

Microsoft EXCEL Training
Level 2

Introduction

This course will give you the skills to perform simple data analysis in Excel. You will learn how to use formulas, conditional formatting, filtering and sorting and many more data analysis features to help you in your work. This course will increase your competence in day-to-day data analysis making you more efficient and productive.

Topics Include

- Use workbooks as templates for other workbooks.
- Manipulate worksheet data.
- Use intermediate data management tools such as filters and advanced filters.
- Summarize data that meets specific conditions.
- Link to data in other worksheets and workbooks.
- Locate and use some of the more complex Excel functions.
- Create and modify charts.

Prerequisite

Comfortable with Windows 7, or OSX

Platform

Windows, OSX

Software

Microsoft Excel 2013, Microsoft Excel 2010 (Windows)

Microsoft Excel 2011 (MAC)

Instructor

Anna Neagu – Application Support Consultant

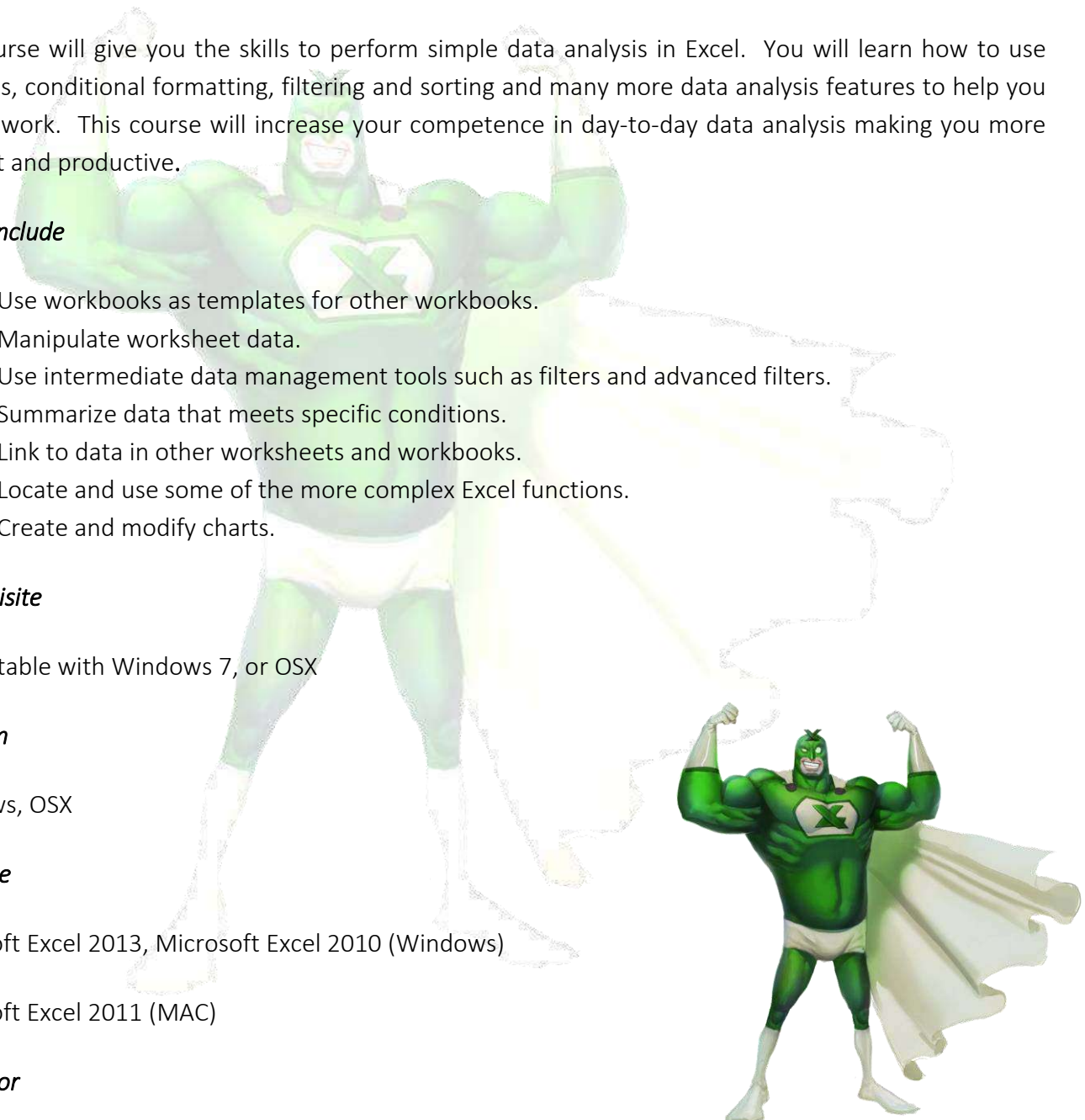


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1. Worksheet Organization

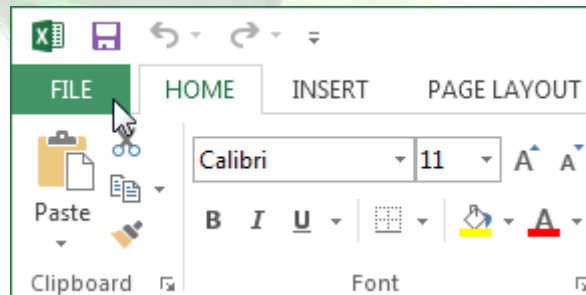
The Excel 2013 "Big Grid" increases the maximum number of rows per worksheet from 65,536 to over 1 million, and the number of columns from 256 to 16,384. When you open a new workbook there is 1 worksheet by default.

1.1. Using Workbook Templates

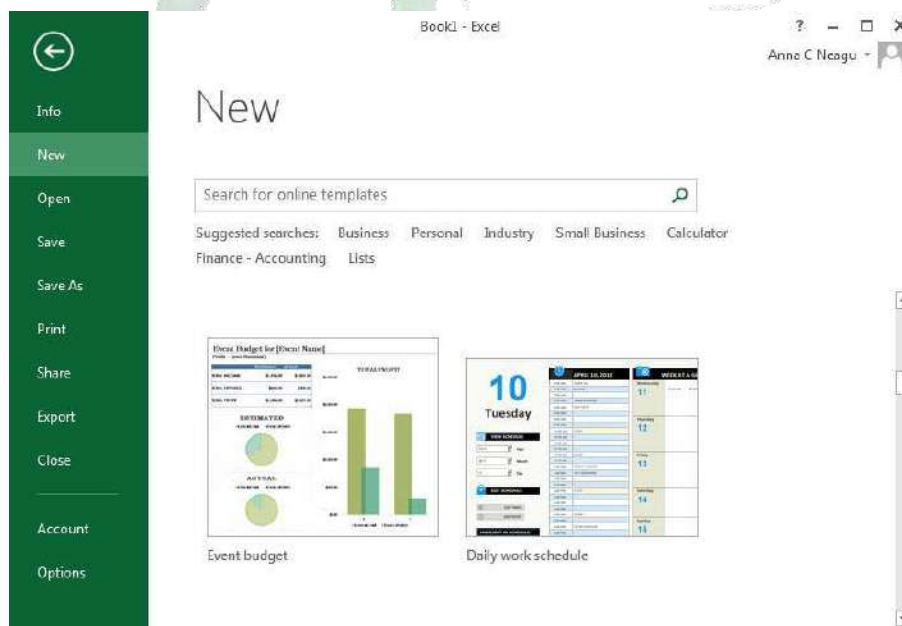
A **template** is a **predesigned spreadsheet** you can use to create a new workbook quickly. Templates often include **custom formatting** and **predefined formulas**, so they can save you a lot of time and effort when starting a new project.

To create a new workbook from a template

1. Click the **File** tab to access **Backstage view**.



2. Select **New**. Several templates will appear below the **Blank workbook** option.
3. Select a **template** to review it.



- A **preview** of the template will appear, along with **additional information** on how the template can be used.
- Click **Create** to use the selected template.

Sales invoice tracker
Provided by: Microsoft Corporation

This template is more than a one dimensional invoice. It actually is designed to maintain a history of customers, invoices, and invoice details so you can store multiple invoices without creating multiple files. You can also use the Invoice Tracker to analyze your previously invoiced data.

Download size: 59 KB

Create

- A new workbook will appear with the **selected template**.
- TIP:** You can also browse templates by **category** or use the **search bar** to find something more specific.

