

Data Analysis in Excel

Data Science

Artificial Intelligence

2025-2026

1- Sort Data in Excel

You can sort your Excel data by one column or multiple columns. You can sort in ascending or descending order.

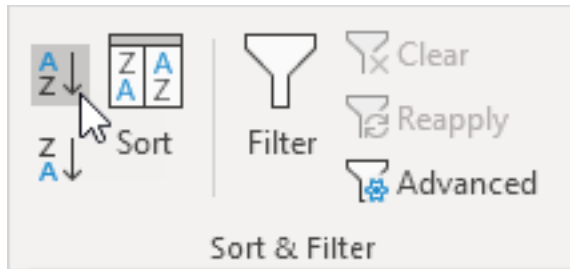
Sort by One Column

To sort by one column in Excel, execute the following steps.

1. Click any cell in the column you want to sort.

	A	B	C	D	E
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					

2. To sort in ascending order, on the Data tab, in the Sort & Filter group, click AZ.



Result:

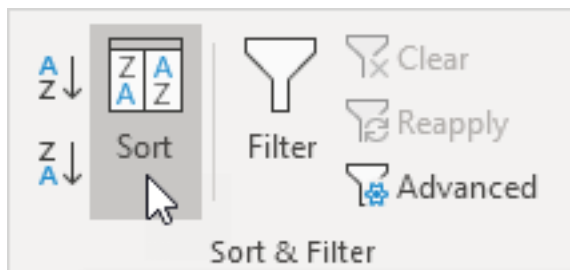
	A	B	C	D	E
1	Last Name	Sales	Country	Quarter	
2	Brown	\$4,865.00	USA	Qtr 4	
3	Brown	\$3,255.00	USA	Qtr 2	
4	Johnson	\$14,808.00	USA	Qtr 4	
5	Johnson	\$9,339.00	UK	Qtr 2	
6	Jones	\$1,390.00	USA	Qtr 3	
7	Jones	\$9,213.00	USA	Qtr 4	
8	Jones	\$7,433.00	UK	Qtr 1	
9	Smith	\$16,753.00	UK	Qtr 3	
10	Smith	\$18,919.00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

Note: to sort in descending order, click ZA.

Sort by Multiple Columns

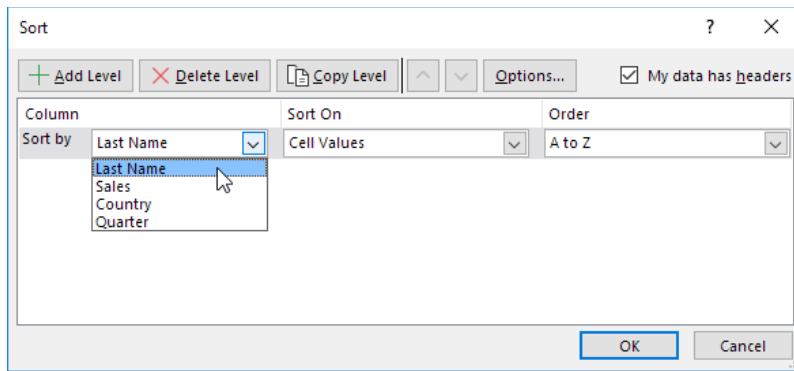
To sort by multiple columns in Excel, execute the following steps.

1. On the Data tab, in the Sort & Filter group, click Sort.



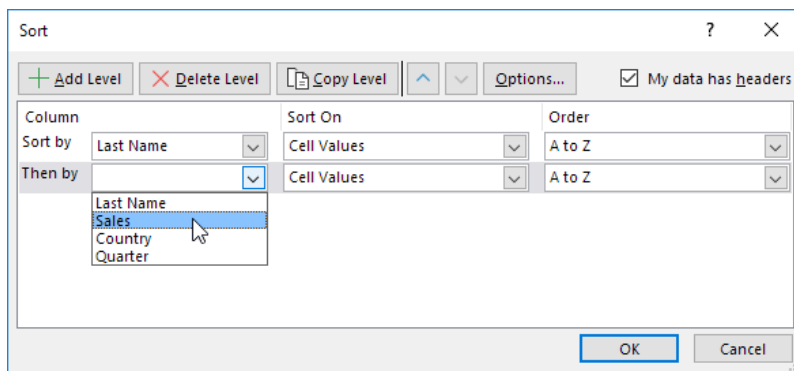
The Sort dialog box appears.

2. Select Last Name from the 'Sort by' drop-down list.



3. Click on Add Level.

4. Select Sales from the 'Then by' drop-down list.



5. Click OK.

Result: records are sorted by Last Name first and Sales second.

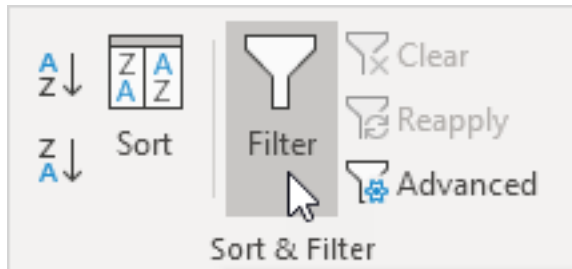
	A	B	C	D	E
1	Last Name	Sales	Country	Quarter	
2	Brown	\$3,255.00	USA	Qtr 2	
3	Brown	\$4,865.00	USA	Qtr 4	
4	Johnson	\$9,339.00	UK	Qtr 2	
5	Johnson	\$14,808.00	USA	Qtr 4	
6	Jones	\$1,390.00	USA	Qtr 3	
7	Jones	\$7,433.00	UK	Qtr 1	
8	Jones	\$9,213.00	USA	Qtr 4	
9	Smith	\$9,698.00	USA	Qtr 1	
10	Smith	\$16,753.00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

Lab: Sort by Color in Excel

2- Filter Data in Excel

Filter your Excel data to only display records that meet certain criteria. This is page 1 of 10 in our comprehensive filtering course.

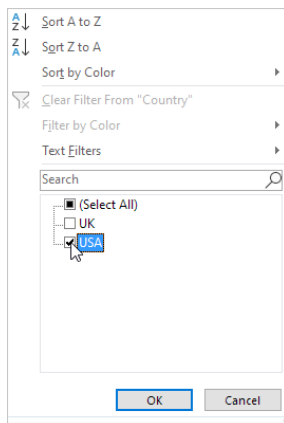
1. Click any single cell inside a data set.
2. On the Data tab, in the Sort & Filter group, click Filter.



Arrows in the column headers appear.

	A	B	C	D	E
1	Last Name	Sales	Count	Quart	
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					

3. Click the arrow next to Country.
4. Click on Select All to clear all the check boxes, and click the check box next to USA.



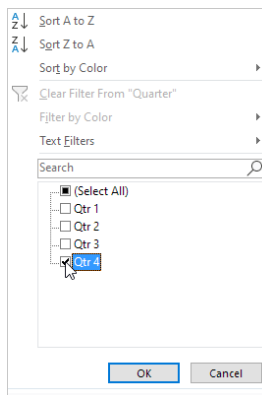
5. Click OK.

Result: Excel only displays the sales in the USA.

	A	B	C	D	E
1	Last Name	Sales	Count	Quarter	
3	Johnson	\$14,808.00	USA	Qtr 4	
5	Jones	\$1,390.00	USA	Qtr 3	
6	Brown	\$4,865.00	USA	Qtr 4	
9	Smith	\$18,919.00	USA	Qtr 3	
10	Jones	\$9,213.00	USA	Qtr 4	
12	Brown	\$3,255.00	USA	Qtr 2	
13	Williams	\$14,867.00	USA	Qtr 3	
15	Smith	\$9,698.00	USA	Qtr 1	
16					

6. Click the arrow next to Quarter.

7. Click on Select All to clear all the check boxes, and click the check box next to Qtr 4.

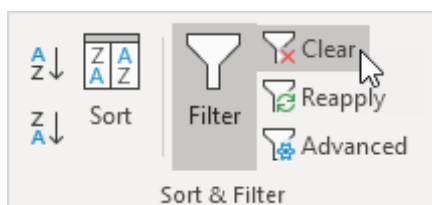


8. Click OK.

Result: Excel only displays the sales in the USA in Qtr 4.

	A	B	C	D	E
1	Last Name	Sales	Count	Quarter	
3	Johnson	\$14,808.00	USA	Qtr 4	
6	Brown	\$4,865.00	USA	Qtr 4	
10	Jones	\$9,213.00	USA	Qtr 4	
16					

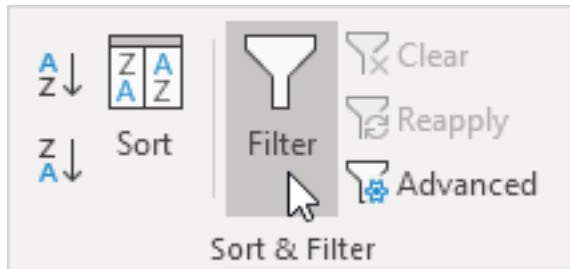
9. To remove the filter, on the Data tab, in the Sort & Filter group, click Clear. To remove the filter and the arrows, click Filter.



3- Number and Text Filters in Excel

This example teaches you how to apply a number filter and a text filter to only display records that meet certain criteria.

1. Click any single cell inside a data set.
2. On the Data tab, in the Sort & Filter group, click Filter.



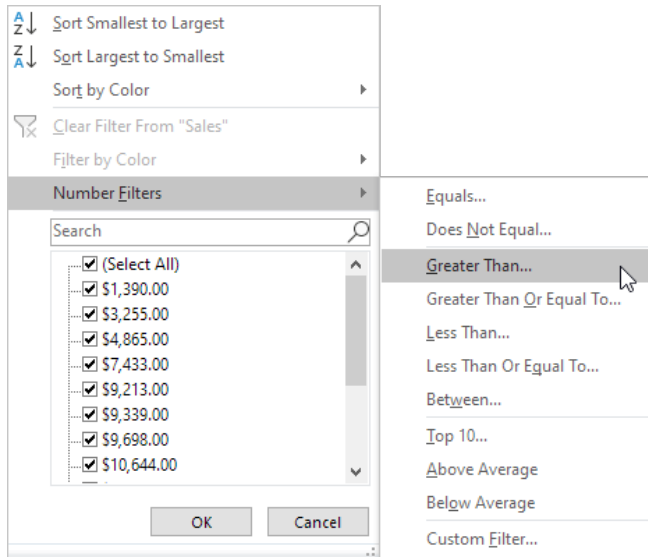
Arrows in the column headers appear.

