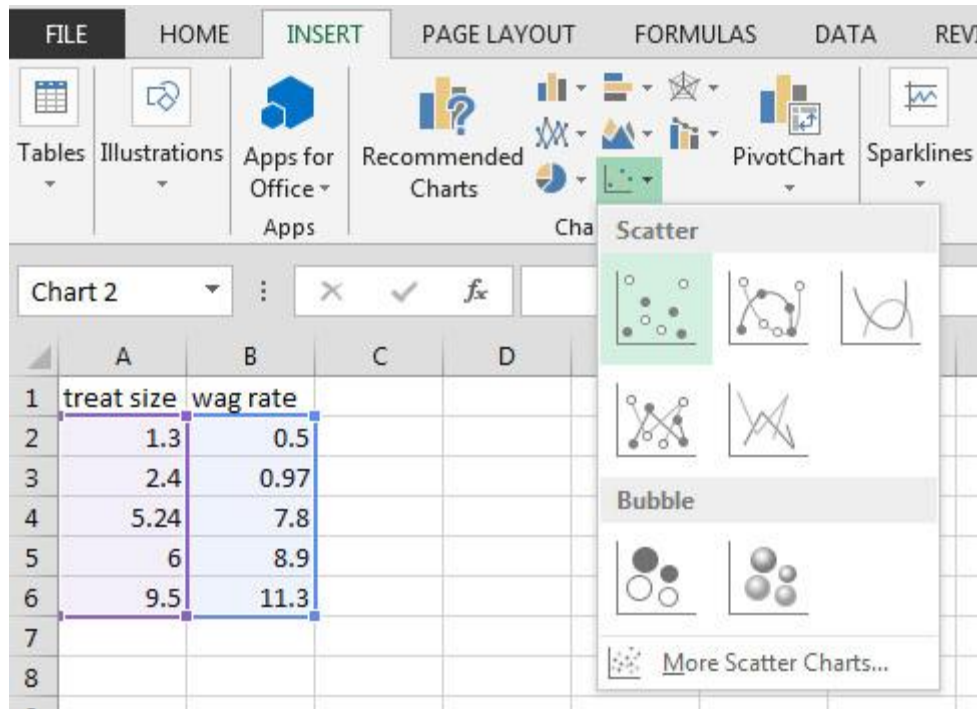
Data is usually represented by values that show some SCATTER, which is due to fluctuations or errors in measurement.

Scatter plot, Trendline, and Linear regression

<http://researchguides.library.vanderbilt.edu/c.php?g=69346&p=855833>

Creating a scatter plot in Excel

To set up a scatter plot in Excel, enter the pairs of data in two columns with each value of a pair on the same row. By default, Excel considers the column on the left to contain the horizontal (X) values and the column on the right to contain the vertical (Y) values.



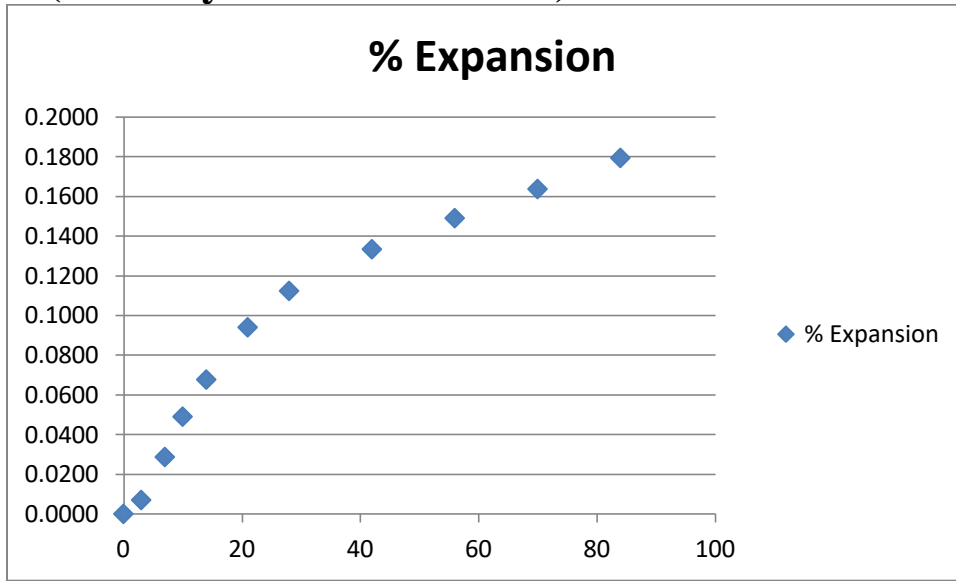
After creating the graph, click on the data points, and then right mouse click and select Add Trendline