Sales leads tracker

HOUSE CLEANING CHECKLIST

Category	Count
Lists	227
Business	116
Personal	114
Small Business	67
Industry	63
Logs	47
Education	44
Task List	42
Checklist	41
Event	36
Family	31
Household	29

1.2. View Options

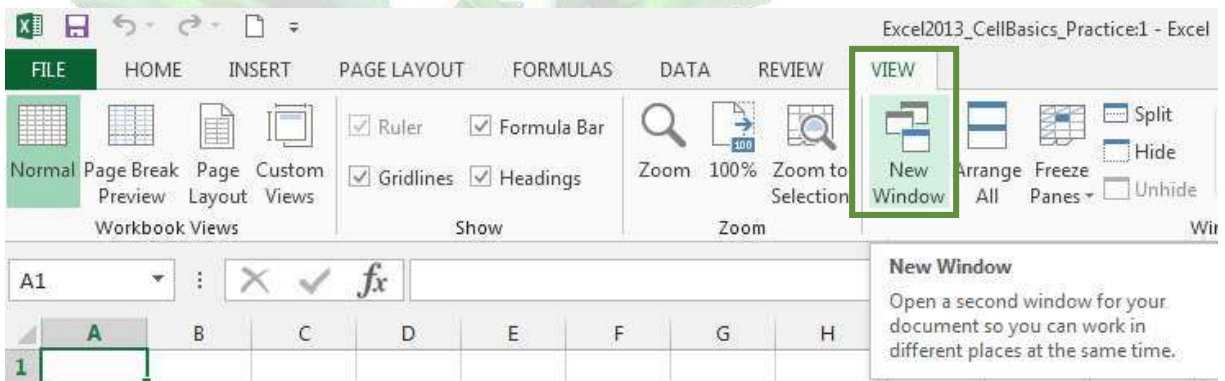
If your workbook contains a lot of content, it can sometimes be difficult to compare different sections. Excel includes additional options to make your workbooks easier to view and compare. For example, you can choose to **open a new window** for your workbook or **split a worksheet** into separate panes.


To open a new window for the current workbook

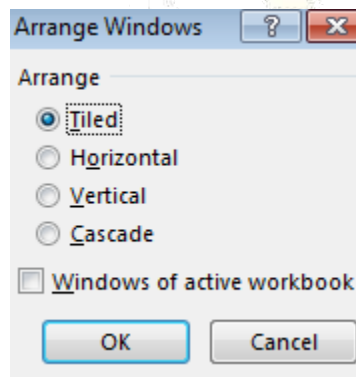
Excel allows you to open **multiple windows** for a single workbook at the same time. In our example, we'll use this feature to compare two different **worksheets** from the same workbook.

1. Click the **View** tab on the **Ribbon**, then select the **New Window** command.

Mac Users - Window Menu / New Window



2. A **new window** for the workbook will appear.
 3. You can now compare different worksheets from the same workbook across windows.
-  **TIP:** If you have several windows open at the same time, you can use the **Arrange All** command to rearrange them quickly.

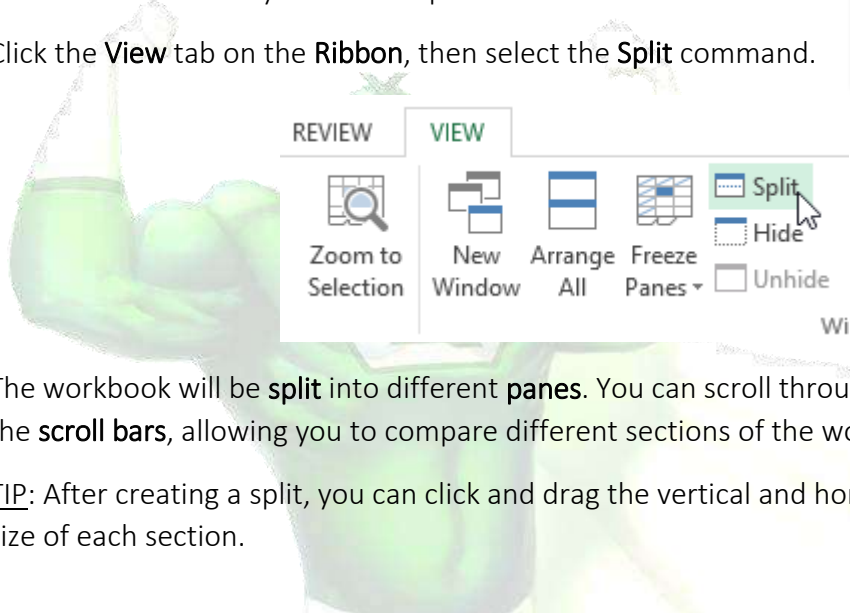


To split a worksheet

Sometimes you may want to compare different sections of the same workbook without creating a new window. The **Split** command allows you to **divide** the worksheet into multiple panes that scroll separately.

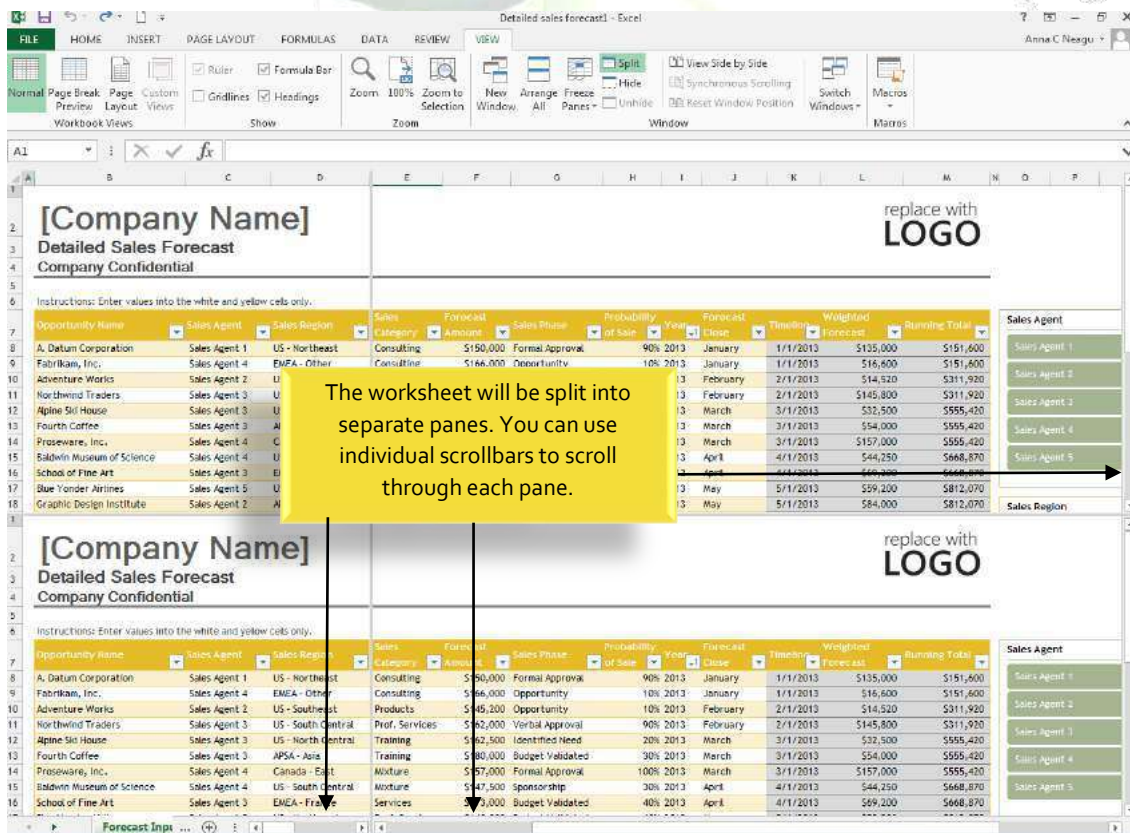
1. Select the **cell** where you wish to split the worksheet.
2. Click the **View** tab on the **Ribbon**, then select the **Split** command.

Mac Users - Window Menu / Split



3. The workbook will be **split** into different **panes**. You can scroll through each pane separately using the **scroll bars**, allowing you to compare different sections of the workbook.

TIP: After creating a split, you can click and drag the vertical and horizontal dividers to change the size of each section.



To remove the split, click the **Split** command again.

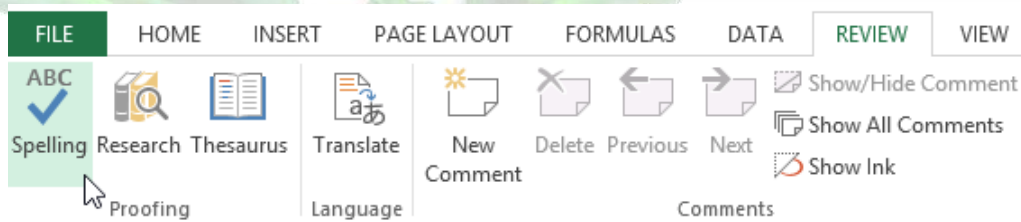
1.3. Finalizing and Protecting Workbooks

Before sharing a workbook, you'll want to make sure it doesn't include any spelling errors or information you wish to keep private. Fortunately, Excel includes several tools to help **finalize** and **protect** your workbook, such as **Spell Check** and the **Document Inspector**.