	A	B	C	D	E
1	Last Nam ▾	Sales ▾	Count ▾	Quart ▾	
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					

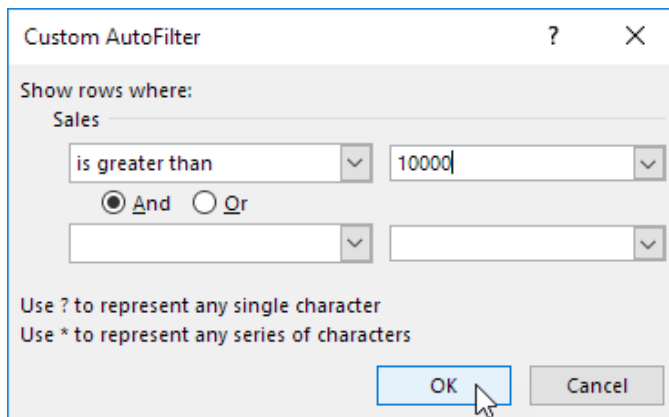
Number Filter

To apply a number filter, execute the following steps.

1. Click the arrow next to Sales.
2. Click Number Filters (this option is available because the Sales column contains numeric data) and select Greater Than from the list.



3. Enter 10,000 and click OK.



Result: Excel only displays the records where Sales is greater than \$10,000.

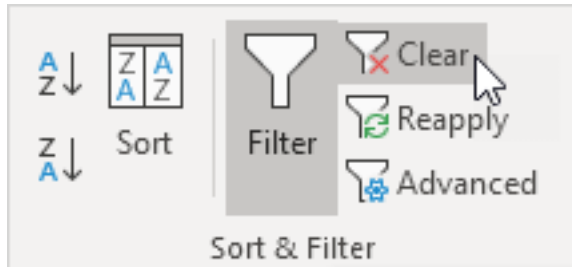
	A	B	C	D	E
1	Last Name	Sales	Count	Quarter	
2	Smith	\$16,753.00	UK	Qtr 3	
3	Johnson	\$14,808.00	USA	Qtr 4	
4	Williams	\$10,644.00	UK	Qtr 2	
7	Williams	\$12,438.00	UK	Qtr 1	
9	Smith	\$18,919.00	USA	Qtr 3	
13	Williams	\$14,867.00	USA	Qtr 3	
14	Williams	\$19,302.00	UK	Qtr 4	
16					

Note: you can also display records equal to a value, less than a value, between two values, the top x records, records that are above average, etc. The sky is the limit!

Text Filter

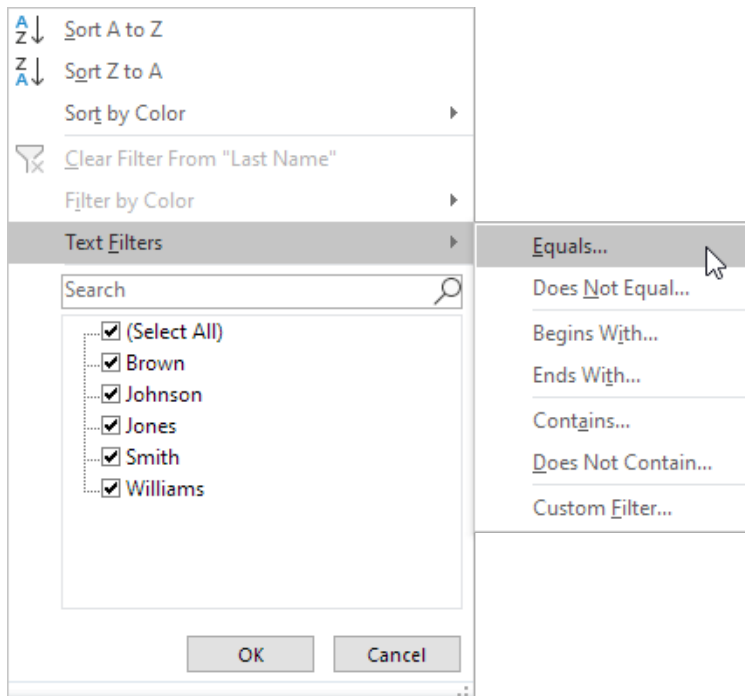
To apply a text filter, execute the following steps.

1. First, to remove the previously applied filter, on the Data tab, in the Sort & Filter group, click Clear.



2. Next, click the arrow next to Last Name.

3. Click Text Filters (this option is available because the Last Name column contains text data) and select Equals from the list.

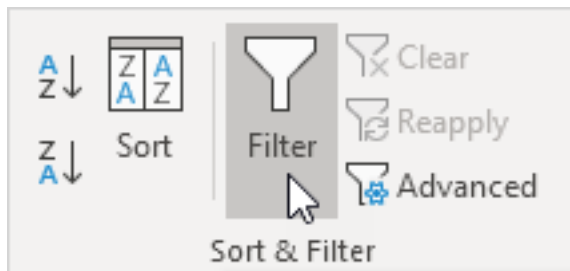


4. Enter Smith and click OK.

4- Date Filters in Excel

This page teaches you how to apply a date filter to only display records that meet certain criteria.

1. Click any single cell inside a data set.
2. On the Data tab, in the Sort & Filter group, click Filter.

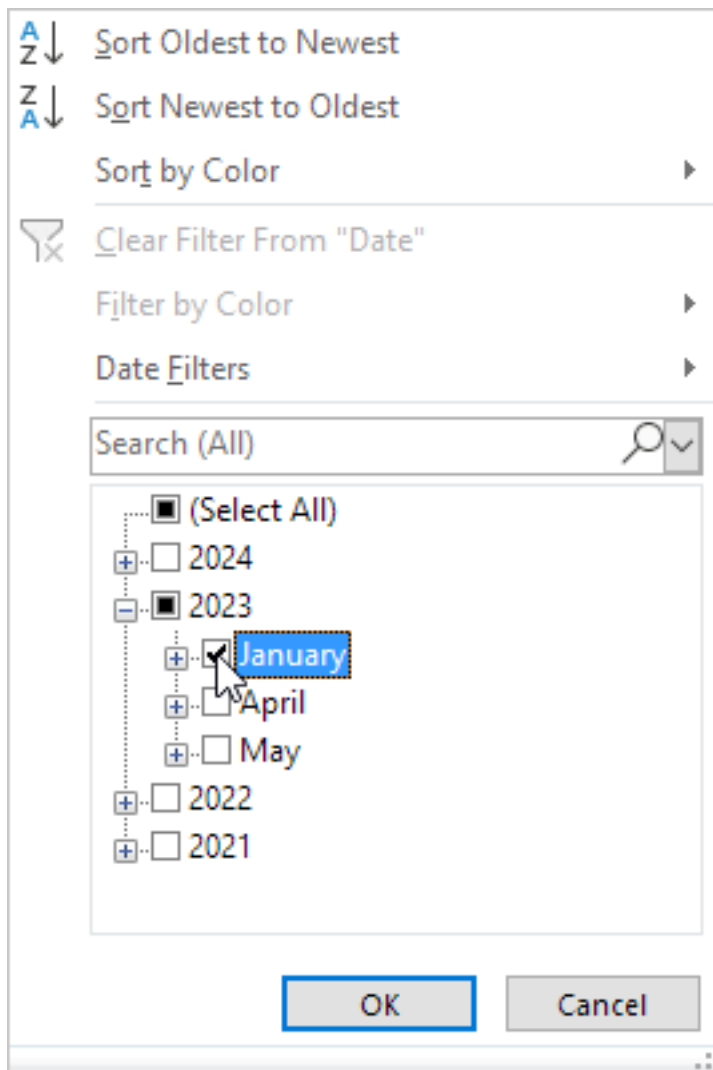


Arrows in the column headers appear.

	A	B	C	D	E
1	Last Name	Sales	Count	Date	
2	Smith	\$16,753.00	UK	4/25/2021	
3	Johnson	\$14,808.00	USA	1/5/2024	
4	Williams	\$10,644.00	UK	4/13/2023	
5	Jones	\$1,390.00	USA	9/5/2024	
6	Brown	\$4,865.00	USA	1/21/2021	
7	Williams	\$12,438.00	UK	4/6/2021	
8	Johnson	\$9,339.00	UK	11/14/2024	
9	Smith	\$18,919.00	USA	7/16/2022	
10	Jones	\$9,213.00	USA	1/26/2023	
11	Jones	\$7,433.00	UK	11/1/2021	
12	Brown	\$3,255.00	USA	5/18/2023	
13	Williams	\$14,867.00	USA	1/5/2023	
14	Williams	\$19,302.00	UK	8/23/2024	
15	Smith	\$9,698.00	USA	1/17/2024	
16					

3. Click the arrow next to Date.

4. Click on Select All to clear all the check boxes, click the + sign next to 2023, and click the check box next to January.



