1. Data Form

1.1 Introduction

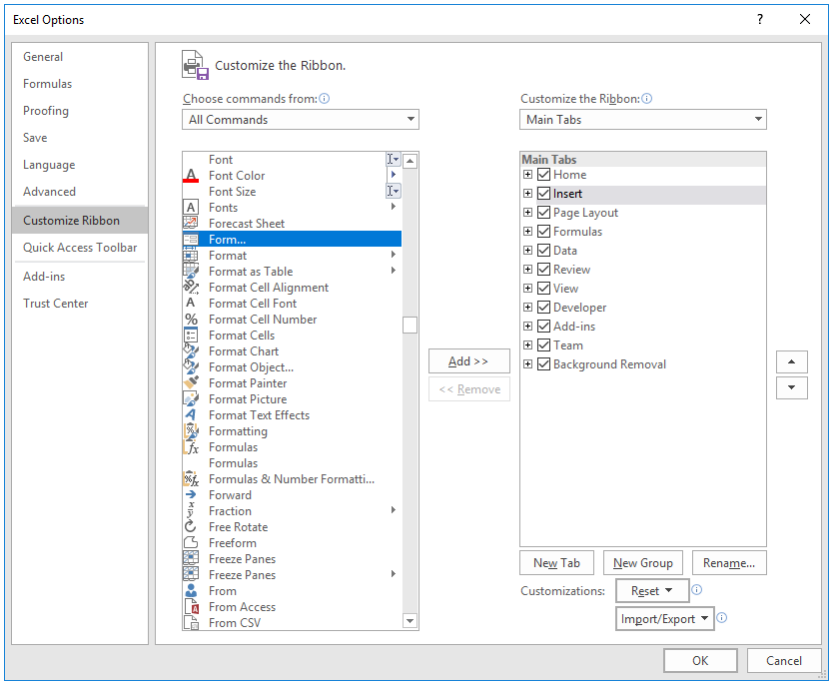
A data form provides a convenient means to enter or display one complete row of information in a range or table without scrolling horizontally. You may find that using a data form can make data entry easier than moving from column to column when you have more columns of data than can be viewed on the screen. Use a data form when a simple form of text boxes that list the column headings as labels is sufficient and you don't need sophisticated or custom form features, such as a list box or spin button.

Excel can automatically generate a built-in data form for your range or table. The data form displays all column headers as labels in a single dialog box. Each label has an adjacent blank text box in which you can enter data for each column, up to a maximum of 32 columns. In a data form, you can enter new rows, find rows by navigating, or update rows and delete rows. If a cell contains a formula, the formula result is displayed in the data form, but you cannot change the formula by using the data form. However, you cannot print a data form until you close the data form.

1.2 Create a Data Form

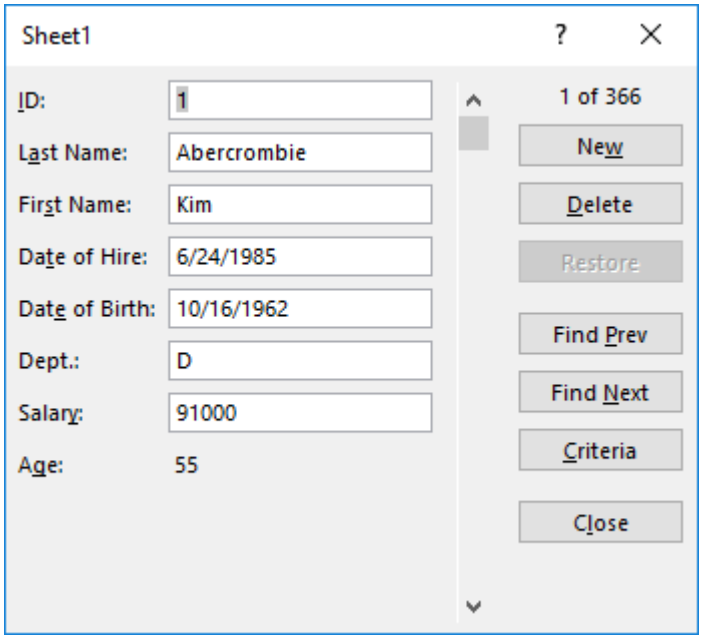
In the **Excel Options,** click the **Customize Ribbon** button on the left. To add the **Data Form** option, click the drop-down list where it says **Choose Commands From**, click on **Commands Not in the Ribbon** and select **Form**. Now click the **Add** button for adding the button to the toolbar.

1. Add a column header to each column in the range or table. Excel uses these column headers to create labels for each field on the form.
2. Select the range or table which you want to add the form, and then select **Form**.



1.3 Add new Record

1. Click **[New]** in the data form windows.
2. Type the information for the new record, and press **[Enter]** to add the record.
3. When you finish adding records, click **[Close]** to add the new record and close the data form.



1.4 Find a Record

1.4.1 Find a Record by Navigating

To move through records one at a time, use the scroll bar arrows in the dialog box. To move through 10 records at a time, click the scroll bar between the arrows.

To move to the next record in the range or list, click **[Find Next]**. To move to the previous record in the range or list, click **[Find Prev]**.

1.4.2 Find a Record by Entering Search Criteria

To set search conditions, or comparison criteria, click **[Criteria]**, then enter the criteria into the data form. To find records that match the criteria, click **[Find Next]** or **[Find Prev]**. To return to the data form without searching for records based on the criteria you specified, click **[Form]**.

The following wildcard characters can be used as comparison criteria for filters, and when searching and replacing content.

Use	To Find
? (question mark)	Any single character For example, sm?th finds "smith" and "smyth"
* (asterisk)	Any number of characters For example, *east finds "Northeast" and "Southeast"
~ (tilde) followed by ?, *, or ~	A question mark, asterisk, or tilde For example, fy91~? finds "fy91?"

1.5 Change a Record

1. Find the row that you want to change.
2. Change the data in the row. To move to the next field in the row, press **[Tab]**. To move to the previous field, press **[Shift]** + **[Tab]**.
3. After you finish changing data, press **[Enter]** to update the row. Excel automatically moves to the next row.

1.6 Delete a row

1. In the data form, find the row that you want to delete.
2. Click **[Delete]**. Excel prompts you to confirm the operation. You cannot undo a row deletion after you confirm it.

1.7 Close a Data Form

To close the data form and return to the worksheet, click **[Close]**.

2. Filtering

2.1 Overview

Filtering is a quick and easy way to find and work with a subset of data in a range. A filtered range displays only the rows that meet the criteria you specify for a column. Excel provides two commands for filtering ranges: AutoFilter and Advanced Filter.

Unlike sorting, filtering does not rearrange a range. Filtering temporarily hides rows you do not want displayed. When Excel filters rows, you can edit, format, chart, and print your range subset without rearranging or moving it.

2.2 Use AutoFilter for Simple Criteria and to Filter by Selection

Using AutoFilter, you can create three types of filters: by a list values, by a format, or by criteria. Each of these filter types is mutually exclusive for each range of cells or column table. For example, you can filter by cell color or by a list of numbers, but not by both; you can filter by icon or by a custom filter, but not by both.

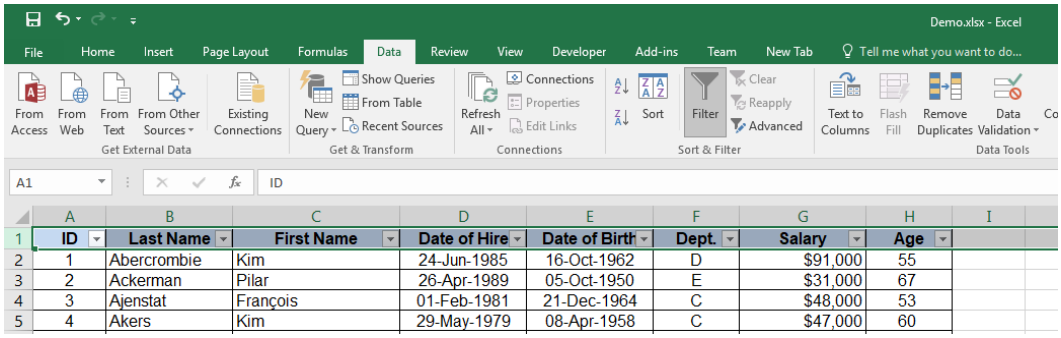
2.2.1 Data Type Checking

In your worksheet, the top row of each column should have a heading that describes the contents of the column, such as “Last Name” and “Age”. The data in each column should all be the same type. For instance, do not mix text in a column with numbers, or numbers in a column with dates.

	A	B	C	D	E	F	G	H
1	ID	Last Name	First Name	Date of Hire	Date of Birth	Dept.	Salary	Age
2	1	Abercrombie	Kim	24-Jun-1985	16-Oct-1962	D	$91,000	55
3	2	Ackerman	Pilar	26-Apr-1989	05-Oct-1950	E	$31,000	67
4	3	Ajenstat	François	01-Feb-1981	21-Dec-1964	C	$48,000	53
5	4	Akers	Kim	29-May-1979	08-Apr-1958	C	$47,000	60

2.2.2 Activate the AutoFilter

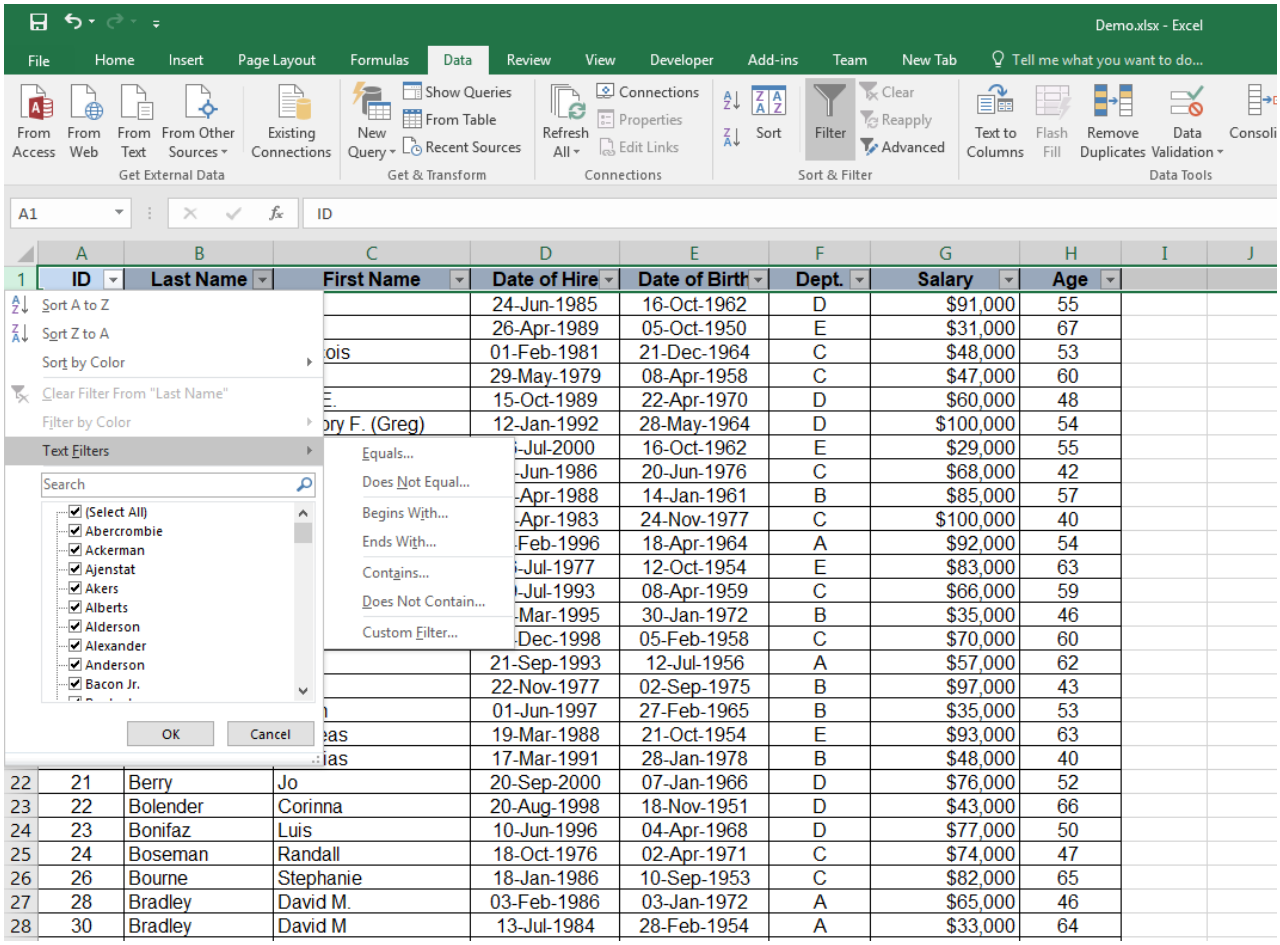
Activate the AutoFilter by select **Data** Tab, then **Filter**. The AutoFilter arrows now appear to the right of each column heading. If you select an entire column instead of a single cell before clicking the Filter command, an AutoFilter arrow will appear only on the selected column, not on all columns of the data.



	A	B	C	D	E	F	G	H	I
1	ID	Last Name	First Name	Date of Hire	Date of Birth	Dept.	Salary	Age	
2	1	Abercrombie	Kim	24-Jun-1985	16-Oct-1962	D	$91,000	55	
3	2	Ackerman	Pilar	26-Apr-1989	05-Oct-1950	E	$31,000	67	
4	3	Ajenstat	François	01-Feb-1981	21-Dec-1964	C	$48,000	53	
5	4	Akers	Kim	29-May-1979	08-Apr-1958	C	$47,000	60	

2.2.3 Start Filtering Data

Suppose your worksheet contains customer sales data. Each customer entry includes information about the customer's location, products they purchase, purchase dates, and revenues and profits from each purchase. Perhaps you want to view sales activity only for those customers located in the West region. Excel can help you do this.