1.3.1. Spell Check

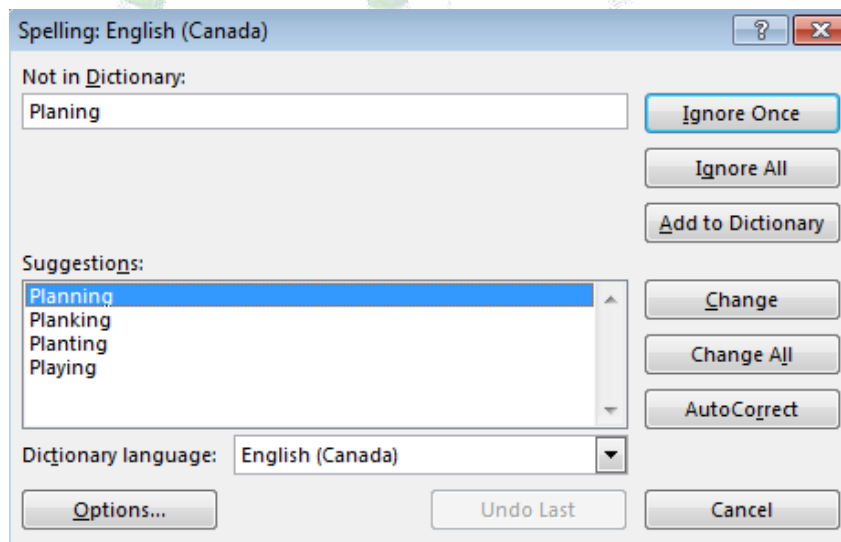
1. From the **Review** tab, click the **Spelling** command.

Mac Users – Review Tab / Spelling

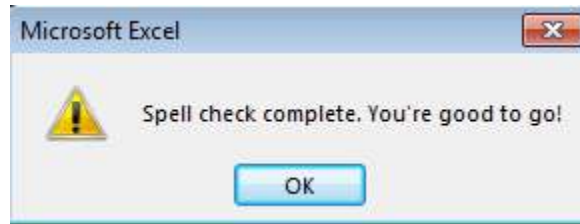


2. The **Spelling** dialog box will appear. For each spelling error in your worksheet, Spell Check will try to offer **suggestions** for the correct spelling. Choose a suggestion, then click **Change** to correct the error.

 **TIP:** If there are no appropriate suggestions, you can also enter the correct spelling manually.



3. A dialog box will appear after reviewing all spelling errors. Click **OK** to close Spell Check.



Ignoring spelling "errors"

Spell Check **isn't always correct**. It will sometimes mark certain words as incorrect, even if they're spelled correctly. This often happens with names, which may not be in the dictionary. You can choose **not** to change a spelling "error" using one of three options:

- **Ignore Once:** This will skip the word without changing it.
- **Ignore All:** This will skip the word without changing it and also skip all other instances of the word in your worksheet.
- **Add:** This adds the word to the dictionary so it will never appear as an error again. Make sure the word is spelled correctly before choosing this option.

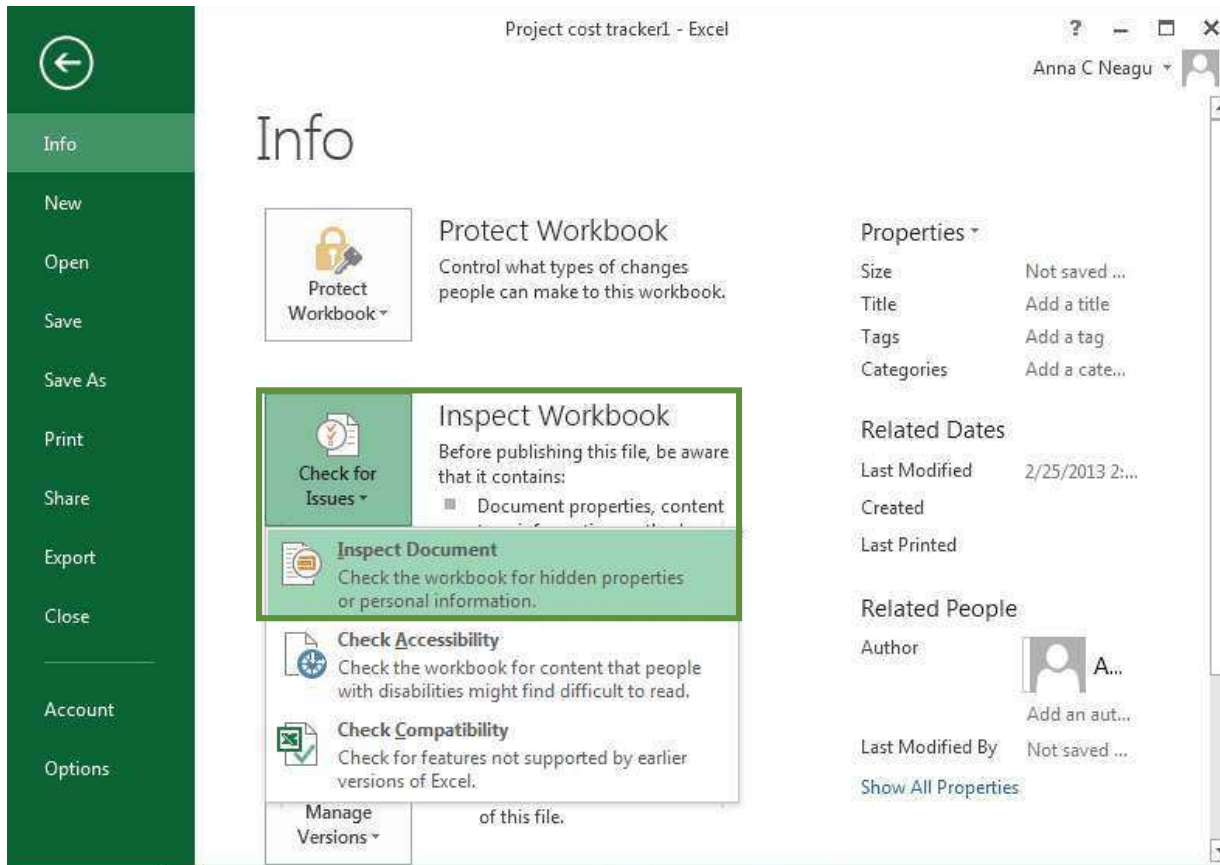
1.3.2. Document Inspector

Mac Users – Option Not Available

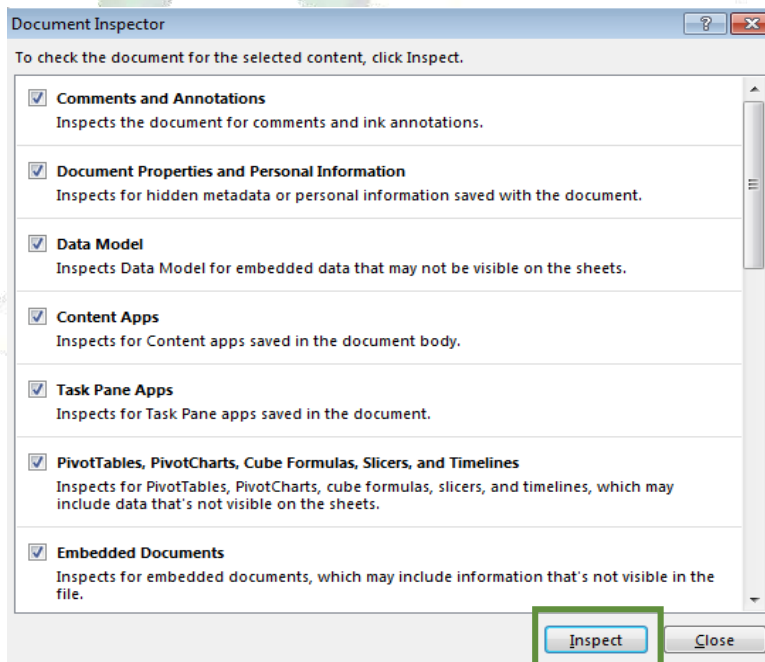
Whenever you create or edit a workbook, certain **personal information** may be added to the file automatically. You can use the Document Inspector to remove this kind of information before sharing a workbook with others.

Because some changes may be permanent, it's a good idea to save an additional copy of your workbook before using the Document Inspector to remove information.