Days	% Expansion
0	0.0000
3	0.0070
7	0.0287
10	0.0490
14	0.0677
21	0.0940
28	0.1123
42	0.1333
56	0.1490
70	0.1637
84	0.1793

To utilize the Trendline Analysis tool, an XY Scatter graph must already be present. Notice that the trendline is the best line that fits through the points. It may or may not actually pass through any particular points. That's why another name for trendline is **best-fit line**. In scientific graphs, one almost never "connects the dots". (There is another chart type that Excel makes which does that - don't use it!) The name of the process used to create the best-fit line is called **linear regression**. (<http://researchguides.library.vanderbilt.edu/c.php?g=69346&p=855833>)

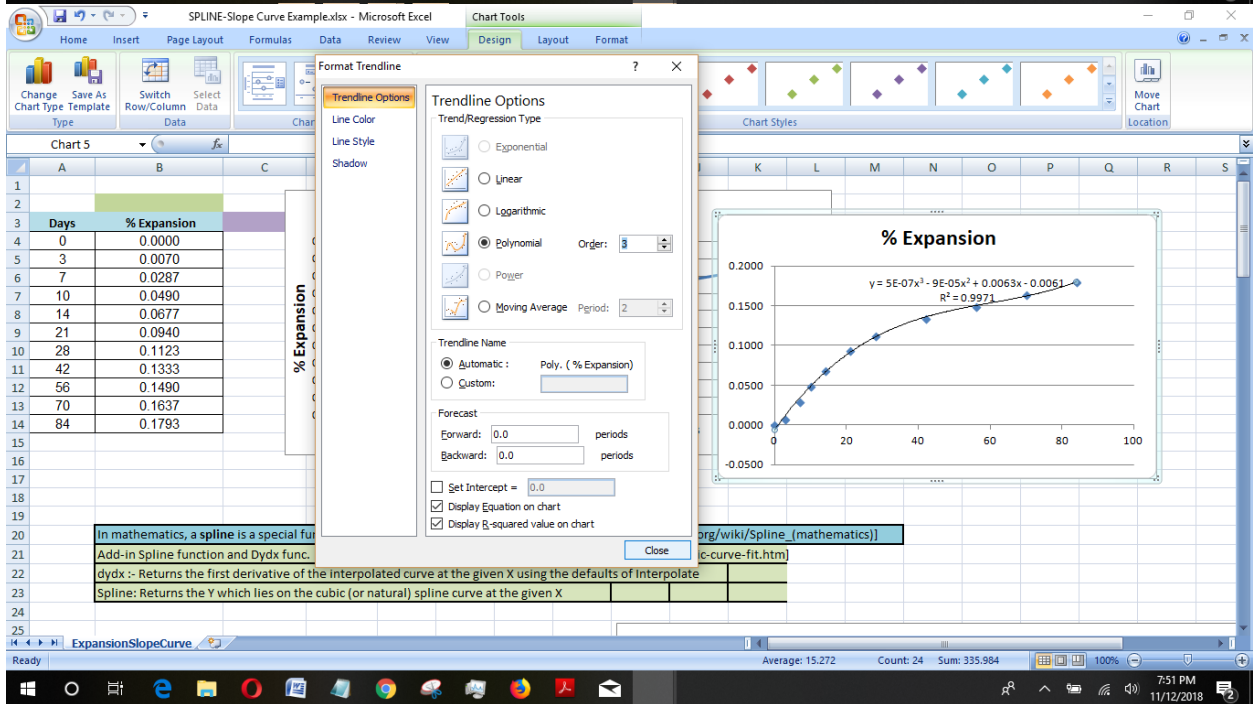
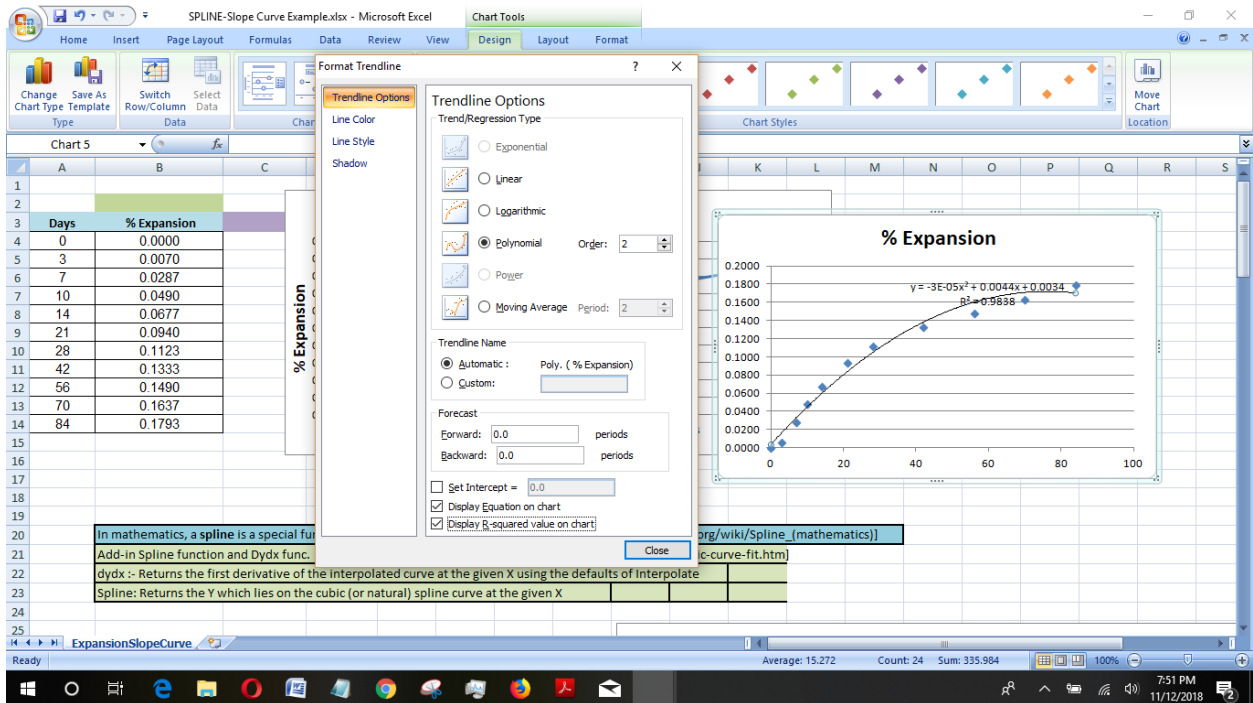
In addition to visually depicting the trend in the data with a regression line, you can also calculate the equation of the regression line. This equation can either be seen in a dialogue box and/or shown on your graph. How well this equation describes the data (the 'fit'), is expressed as a correlation coefficient, R^2 (R-squared). The closer R^2 is to 1.00, the better the fit. This too can be calculated and displayed in the graph.