ID	Last Name	First Name	Date of Hire	Date of Birth	Dept.	Salary	Age
			24-Jun-1985	16-Oct-1962	D	$91,000	55
			26-Apr-1989	05-Oct-1950	E	$31,000	67
		ois	01-Feb-1981	21-Dec-1964	C	$48,000	53
			29-May-1979	08-Apr-1958	C	$47,000	60
		E.	15-Oct-1989	22-Apr-1970	D	$60,000	48
		ory F. (Greg)	12-Jan-1992	28-May-1964	D	$100,000	54
			-Jul-2000	16-Oct-1962	E	$29,000	55
			-Jun-1986	20-Jun-1976	C	$68,000	42
			-Apr-1988	14-Jan-1961	B	$85,000	57
			-Apr-1983	24-Nov-1977	C	$100,000	40
			-Feb-1996	18-Apr-1964	A	$92,000	54
			-Jul-1977	12-Oct-1954	E	$83,000	63
			-Jul-1993	08-Apr-1959	C	$66,000	59
			-Mar-1995	30-Jan-1972	B	$35,000	46
			-Dec-1998	05-Feb-1958	C	$70,000	60
			21-Sep-1993	12-Jul-1956	A	$57,000	62
			22-Nov-1977	02-Sep-1975	B	$97,000	43
			01-Jun-1997	27-Feb-1965	B	$35,000	53
		eas	19-Mar-1988	21-Oct-1954	E	$93,000	63
		ias	17-Mar-1991	28-Jan-1978	B	$48,000	40
21	Berry	Jo	20-Sep-2000	07-Jan-1966	D	$76,000	52
22	Bolender	Corinna	20-Aug-1998	18-Nov-1951	D	$43,000	66
23	Bonifaz	Luis	10-Jun-1996	04-Apr-1968	D	$77,000	50
24	Boseman	Randall	18-Oct-1976	02-Apr-1971	C	$74,000	47
26	Bourne	Stephanie	18-Jan-1986	10-Sep-1953	C	$82,000	65
28	Bradley	David M.	03-Feb-1986	03-Jan-1972	A	$65,000	46
30	Bradley	David M	13-Jul-1984	28-Feb-1954	A	$33,000	64

2.2.4 Apply Additional Filters

If you want to focus on even more specific information, you can filter again on another column, and then again on another column, and so on. You can click the arrow next to any heading in any column to apply a filter.

2.2.5 Turn Off Filtering

How you remove filters depends on how many filters you have applied, and from how many columns you wish to remove filters.

- To remove a filter from one column, click the AutoFilter arrow next to that column, and then click **All**. That command will display the rows hidden by that filter.
- To turn off AutoFilter, click select **Data** tab, then click **Filter** again.

2.3 Custom Filter Example

Excel enables you to perform more intricate types of filtering. Two particularly useful types are:

- Top 10 Filter
- Custom Filtering.

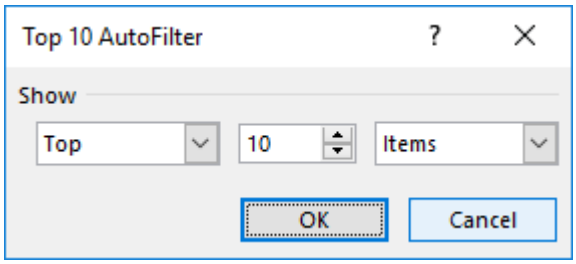
When you apply a filter to a column, the only filters available for other columns are the values visible in the currently filtered range. Only the first 1000 unique entries in a list appear when you click the arrow

2.3.1 Finding the Top 10 (or Bottom 10) in a Column

You can use the **Top 10** filter on columns of numbers or dates. With Top 10 you can find either the top items or the bottom items (the smallest or largest numbers or dates). And you're not limited to finding the top 10 items or the bottom 10 items. You can choose how many items you want to see: only 1 or as many as 500. You can use Top 10 to find the highest-priced or lowest-priced products, to identify employees with the most recent hire dates, or to see the top or bottom student grades.

To use Top 10 on a column of data, click on a data cell in the column and then click the column's AutoFilter arrow. Select **(Top 10…)** near the top of the drop down list. The **Top 10 AutoFilter** dialog box opens. In the dialog box, select either **Top** or **Bottom**. Then select a number. Finally, select either **Items** or **Percent**.

You can filter columns in any order you choose. The filters are applied progressively, in the order you apply them. Each filter limits the data to which you can apply the next filter.



2.3.1.1 Filter for the Smallest or Largest Number

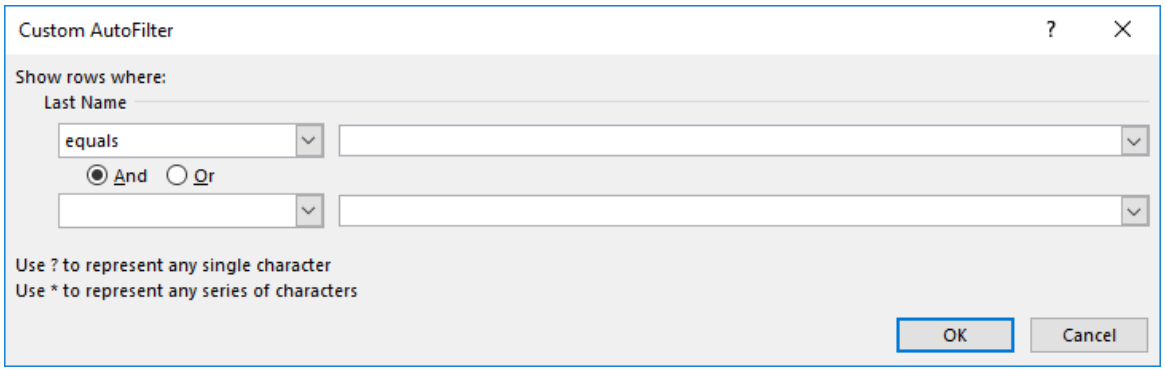
1. Click the arrow in the column that contains the numbers, and click **(Top 10...)**.
2. In the box on the left, click **Top**, or **Bottom**.
3. In the box in the middle, enter a number.
4. In the box on the right, click **Items**.

2.3.1.2 Filter for the Top or Bottom Numbers by Percent

1. Click the arrow in the column that contains the numbers, and click **(Top 10...)**.
2. In the box on the left, click **Top** or **Bottom**.
3. In the box in the middle, enter a number.
4. In the box on the right, click **Percent**.

2.3.2 Using Custom Filters

When you filter by choosing from the AutoFilter drop-down list, you hide everything except your single choice. If you want to see more than one selection in a column, you can create custom filters. To create a custom filter, click **(Custom…)** near the top of the drop down list. The **Custom AutoFilter** dialog box opens. You can now enter two filtering requirements for the column of data.



2.3.2.1 Filter a Range for Rows that Contain Specific Text

1. Click the arrow in the column that contains the numbers, and click **(Custom)**.
2. In the box on the left, click **equals**, or **does not equal**, **contains**, or **does not contain**.
3. In the box on the right, enter the text you want. If you need to find text values that share some characters but not others, use a wildcard character.
4. To add another criteria, click **And** or **Or**, and repeat the previous step.

2.3.2.2 Filter for Blank or Nonblank Cells

Click the arrow in the column that contains the numbers, then click **(Blanks)** or **(NonBlanks)**. The **Blanks** and **NonBlanks** options are available only if the column you want to filter contains a blank cell.

2.3.2.3 Filter for Numbers Greater than or Less than Another Number

1. Click the arrow in the column that contains the numbers, and click **(Custom)**.
2. In the box on the left, click **is greater than**, **is less than**, **is greater than or equal to**, or **is less than or equal to**.
3. In the box on the right, enter a number.
4. To add another criteria, click **And** or **Or**, and repeat the previous step.

2.3.2.4 Filter for a Number Equal to or Not Equal to Another Number

1. Click the arrow in the column that contains the numbers, and click **(Custom)**.
2. In the box on the left, click **equals**, or **does not equal**.
3. In the box on the right, enter a number.
4. To add another criteria, click **And** or **Or**, and repeat the previous step.

2.3.2.5 Filter for the beginning or end of a text string

1. Click the arrow in the column that contains the numbers, and click **(Custom)**.
2. In the box on the left, click **begins with**, or **does not begin with**, or **ends with**, or **does not end with**.
3. In the box on the right, enter the text you want. If you need to find text values that share some characters but not others, use a wildcard character.
4. To add another criteria, click **And** or **Or**, and repeat the previous step.

2.4 Use Advanced Filter for more Complex Criteria

Excel's Advanced Filter is really helpful when it comes to finding data that meets two or more complex criteria such as extracting matches and differences between two columns, filtering rows that match items in another list, finding exact matches including uppercase and lowercase characters, and more.

The **Data ➔ Filter ➔ Advanced Filter** lets you use complex criteria to filter a range, but it works differently from the AutoFilter command in several important ways.

1. It displays the Advanced Filter dialog box instead of the Custom AutoFilter dialog box.
2. You do not type the complex criteria in the Advanced Filter dialog box as you do in the Custom AutoFilter dialog box. Rather, you type the complex criteria in a criteria range on the worksheet and above the range you want to filter. Excel uses the separate criteria range in the Advanced Filter dialog box as the source for the complex criteria.
3. Although you can filter a range in place, like the AutoFilter command, the Advanced Filter command does not display drop-down lists for the columns

In order to use the Advanced Filter

1. Insert at least three blank rows above the range that can be used as a criteria range. The criteria range must have column labels. Make sure there is at least one blank row between the criteria values and the range.
2. In the rows below the column labels, type the criteria you want to match.
3. Select the range, and then select **Data ➔ Filter ➔ Advanced Filter**

	A	B	C	D
1	**Type**	**Salesperson**	**Sales**	
2				
3				
4				
5				
6	**Type**	**Salesperson**	**Sales**	
7	Beverages	Suyama	$5,122.00	
8	Meat	Davolio	$450.00	
9	produce	Buchanan	$6,328.00	
10	Produce	Davolio	$6,544.00	
11				

2.4.1 Using OR Criteria

To find rows that meet multiple criteria for one column, type the criteria directly below each other in separate rows of the criteria range. *For example: In order to find either Salesperson = "Davolio" OR Salesperson = "Buchanan"*

1. Type = "=Davolio" in cell B2
2. Type = "= Buchanan" in cell B3
3. Select **Data ➔ Filter ➔ Advanced Filter**, and define the **List range** (A6:C10), the **Criteria range** (B1:B3)
4. The rows that contain either "Davolio" or "Buchanan" in the Salesperson column (A8:C10) is filtered.

	A	B	C	D
1	**Type**	**Salesperson**	**Sales**	
2		=Davolio		
3		=Buchanan		
4				
5				
6	**Type**	**Salesperson**	**Sales**	
8	Meat	Davolio	$450.00	
9	produce	Buchanan	$6,328.00	
10	Produce	Davolio	$6,544.00	
11				

2.4.2 Using AND Criteria

To find rows that meet multiple criteria in multiple columns, type all of the criteria in the same row of the criteria range. *For example: In order to find Type = "Produce" AND Sales > 1000*

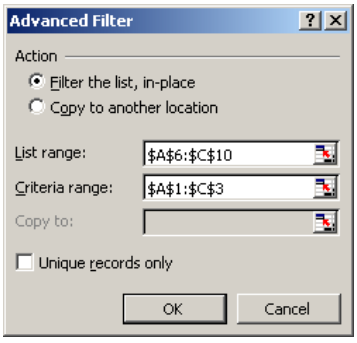
1. Type ="=Produce" in cell A2
2. Type =">1000" in cell C2
3. Select **Data ➔ Filter ➔ Advanced Filter**, and define the **List range** (A6:C10), the **criteria range** (A1:C2)
4. The rows that contain "Produce" in the Type column and a value greater than $1,000 in the Sales column (A9:C10) is filtered.

	A	B	C	D
1	**Type**	**Salesperson**	**Sales**	
2	=Produce		>1000	
3				
4				
5				
6	**Type**	**Salesperson**	**Sales**	
9	produce	Buchanan	$6,328.00	
10	Produce	Davolio	$6,544.00	
11				
12				

2.4.3 Multiple Criteria in Multiple Columns where Any Criteria can be True

To find rows that meet multiple criteria in multiple columns, where any criteria can be true, type the criteria in different rows of the criteria range. *For example, in order to find Type = "Produce" OR Salesperson = "Davolio"*

1. Type ="=Produce" in cell A2
2. Type ="=Davolio" in cell B3
3. Select **Data ➔ Filter ➔ Advanced Filter**, and define the **List range** (A6:C10), the **criteria range** (A1:B3)
4. The rows that contain "Produce" in the Type column or "Davolio" in the Salesperson column (A8:C10) is filtered.