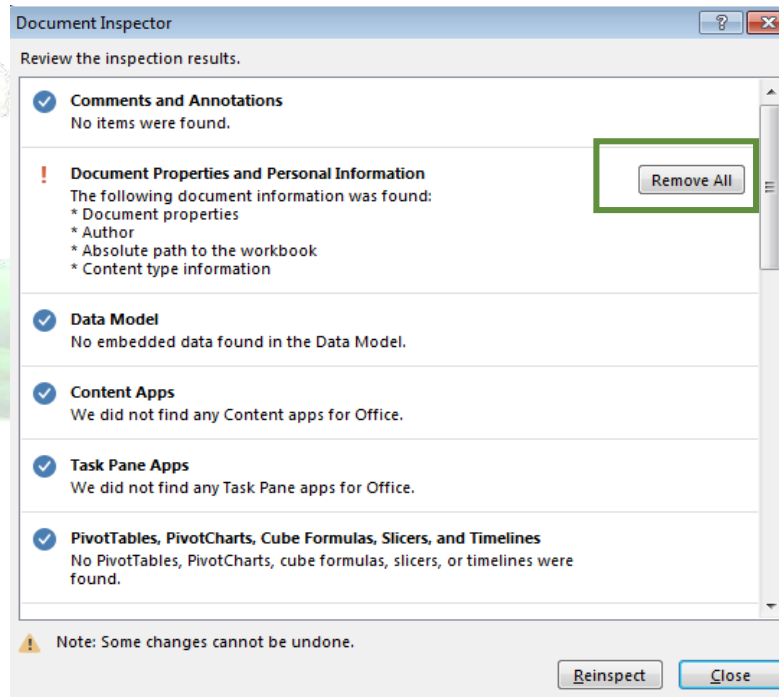
1. Click the **File** tab to access **Backstage view**.
2. From the **Info** pane, click **Check for Issues**, then select **Inspect Document** from the drop-down menu.



3. The **Document Inspector** will appear. Check or uncheck boxes, depending on the content you wish to review, then click **Inspect**.



- The **inspection results** will appear. In our example, we can see that our workbook contains some personal information, so we'll click **Remove All** to remove that information from the workbook.



- When you're done, click **Close**.

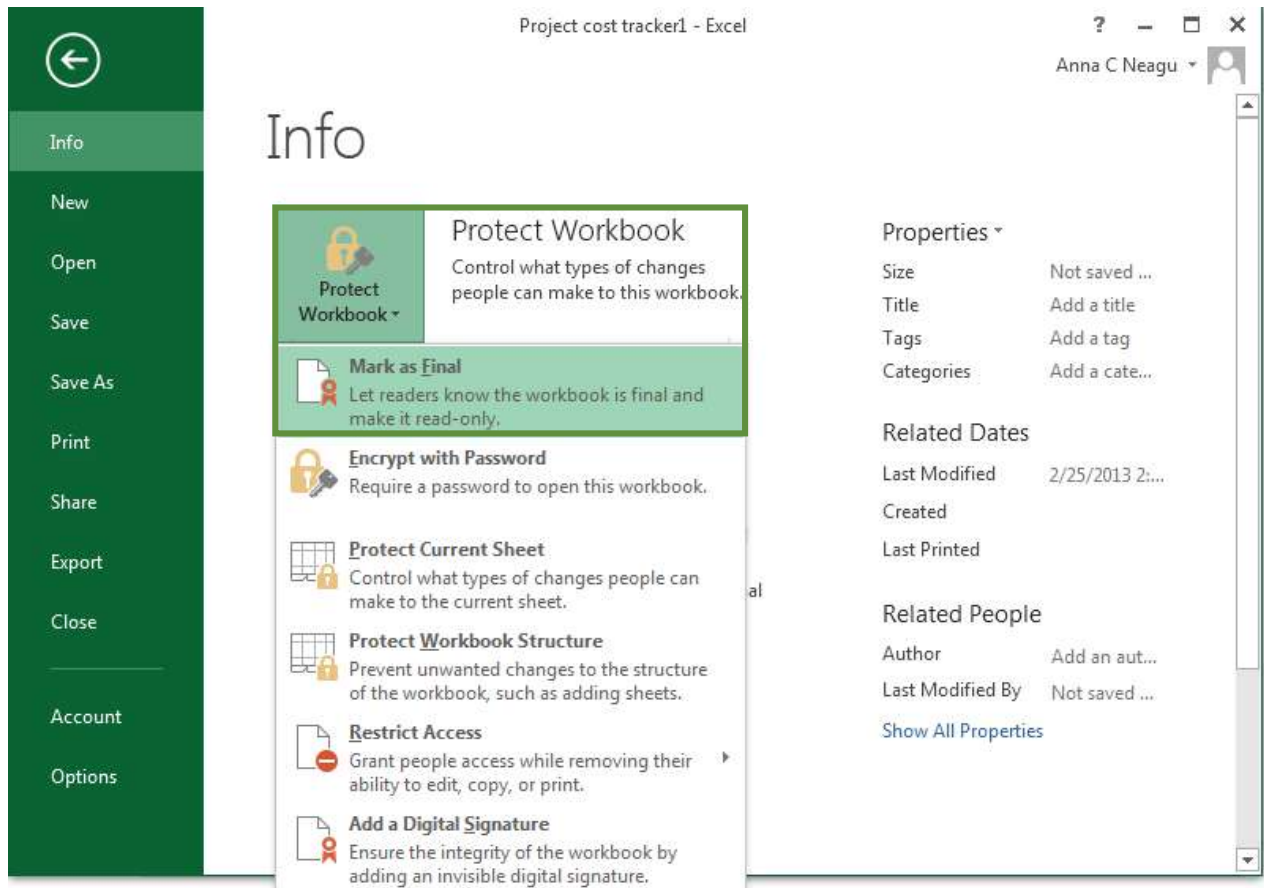
1.3.3. Protecting Your Workbook

By default, anyone with access to your workbook will be able to open, copy, and edit its content unless you **protect** it. There are many different ways to protect a workbook, depending on your needs.

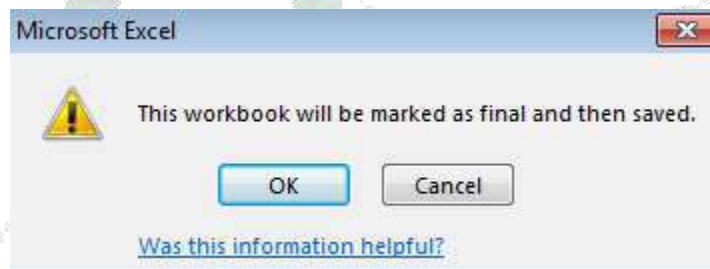
To protect your workbook

- Click the **File** tab to access **Backstage view**.
- From the **Info** pane, click the **Protect Workbook** command.
- In the drop-down menu, choose the option that best suits your needs. In our example, we'll select **Mark as Final**. *Marking your workbook as final is a good way to discourage others from editing the workbook, while the other options give you even more control if needed.*

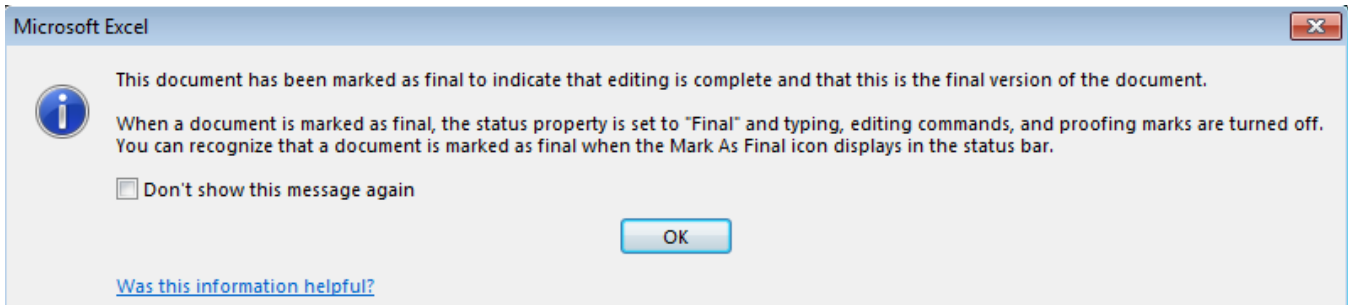
Mac Users – Option Not Available



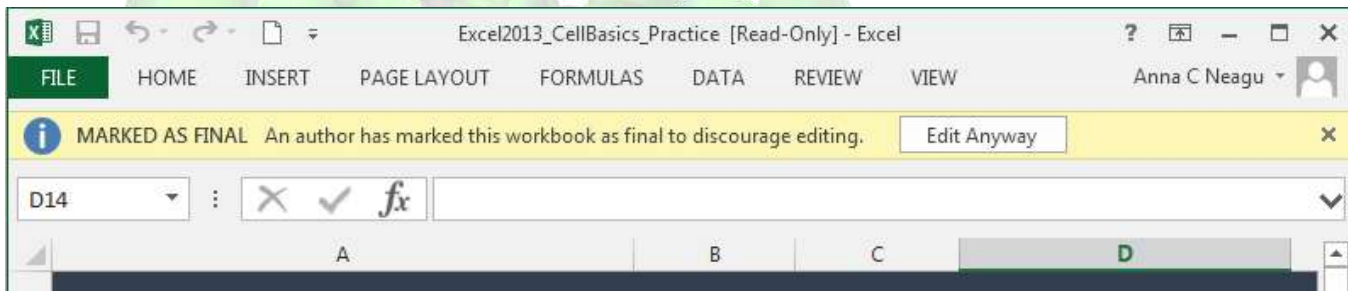
4. A dialog box will appear, prompting you to save. Click **OK**.