5. Click OK.

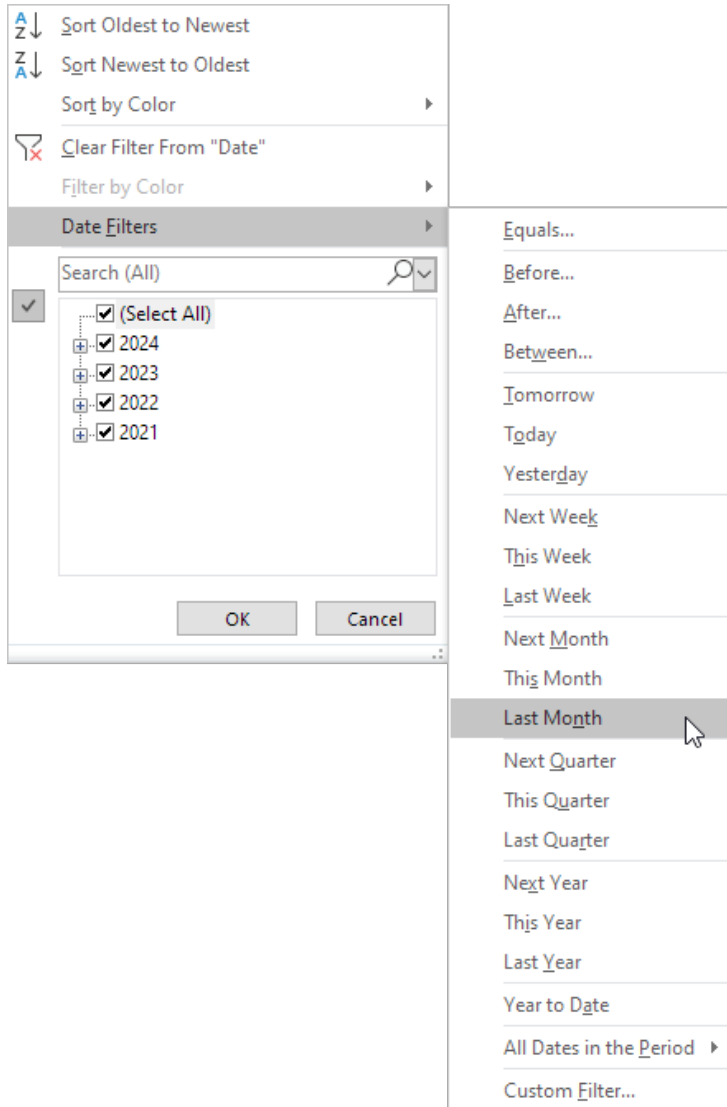
Result: Excel only displays the sales in 2023, in January.

	A	B	C	D	E
1	Last Name	Sales	Count	Date	
10	Jones	\$9,213.00	USA	1/26/2023	
13	Williams	\$14,867.00	USA	1/5/2023	
16					

6. Click the arrow next to Date.

7. Click on Select All to select all the check boxes.

8. Click Date Filters (this option is available because the Date column contains dates) and select Last Month from the list.



Result: Excel only displays the sales of last month.

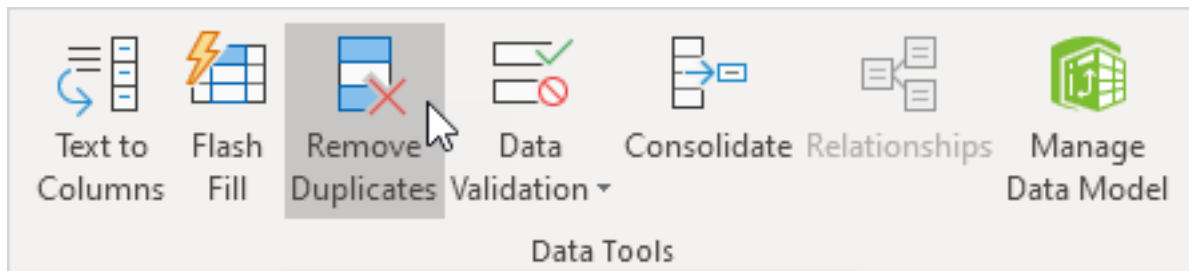
	A	B	C	D	E
1	Last Nan	Sales	Count	Date	
8	Johnson	\$9,339.00	UK	11/14/2024	
16					

Note: this date filter and many other date filters depend on today's date.

5- Remove Duplicates in Excel

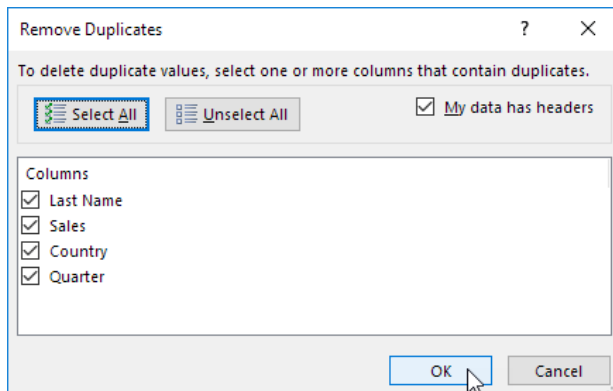
To quickly remove duplicates in Excel, use the tool on the Data tab. Use the Advanced Filter if you don't want to delete duplicates permanently.

1. Click any single cell inside the data set.
2. On the Data tab, in the Data Tools group, click Remove Duplicates.



The following dialog box appears.

3. Leave all check boxes checked and click OK.



Result: Excel removes all identical rows (blue) except for the first identical row found (yellow).

	A	B	C	D
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	Smith	\$16,753.00	UK	Qtr 3
8	Williams	\$12,438.00	UK	Qtr 1
9	Johnson	\$9,339.00	UK	Qtr 2
10	Smith	\$18,919.00	USA	Qtr 3
11	Jones	\$9,213.00	USA	Qtr 4
12	Jones	\$7,433.00	UK	Qtr 1
13	Smith	\$16,753.00	UK	Qtr 3
14	Brown	\$3,255.00	USA	Qtr 2
15	Williams	\$14,867.00	USA	Qtr 3
16	Williams	\$19,302.00	UK	Qtr 4
17	Smith	\$9,698.00	USA	Qtr 1
18				

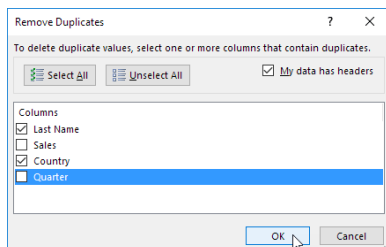
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	A	B	C	D
1	Last Name	Sales	Country	Quarter
2	Smith	\$16,753.00	UK	Qtr 3
3	Johnson	\$14,808.00	USA	Qtr 4
4	Williams	\$10,644.00	UK	Qtr 2
5	Jones	\$1,390.00	USA	Qtr 3
6	Brown	\$4,865.00	USA	Qtr 4
7	Williams	\$12,438.00	UK	Qtr 1
8	Johnson	\$9,339.00	UK	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				
17				
18				

To remove rows with the same values in certain columns, execute the following steps.

4. For example, remove rows with the same Last Name and Country.

5. Check Last Name and Country and click OK.



Result: Excel removes all rows with the same Last Name and Country (blue) except for the first instances found (yellow).

	A	B	C	D
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				
17				
18				

->

	A	B	C	D
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	Johnson	\$9,339.00	UK	Qtr 2
8	Smith	\$18,919.00	USA	Qtr 3
9	Jones	\$7,433.00	UK	Qtr 1
10	Williams	\$14,867.00	USA	Qtr 3
11				
12				
13				
14				
15				
16				
17				
18				

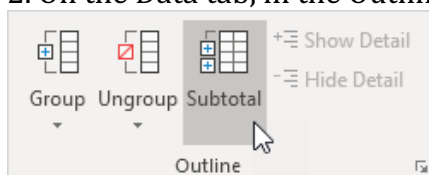
6- Outlining Data in Excel

Outlining data makes your data easier to view. In this example, we will total rows of related data and collapse a group of columns.

1. First, sort the data on the Company column.

	A	B	C	D	E
1	Last Name	Sales	Product Type	Company	
2	Jones	\$1,390.00	DF-3	Kung Food	
3	Williams	\$1,243.00	FD-2	Kung Food	
4	Johnson	\$9,339.00	DC-1	Kung Food	
5	Jones	\$7,433.00	DF-7	Kung Food	
6	Brown	\$3,255.00	FD-2	Pancakes on the Rocks	
7	Williams	\$1,930.00	A-34	Pancakes on the Rocks	
8	Williams	\$1,064.00	EE-2	Peace A Pizza	
9	Brown	\$4,865.00	EEE-45	Peace A Pizza	
10	Smith	\$9,698.00	F-3334	Peace A Pizza	
11	Smith	\$1,675.00	EEE-312	Wok N Roll	
12	Johnson	\$1,480.00	DC-1	Wok N Roll	
13	Smith	\$1,891.00	EEE-312	Wok N Roll	
14	Jones	\$9,213.00	FG-5	Wok N Roll	
15	Williams	\$1,486.00	A-34	Wok N Roll	
16					

2. On the Data tab, in the Outline group, click Subtotal.

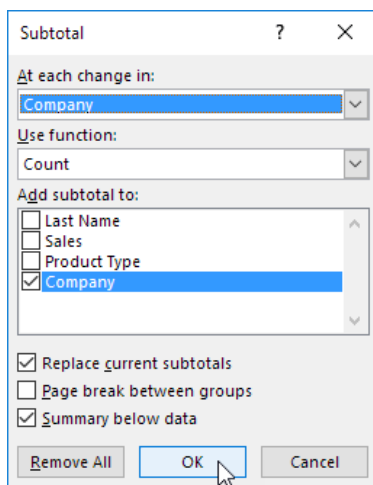


3. Select the Company column, the column we use to outline our worksheet.

4. Use the Count function.

5. Check the Company check box.

6. Click OK.



Result:

1	2	3	A	B	C	D
1	Last Name	Sales	Product Type	Company		
2	Jones	\$1,390.00	DF-3	Kung Food		
3	Williams	\$1,243.00	FD-2	Kung Food		
4	Johnson	\$9,339.00	DC-1	Kung Food		
5	Jones	\$7,433.00	DF-7	Kung Food		
6			Kung Food Count		4	
7	Brown	\$3,255.00	FD-2	Pancakes on the Rocks		
8	Williams	\$1,930.00	A-34	Pancakes on the Rocks		
9			Pancakes on the Rocks Count		2	
10	Williams	\$1,064.00	EE-2	Peace A Pizza		
11	Brown	\$4,865.00	EEE-45	Peace A Pizza		
12	Smith	\$9,698.00	F-3334	Peace A Pizza		
13			Peace A Pizza Count		3	
14	Smith	\$1,675.00	EEE-312	Wok N Roll		
15	Johnson	\$1,480.00	DC-1	Wok N Roll		
16	Smith	\$1,891.00	EEE-312	Wok N Roll		
17	Jones	\$9,213.00	FG-5	Wok N Roll		
18	Williams	\$1,486.00	A-34	Wok N Roll		
19			Wok N Roll Count		5	
20			Grand Count		14	
21						

7. To collapse a group of cells, click a minus sign. You can use the numbers to collapse or expand groups by level. For example, click the 2 to only show the subtotals.