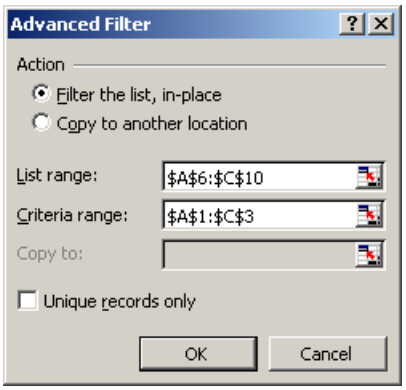


	A	B	C	D
1	Type	Salesperson	Sales	
2	=Produce			
3		=Davolio		
4				
5				
6	Type	Salesperson	Sales	
8	Meat	Davolio	$450.00	
9	produce	Buchanan	$6,328.00	
10	Produce	Davolio	$6,544.00	
11				

2.4.4 Multiple Sets of Criteria where Each Set Includes Criteria for Multiple Columns

To find rows that meet multiple sets of criteria, where each set includes criteria for multiple columns, type each set of criteria in separate rows. *For example, in order to find (Salesperson = "Davolio" AND Sales >3000) OR (Salesperson = "Buchanan" AND Sales > 1500)*

1. Type ="=Davolio" in cell B2 and =">3000" in cell C2
2. Type ="=Buchanan" in cell B3 and =">1500" in cell C3
3. Select **Data ➔ Filter ➔ Advanced Filter**, and define the **List range** (A6:C10), the **criteria range** (A1:C3)
4. The rows that contain both "Davolio" in the Salesperson column and a value greater than $3,000 in the Sales column, or displays the rows that contain "Buchanan" in the Salesperson and a value greater than $1,500 in the Sales column (A9:C10) is filtered.

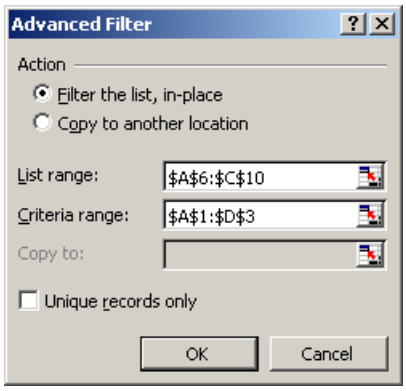


	A	B	C
1	Type	Salesperson	Sales
2		=Davolio	>3000
3		=Buchanan	>1500
4			
5			
6	Type	Salesperson	Sales
9	produce	Buchanan	$6,328.00
10	Produce	Davolio	$6,544.00

2.4.5 Multiple Sets of Criteria where Each Set Includes Criteria for One Column

To find rows that meet multiple sets of criteria, where each set includes criteria for one column, include multiple columns with the same column heading. F*or example, in order to find (Sales > 6000 AND Sales < 6500) OR (Sales < 500)*

1. Type =">6000 " in cell C2 and ="<6500" in cell D2
2. Type ="<500" in cell C3
3. Select **Data ➔ Filter ➔ Advanced Filter**, and define the **List range** (A6:C10), the **criteria range** (A1:D3)
4. The rows that contain values between 5,000 and 8,000 and values less than 500 in the Sales column (A8:C10) is filtered.

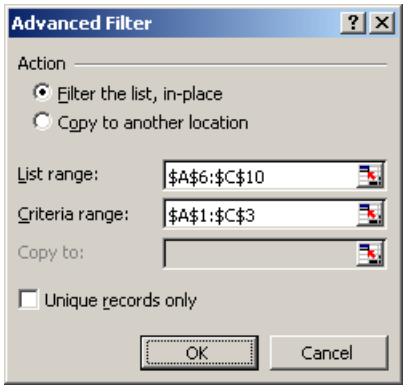


	A	B	C	D
1	Type	Salesperson	Sales	Sales
2			>6000	<6500
3			<500	
4				
5				
6	Type	Salesperson	Sales	
8	Meat	Davolio	$450.00	
9	produce	Buchanan	$6,328.00	

2.4.6 Criteria to Find Text Values that Share Some Characters but Not Others

To find text values that share some characters but not others, do one or more of the following. *For example, in order to find (Type begin with "ME" or the 2nd character is "u"*

1. Type ="Me" in cell A2
2. Type ="=?u*" in cell B3
3. Select **Data ➔ Filter ➔ Advanced Filter**, and define the **List range** (A6:C10), the **criteria range** (A1:C3)
4. The rows with "Me" as the first characters in the Type column or rows with the second character equal to "u" in the Salesperson column (A7:C9) is filtered.



	A	B	C
1	Type	Salesperson	Sales
2	Me		
3		=?u*	
4			
5			
6	Type	Salesperson	Sales
7	Beverages	Suyama	$5,122.00
8	Meat	Davolio	$450.00
9	produce	Buchanan	$6,328.00

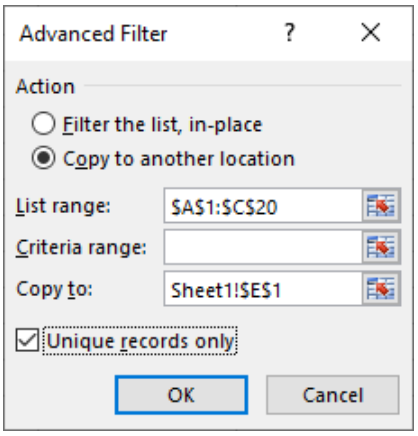
2.4.7 Extracting a Unique List

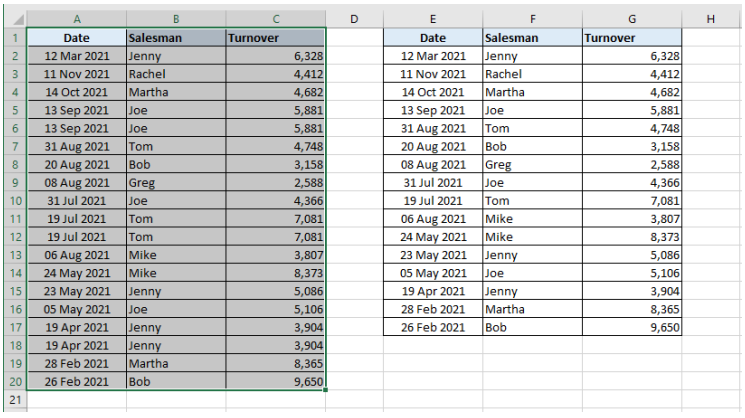
You can use Excel Advanced Filter to quickly extract unique records from a data set.

1. Suppose you have a dataset as shown below. Select the entire data set (including the headers).

Date	Salesman	Turnover
12 Mar 2021	Jenny	6,328
11 Nov 2021	Rachel	4,412
14 Oct 2021	Martha	4,682
13 Sep 2021	Joe	5,881
13 Sep 2021	Joe	5,881
31 Aug 2021	Tom	4,748
20 Aug 2021	Bob	3,158
08 Aug 2021	Greg	2,588
31 Jul 2021	Joe	4,366
19 Jul 2021	Tom	7,081
19 Jul 2021	Tom	7,081
06 Aug 2021	Mike	3,807
24 May 2021	Mike	8,373
23 May 2021	Jenny	5,086
05 May 2021	Joe	5,106
19 Apr 2021	Jenny	3,904
19 Apr 2021	Jenny	3,904
28 Feb 2021	Martha	8,365
26 Feb 2021	Bob	9,650

2. Select **Data ➔ Sort & Filter ➔ Advanced**, or press **[Alt] + [A] + [Q]**. This will open the Advanced Filter dialog box
3. In the Advanced Filter dialog box, input the following information:
   - Select the "**Copy to another location**" option. This will allow you to specify the location where you can get the list of unique records.
   - Make sure the "**List range"** refers to the dataset from which you want to find unique records. Also, make sure headers in the data set are included.
   - Specify the "**Copy To"** address where you want to get the list of unique records.
   - Tick the "**Copy Unique Records Only**" checkbox.
4. This will instantly give you a list of all the unique records.





3. Sorting

Excel provides numerous ways to sort worksheet ranges. You can sort by columns or rows, in ascending or descending order, and with capitalization considered or ignored. You can even define custom sorting sequences so that, for example, your company's division names always appear in a particular order, regardless of their alphabetic sequence.

3.1 Default Sort Orders

After sorting a list of Excel figures, are some of the numbers not in the order you expect? A common reason for this problem is that some numbers may be formatted and stored as text instead of as numbers. When you sort data that includes values formatted and stored as text and as numbers, Excel sorts the text values separately from the number values. For example, the sales value for Tennis is formatted as text, and there were no sales for Soccer. When you sort this data by the Sales column in ascending order, you will get the following result:

	A	B
1	**Sport**	**Sales**
2	Golf	5,500
3	Safari	10,000
4	Soccer	
5	Tennis	1,000
6	Windsurfing	1,850

	A	B
1	**Sport**	**Sales**
2	Windsurfing	1,850
3	Golf	5,500
4	Safari	10,000
5	Tennis	1,000
6	Soccer	

In an ascending sort, Microsoft Excel uses the following order. In a descending sort, this sort order is reversed except for blank cells, which are always placed last.

Numbers Numbers are sorted from the smallest negative number to the largest positive number.

Dates Dates are sorted from the earliest date to the latest date.

Alphanumeric sort When you sort alphanumeric text, Excel sorts left to right, character by character. For example, if a cell contains the text "A100," Excel places the cell after a cell that contains the entry "A1" and before a cell that contains the entry "A11."

Text and text that includes numbers are sorted in the following order:

0 1 2 3 4 5 6 7 8 9 (space) ! " # $ % & ( ) * , . / : ; ? @ [\ ] ^ _ ` { | } ~ + < = > A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Apostrophes (') and hyphens (-) are ignored, with one exception: If two text strings are the same except for a hyphen, the text with the hyphen is sorted last.

Logical values In logical values, FALSE is placed before TRUE.

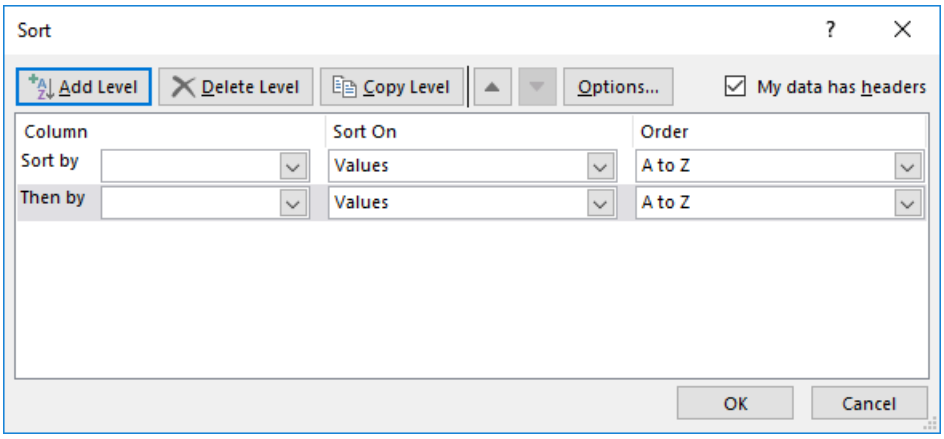
Error values All error values are equal.

Blanks Blanks are always placed last.

3.2 Sorting on Column (by Row)

You can sort on as many as three columns at once.

1. Select a column of alphanumeric data in a range of cells, or make sure that the active cell is in a table column containing alphanumeric data.
2. On the **Data** tab, in the **Sort & Filter** group, do one of the following:
   - To sort in ascending alphanumeric order, click **Sort A to Z**.
   - To sort in descending alphanumeric order, click **Sort Z to A**.
3. Optionally, you can do a case-sensitive sort.
   - In the **Sort** dialog box, click **Options**.
   - In the **Sort Options** dialog box, select **Case sensitive**.
   - Click **OK** twice.
4. To reapply a sort after you change the data, click a cell in the range or table, and then on the Data tab, in the Sort & Filter group, click Reapply.



3.3 Sorting by Columns

To sort by columns, follow these steps:

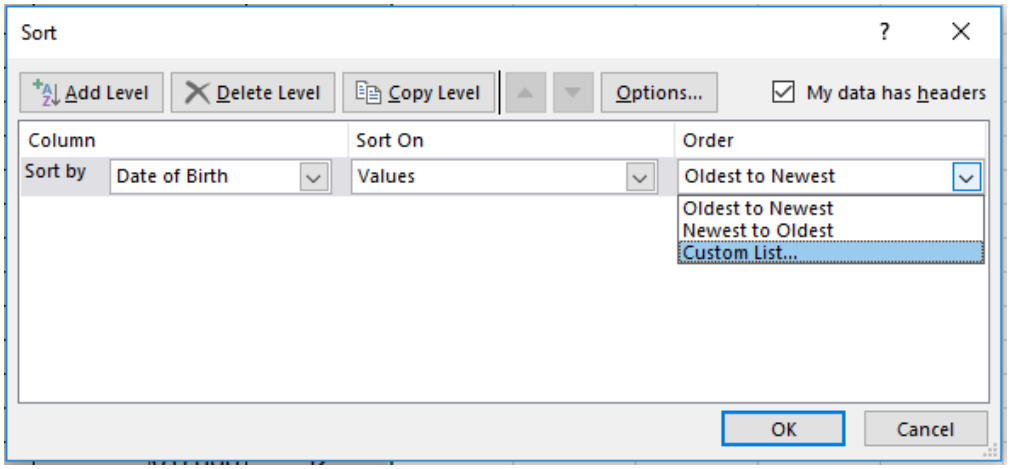
1. Select a column of alphanumeric data in a range of cells, or make sure that the active cell is in a table column containing alphanumeric data.
2. In the **Sort** dialog box, click **Options**.
3. In the **Sort Options** dialog box, select **Sort left to right**.
4. Click **OK** twice.
5. Fill out the boxes and option buttons in the **Sort** dialog box, and click **[OK]**.