5. Another dialog box will appear. Click **OK**.



6. The workbook will be marked as final.



 **TIP:** Marking a workbook as final will not prevent someone from editing it. If you want to prevent people from editing it, you can use the **Restrict Access** option instead.

Challenge!

1. Open an existing Excel workbook.
2. Run the **Spell Check** to correct any spelling errors in the workbook.
3. Use the **Document Inspector** to check the workbook.
4. **Protect** the workbook by marking it as final.


1.3.4. Password Protect Workbook

When you share a workbook with other users, you may want to protect data in specific worksheet or workbook elements to help prevent it from being changed. You can also specify a password that users must enter to modify specific, protected worksheet and workbook elements. In addition, you can prevent users from changing the structure of a worksheet.

When you protect a worksheet or workbook by locking its elements, adding a password to edit the unlocked elements is optional. In this context, the password is only intended to allow access to certain users while helping to prevent changes by other users. This level of password protection does not

guarantee that all sensitive data in your workbook is secure. For optimal security, you should secure a workbook itself with a password to help safeguard it from unauthorized access.

When you protect worksheet or workbook elements by using a password, it is very important that you

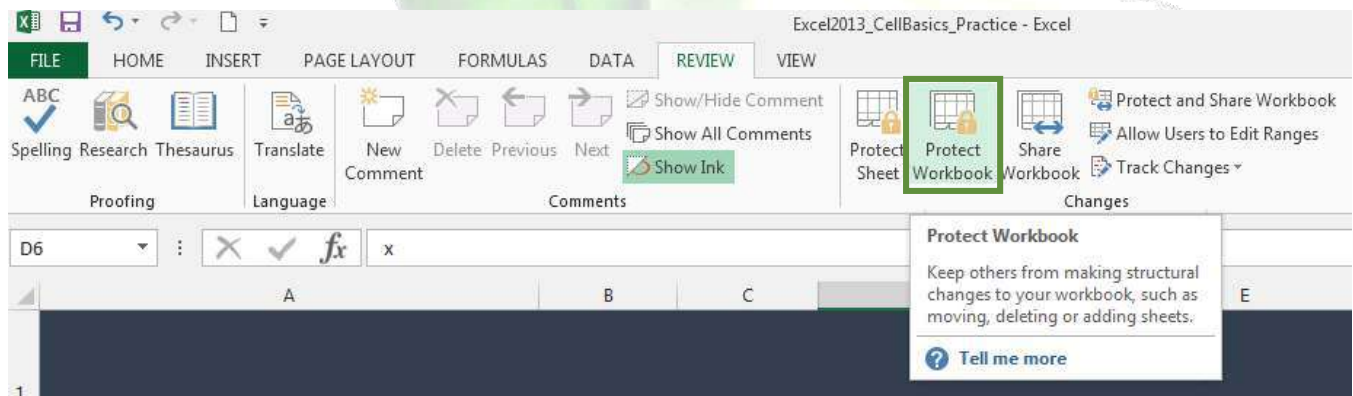
-  **TIP: It is critical that you remember your password. If you forget your password, Microsoft cannot retrieve it.** Store the passwords that you write down in a secure place away from the information that they help protect.

To Password Protect Workbook

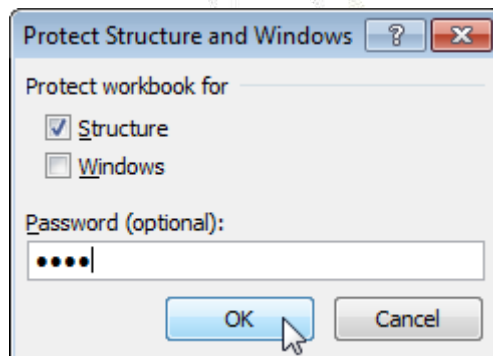
If you protect the workbook structure, users cannot insert, delete, rename, move, copy, hide or unhide worksheets anymore.

1. Open a workbook.
2. On the **Review** tab, click **Protect Workbook**.

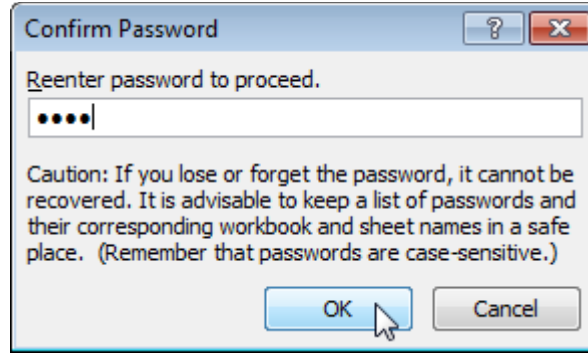
Mac Users – Same (Review Tab / Workbook)




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



4. **Re-enter** the password and click on **OK**.



 **TIP:** If you protect the workbook windows, users cannot move, change the size and close windows anymore.

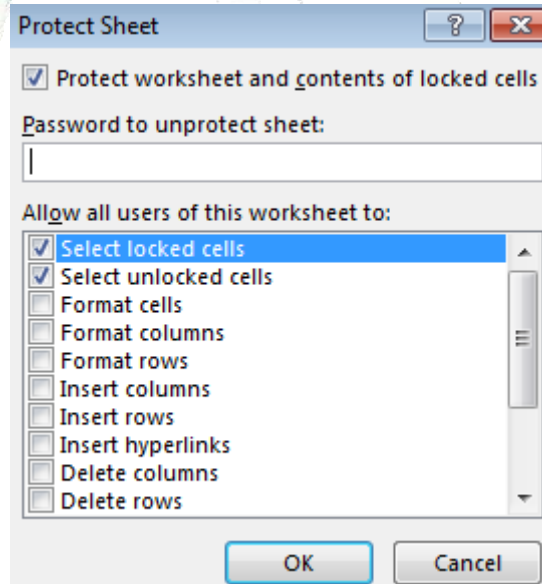
To unprotect the workbook, click Protect Workbook and enter the password.

To Protect Worksheet Elements

Mac Users – Same (Review Tab / Sheet)

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

1. On the **Review** tab, click **Protect Sheet**.
2. Click **Protect Sheet**.
3. Enter a password.
4. Check the actions you allow the users of your worksheet to perform.
5. Click **OK**.




6. Confirm the password and click **OK**.



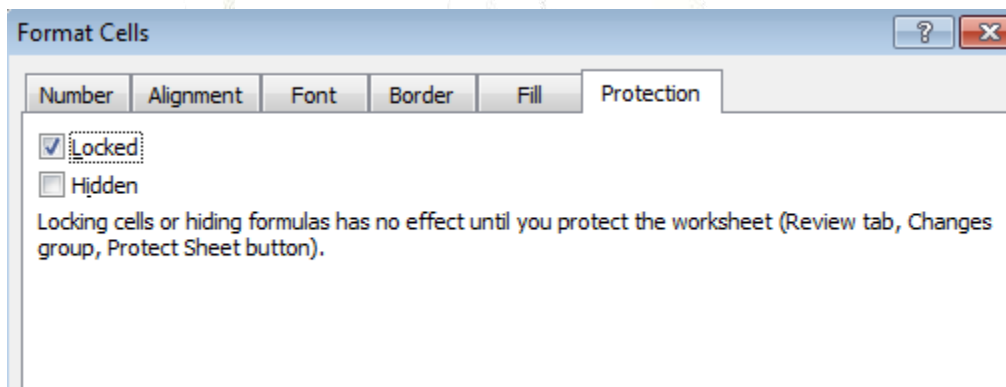
1.3.5. Lock Cells Mac Users – Same Options


You can **lock cells** if you want to protect cells from being edited.

Before you start: by default, all cells are **locked**.

 **TIP: Locking cells has no effect until you protect the worksheet.** So when you protect a worksheet, all your cells (=worksheet) will be locked. As a result, if you want to lock a cell, you have to unlock all cells first, lock a cell, and then protect the sheet.

1. Select all cells.
2. Right click, and then click **Format Cells**.
3. On the **Protection** tab, check the **Locked** check box and click **OK**.



 **TIP:** If you also check the Hidden check box, users cannot see the formula in the formula bar when they select a cell.

2. Data Analysis

If your worksheet contains a lot of content, it can be difficult to find information quickly. **Filters** can be used to **narrow down** the data in your worksheet, allowing you to view only the information you need.

2.1. AutoFilter and Advanced Filter

Filtering rows allows you to include or exclude rows based upon a value. When a column is filtered a small filter icon (▼) appears in the column header.

2.1.1. AutoFilter

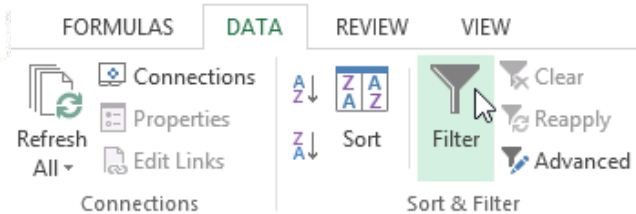
The AutoFilter feature puts drop-down arrows (with menus) in the titles of each column. The menus are used to select criteria in the column so that only records that meet the specified criteria are displayed.