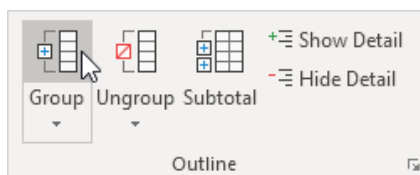
1	2	3	A	B	C	D
1	Last Name	Sales	Product Type	Company		
6			Kung Food Count		4	
9			Pancakes on the Rocks Count		2	
13			Peace A Pizza Count		3	
19			Wok N Roll Count		5	
20			Grand Count		14	
21						

Note: click the 1 to only show the Grand Count, click the 3 to show everything.

To collapse a group of columns, execute the following steps.

8. For example, select column A and B.

9. On the Data tab, in the Outline group, click Group.



10. Click the minus sign above column C (it will change to a plus sign).

Result:

	+				
1	2	C	D	E	F
		Product Type	Company		
		DF-3	Kung Food		
		FD-2	Kung Food		
		DC-1	Kung Food		
		DF-7	Kung Food		
-		Kung Food Count		4	
		FD-2	Pancakes on the Rocks		
		A-34	Pancakes on the Rocks		
-		Pancakes on the Rocks Count		2	
		EE-2	Peace A Pizza		
		EEE-45	Peace A Pizza		
		F-3334	Peace A Pizza		
-		Peace A Pizza Count		3	
		EEE-312	Wok N Roll		
		DC-1	Wok N Roll		
		EEE-312	Wok N Roll		
		FG-5	Wok N Roll		
		A-34	Wok N Roll		
-		Wok N Roll Count		5	
		Grand Count		14	

11. To remove the outline, click any cell inside the data set and on the Data tab, in the Outline group, click Subtotal, Remove all.

Subtotal ? X

At each change in:

Company

Use function:

Count

Add subtotal to:

- ☐ Last Name
- ☐ Sales
- ☐ Product Type
- ☒ Company

☒ Replace current subtotals

☐ Page break between groups

☒ Summary below data

Remove All OK Cancel

7- Unique Values in Excel

To find unique values in Excel, use the Advanced Filter to extract unique values or filter for unique values. If you have Excel 365 or Excel 2021, use the magic UNIQUE function.

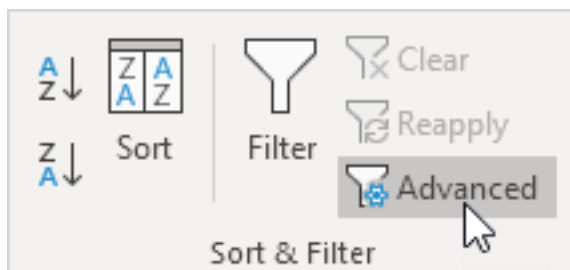
Extract Unique Values

When using the Advanced Filter in Excel, always enter a text label at the top of each column of data.

1. Click a cell in the list range.

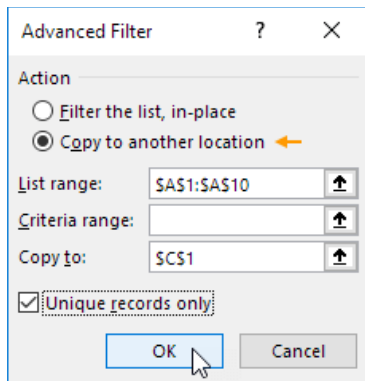
	A	B	C	D
1	Animals			
2	Lion			
3	Elephant			
4	Rhino			
5	Leopard			
6	Buffalo			
7	Lion			
8	Giraffe			
9	Elephant			
10	Zebra			
11				

2. On the Data tab, in the Sort & Filter group, click Advanced.



The Advanced Filter dialog box appears.

3. Click Copy to another location (see image below).
4. Click in the Copy to box and select cell C1.
5. Check Unique records only.
6. Click OK.



Result:

	A	B	C	D
1	Animals		Animals	
2	Lion		Lion	
3	Elephant		Elephant	
4	Rhino		Rhino	
5	Leopard		Leopard	
6	Buffalo		Buffalo	
7	Lion		Giraffe	
8	Giraffe		Zebra	
9	Elephant			
10	Zebra			
11				

Note: Excel removes all duplicate values (Lion in cell A7 and Elephant in cell A9) and sends the unique values to column C. You can also use this tool to extract unique rows in Excel.

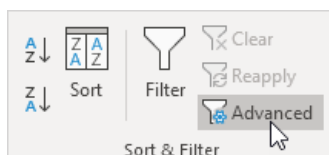
Filter for Unique Values

Filtering for unique values in Excel is a piece of cake.

1. Click a cell in the list range.

	A	B	C	D
1	Animals			
2	Lion			
3	Elephant			
4	Rhino			
5	Leopard			
6	Buffalo			
7	Lion			
8	Giraffe			
9	Elephant			
10	Zebra			
11				

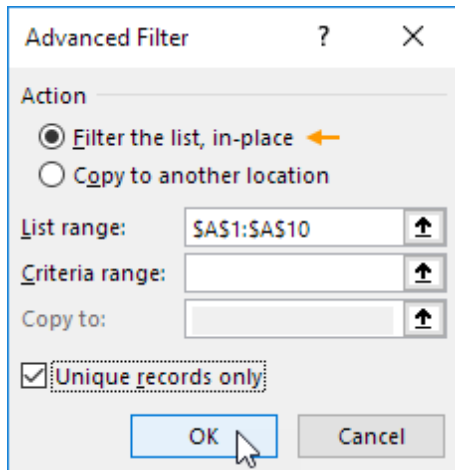
2. On the Data tab, in the Sort & Filter group, click Advanced.



3. Click Filter the list, in-place (see image below).

4. Check Unique records only.

5. Click OK.



Result:

	A	B	C	D
1	Animals			
2	Lion			
3	Elephant			
4	Rhino			
5	Leopard			
6	Buffalo			
8	Giraffe			
10	Zebra			
11				

Note: rows 7 and 9 are hidden. To clear this filter, on the Data tab, in the Sort & Filter group, click Clear.

8- Conditional Formatting in Excel

Use conditional formatting in Excel to automatically highlight cells based on their content. Apply a rule or use a formula to determine which cells to format.

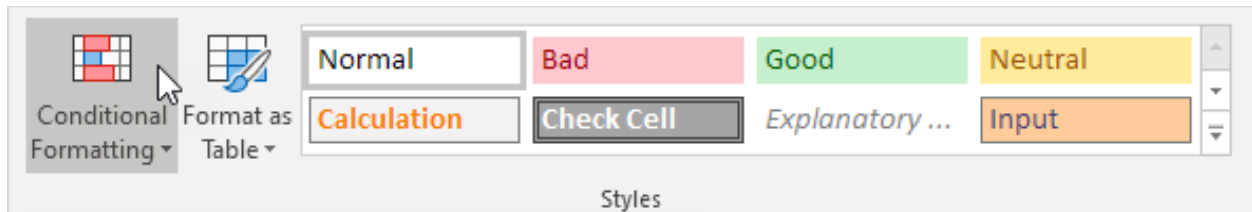
Highlight Cells Rules

To highlight cells that are greater than a value, execute the following steps.

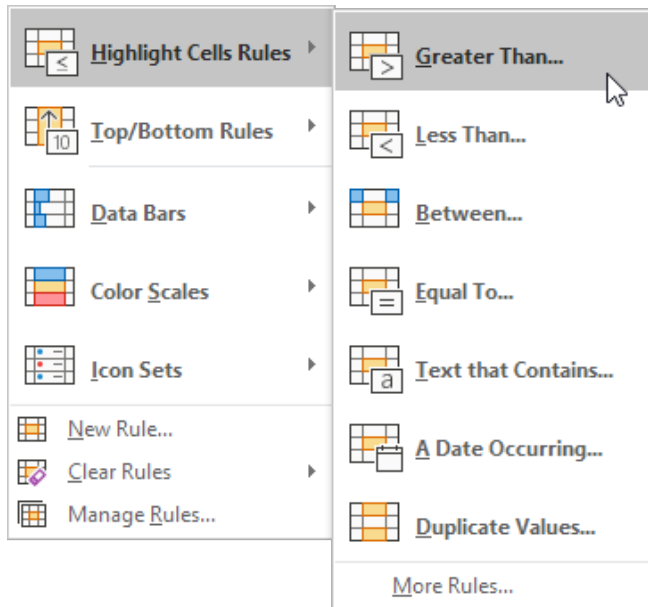
1. Select the range A1:A10.

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

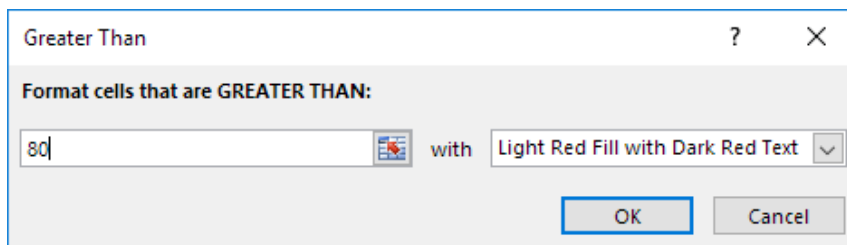
2. On the Home tab, in the Styles group, click Conditional Formatting.



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		

6. Change the value of cell A1 to 81.

Result: Excel changes the format of cell A1 automatically.

	A	B
1	81	
2	6	
3	39	
4	43	
5	2	
6	95	
7	5	
8	11	
9	86	
10	57	
11		

Note: you can also use this category (see step 3) to highlight cells that are less than a value, between two values, equal to a value, cells that contain specific text, dates (today, last week, next month, etc.), duplicates or unique values.

Clear Rules

To clear a conditional formatting rule, execute the following steps.