3.4 Sorting Months, Weekdays, or Custom Lists

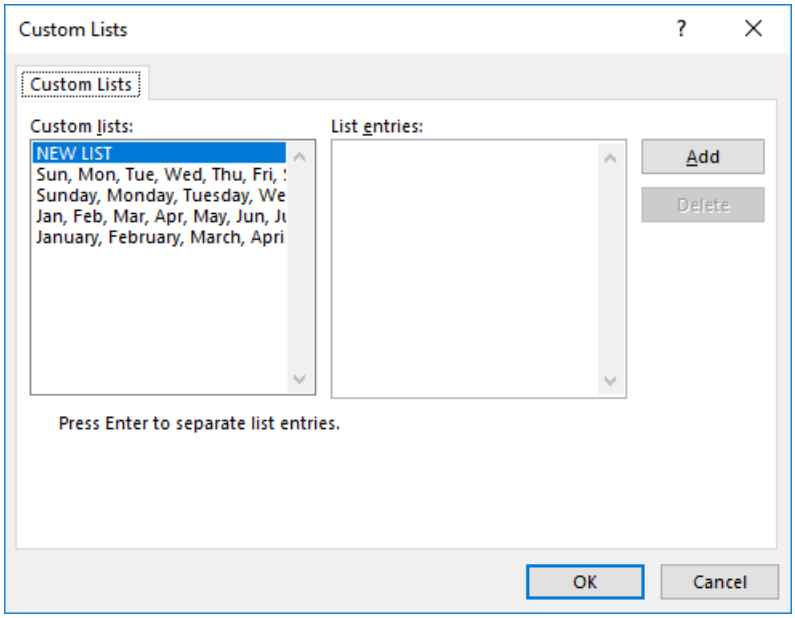
Excel normally sorts text in alphabetical order, but it can sort on the basis of any of its custom lists if you want it to. The program includes four custom lists by default

- Sun, Mon, Tues, …
- Sunday, Monday, Tuesday, …
- Jan, Feb, Mar, …
- January, February, March, …

If you have a column consisting of these day or month labels, you can sort them in their proper chronological order. If you've created other custom lists, you can sort text fields in the order of those lists as well.



To sort on the basis of a custom list, click **Order** in the **Sort** dialog box, and then select **Custom List…**. The four default custom lists will appear there, along with any others that you have created.



3.5 Sorting Cells that Contain Formulas

You need to exercise caution when sorting cells that contain formulas with cell references. If you sort by row, references to other cells in the same row will be correct after the sort, but references to cells in other rows of the list will no longer be correct.

Similarly, if you sort by column, references to other cells in the same columns will be correct after the sort, but references to cells in other columns will be broken. With either kind of sort, relative references to cells outside the list will be broken by the sort.

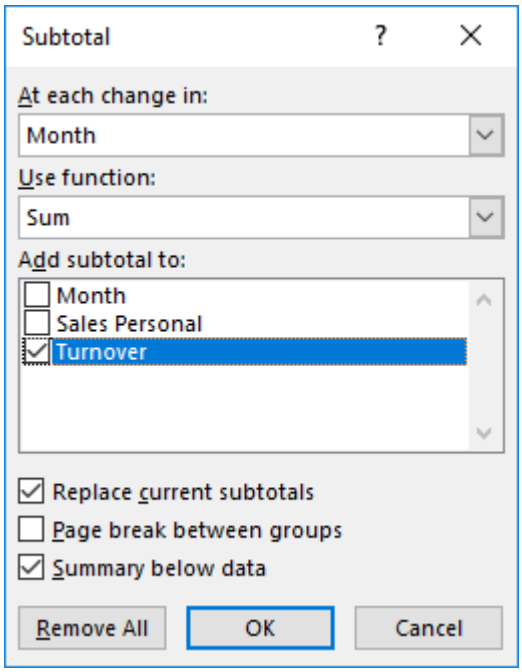
To avoid the problems associated with sorting ranges containing formulas, observe the following rules:

- In formulas that reference cells outside the sort range, use only absolute references.
- When sorting by row, avoid formulas that reference cells in other rows. If you must use such formulas, reference cells by name, not by address.
- When sorting by column, avoid formulas that reference cells in other columns. If you must use such formulas, reference cells by name, not by address.

4. Using Subtotals to Analyst a List

Microsoft Excel can automatically calculate subtotal and grand total values in a list. When you insert automatic subtotals, Excel outlines the list so that you can display and hide the detail rows for each subtotal.

To insert subtotals, you first sort your list so that the rows you want to subtotal are grouped together. You can then calculate subtotals for any column that contains numbers by selecting **Data** tab, and click **Subtotal**.



4.1 How Subtotals are Calculated

4.1.1 Subtotals

Excel calculates subtotal values with a summary function, such as Sum or Average. You can display subtotals in a list with more than one type of calculation at a time.

4.1.2 Grand Totals

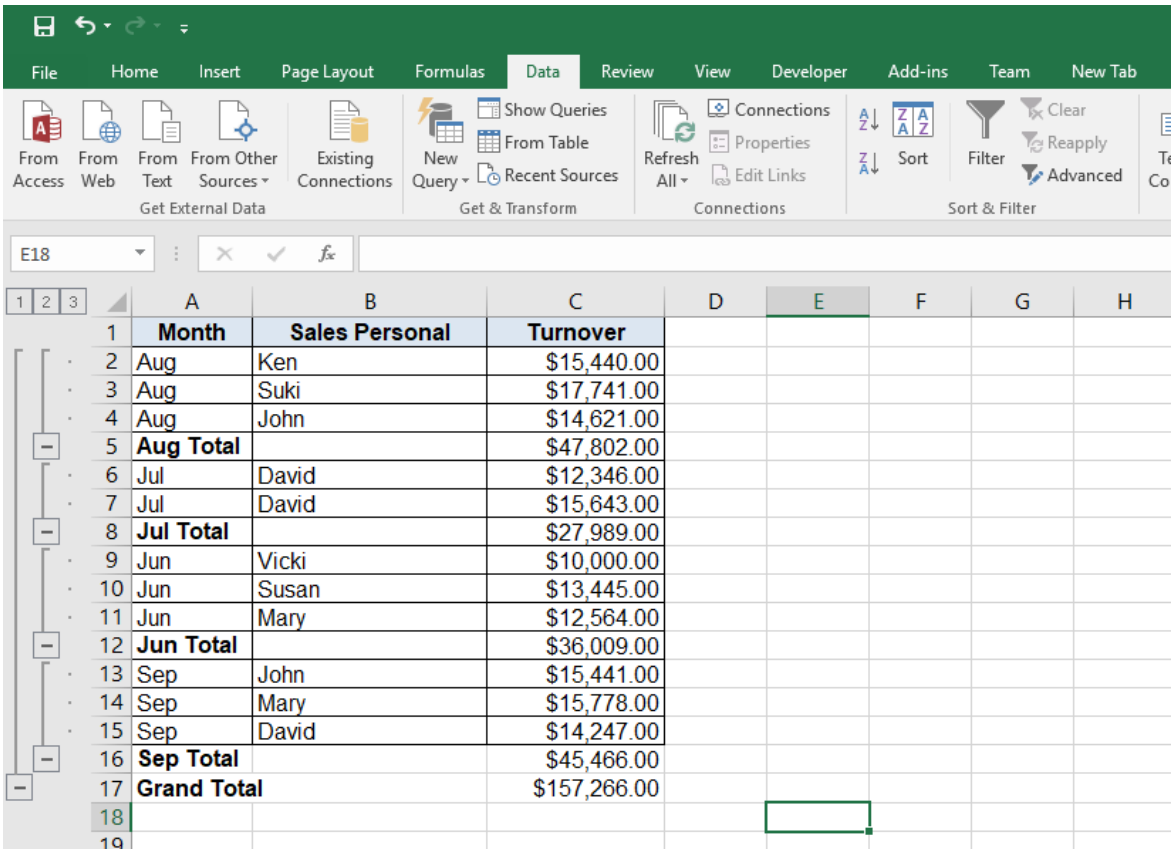
Grand total values are derived from detail data, not from the values in the subtotal rows. For example, if you use the Average summary function, the grand total row displays an average of all detail rows in the list, not an average of the values in the subtotal rows.

4.1.3 Automatic Recalculation

Excel recalculates subtotal and grand total values automatically as you edit the detail data.

4.2 Create Summary Reports

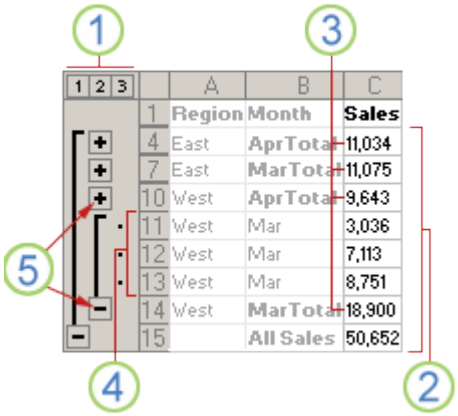
1. Sort the column you wish to perform subtotal.
2. Select **Data** tab, and then click **Subtotals** to popup the **Subtotal** dialog box
3. In the **At each change in** box, click the column to subtotal.
4. In the **Use function** box, click the summary function that you want to use to calculate the subtotals. In the example above, you would select **Sum**.
5. In the **Add subtotal to** box, select the check box for each column that contains values that you want to subtotal. By default, Excel offers to subtotal the last column of your data.
6. If you want an automatic page break following each subtotal, select the **Page break between groups** check box.
7. To specify a summary row above the details row, clear the **Summary below data** check box. To specify a summary row below the details row, select the Summary below data check box. In the example above, you would clear the check box.
8. Optionally, you can use the Subtotals command again by repeating steps one through seven to add more subtotals with different summary functions. To avoid overwriting the existing subtotals, clear the **Replace current subtotals** check box.
9. Click **[OK]** to confirm. Excel inserts a new row at each change of column and calculates a subtotal. After you have the subtotals in, you will see small 1, 2, and 3 buttons appear below the name box. Click the 2 button to see just one line per account with the totals. Click the 3 button to see all lines.



	A	B	C	D	E	F	G	H
1	**Month**	**Sales Personal**	**Turnover**					
2	Aug	Ken	$15,440.00					
3	Aug	Suki	$17,741.00					
4	Aug	John	$14,621.00					
5	**Aug Total**		$47,802.00					
6	Jul	David	$12,346.00					
7	Jul	David	$15,643.00					
8	**Jul Total**		$27,989.00					
9	Jun	Vicki	$10,000.00					
10	Jun	Susan	$13,445.00					
11	Jun	Mary	$12,564.00					
12	**Jun Total**		$36,009.00					
13	Sep	John	$15,441.00					
14	Sep	Mary	$15,778.00					
15	Sep	David	$14,247.00					
16	**Sep Total**		$45,466.00					
17	**Grand Total**		$157,266.00					
18								

5. Grouping

If you have a list of data that you want to group and summarize, you can create an outline of up to eight levels, one for each group. Each inner level, represented by a higher number in the outline symbols displays detail data for the preceding outer level, represented by a lower number in the outline symbols. Use an outline to quickly display summary rows or columns, or to reveal the detail data for each group. You can create an outline of rows, an outline of columns, or an outline of both rows and columns.



1. To display rows for a level, click the appropriate 1 2 3 outline symbols.
2. Level 1 contains the total sales for all detail rows.
3. Level 2 contains total sales for each month in each region.
4. Level 3 contains detail rows (only detail rows 11 through 13 are currently visible).
5. To expand or collapse data in your outline, click the + and − outline symbols.

5.1 Create an Outline of Rows

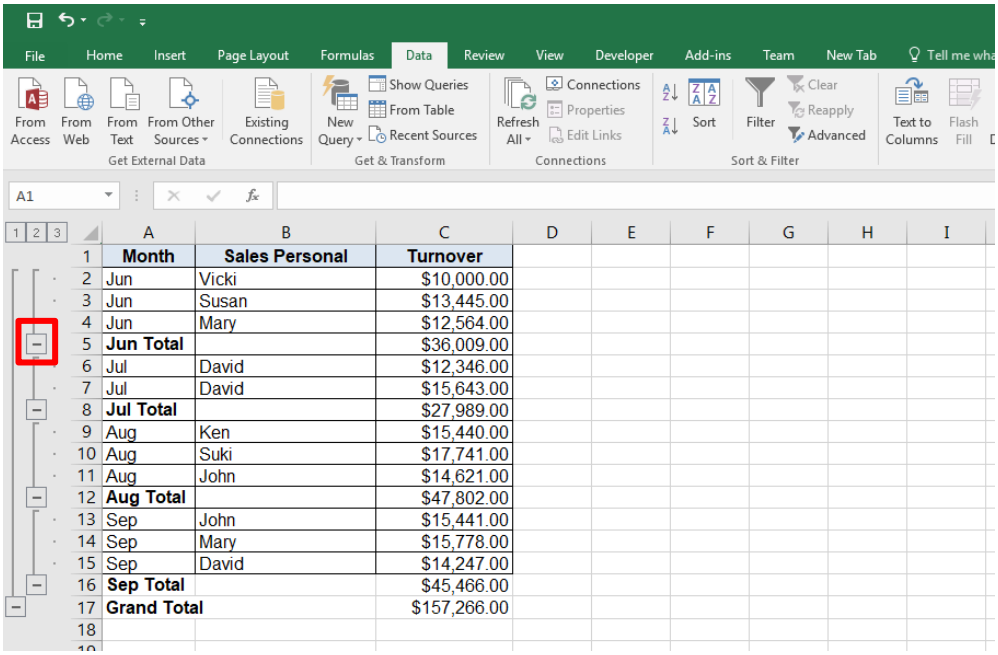
1. Make sure that each column of the data that you want to outline has a label in the first row, contains similar facts in each column, and that the range has no blank rows or columns.
2. Select a cell in the range.
3. To sort the column that contains the data you want to group by, select that column, and then on the Data tab, in the Sort & Filter group, click Sort A to Z or Sort Z to A.
4. Insert summary rows. To outline data by rows, you must have summary rows that contain formulas that reference cells in each of the detail rows for that group.
   - Insert summary rows by using the Subtotal command. Use the Subtotal command, which inserts the SUBTOTAL function immediately below or above each group of detail rows and automatically creates the outline for you. For more information, see Insert subtotals in a list of data in a worksheet.
   - Insert your own summary rows. Insert your own summary rows with formulas immediately below or above each group of detail rows.
5. Specify whether the location of the summary row is below or above the detail rows. To specify a summary row above the details row, clear the Summary rows below detail check box. To specify a summary row below the details row, select the Summary rows below detail check box.
6. Outline the data
   - Outline the outer group.
   - outline an inner, nested group.