Example (courtesy Dr. E. R. Latifee):



The screenshot shows the 'Format Trendline' dialog box in Microsoft Excel. The 'Trend/Regression Type' section has 'Linear' selected. The 'Trendline Name' section shows 'Automatic: Linear (% Expansion)'. The 'Forecast' section shows 'Forward: 0.0 periods' and 'Backward: 0.0 periods'. The 'Display Equation on chart' and 'Display R-squared value on chart' checkboxes are checked. The equation $y = 0.0021x + 0.0255$ and $R^2 = 0.9016$ are visible on the chart in the background.

Days	% Expansion
0	0.0000
3	0.0070
7	0.0287
10	0.0490
14	0.0677
21	0.0940
28	0.1123
42	0.1333
56	0.1490
70	0.1637
84	0.1793

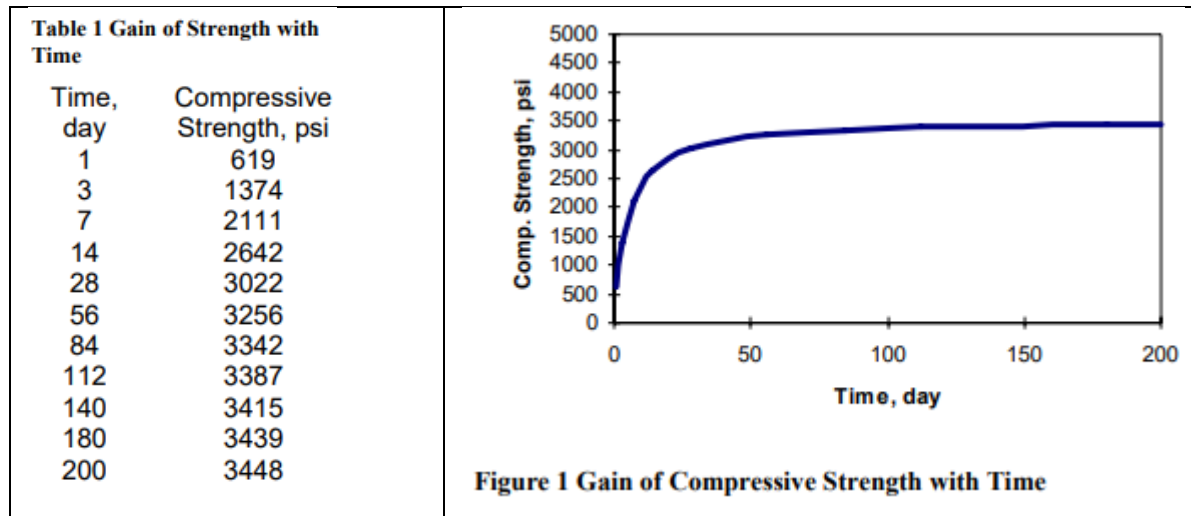


R squared. This is r^2 , the Coefficient of Determination. An R^2 of 0.94 means that 94% of the variance in the data is explained by the line and 6% of the variance is due to unexplained effects. For example, r^2 , 80% means, 80% of the values fit the model. Once the equation is known, interpolation and extrapolation can be done easily, i.e., given x, find y from the equation.