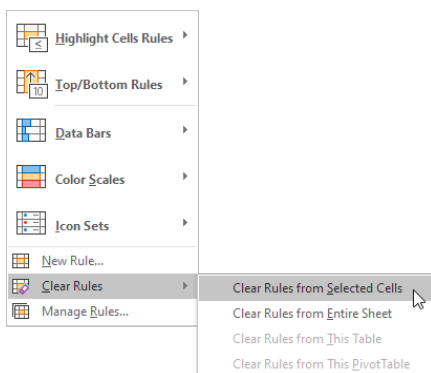
1. Select the range A1:A10.

	A	B
1	81	
2	6	
3	39	
4	43	
5	2	
6	95	
7	5	
8	11	
9	86	
10	57	
11		

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



3. Click Clear Rules, Clear Rules from Selected Cells.



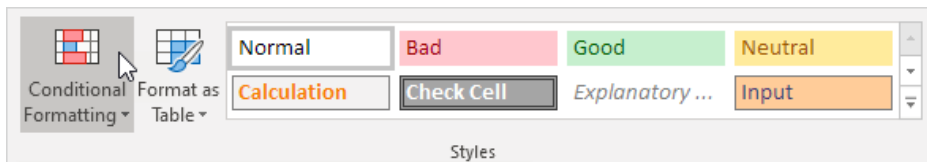
Top/Bottom Rules

To highlight cells that are above average, execute the following steps.

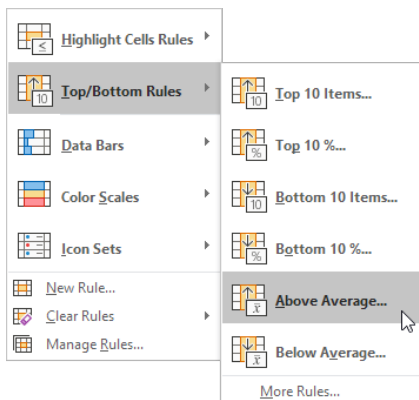
1. Select the range A1:A10.

	A	B
1	81	
2	6	
3	39	
4	43	
5	2	
6	95	
7	5	
8	11	
9	86	
10	57	
11		

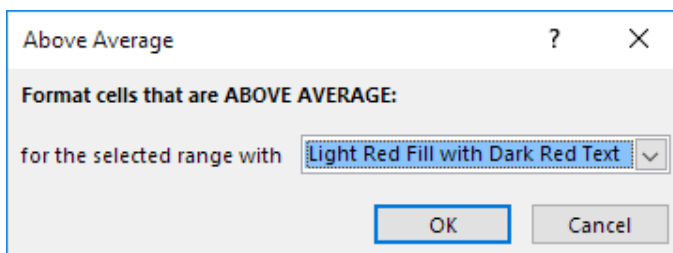
2. On the Home tab, in the Styles group, click Conditional Formatting.



3. Click Top/Bottom Rules, Above Average.



4. Select a formatting style.



5. Click OK.

Result: Excel calculates the average (42.5) and formats the cells that are above this average.

	A	B
1	81	
2	6	
3	39	
4	43	
5	2	
6	95	
7	5	
8	11	
9	86	
10	57	
11		

Note: you can also use this category (see step 3) to highlight the top n items, the top n percent, the bottom n items, the bottom n percent or cells that are below average.

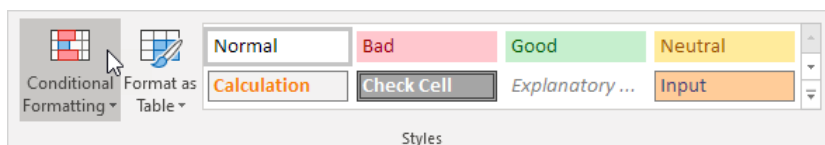
Conditional Formatting with Formulas

Take your Excel skills to the next level and use a formula to determine which cells to format. Formulas that apply conditional formatting must evaluate to TRUE or FALSE.

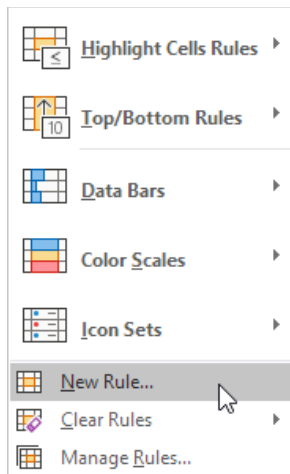
1. Select the range A1:E5.

	A	B	C	D	E	F
1	90	77	33	20	96	
2	59	66	20	61	44	
3	94	99	97	41	52	
4	36	43	70	13	54	
5	15	6	28	28	15	
6						

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



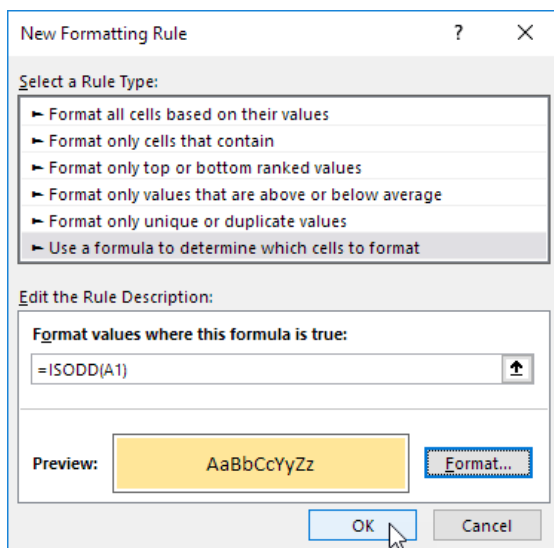
3. Click New Rule.



4. Select 'Use a formula to determine which cells to format'.

5. Enter the formula =ISODD(A1)

6. Select a formatting style and click OK.



Result: Excel highlights all odd numbers.

	A	B	C	D	E	F
1	90	77	33	20	96	
2	59	66	20	61	44	
3	94	99	97	41	52	
4	36	43	70	13	54	
5	15	6	28	28	15	
6						

Color Scales

[illegible]

Highlight Blank Cells

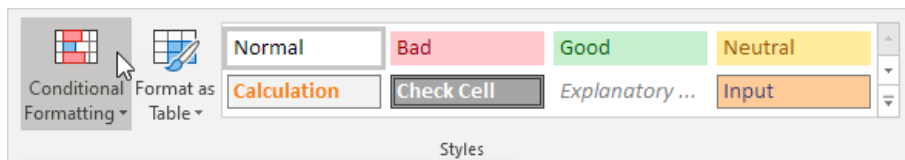
[illegible]

9- Data Bars in Excel

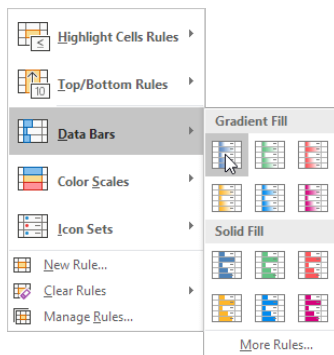
Data bars in Excel make it very easy to visualize values in a range of cells. A longer bar represents a higher value.

To add data bars, execute the following steps.

1. Select a range.
2. On the Home tab, in the Styles group, click Conditional Formatting.



3. Click Data Bars and click a subtype.



Result:

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

Explanation: by default, the cell that holds the minimum value (0 if there are no negative values) has no data bar and the cell that holds the maximum value (95) has a data bar that fills the entire cell. All other cells are filled proportionally.

4. Change the values.

Result: Excel updates the data bars automatically.

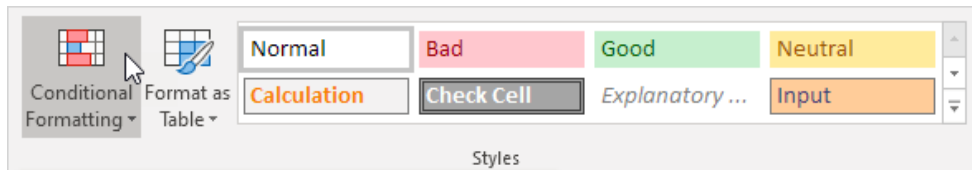
	A	B
1	101	
2	125	
3	137	
4	114	
5	139	
6	106	
7	127	
8	148	
9	133	
10	121	
11		

10- Color Scales in Excel

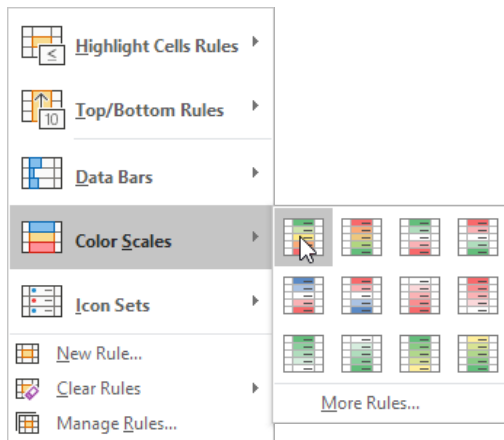
Color Scales in Excel make it very easy to visualize values in a range of cells. The shade of the color represents the value in the cell.

To add a color scale, execute the following steps.

1. Select a range.
2. On the Home tab, in the Styles group, click Conditional Formatting.



3. Click Color Scales and click a subtype.



Result:

	A	B
1	26	
2	37	
3	9	
4	80	
5	36	
6	15	
7	50	
8		

Explanation: by default, for 3-Color scales, Excel calculates the 50th percentile (also known as median, middle value or midpoint). The cell that holds the minimum value (9) is colored red. The cell that holds the median (36) is colored yellow, and the cell that holds the maximum value (80) is colored green. All other cells are colored proportionally.

Read on to further customize this color scale.

4. Select the range A1:A7.

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

6. Click Edit rule.

Excel launches the Edit Formatting Rule dialog box. Here you can further customize your color scale (Format Style, Minimum, Midpoint and Maximum, Color, etc).