- Continue selecting and grouping inner rows until you have created all of the levels that you want in the outline.
- If you want to ungroup rows, select the rows, and then on the Data tab, in the Outline group, click Ungroup.

5.2 Showing and Hiding Data

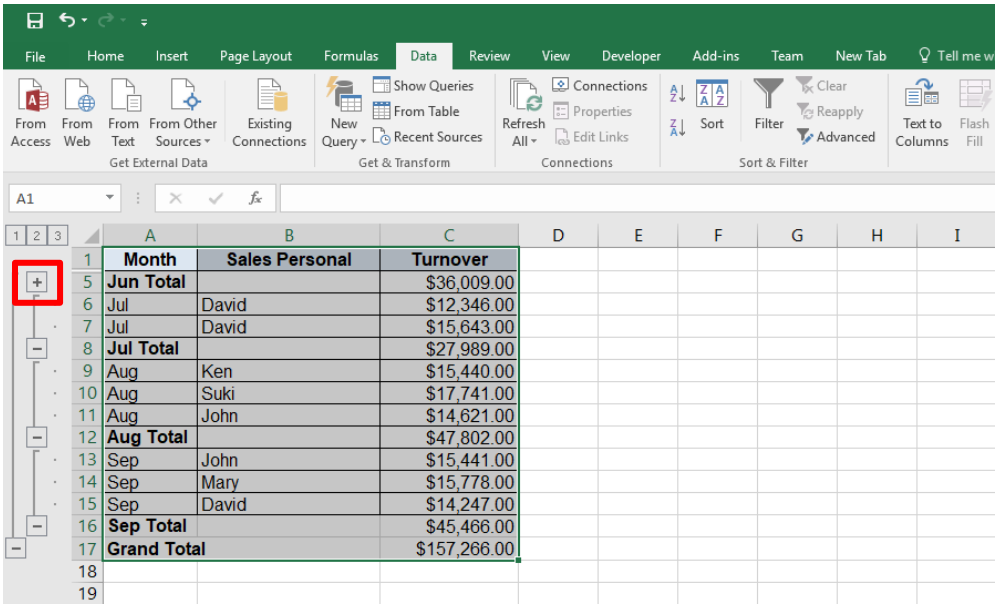
To show or hide a group:

1. Click the minus sign—also known as the Hide Detail symbol—to collapse the group.



	A	B	C
1	**Month**	**Sales Personal**	**Turnover**
2	Jun	Vicki	$10,000.00
3	Jun	Susan	$13,445.00
4	Jun	Mary	$12,564.00
5	**Jun Total**		$36,009.00
6	Jul	David	$12,346.00
7	Jul	David	$15,643.00
8	**Jul Total**		$27,989.00
9	Aug	Ken	$15,440.00
10	Aug	Suki	$17,741.00
11	Aug	John	$14,621.00
12	**Aug Total**		$47,802.00
13	Sep	John	$15,441.00
14	Sep	Mary	$15,778.00
15	Sep	David	$14,247.00
16	**Sep Total**		$45,466.00
17	**Grand Total**		$157,266.00
18			

2. Click the plus sign—also known as the Show Detail symbol—to expand the group again.

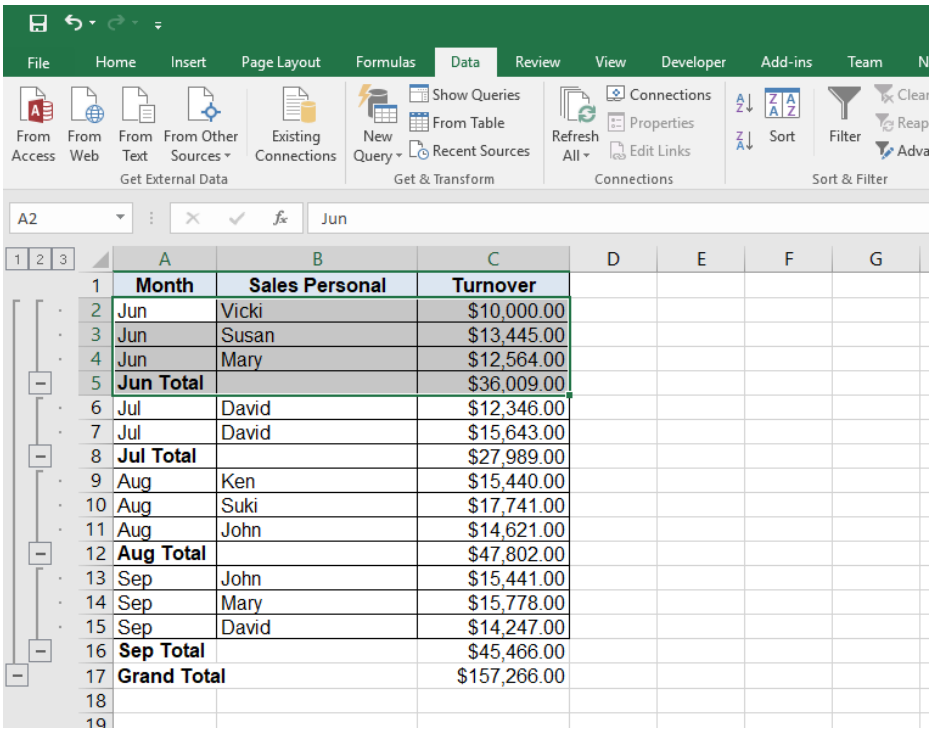


	A	B	C
1	**Month**	**Sales Personal**	**Turnover**
5	**Jun Total**		$36,009.00
6	Jul	David	$12,346.00
7	Jul	David	$15,643.00
8	**Jul Total**		$27,989.00
9	Aug	Ken	$15,440.00
10	Aug	Suki	$17,741.00
11	Aug	John	$14,621.00
12	**Aug Total**		$47,802.00
13	Sep	John	$15,441.00
14	Sep	Mary	$15,778.00
15	Sep	David	$14,247.00
16	**Sep Total**		$45,466.00
17	**Grand Total**		$157,266.00
18			
19			

5.3 Removing Groups and Subtotaling

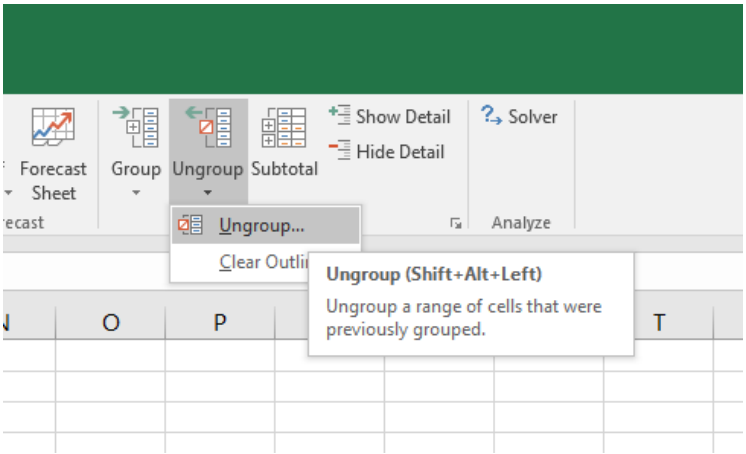
To ungroup data:

1. Select the rows or columns you want to ungroup. In this example, we'll ungroup size Small. Selecting cells to ungroup



	A	B	C	D	E	F	G
1	**Month**	**Sales Personal**	**Turnover**				
2	Jun	Vicki	$10,000.00				
3	Jun	Susan	$13,445.00				
4	Jun	Mary	$12,564.00				
5	**Jun Total**		$36,009.00				
6	Jul	David	$12,346.00				
7	Jul	David	$15,643.00				
8	**Jul Total**		$27,989.00				
9	Aug	Ken	$15,440.00				
10	Aug	Suki	$17,741.00				
11	Aug	John	$14,621.00				
12	**Aug Total**		$47,802.00				
13	Sep	John	$15,441.00				
14	Sep	Mary	$15,778.00				
15	Sep	David	$14,247.00				
16	**Sep Total**		$45,466.00				
17	**Grand Total**		$157,266.00				
18							

2. From the Data tab, click the Ungroup command. The range of cells will be ungrouped. Ungrouping the selected cells



6. Excel Table

6.1 What is Excel Table?

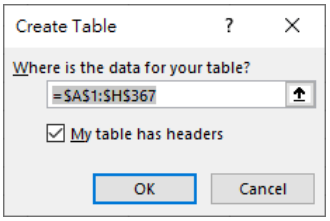
A table is a powerful feature to group your data together in Excel. When you create a table, you can manage and analyze the data in that table independently of data outside the table. For example, you can filter table columns, add a row for totals, apply table formatting.

The advantages of an Excel table include all of the following:

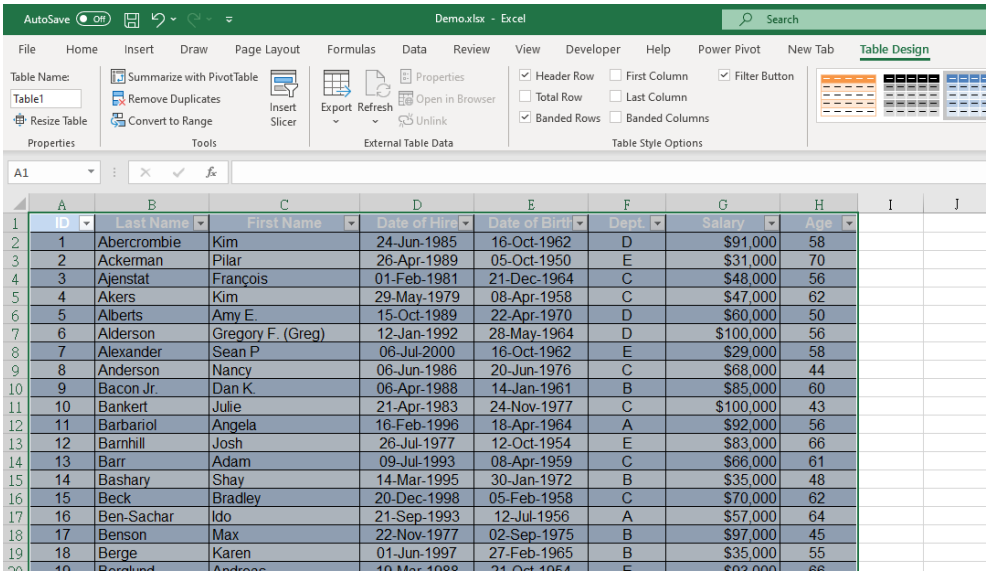
- Quick Styles: Add color, banded rows, and header styles with just one click to style your data.
- Table Names: Give a table a name to make it easier to reference in other formulas.
- Cleaner Formulas: Excel Formulas are much easier to read and write when working in tables.
- Auto Expand: Add a new row or column to your data, and the Excel table automatically updates to include the new cells.
- Filters & Subtotals: Automatically add filter buttons and subtotals that adapt as you filter your data.

6.2 Create an Excel Table

1. On a worksheet, select the range of cells that you want to include in the table. The cells can be empty or can contain data.
2. On the **Insert** tab, in the **Tables** group, click **Table**.
3. If the selected range contains data that you want to display as table headers, select the **My table has headers** check box.



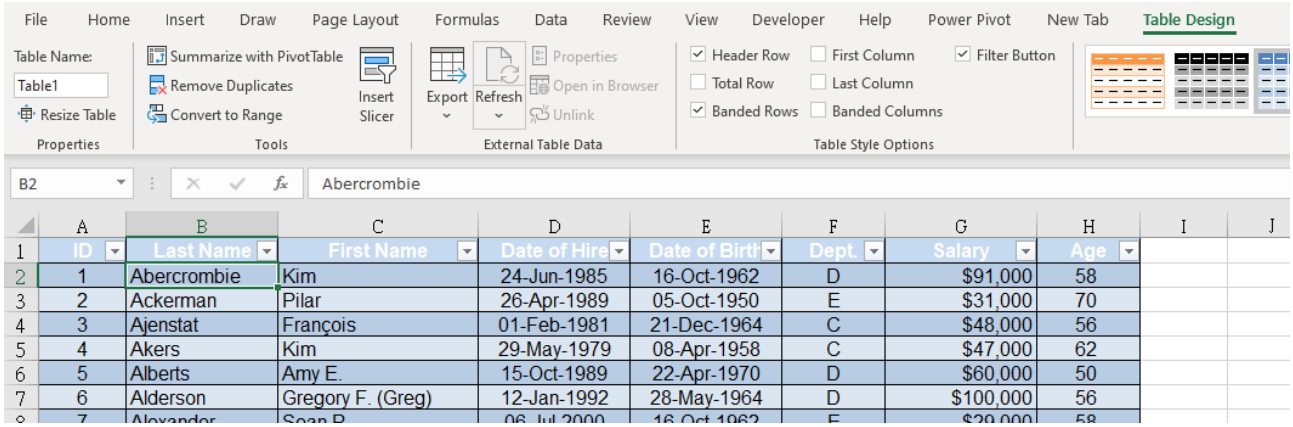
4. Table headers display default names if you do not select the My table has headers check box. You can change the default names by typing the text that you want.