1. In order for filtering to work correctly, your worksheet should include a **header row**, which is used to identify the name of each column.

Opportunity Name	Sales Agent	Sales Region	Sales Category	Forecast Amount	Sales Phase	Probability of Sale	Year	Forecast Close
A. Datum Corporation	Sales Agent 1	US - Northeast	Consulting	\$150,000	Formal Approval	90%	2013	January
Fabrikam, Inc.	Sales Agent 4	EMEA - Other	Consulting	\$166,000	Opportunity	10%	2013	January
Adventure Works	Sales Agent 2	US - Southeast	Products	\$145,200	Opportunity	10%	2013	February
Northwind Traders	Sales Agent 3	US - South Central	Prof. Services	\$162,000	Verbal Approval	90%	2013	February
Alpine Ski House	Sales Agent 3	US - North Central	Training	\$162,500	Identified Need	20%	2013	March
Fourth Coffee	Sales Agent 3	APSA - Asia	Training	\$180,000	Budget Validated	30%	2013	March
Proseware, Inc.	Sales Agent 4	Canada - East	Mixture	\$157,000	Formal Approval	100%	2013	March
Baldwin Museum of Science	Sales Agent 4	US - South Central	Mixture	\$147,500	Sponsorship	30%	2013	April
School of Fine Art	Sales Agent 3	EMEA - France	Services	\$173,000	Budget Validated	40%	2013	April
Blue Yonder Airlines	Sales Agent 5	US - Northwest	Prof. Services	\$148,000	Budget Validated	40%	2013	May
Graphic Design Institute	Sales Agent 2	APSA - Pacific	Services	\$140,000	Solution Proposed	60%	2013	May
City Power & Light	Sales Agent 1	US - Southwest	Support	\$175,000	Needs Analysis	50%	2013	June
Humongous Insurance	Sales Agent 1	APSA - Mexico	Support	\$155,000	Sponsorship	30%	2013	June
Coho Vineyard	Sales Agent 3	Canada - East	Mixture	\$149,000	Solution Proposed	60%	2013	July

2. Select the **Data** tab, then click the **Filter** command.

Mac Users – Same Tab

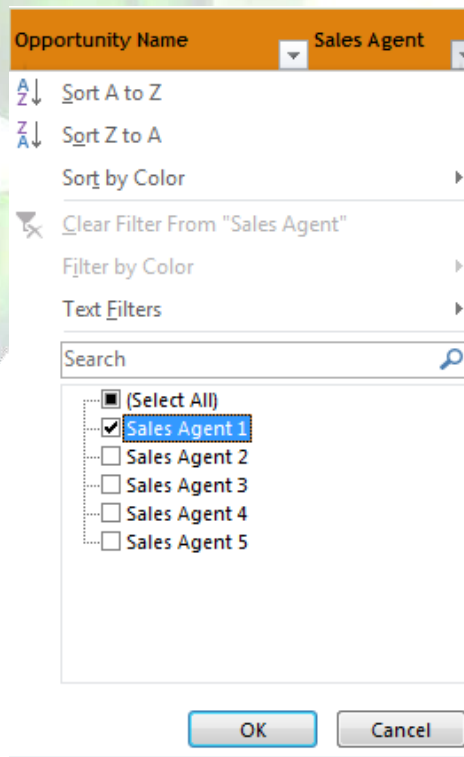


3. A **drop-down arrow** ▼ will appear in the header cell for each column.

4. Click the **drop-down arrow** for the column you wish to filter.

Opportunity Name	Sales Agent	Sales Region	Sales Category	Forecast Amount	Sales Phase	Probability of Sale	Year	Forecast Close
A. Datum Corporation	Sales Agent 1	US - Northeast	Consulting	\$150,000	Formal Approval	90%	2013	January
Fabrikam, Inc.	Sales Agent 4	EMEA - Other	Consulting	\$166,000	Opportunity	10%	2013	January
Adventure Works	Sales Agent 2	US - Southeast	Products	\$145,200	Opportunity	10%	2013	February
Northwind Traders	Sales Agent 3	US - South Central	Prof. Services	\$162,000	Verbal Approval	90%	2013	February
Alpine Ski House	Sales Agent 3	US - North Central	Training	\$162,500	Identified Need	20%	2013	March
Fourth Coffee	Sales Agent 3	APSA - Asia	Training	\$180,000	Budget Validated	30%	2013	March
Proseware, Inc.	Sales Agent 4	Canada - East	Mixture	\$157,000	Formal Approval	100%	2013	March
Baldwin Museum of Science	Sales Agent 4	US - South Central	Mixture	\$147,500	Sponsorship	30%	2013	April
School of Fine Art	Sales Agent 3	EMEA - France	Services	\$173,000	Budget Validated	40%	2013	April

- The **Filter menu** will appear.
- Uncheck** the box next to **Select All** to quickly deselect all data.
- Check** the boxes next to the data you wish to filter, then click **OK**.

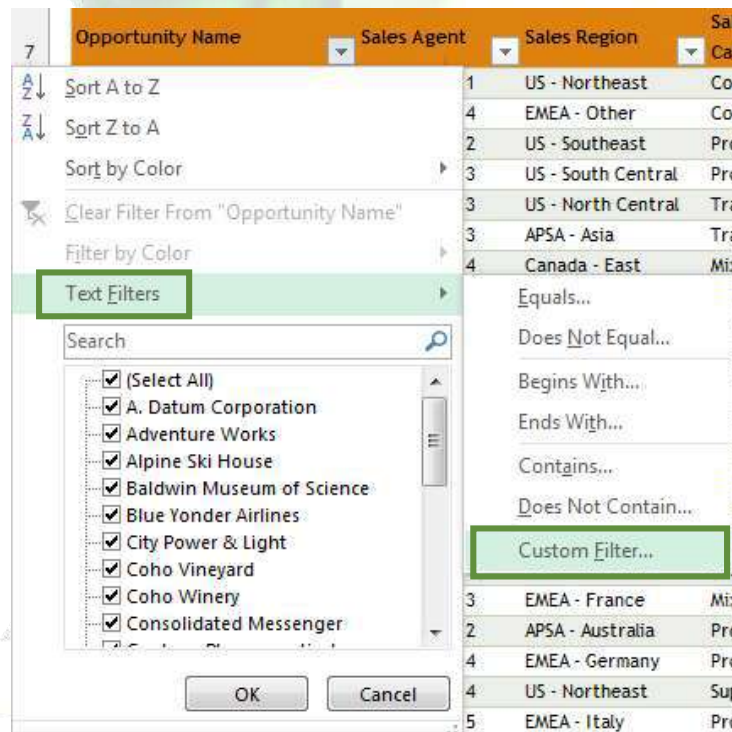


8. The data will be **filtered**, temporarily hiding any content that doesn't match the criteria.

Opportunity Name	Sales Agent	Sales Region	Sales Category	Forecast Amount	Sales Phase	Probability of Sale	Year	Forecast Close
A. Datum Corporation	Sales Agent 1	US - Northeast	Consulting	\$150,000	Formal Approval	90%	2013	January
City Power & Light	Sales Agent 1	US - Southwest	Support	\$175,000	Needs Analysis	50%	2013	June
Humongous Insurance	Sales Agent 1	APSA - Mexico	Support	\$155,000	Sponsorship	30%	2013	June
Tailspin Toys	Sales Agent 1	APSA - Australia	Products	\$168,000	Solution Proposed	60%	2013	September
Total				\$648,000				

To Create Criteria

1. Point to **Text Filters** and then click one of the comparison operators or click Custom Filter.
2. For example, to filter by text that begins with a specific character, select Begins With, or to filter by text that has specific characters anywhere in the text, select Contains.
3. In the Custom AutoFilter dialog box, in the box on the right, enter text or select the text value from the list. Optionally, filter by one more criteria.



To add one or more criteria

1. To filter the table column or selection so that both criteria must be true, select **And**.
2. To filter the table column or selection so that either or both criteria can be true, select **Or**.

3. In the second entry, select a comparison operator, and then in the box on the right, enter text or select a text value from the list.

To remove criteria

1. Click anywhere with the filtered list.
2. On the **Data** Tab in the **Sort & Filter** group click on the **Clear** button.
3. The full list will be displayed again but the filter dropdown arrows are still available

To remove all filters from your worksheet, click the **Filter** command on the **Data** tab.

2.1.2. Advanced Filter

Mac Users – Same Tab

If you need to filter for something specific, basic filtering may not give you enough options. Fortunately, Excel includes many **advanced filtering tools**, including **search**, **text**, **date**, and **number filtering**, which can narrow your results to help find exactly what you need.

To filter with search

Excel allows you to **search** for data that contains an exact phrase, number, date, and more.