Edit Formatting Rule

Select a Rule Type:

- Format all cells based on their values
- Format only cells that contain
- Format only top or bottom ranked values
- Format only values that are above or below average
- Format only unique or duplicate values
- Use a formula to determine which cells to format

Edit the Rule Description:

Format all cells based on their values:

Format Style: 3-Color Scale

	Minimum	Midpoint	Maximum
Type:	Lowest Value	Percentile	Highest Value
Value:	(Lowest value)	50	(Highest value)
Color:	Red	Yellow	Green

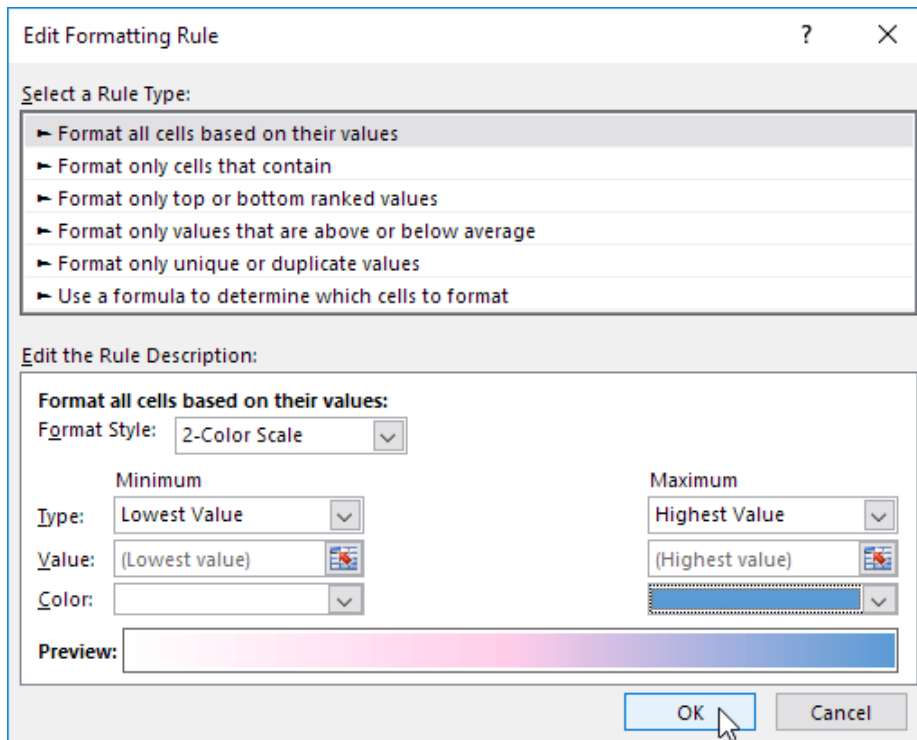
Preview: [Color gradient bar]

OK Cancel

Note: to directly launch this dialog box for new rules, at step 3, click More Rules.

7. Select 2-Color Scale from the Format Style drop-down list and select white and blue.

8. Click OK twice.



Result:

	A	B
1	26	
2	37	
3	9	
4	80	
5	36	
6	15	
7	50	
8		

Icon Sets in Excel - Lab

Find Duplicates in Excel – Lab

11- Charts in Excel

A simple chart in Excel can say more than a sheet full of numbers. As you'll see, creating charts is very easy.

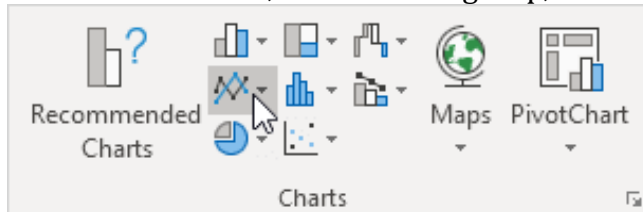
Create a Chart

To create a line chart, execute the following steps.

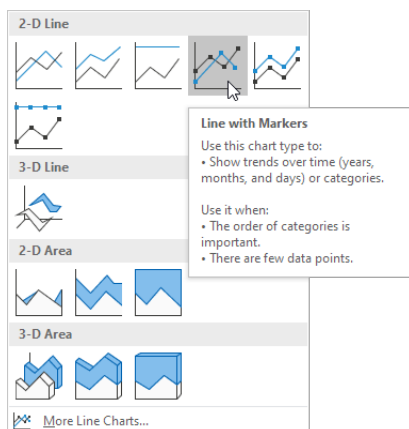
1. Select the range A1:D7.

	A	B	C	D	E
1	Month	Bears	Dolphins	Whales	
2	Jan	8	150	80	
3	Feb	54	77	54	
4	Mar	93	32	100	
5	Apr	116	11	76	
6	May	137	6	93	
7	Jun	184	1	72	
8					

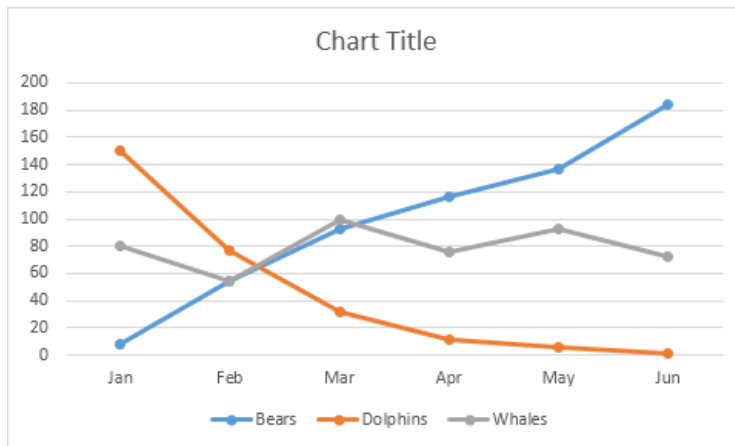
2. On the Insert tab, in the Charts group, click the Line symbol.



3. Click Line with Markers.



Result:

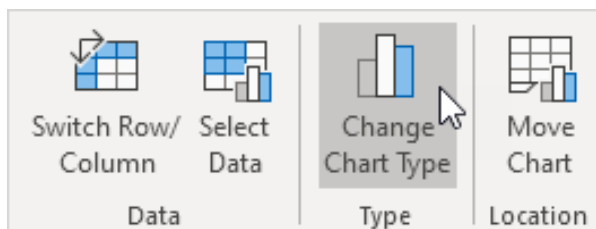


Note: enter a title by clicking on Chart Title. For example, Wildlife Population.

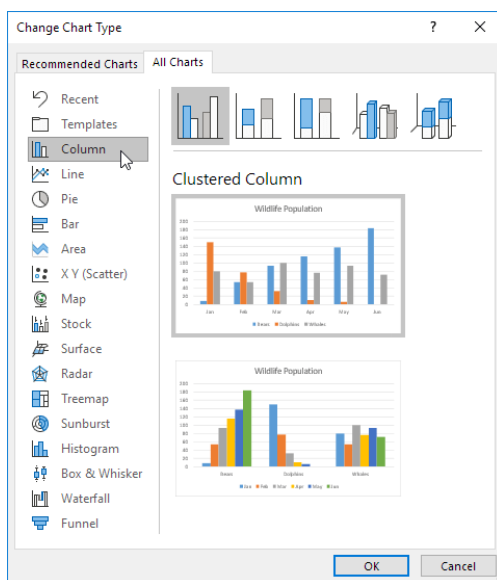
Change Chart Type

You can easily change to a different type of chart at any time.

1. Select the chart.
2. On the Chart Design tab, in the Type group, click Change Chart Type.

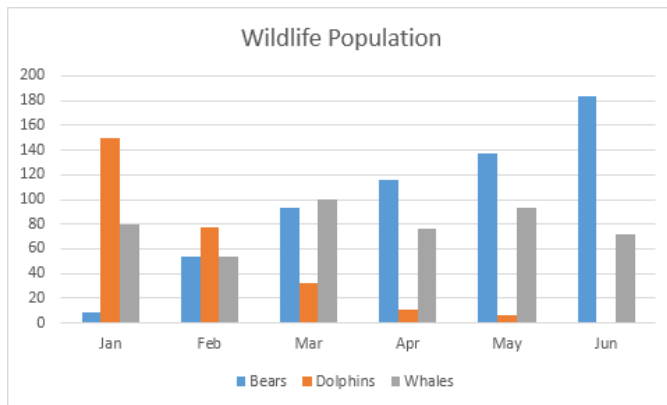


3. On the left side, click Column.



4. Click OK.

Result:

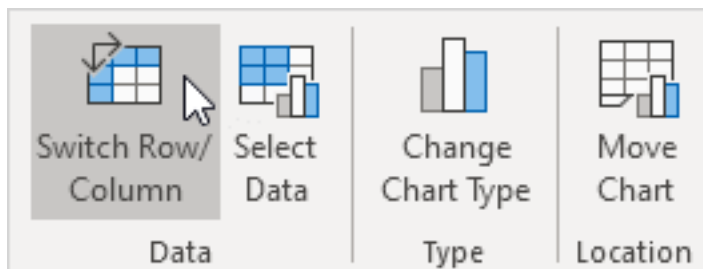


Switch Row/Column

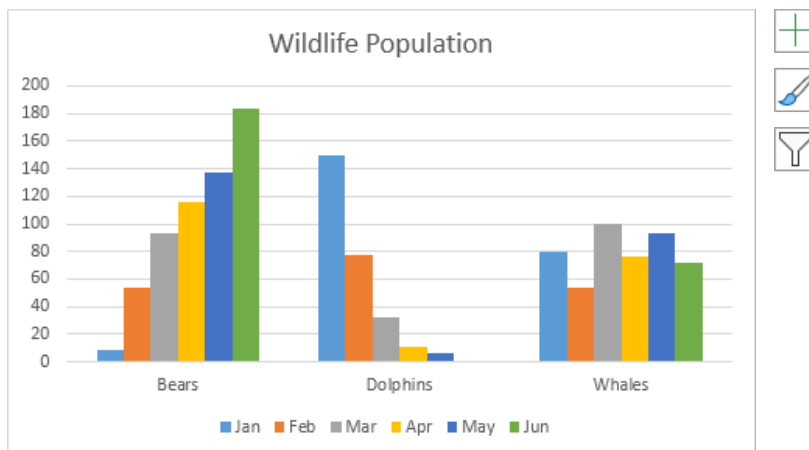
If you want to display the animals (instead of the months) on the horizontal axis, execute the following steps.