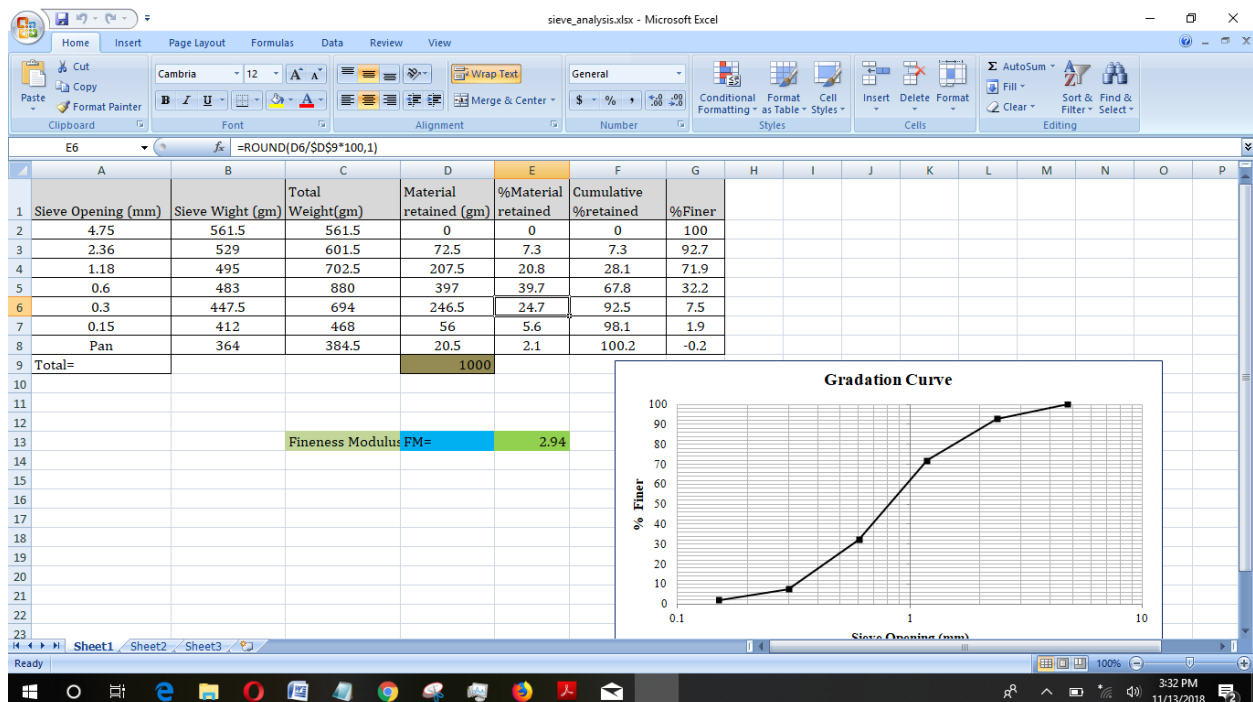
_ * _ * _ * _ * _

Graphs Data Presentation and other Application in CE Materials