1. Select the **Data** tab, then click the **Filter** command. A **drop-down arrow** will appear in the header cell for each column. Note: If you've already added filters to your worksheet, you can skip this step.
2. Click the **drop-down arrow** for the column you wish to filter.
3. The **Filter menu** will appear. Enter a **search term** into the **search box**. Search results will appear automatically below the **Text Filters** field as you type.
4. When you're done, click **OK**.
5. The worksheet will be **filtered** according to your search term.

To use advanced text filters

Advanced text filters can be used to display more specific information, such as cells that contain a certain number of characters, or data that excludes a specific word or number.

And Criteria

To find data that meets one condition in two or more columns, enter all the criteria in the same row of the criteria range.

1. Enter the criteria shown below on the worksheet.

	A	B	C	D
1	Last Name	Sales	Country	Quarter
2			Canada	Q1
3				
4				
5	Last Name	Sales	Country	Quarter
6	Smith	\$145,258.00	Canada	Q1
7	Johnson	\$475,822.00	Canada	Q4
8	Doe	\$169,854.00	US	Q4
9	Black	\$152,888.00	Canada	Q3
10	Williams	\$6,000.00	US	Q1
11	Brown	\$5,200.00	US	Q2
12				

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



4. Click in the **Criteria** range box and select the range C1:D2.
5. Click **OK**.

	A	B	C	D
1	Last Name	Sales	Country	Quarter
2			Canada	Q1
3				
4				
5	Last Name	Sales	Country	Quarter
6	Smith	\$145,258.00	Canada	Q1
12				
13				
14				
15				
16				
17				

Or Criteria

To find data that meets either a condition in one column or a condition in another column, enter the criteria in different rows of the criteria range.

1. Enter the criteria shown below on the worksheet.
2. On the **Data** tab, click **Advanced**, and adjust the Criteria range to range C1:D3.
3. Click OK.

	A	B	C	D
1	Last Name	Sales	Country	Quarter
2			Canada	Q1
3			US	Q2
4				
5	Last Name	Sales	Country	Quarter
6	Smith	\$145,258.00	Canada	Q1
11	Brown	\$5,200.00	US	Q2
12				
13				
14				
15				
16				

Formula as Criteria

1. Enter the criteria (+formula) shown below on the worksheet.
2. On the **Data** tab, click **Advanced**, and adjust the **Criteria range** to range B1:D3.
3. Click **OK**.

	A	B	C	D
1	Last Name	Sales	Country	Quarter
2			Canada	Q4
3		>=\$150,000		
4				
5				
6	Last Name	Sales	Country	Quarter
8	Johnson	\$475,822.00	Canada	Q4
9	Doe	\$169,854.00	US	Q4
10	Black	\$152,888.00	Canada	Q3
13				
14				
15				

Advanced Filter

Action

Filter the list, in-place

Copy to another location

List range:

Criteria range:

Copy to:

Unique records only

OK Cancel

To turn off the **Advanced Filter** click on **Clear** from the **Data** tab in the **Sort & Filter** Group.

2.2. Creating and Using Outlines

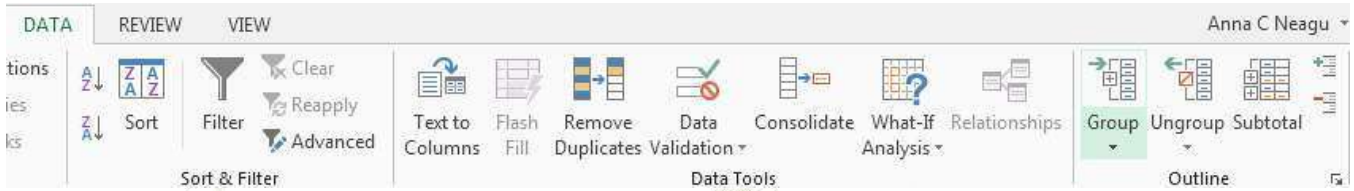
Worksheets with a lot of content can sometimes feel overwhelming and even become difficult to read. Fortunately, Excel can organize data in **groups**, allowing you to easily **show** and **hide** different sections of your worksheet. You can also summarize different groups using the **Subtotal** command and create an **outline** for your worksheet.

2.2.1. Grouping Rows or Columns

1. Select the **rows** or **columns** you wish to group. In this example, we'll select columns **A**, **B**, and **C**.

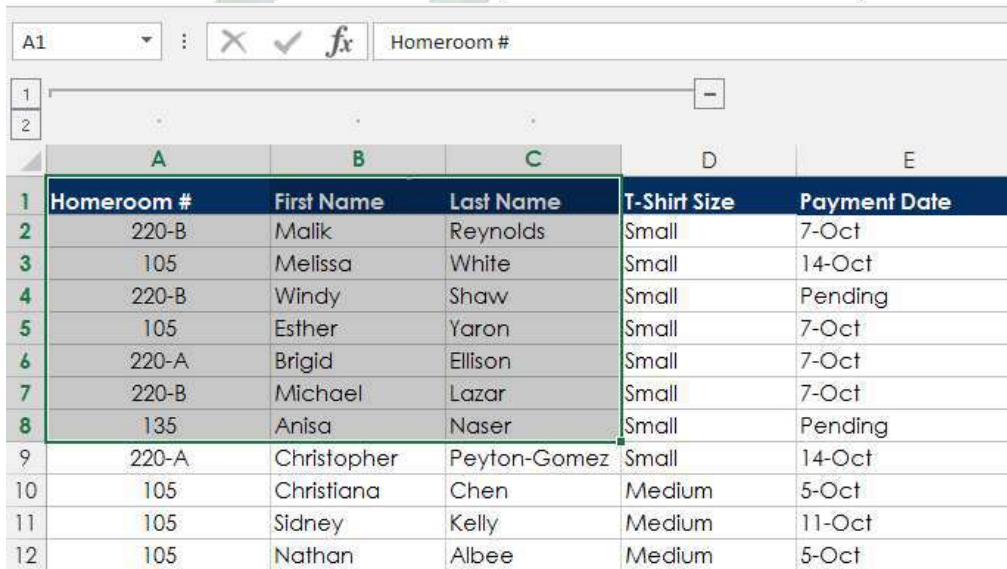
2. Select the **Data** tab on the **Ribbon**, then click the **Group** command.

Mac Users – Same (Data Tab / Group)

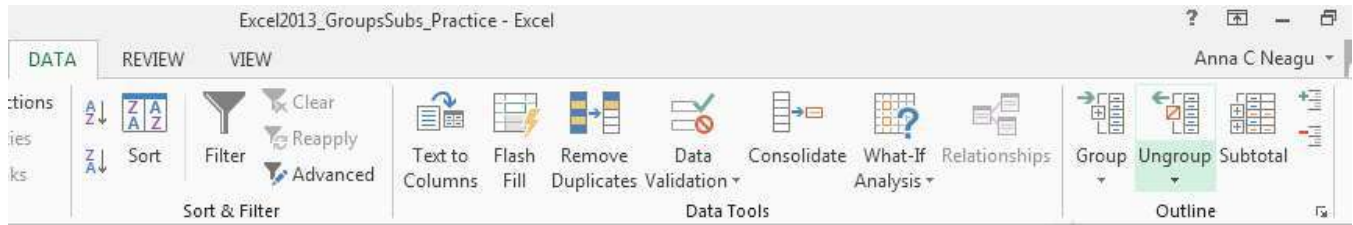


	A	B	C	D	E
1	Homerroom #	First Name	Last Name	T-Shirt Size	Payment Date
2	220-B	Malik	Reynolds	Small	7-Oct
3	105	Melissa	White	Small	14-Oct
4	220-B	Windy	Shaw	Small	Pending
5	105	Esther	Yaron	Small	7-Oct
6	220-A	Brigid	Ellison	Small	7-Oct
7	220-B	Michael	Lazar	Small	7-Oct
8	135	Anisa	Naser	Small	Pending
9	220-A	Christopher	Peyton-Gomez	Small	14-Oct
10	105	Christiana	Chen	Medium	5-Oct
11	105	Sidney	Kelly	Medium	11-Oct
12	105	Nathan	Albee	Medium	5-Oct
13	110	Gabriel	Del Toro	Medium	11-Oct
14	220-B	Avery	Kelly	Medium	13-Oct


3. The selected rows or columns will be **grouped**.

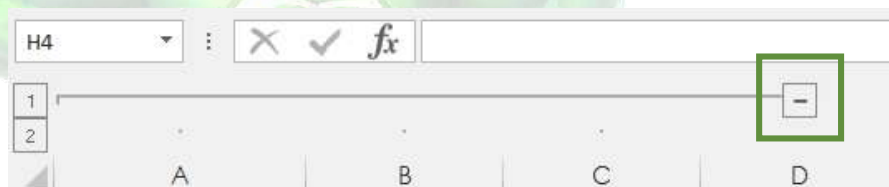



To **ungroup** data, select the grouped rows or columns, then click the **Ungroup** command.