1. Select the chart.

2. On the Chart Design tab, in the Data group, click Switch Row/Column.



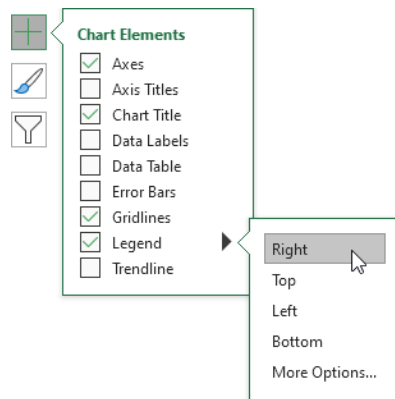
Result:



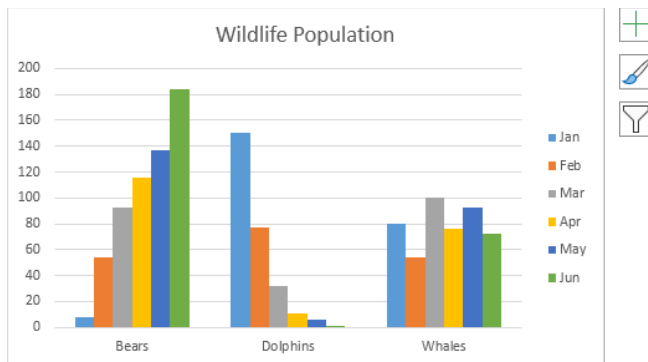
Legend Position

To move the legend to the right side of the chart, execute the following steps.

1. Select the chart.
2. Click the + button on the right side of the chart, click the arrow next to Legend and click Right.



Result:

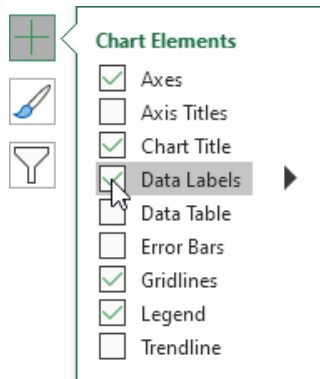


Data Labels

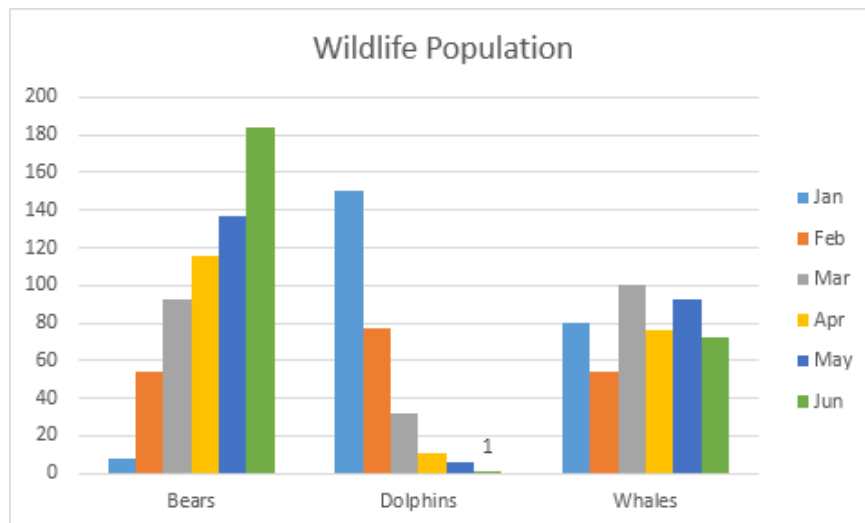
You can use data labels to focus your readers' attention on a single data series or data point.

1. Select the chart.
2. Click a green bar to select the Jun data series.
3. Hold down CTRL and use your arrow keys to select the population of Dolphins in June (tiny green bar).

4. Click the + button on the right side of the chart and click the check box next to Data Labels.



Result:



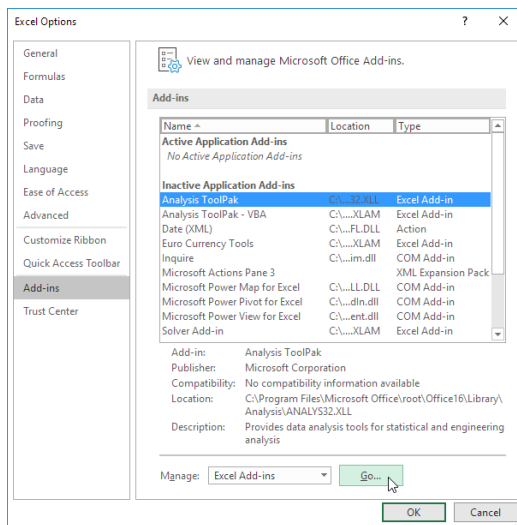
12- Analysis ToolPak in Excel

The Analysis ToolPak is an Excel add-in program that provides data analysis tools for financial, statistical and engineering data analysis.

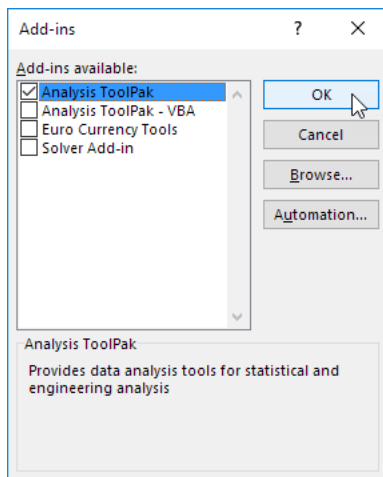
To load the Analysis ToolPak add-in, execute the following steps.

1. On the File tab, click Options.

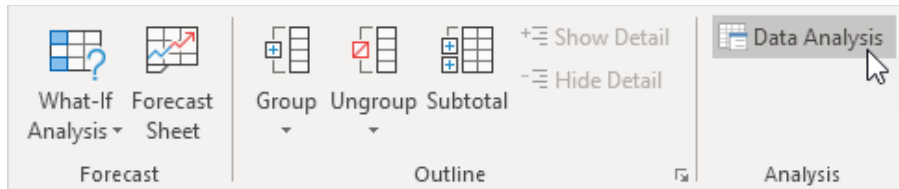
2. Under Add-ins, select Analysis ToolPak and click on the Go button.



3. Check Analysis ToolPak and click on OK.

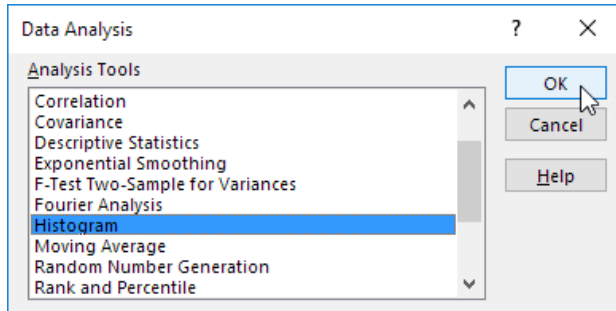


4. On the Data tab, in the Analysis group, you can now click on Data Analysis.



The following dialog box below appears.

5. For example, select Histogram and click OK to create a Histogram in Excel.



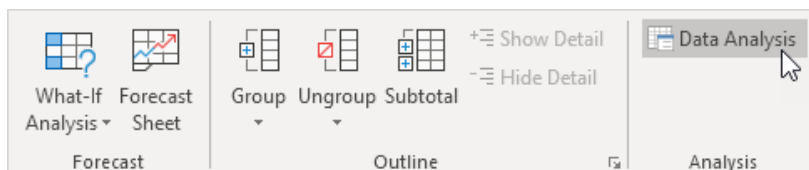
13- Histogram in Excel

This example teaches you how to make a histogram in Excel.

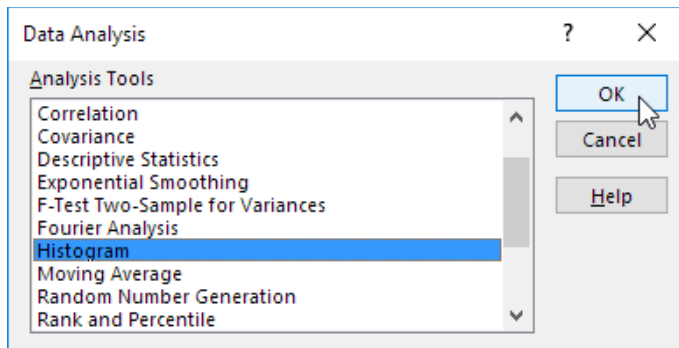
1. First, enter the bin numbers (upper levels) in the range C4:C8.

	A	B	C	D
1	Number of students			
2	22			
3	29			
4	40		20	
5	30		25	
6	48		30	
7	24		35	
8	21		40	
9	19			
10	24			
11	22			
12	25			
13	52			
14	35			
15	40			
16	31			
17	37			
18	21			
19	23			
20				

2. On the Data tab, in the Analysis group, click Data Analysis.



3. Select Histogram and click OK.

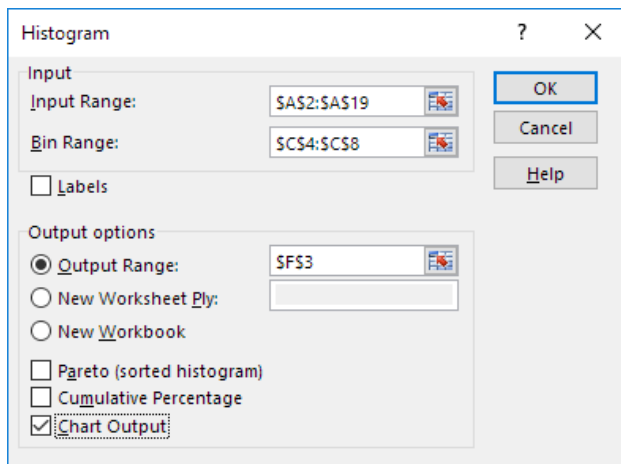


4. Select the range A2:A19.

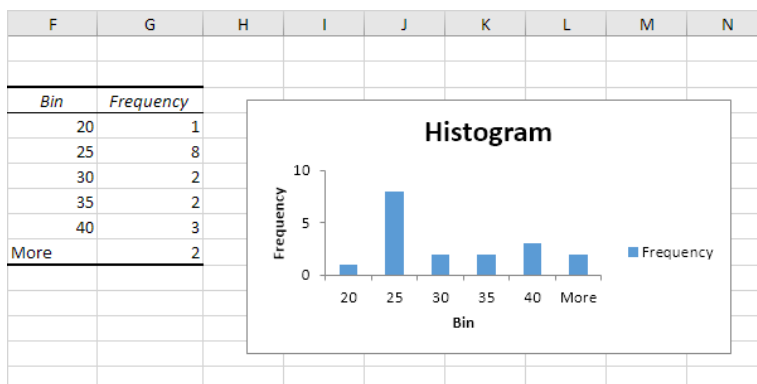
5. Click in the Bin Range box and select the range C4:C8.