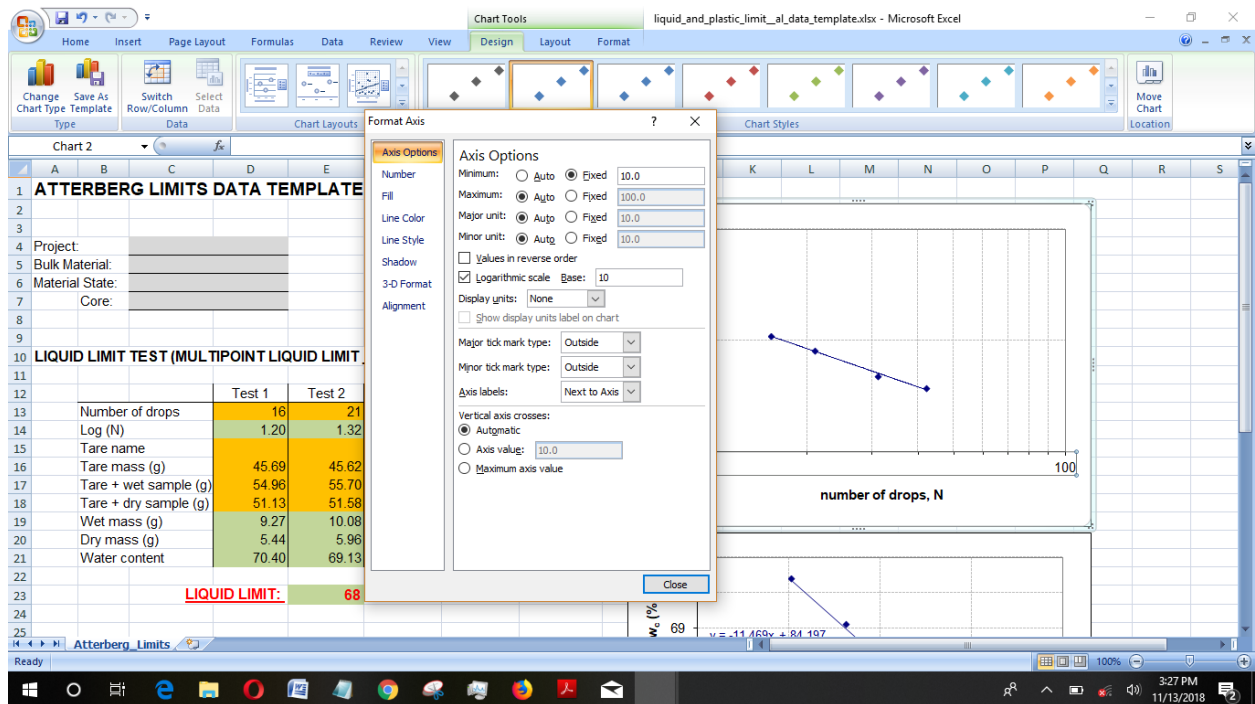
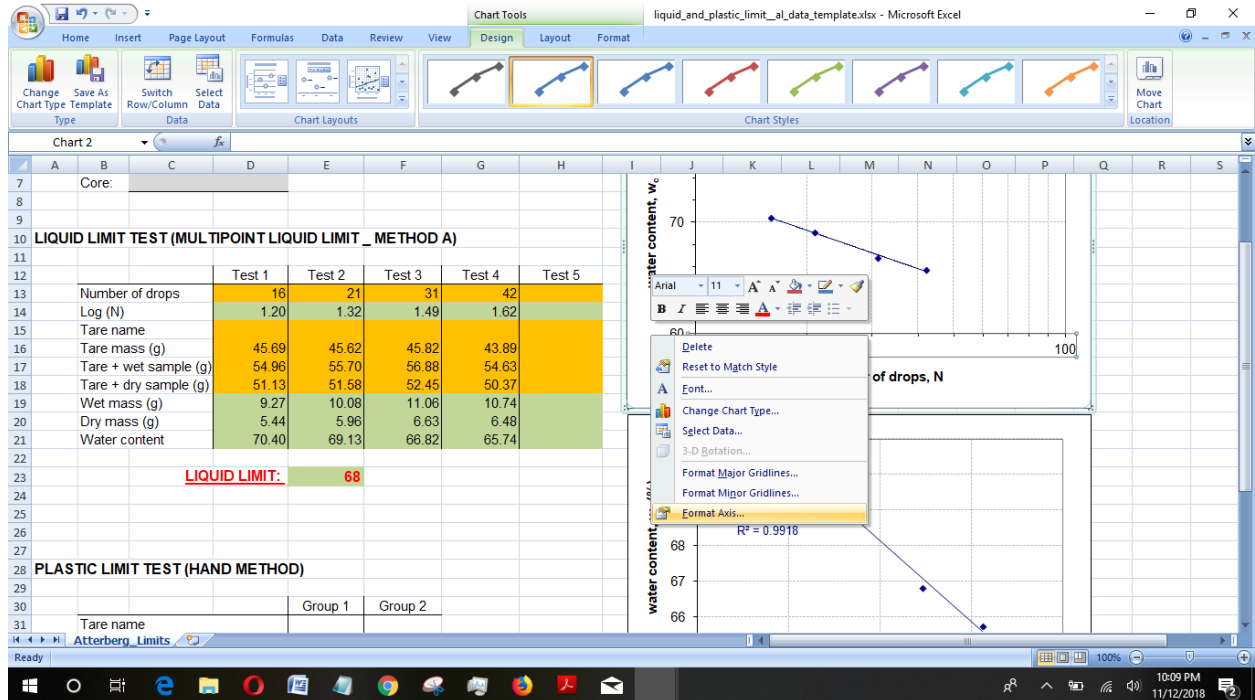
"A picture is worth a thousand words."