ID	Last Name	First Name	Date of Hire	Date of Birth	Dept	Salary	Age
1	Abercrombie	Kim	24-Jun-1985	16-Oct-1962	D	$91,000	58
2	Ackerman	Pilar	26-Apr-1989	05-Oct-1950	E	$31,000	70
3	Ajenstat	François	01-Feb-1981	21-Dec-1964	C	$48,000	56
4	Akers	Kim	29-May-1979	08-Apr-1958	C	$47,000	62
5	Alberts	Amy E.	15-Oct-1989	22-Apr-1970	D	$60,000	50
6	Alderson	Gregory F. (Greg)	12-Jan-1992	28-May-1964	D	$100,000	56
7	Alexander	Sean P	06-Jul-2000	16-Oct-1962	E	$29,000	58
8	Anderson	Nancy	06-Jun-1986	20-Jun-1976	C	$68,000	44
9	Bacon Jr.	Dan K.	06-Apr-1988	14-Jan-1961	B	$85,000	60
10	Bankert	Julie	21-Apr-1983	24-Nov-1977	C	$100,000	43
11	Barbariol	Angela	16-Feb-1996	18-Apr-1964	A	$92,000	56
12	Barnhill	Josh	26-Jul-1977	12-Oct-1954	E	$83,000	66
13	Barr	Adam	09-Jul-1993	08-Apr-1959	C	$66,000	61
14	Bashary	Shay	14-Mar-1995	30-Jan-1972	B	$35,000	48
15	Beck	Bradley	20-Dec-1998	05-Feb-1958	C	$70,000	62
16	Ben-Sachar	Ido	21-Sep-1993	12-Jul-1956	A	$57,000	64
17	Benson	Max	22-Nov-1977	02-Sep-1975	B	$97,000	45
18	Berge	Karen	01-Jun-1997	27-Feb-1965	B	$35,000	55

6.3 Naming a Table

Once you create a table, Excel will automatically give it a name. You can find out the table name by selecting the table. Click on the **Design** tab, and then you can find the table name on the left side of this menu. If you want to change the name, type in a new name for the table. (no spaces are allowed in table names.)

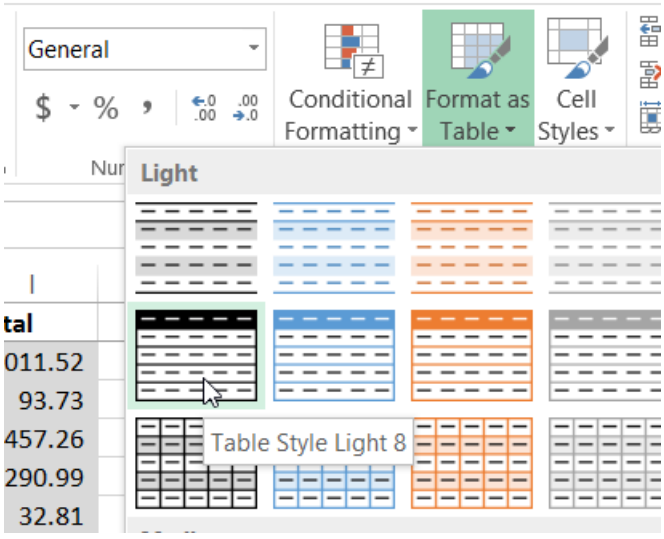


	A	B	C	D	E	F	G	H	I	J
1	ID	Last Name	First Name	Date of Hire	Date of Birth	Dept.	Salary	Age		
2	1	Abercrombie	Kim	24-Jun-1985	16-Oct-1962	D	$91,000	58		
3	2	Ackerman	Pilar	26-Apr-1989	05-Oct-1950	E	$31,000	70		
4	3	Ajenstat	François	01-Feb-1981	21-Dec-1964	C	$48,000	56		
5	4	Akers	Kim	29-May-1979	08-Apr-1958	C	$47,000	62		
6	5	Alberts	Amy E.	15-Oct-1989	22-Apr-1970	D	$60,000	50		
7	6	Alderson	Gregory F. (Greg)	12-Jan-1992	28-May-1964	D	$100,000	56		

6.4 Format Specific Style

When you create a table with the Table command on the Insert tab, the table retains any formatting that it currently has, and the default Table Style is applied. If you want to apply a specific table style when creating an Excel Table:

1. Select a cell in the list of data that you prepared.
2. On the Ribbon, click the **Home** tab.
3. In the **Styles** group, click **Format as Table**
4. Click on the Style that you want to use
5. In the Create Table dialog box, the range for your data should automatically appear, and the My table has headers option is checked. If necessary, you can adjust the range, and check box.
6. Click **[OK]** to accept these settings.

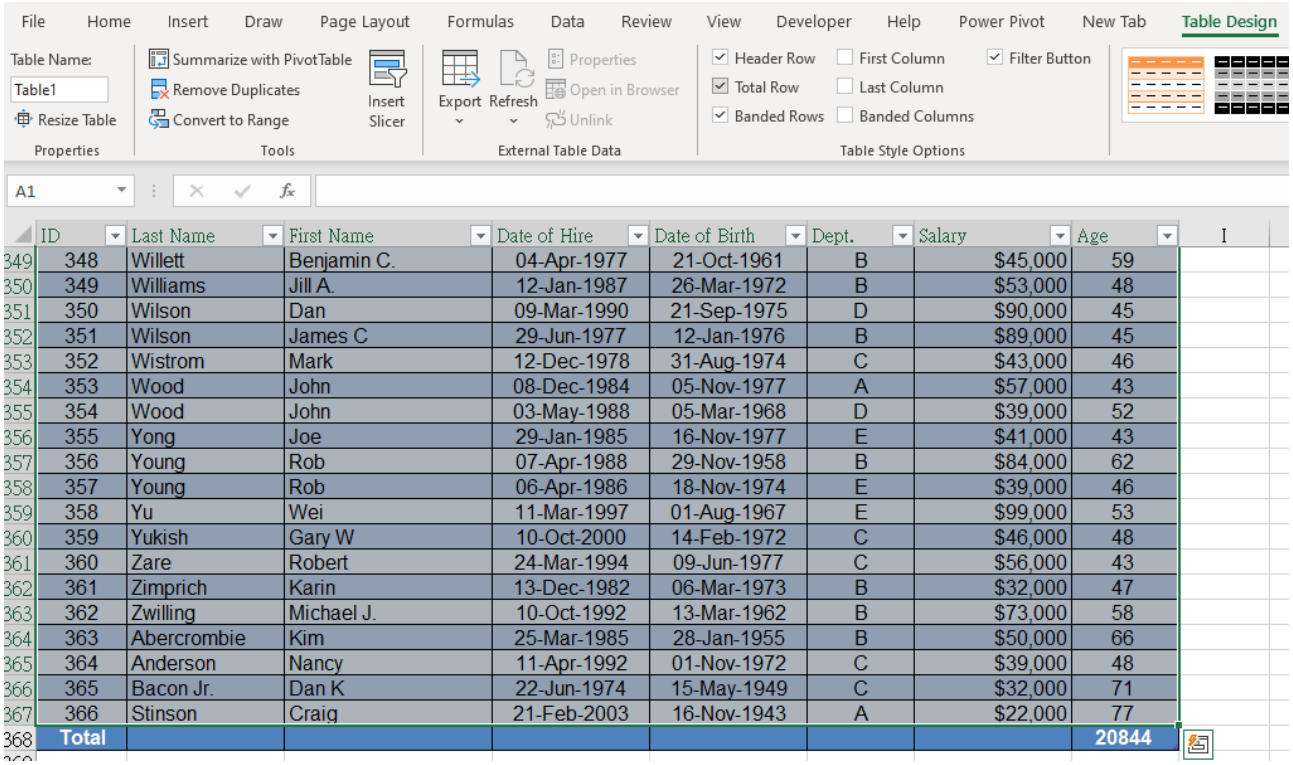


6.5 Totals in an Excel Table

6.5.1 Show Totals in a Table

After you create an Excel table, it's easy to show the total for a column, or for multiple columns, using a built-in Table feature.

1. Select any cell in the table
2. Under the Table Design tab, select the **Total Row** check box in the **Table Style Options** group,
3. A Total row will be added at the bottom of the table, and one or more column of numbers might show a total.

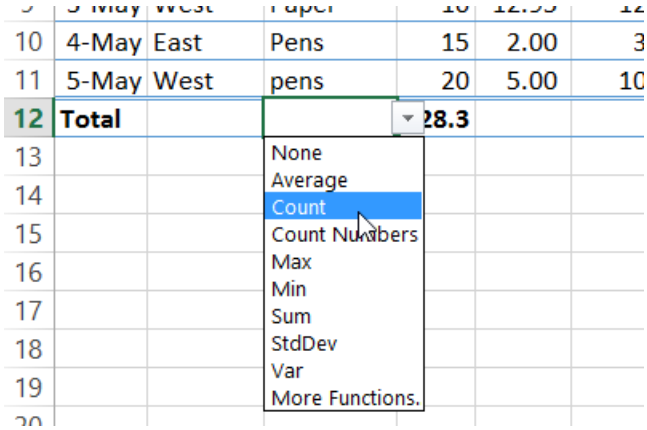


	ID	Last Name	First Name	Date of Hire	Date of Birth	Dept.	Salary	Age
349	348	Willett	Benjamin C.	04-Apr-1977	21-Oct-1961	B	$45,000	59
350	349	Williams	Jill A.	12-Jan-1987	26-Mar-1972	B	$53,000	48
351	350	Wilson	Dan	09-Mar-1990	21-Sep-1975	D	$90,000	45
352	351	Wilson	James C	29-Jun-1977	12-Jan-1976	B	$89,000	45
353	352	Wistrom	Mark	12-Dec-1978	31-Aug-1974	C	$43,000	46
354	353	Wood	John	08-Dec-1984	05-Nov-1977	A	$57,000	43
355	354	Wood	John	03-May-1988	05-Mar-1968	D	$39,000	52
356	355	Yong	Joe	29-Jan-1985	16-Nov-1977	E	$41,000	43
357	356	Young	Rob	07-Apr-1988	29-Nov-1958	B	$84,000	62
358	357	Young	Rob	06-Apr-1986	18-Nov-1974	E	$39,000	46
359	358	Yu	Wei	11-Mar-1997	01-Aug-1967	E	$99,000	53
360	359	Yukish	Gary W	10-Oct-2000	14-Feb-1972	C	$46,000	48
361	360	Zare	Robert	24-Mar-1994	09-Jun-1977	C	$56,000	43
362	361	Zimprich	Karin	13-Dec-1982	06-Mar-1973	B	$32,000	47
363	362	Zwilling	Michael J.	10-Oct-1992	13-Mar-1962	B	$73,000	58
364	363	Abercrombie	Kim	25-Mar-1985	28-Jan-1955	B	$50,000	66
365	364	Anderson	Nancy	11-Apr-1992	01-Nov-1972	C	$39,000	48
366	365	Bacon Jr.	Dan K	22-Jun-1974	15-May-1949	C	$32,000	71
367	366	Stinson	Craig	21-Feb-2003	16-Nov-1943	A	$22,000	77
368	Total							20844

6.5.2 Change and Add Totals

In addition to the automatically created totals, you can select totals for other columns.

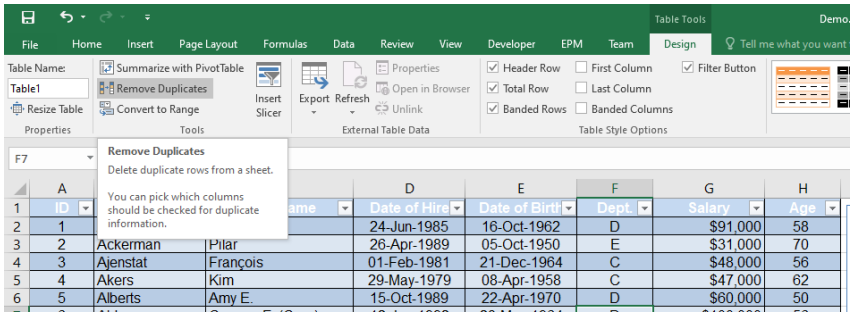
1. Click in the Total cell for one of the columns.
2. From the drop down list, select the function that you want to use in the current column.



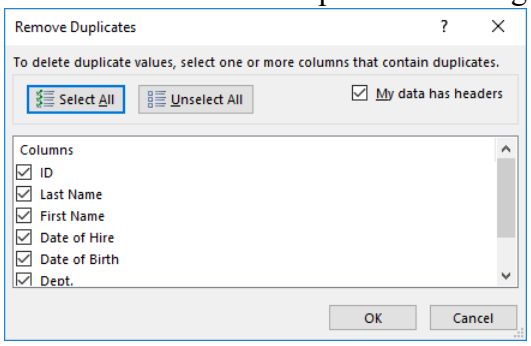
6.6 Remove Duplicate

Microsoft has made it quicker to remove duplicate rows in Excel, all it takes now is two simple steps. The best part is that you don't need to select any specific row before removing the duplicate rows, the build-in Remove Duplicate feature takes care of it.

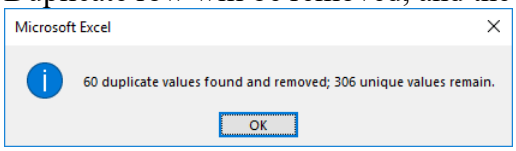
1. Sort the record in ascending order
2. Select the table, and then select **Design** Tab, then select **Remove Duplicates**.