6. Click the Output Range option button, click in the Output Range box and select cell F3.

7. Check Chart Output.



8. Click OK.



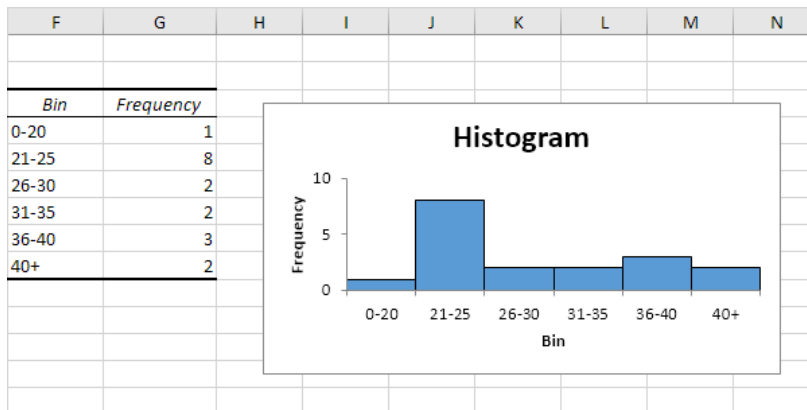
9. Click the legend on the right side and press Delete.

10. Properly label your bins.

11. To remove the space between the bars, right click a bar, click Format Data Series and change the Gap Width to 0%.

12. To add borders, right click a bar, click Format Data Series, click the Fill & Line icon, click Border and select a color.

Result:

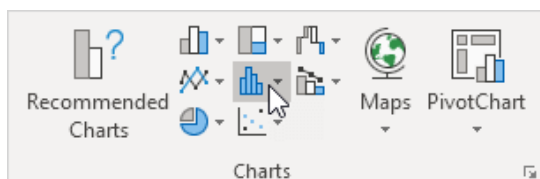


If you have Excel 2016 or later, simply use the Histogram chart type.

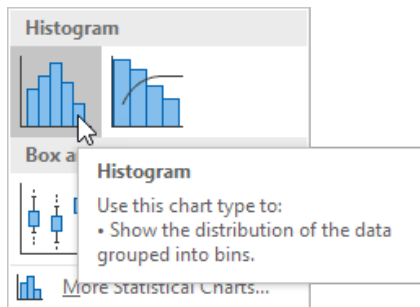
13. Select the range A1:A19.

	A	B
1	Number of students	
2		22
3		29
4		40
5		30
6		48
7		24
8		21
9		19
10		24
11		22
12		25
13		52
14		35
15		40
16		31
17		37
18		21
19		23
20		

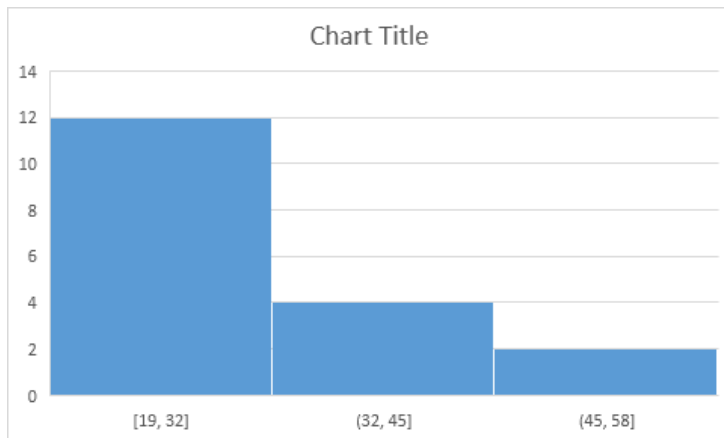
14. On the Insert tab, in the Charts group, click the Histogram symbol.



15. Click Histogram.

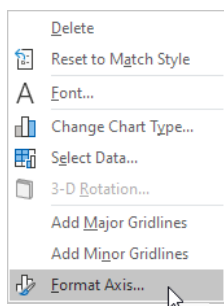


Result: a histogram with 3 bins.



Note: Excel uses Scott's normal reference rule for calculating the number of bins and the bin width.

16. Right click the horizontal axis, and then click Format Axis.



The Format Axis pane appears.

17. Define the histogram bins. We'll use the same bin numbers as before (see first picture on this page). Bin width: 5. Number of bins: 6. Overflow bin: 40. Underflow bin: 20.

Format Axis

Axis Options ▼ Text Options

Axis Options

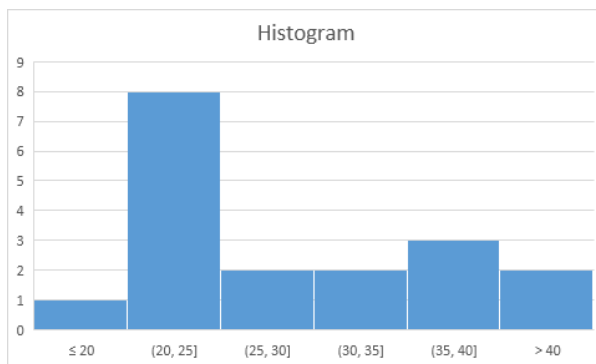
Bins

☐ By Category
☐ Automatic
☐ Bin width 5.0
☒ Number of bins 6

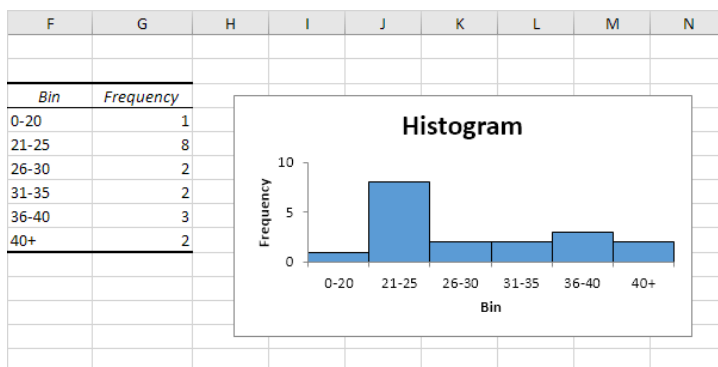
☒ Overflow bin 40.0 Reset
☒ Underflow bin 20.0 Reset

▸ Tick Marks
 ▸ Number

Result:



Recall, we made the following histogram using the Analysis ToolPak (steps 1-12).



Conclusion: the bin labels look different, but the histograms are the same. ≤ 20 is the same as 0-20, $(20, 25]$ is the same as 21-25, etc.

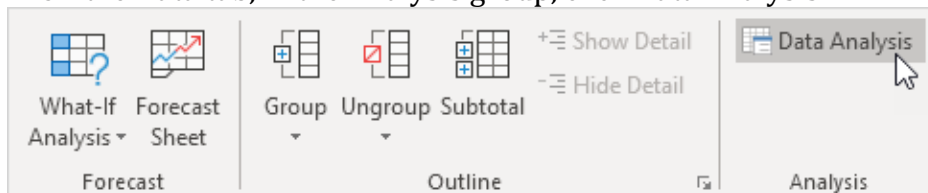
14- Descriptive Statistics in Excel

You can use the Analysis Toolpak add-in to generate descriptive statistics. For example, you may have the scores of 14 participants for a test.

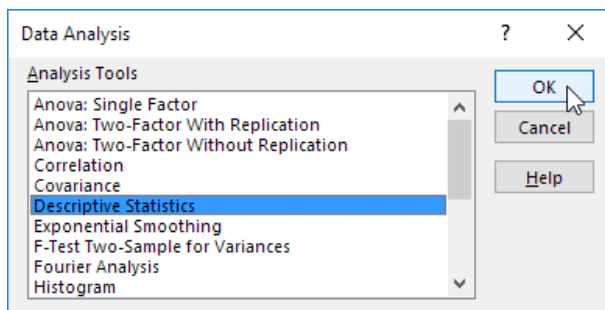
	A	B
1	Scores	
2	82	
3	93	
4	91	
5	69	
6	96	
7	61	
8	88	
9	58	
10	59	
11	100	
12	93	
13	71	
14	78	
15	98	
16		

To generate descriptive statistics for these scores, execute the following steps.

1. On the Data tab, in the Analysis group, click Data Analysis.



2. Select Descriptive Statistics and click OK.



3. Select the range A2:A15 as the Input Range.

4. Select cell C1 as the Output Range.

5. Make sure Summary statistics is checked.

Descriptive Statistics

Input
 Input Range:

Grouped By: ☒ Columns ☐ Rows

☐ Labels in first row

Output options
☒ Output Range:
☐ New Worksheet Ply:
☐ New Workbook
☒ Summary statistics
☐ Confidence Level for Mean: %
☐ Kth Largest:
☐ Kth Smallest:

6. Click OK.

Result:

	A	B	C	D	E
1	Scores		Column1		
2	82				
3	93	Mean		81.21428571	
4	91	Standard Error		4.045318243	
5	69	Median		85	
6	96	Mode		93	
7	61	Standard Deviation		15.13619489	
8	88	Sample Variance		229.1043956	
9	58	Kurtosis		-1.426053506	
10	59	Skewness		-0.402108004	
11	100	Range		42	
12	93	Minimum		58	
13	71	Maximum		100	
14	78	Sum		1137	
15	98	Count		14	
16					