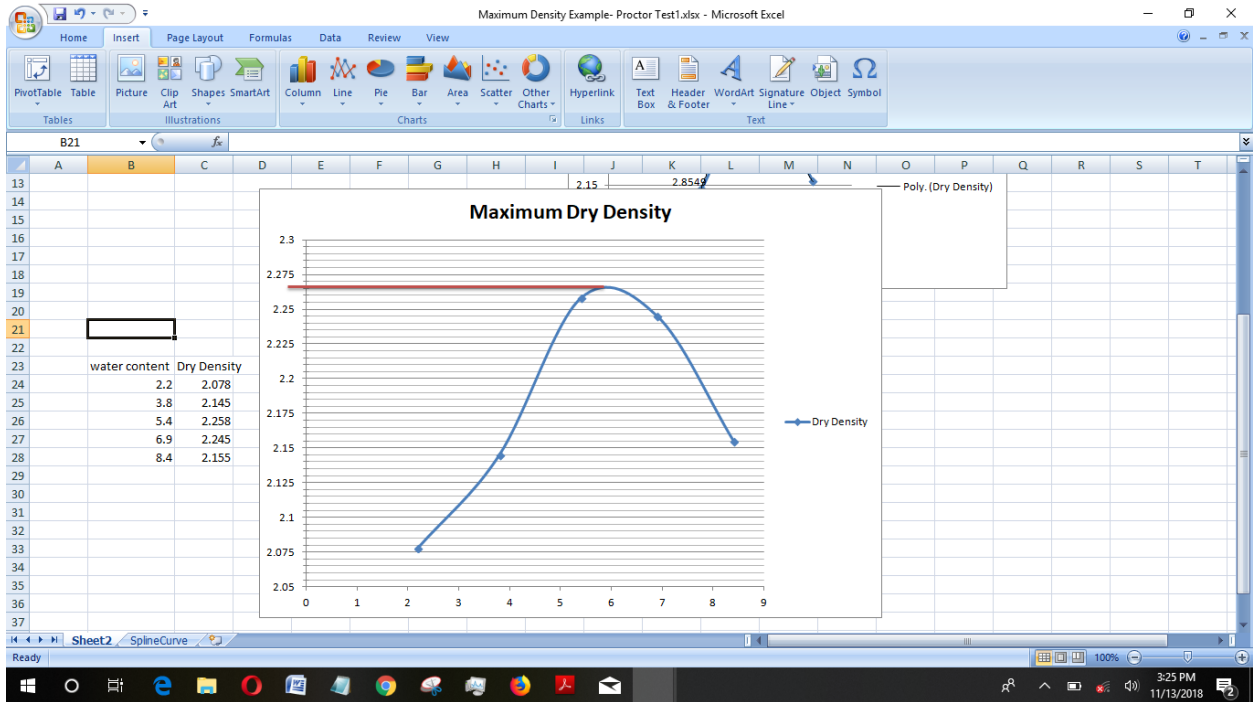


Sieve Analysis, F.M., C_u etc. Maximum Dry Densit



Double click on the axis, right mouse click, change the major and minor grid or change axis to Log scale





Print a Worksheet

To print a worksheet in Excel, execute the following steps.

1. On the File tab, click Print.
2. To preview the other pages that will be printed, click 'Next Page' or 'Previous Page' at the bottom of the window.

Print



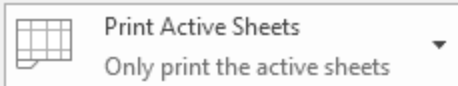
Copies: 1

Printer

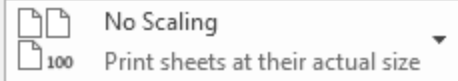
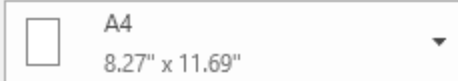
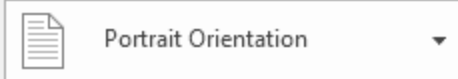


[Printer Properties](#)