3. Select the column for duplicate checking and press [OK]

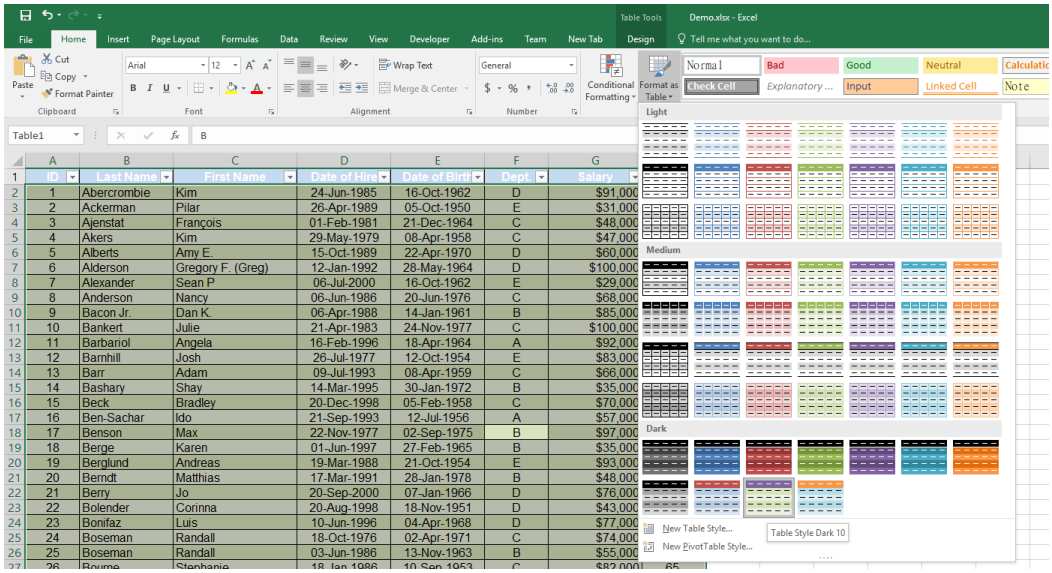


4. Duplicate row will be removed, and the number of row will be returned.



6.7 AutoFormat

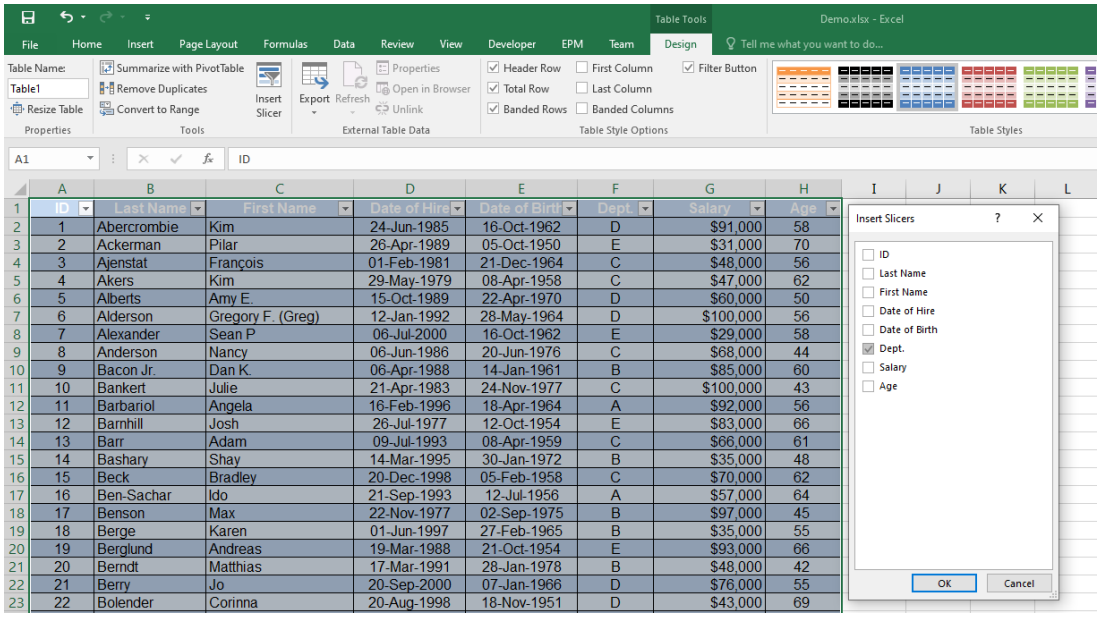
Style galleries for tables, cells, and PivotTables provide a set of professional formats that can be applied quickly. You can choose from many predefined styles or create custom styles as needed. Styles replace AutoFormat as the simplest way to apply formatting to a range of cells.



6.8 Using Slicers as Filter

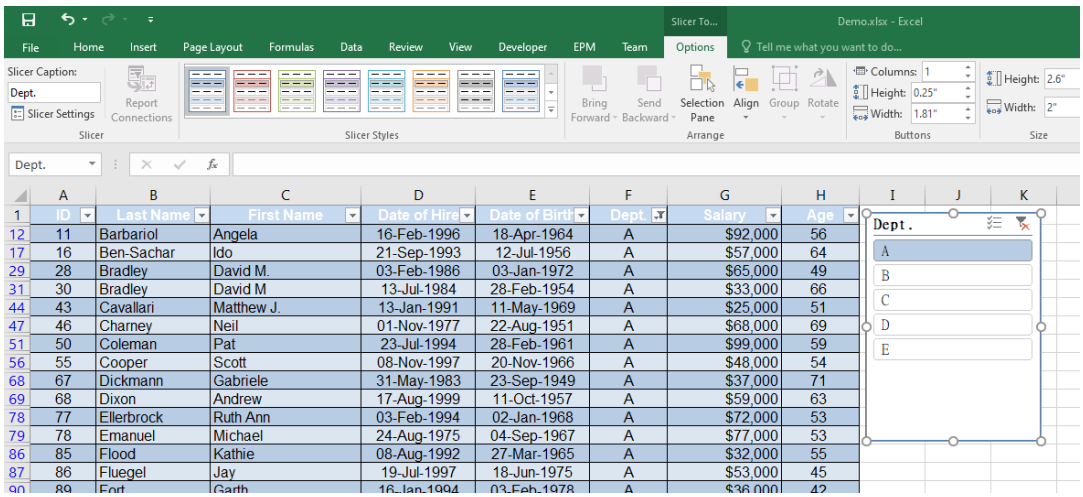
When you need a quick, easy-to-use filter, but one that filters using only large categories, use a Slicer. Slicers are boxes that display on your worksheet. They contain buttons that display a list of unique contents for the column you want as a filter. Click one of the buttons and the list or Excel Table is filtered.

1. In **Design** tab, select **Insert Slicer** from **Tools** group.
2. Tick the column you like to create slicers.



ID	Last Name	First Name	Date of Hire	Date of Birth	Dept	Salary	Age
1	Abercrombie	Kim	24-Jun-1985	16-Oct-1962	D	$91,000	58
2	Ackerman	Pilar	26-Apr-1989	05-Oct-1950	E	$31,000	70
3	Ajenstat	François	01-Feb-1981	21-Dec-1964	C	$48,000	56
4	Akers	Kim	29-May-1979	08-Apr-1958	C	$47,000	62
5	Alberts	Amy E.	15-Oct-1989	22-Apr-1970	D	$60,000	50
6	Alderson	Gregory F. (Greg)	12-Jan-1992	28-May-1964	D	$100,000	56
7	Alexander	Sean P	06-Jul-2000	16-Oct-1962	E	$29,000	58
8	Anderson	Nancy	06-Jun-1986	20-Jun-1976	C	$68,000	44
9	Bacon Jr.	Dan K.	06-Apr-1988	14-Jan-1961	B	$85,000	60
10	Bankert	Julie	21-Apr-1983	24-Nov-1977	C	$100,000	43
11	Barbariol	Angela	16-Feb-1996	18-Apr-1964	A	$92,000	56
12	Barnhill	Josh	26-Jul-1977	12-Oct-1954	E	$83,000	66
13	Barr	Adam	09-Jul-1993	08-Apr-1959	C	$66,000	61
14	Bashary	Shay	14-Mar-1995	30-Jan-1972	B	$35,000	48
15	Beck	Bradley	20-Dec-1998	05-Feb-1958	C	$70,000	62
16	Ben-Sachar	Ido	21-Sep-1993	12-Jul-1956	A	$57,000	64
17	Benson	Max	22-Nov-1977	02-Sep-1975	B	$97,000	45
18	Berge	Karen	01-Jun-1997	27-Feb-1965	B	$35,000	55
19	Berglund	Andreas	19-Mar-1988	21-Oct-1954	E	$93,000	66
20	Berndt	Matthias	17-Mar-1991	28-Jan-1978	B	$48,000	42
21	Berry	Jo	20-Sep-2000	07-Jan-1966	D	$76,000	55
22	Bolender	Corinna	20-Aug-1998	18-Nov-1951	D	$43,000	69

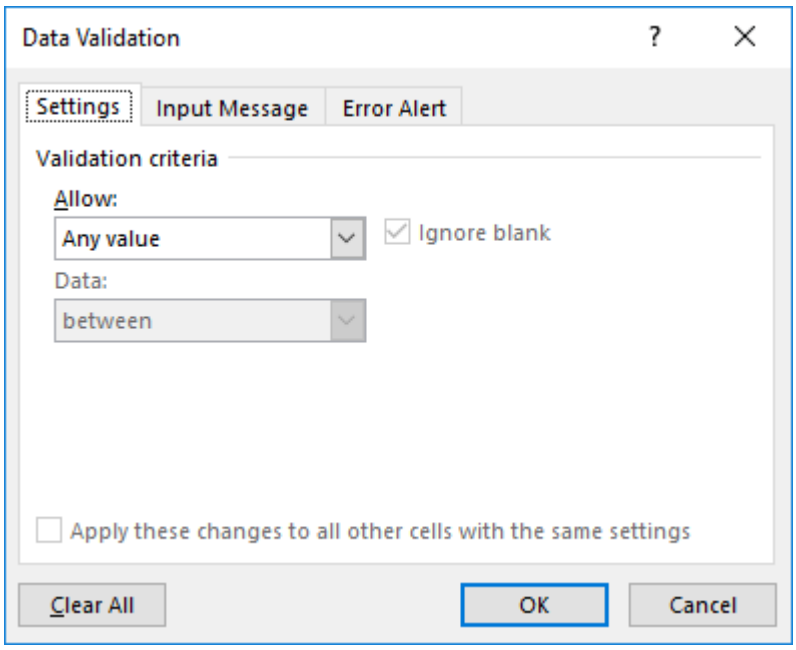
3. If you need to select multiple Slicers, hold the **[Ctrl]** key as you click a slicer.



ID	Last Name	First Name	Date of Hire	Date of Birth	Dept	Salary	Age
11	Barbariol	Angela	16-Feb-1996	18-Apr-1964	A	$92,000	56
16	Ben-Sachar	Ido	21-Sep-1993	12-Jul-1956	A	$57,000	64
28	Bradley	David M.	03-Feb-1986	03-Jan-1972	A	$65,000	49
30	Bradley	David M	13-Jul-1984	28-Feb-1954	A	$33,000	66
43	Cavallari	Matthew J.	13-Jan-1991	11-May-1969	A	$25,000	51
46	Charney	Neil	01-Nov-1977	22-Aug-1951	A	$68,000	69
50	Coleman	Pat	23-Jul-1994	28-Feb-1961	A	$99,000	59
55	Cooper	Scott	08-Nov-1997	20-Nov-1966	A	$48,000	54
67	Dickmann	Gabriele	31-May-1983	23-Sep-1949	A	$37,000	71
68	Dixon	Andrew	17-Aug-1999	11-Oct-1957	A	$59,000	63
77	Ellerbrock	Ruth Ann	03-Feb-1994	02-Jan-1968	A	$72,000	53
78	Emanuel	Michael	24-Aug-1975	04-Sep-1967	A	$77,000	53
85	Flood	Kathie	08-Aug-1992	27-Mar-1965	A	$32,000	55
86	Fluegel	Jay	19-Jul-1997	18-Jun-1975	A	$53,000	45
89	Fort	Garth	16-Jan-1994	03-Feb-1978	A	$36,000	42

7. Validating Data Entry

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



7.1 Types of data you can validate

Excel lets you designate the following types of valid data for a cell:

Numbers: Specify that the entry in a cell must be a whole number or a decimal number. You can set a minimum or maximum, exclude a certain number or range, or use a formula to calculate whether a number is valid.

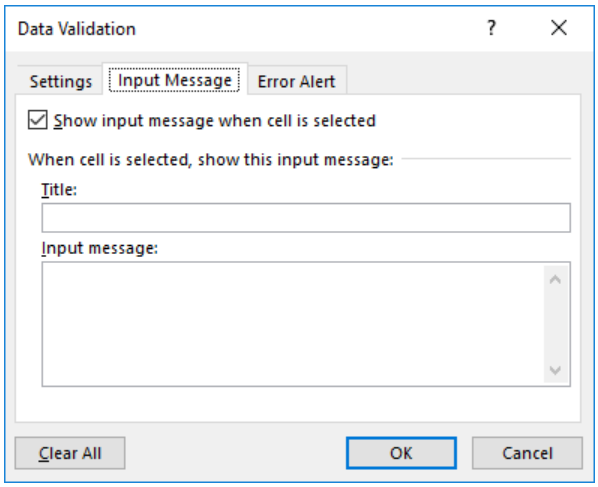
Dates and Times: Set a minimum or maximum, exclude certain dates or times, or use a formula to calculate whether a date or time is valid

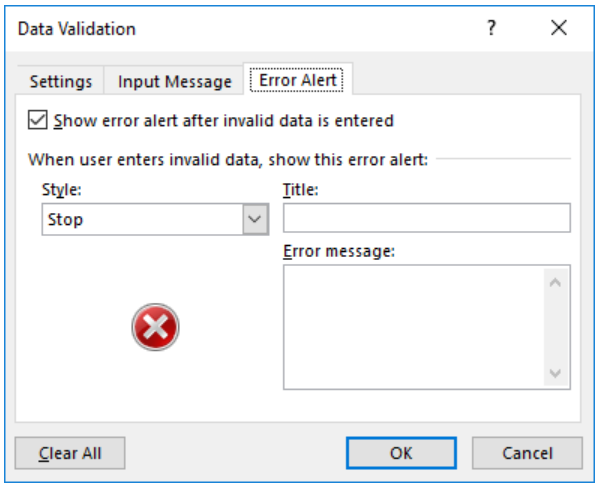
Length: Limit how many characters can be typed in a cell, or require a minimum number of characters.