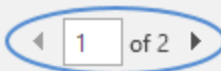
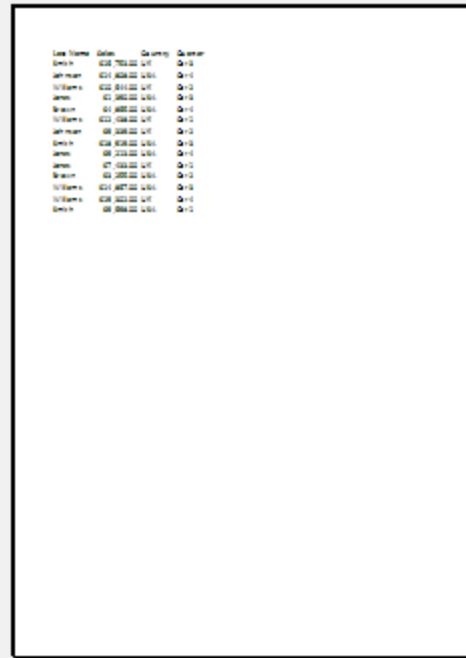
Settings



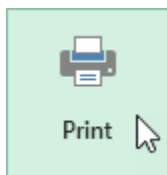
Pages: to



[Page Setup](#)



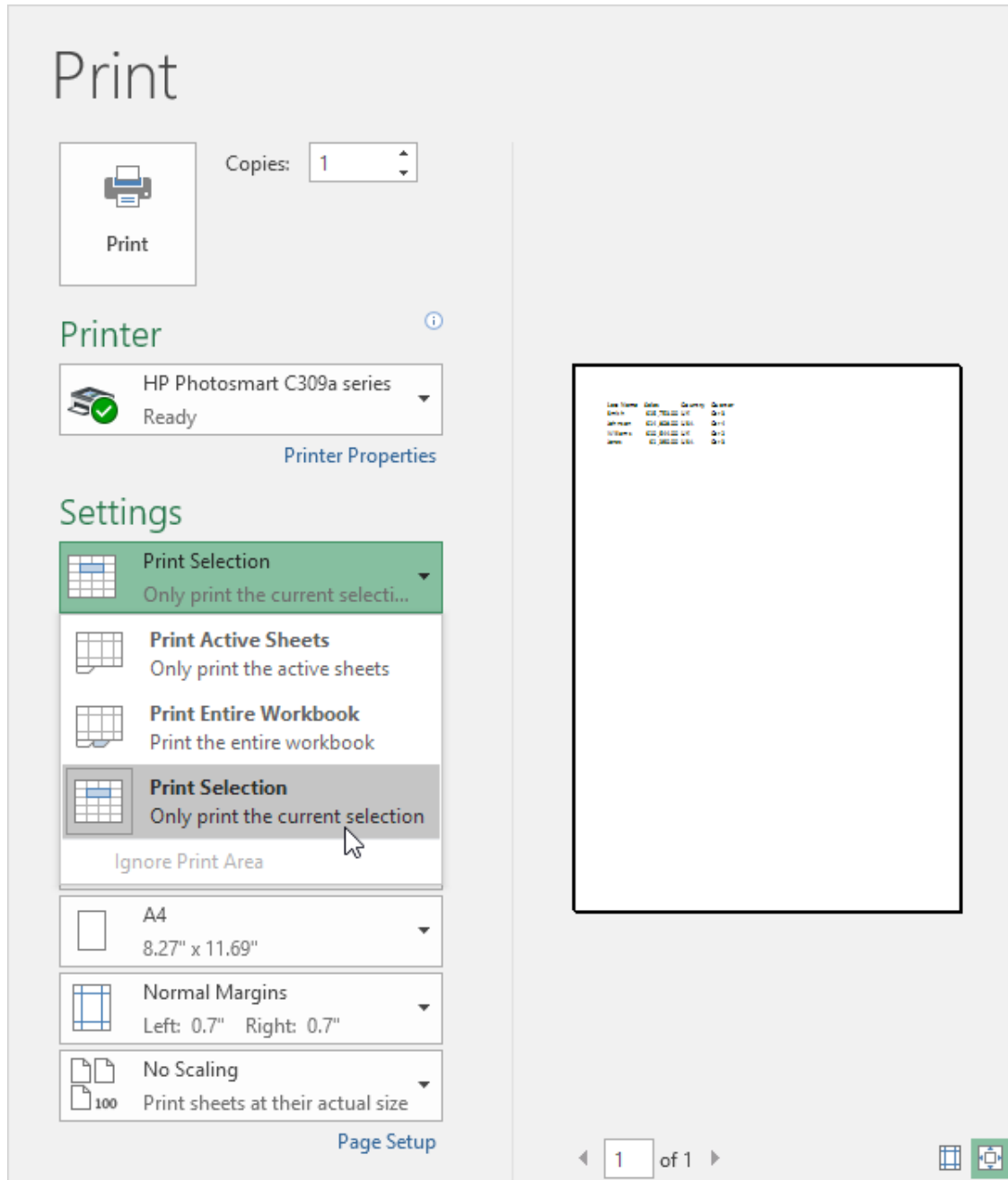
To print the worksheet, click the big Print button.



What to Print

Instead of printing the entire worksheet, you can also only print the current selection.

1. First, select the range of cells you want to print.
2. Next, under Settings, select Print Selection.



3. To print the selection, click the big Print button.

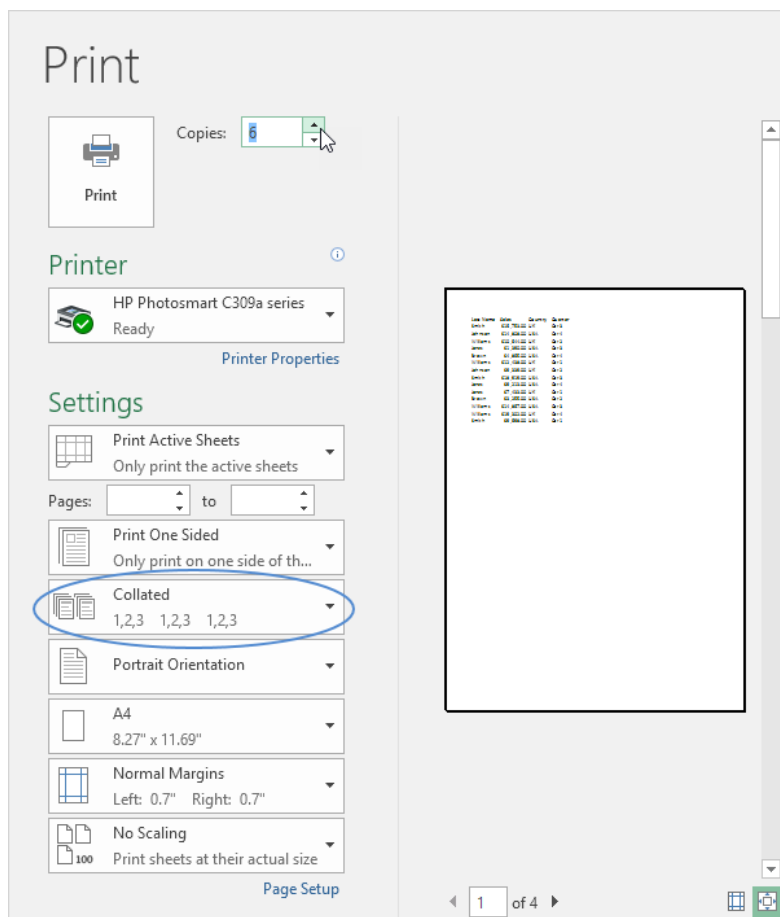


Note: you can also print the active sheets (first select the sheets by holding down CTRL and clicking the sheet tabs) or print the entire workbook. Use the boxes next to Pages (see first screenshot) to only print a few pages of your document. For example, 2 to 2 only prints the second page.

Multiple Copies

To print multiple copies, execute the following steps.

1. Use the arrows next to the Copies box.
2. If one copy contains multiple pages, you can switch between Collated and Uncollated. For example, if you print 6 copies, Collated prints the entire first copy, then the entire second copy, etc. Uncollated prints 6 copies of page 1, 6 copies of page 2, etc.



SPLINE:

Use "XIXtrFun.xll" for the SPLINE in Microsoft Excel.

NOTE: XIXtrFun.xll is a collection of functions which extends the capabilities of Microsoft Excel, which was developed and distributed as free

from-

Advanced Systems Design and Development

346 Atlantic Avenue

Red Lion, PA 17356

email: support@xlxtrfun.com

<http://www.xlxtrfun.com/XIXtrFun/XIXtrFun.htm>

Put XIXtrFun.xll wherever is wanted and use Excel's Add-In Manager to install XIXtrFun.xll.

1. To install an Excel 2007 add-in, click on the Office Button, the big round decoration in the top left of the Excel window.
2. This opens the Office Menu. Click the Excel Options button at the bottom of this menu.
3. The Excel Options dialog opens up. Click the Add-Ins item in the list along the left edge of the dialog to see the Add-Ins panel.
4. Make sure the Manage dropdown at the bottom shows Excel Add-Ins, then click the "Go" button. This brings up the Add-Ins dialog.
5. Click Browse, and use the Browse dialog to locate the add-in file which is in this case- "XIXtrFun.xll".
6. Click "OK"