List of Values: Make a list of the choices for a cell — such as small, medium, large — and allow only those values in the cell. You can display a dropdown arrow when a user clicks the cell to make it easy to pick from your list.

7.2 Types of messages you can display

For each cell you validate, you can display two different messages: one that appears before the user enters data, and one that appears after the user tries to enter data that doesn't meet your requirements. If users have the Office Assistant turned on, the Assistant displays the messages.





7.2.1 Input Message

This type of message appears as soon as a user clicks the validated cell. You can use it to provide instructions about the type of data you want entered in the cell.

7.2.2 Error Alert

This type of message appears only when the user types data that isn't valid and presses **[Enter]**. You can choose from three types of error messages. If you don't specify any messages, Excel flags whether the data a user enters is valid so that you can check for it later, but does not notify the user when an entry is invalid

Information Message: This message does not prevent entry of invalid data. In addition to the text you provide, it has an information icon, an OK button, which enters the invalid data in the cell, and a Cancel button, which restores the previous value to the cell.

Warning Message: This message does not prevent entry of invalid data. It has the text you provide, a warning icon, and three buttons: Yes enters the invalid data in the cell, No returns to the cell for further editing, and Cancel restores the previous value to the cell.

Stop Message: This message won't allow invalid data to be entered. It has text you provide, a stop icon, and two buttons: Retry returns to the cell for further editing, and Cancel restores the previous value to the cell. Note that this message isn't intended as a security measure: although users can't enter invalid data by typing and pressing **[Enter]**, they can circumvent the validation by copying and pasting or filling data in the cell.

7.3 Setting up Data Validation

Once you know what validation you want to use on a worksheet, you can use select the **Data tab,** and then select **Data Validation** to set it up. Here's a general overview of the process:

1. **Set up your worksheet** – Start by entering the data and formulas on your worksheet. If you're using a list of valid choices, enter and name your list.
2. **Define the settings for a cell –** Beginning with the first cell you want to validate, use the Data Validation dialog box to designate the type of validation you want, an input message if you want one, and an error message if you want one.
3. **Set up validation for other cells –** You can often save time by copying the validation settings from the first cell to other cells and then modifying the settings.
4. **Test your validation rules –** Try entering both valid and invalid data in the cells to make sure your settings are working as you intended and your messages are appearing when you expect. Use the Validation command to make any changes to the settings. If you make changes to the validation in one cell, you can automatically apply your changes to all other cells that have the same settings.
5. **Set up your lists of valid choices –** If you used a list of valid choices and don't want users to be able to find and change the list, you can put the list on another worksheet, set up the validation, hide the worksheet that contains the list, and then help protect the workbook with a password. The workbook password will help guard the worksheet that contains the list from others.
6. **Apply protection, if desired –** If you're planning to protect the worksheet or workbook, do that after you're finished setting up validation. Make sure you unlock any validated cells before protecting the worksheet, otherwise users won't be able to type in the cells.
7. **Share the workbook, if desired –** If you're planning to share the workbook, do that after you're finished setting up validation and protection. After you share a workbook, you won't be able to change the validation settings unless you stop sharing, but Excel will continue to validate the cells you've designated while the workbook is shared.
8. **Check the results for invalid data –** After users enter data in the worksheet, you can check for invalid data.

7.4 Entering data in validated cells

Here's what the process of entering data is like for users. You can use input and error messages to provide the instructions users need to understand how you've set up the worksheet to ensure correct data.

7.4.1 Viewing your input message

When a user clicks a validated cell or uses the arrow keys to move into the cell, your input message appears either in an Assistant balloon or a separate message box. If you provided a dropdown list for the cell, the dropdown arrow appears to the right of the cell.

7.4.2 Typing data

As the user types data or clicks the dropdown arrow to select a value from your list, the input message stays on the screen (the dropdown list may cover part of your message).

7.4.3 Entering Valid Data

If the user types valid data and presses **[Enter]**, the data is entered in the cell and nothing special happens.

7.4.4 Entering Invalid Data

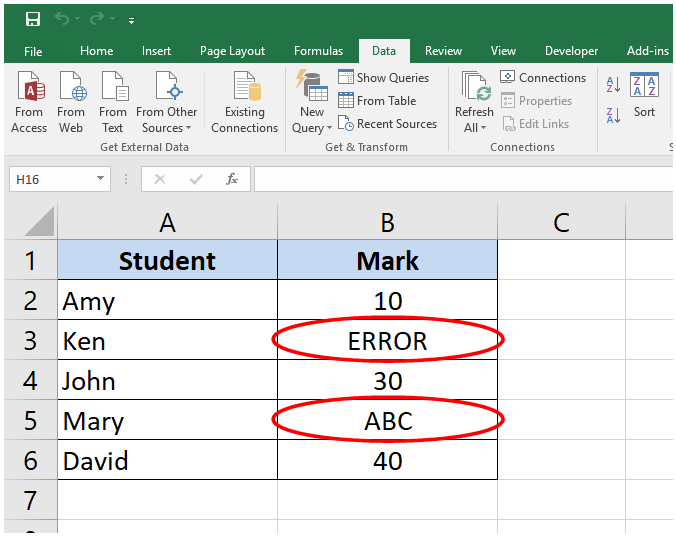
If the user types data that doesn't meet your criteria, and you specified an error message for invalid data, your message appears either in an Assistant balloon or a separate message window. The user can then read the message and decide what to do.

- For an information message, the user can click **[OK]** to enter the invalid data, or click **[Cancel]** to start over.
- For a warning message, the user can click **[Yes]** to enter the invalid data, **[No]** to edit the cell some more, or **[Cancel]** to start over.
- For a stop message, the user can't enter the invalid data, and can either click **[Retry]** to edit the cell or **[Cancel]** to start over.

If you don't provide messages, entering data in validated cells is the same for users as regular Excel data entry. However, Excel does flag any cells that have invalid entries so you can easily find those entries.

7.5 Checking a Worksheet for Invalid Entries

When you receive worksheets back from users who may have entered invalid data, you can have Excel display red circles around any data that didn't meet your criteria, making it easy to scan the worksheet for errors. Use the **[Circle Invalid Data]** and **[Clear Validation Circles]** buttons on the Auditing toolbar for this purpose. When you correct the data within the cell, the circle disappears.

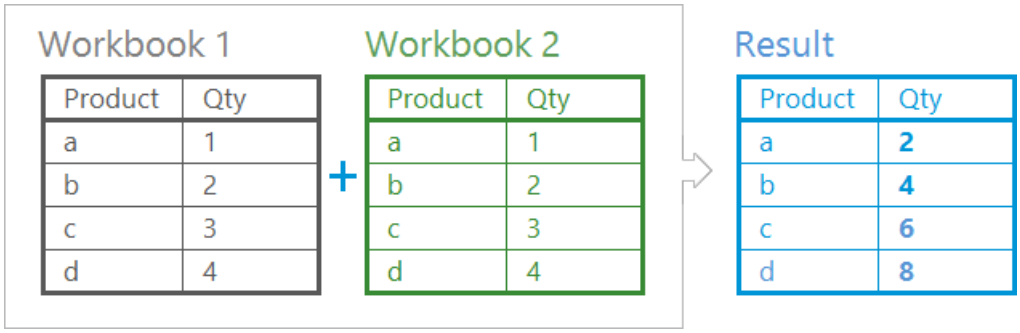


8. Consolidating Data in Multiple Worksheets

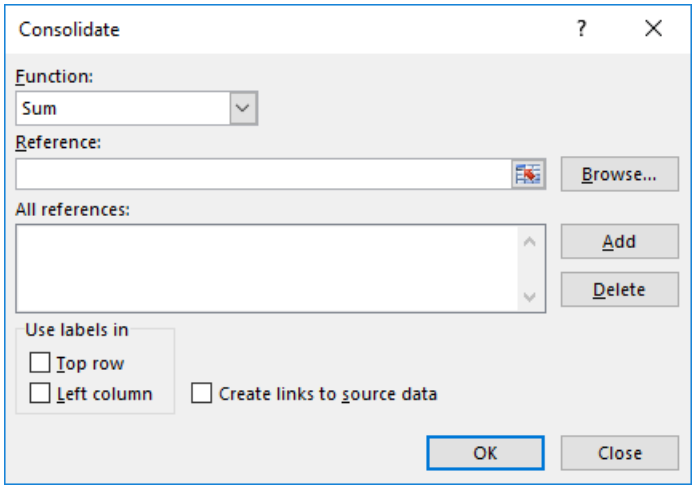
8.1 Overview

To summarize and report results from multiple worksheets, you can consolidate data from each worksheet into a master worksheet. The worksheets can be in the same workbook or other workbooks. When you consolidate data, you are assembling data so you can more easily update and aggregate it on a regular or ad hoc basis.

For example, if you have a worksheet of expense figures for each of your regional offices, you might use a consolidation to roll up these figures into a corporate expense worksheet. This master worksheet might contain sales totals and averages, current inventory levels, and highest selling products for the entire enterprise.



To consolidate data, you use the **Data** tab, and then **Consolidate** to display the **Consolidate** dialog box.



You can use this dialog box in several ways to consolidate your data:

Position Use this approach when the data in all worksheets is arranged in identical order and location.

Category Use this approach when each worksheet organizes the data differently, but has the same row and column labels, which you can use to match the data.

3-D Formulas Use this approach when the worksheets do not have a consistent pattern you can rely on. You can create formulas that refer to cells in each range of data that you're combining. Formulas that refer to cells on multiple worksheets are called 3-D formulas

8.2 Consolidate by Position or Category

Consolidate by position when the data in all source areas is arranged in identical order and location; for example, if you have data from a series of worksheets that were created from the same template, you can consolidate the data by position.

Consolidate by category when you want to summarize a set of worksheets that have the same row and column labels but organize the data differently. This method combines data that has matching labels from each worksheet.

You can set up the consolidation to update automatically when the source data changes, but you won't be able to change which cells and ranges are included in the consolidation. Or you can update the consolidation manually, allowing you to change the included cells and ranges.

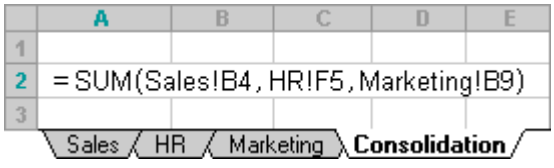
1. Set up the data to be consolidated.
2. Click the upper-left cell of the area where you want the consolidated data to appear.
3. Select **Data** tab, and then select **Consolidate** to popup the **Consolidate** dialog box.
4. In the **Function** box, click the summary function you want Excel to use to consolidate the data.
5. Click the **Reference** box, click the sheet tab of the first range to consolidate, type the name you gave the range, and then click **[Add]**. Repeat this step for each range.
6. If you want to update the consolidation table automatically whenever data in any of the source ranges changes, and you're sure you won't want to include different or additional ranges in the consolidation later on, select the **Create links to source data** check box.
7. If you're consolidating by position, leave the boxes under **Use labels in** blank. Excel does not copy the row or column labels in the source ranges to the consolidation. If you want labels for the consolidated data, copy them from one of the source ranges or enter them manually.
8. If you're consolidating by category, select the check boxes under **Use labels in** that indicate where the labels are located in the source ranges: either the **top row**, the **left column**, or both. Any labels that don't match up with labels in the other source areas result in separate rows or columns in the consolidation.

8.3 Consolidate by Using 3-D Formulas

When you use 3-D references in formulas, there are no restrictions on the layout of the separate ranges of data. You can change the consolidation any way you need to. The consolidation updates automatically when the data in the source ranges changes.

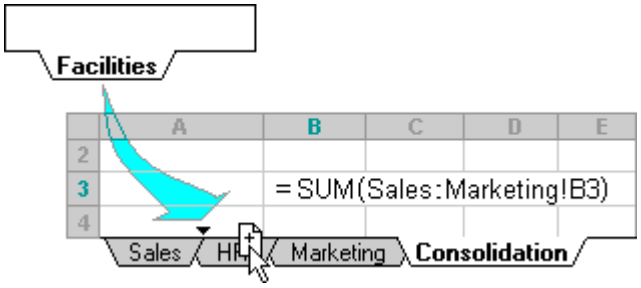
8.3.1 Use formulas to combine data

In the following example, the formula in cell A2 adds three numbers that are located in different positions on three different worksheets.



8.3.2 Add data to a consolidation with 3-D references

When all of your source worksheets have the same layout, you can use a range of sheet names in 3-D formulas. To add another worksheet to the consolidation, just move the sheet into the range your formula refers to.



8.3.3 Step to create 3-D Formulas Consolidation

1. On the consolidation worksheet, copy or enter the labels you want for the consolidated data.
2. Click a cell that you want to contain consolidated data.
3. Type a formula that includes references to the source cells on each worksheet that contains data you want to consolidate. For example, to combine the data in cell B3 from worksheets Sheet 2 through Sheet 7 inclusive, you could type =SUM(Sheet2:Sheet7!B3). If the data to consolidate is in different cells on different worksheets, enter a formula such as this: =SUM(Sheet3!B4, Sheet4!A7, Sheet5!C5). To enter a reference such as Sheet3!B4 in a formula without typing, type the formula up to the point where you need the reference, click the worksheet tab, and then click the cell.