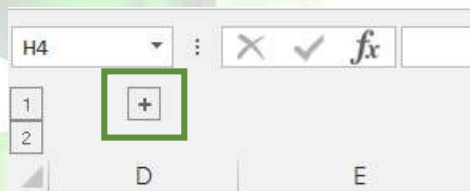


To hide and show groups

1. To hide a group, click the **Hide Detail** button .



2. The group will be **hidden**. To show a hidden group, click the **Show Detail** button .



2.2.2. Creating subtotals

The **Subtotal** command allows you to automatically **create groups** and use common functions like SUM, COUNT, and AVERAGE to help **summarize** your data. For example, the Subtotal command could help to calculate the cost of office supplies by type from a large inventory order. The **Subtotal** command will create a hierarchy of groups, known as an **outline**, to help organize your worksheet.

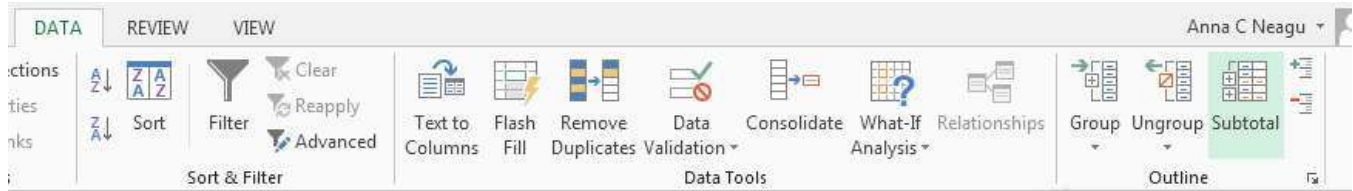
To create a subtotal

In our example, we will use the Subtotal command with a T-shirt order form to determine how many T-shirts were ordered in each size (Small, Medium, Large, and X-Large). This will create an **outline** for our worksheet with a **group** for each T-shirt size and then **count** the total number of shirts in each group.

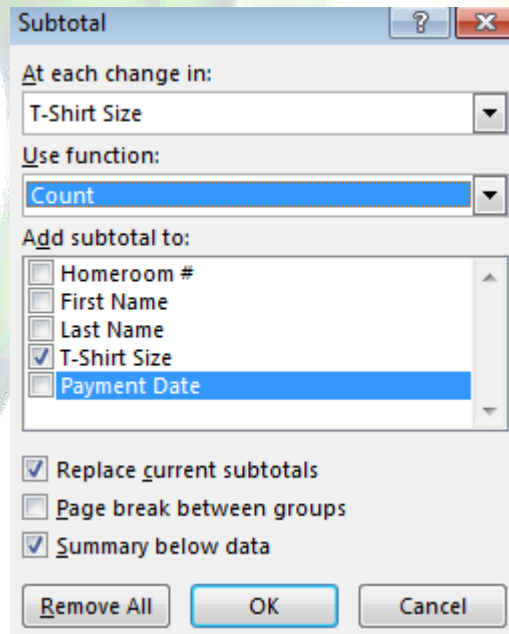
1. First, **sort** your worksheet by the data you wish to subtotal. In this example, we will create a subtotal for each T-shirt size, so our worksheet has been sorted by T-shirt size from smallest to largest.

2. Select the **Data** tab, then click the **Subtotal** command.

Mac Users – Same (Data Tab / Subtotal)



3. The **Subtotal** dialog box will appear. Click the drop-down arrow for the **At each change in:** field to select the **column** you wish to subtotal. In our example, we'll select **T-Shirt Size**.
4. Click the drop-down arrow for the **Use function:** field to select the **function** you wish to use. In our example, we'll select **COUNT** to count the number of shirts ordered in each size.
5. In the **Add subtotal to:** field, select the **column** where you want the **calculated subtotal** to appear. In our example, we'll select **T-Shirt Size**.



6. When you're satisfied with your selections, click **OK**.
7. The worksheet will be **outlined** into **groups**, and the **subtotal** will be listed below each group. In our example, the data is now grouped by T-shirt size, and the number of shirts ordered in that size appears below each group.

	A	B	C	D	E
1	Homeroom #	First Name	Last Name	T-Shirt Size	Payment Date
2	220-B	Malik	Reynolds	Small	7-Oct
3	105	Melissa	White	Small	14-Oct
4	220-B	Windy	Shaw	Small	Pending
5	105	Esther	Yaron	Small	7-Oct
6	220-A	Brigid	Ellison	Small	7-Oct
7	220-B	Michael	Lazar	Small	7-Oct
8	135	Anisa	Naser	Small	Pending
9	220-A	Christopher	Peyton-Gomez	Small	14-Oct
10			Small Count		8
11	105	Christiana	Chen	Medium	5-Oct
12	105	Sidney	Kelly	Medium	11-Oct
13	105	Nathan	Albee	Medium	5-Oct
14	110	Gabriel	Del Toro	Medium	11-Oct
15	220-B	Avery	Kelly	Medium	13-Oct
16	135	James	Panarello	Medium	11-Oct
17	135	Chantal	Weller	Medium	11-Oct
18	220-A	Chevonne	Mears	Medium	13-Oct
19	110	Matt	Benson	Medium	15-Oct
20	220-B	Samantha	Bell	Medium	15-Oct
21			Medium Count		10
22	110	Kris	Ackerman	Large	Pending
23	135	Jordan	Weller	Large	1-Oct
24	135	Alex	Yuen	Large	5-Oct
25	105	Derek	MacDonald	Large	1-Oct
26	110	Regina	Olivera	Large	Pending


To view groups by level

When you create subtotals, your worksheet is divided into different **levels**. You can switch between these levels to quickly control how much information is displayed in the worksheet by clicking the **Level** buttons 1 2 3 to the left of the worksheet. In our example, we'll switch between all three levels in our outline. While this example contains only three levels, Excel can accommodate up to eight.

1. Click the **lowest level** to display the least detail (level 1).
2. Click the **next level** to expand the detail. In our example, we'll select **level 2**, which contains each subtotal row but hides all other data from the worksheet.

	A	B	C	D	E
1	Homeroom #	First Name	Last Name	T-Shirt Size	Payment Date
+	10		Small Count		8
+	21		Medium Count		10
+	27		Large Count		5
+	32		X-Large Count		4
-	33		Grand Count		27

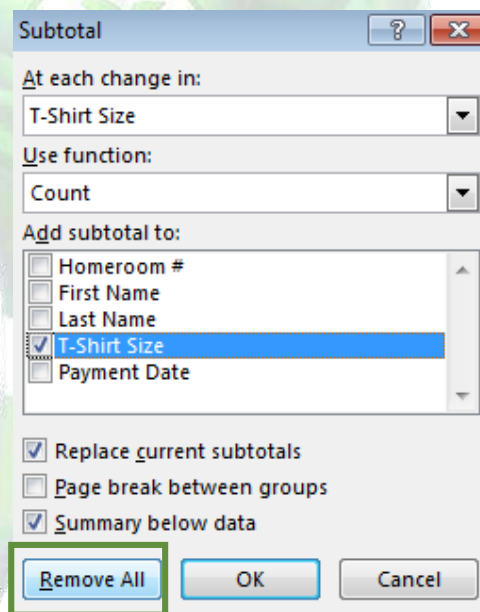
3. Click the **highest level** to view and expand all of your worksheet data (level 2).

 **TIP:** You can also use the **Show** and **Hide Detail** buttons to show and hide the groups within the outline.


To remove subtotals

Sometimes you may not want to keep subtotals in your worksheet, especially if you want to reorganize data in different ways. If you no longer wish to use subtotalling, you'll need **remove it** from your worksheet.

1. Select the **Data** tab, then click the **Subtotal** command.
2. The **Subtotal** dialog box will appear. Click **Remove All**.



3. All worksheet data will be **ungrouped**, and the subtotals will be **removed**.

 **TIP:** To remove all groups without deleting the subtotals, click the **Ungroup** command drop-down arrow, then choose **Clear Outline**.

Challenge!

1. Open an existing Excel workbook.
2. Try **grouping** a range of rows or columns together.
3. Use the **Show** and **Hide Detail** buttons to hide and unhide the group.
4. Try **ungrouping** the group.
5. **Outline** your worksheet using the **Subtotal** command.
6. **Remove subtotalling** from your worksheet.

2.3. Conditional Formatting

Let's imagine you have a worksheet with thousands of rows of data. It would be extremely difficult to see patterns and trends just from examining the raw information. Similar to charts and sparklines, **conditional formatting** provides another way to visualize data and make worksheets easier to understand.

Understanding conditional formatting

Conditional formatting allows you to automatically apply formatting—such as **colors, icons, and data bars**—to one or more cells based on the **cell value**. To do this, you'll need to create a **conditional formatting rule**. For example, a conditional formatting rule might be: "If the value is less than \$2000, color the cell red." By applying this rule, you'd be able to quickly see which cells contain values under \$2000.

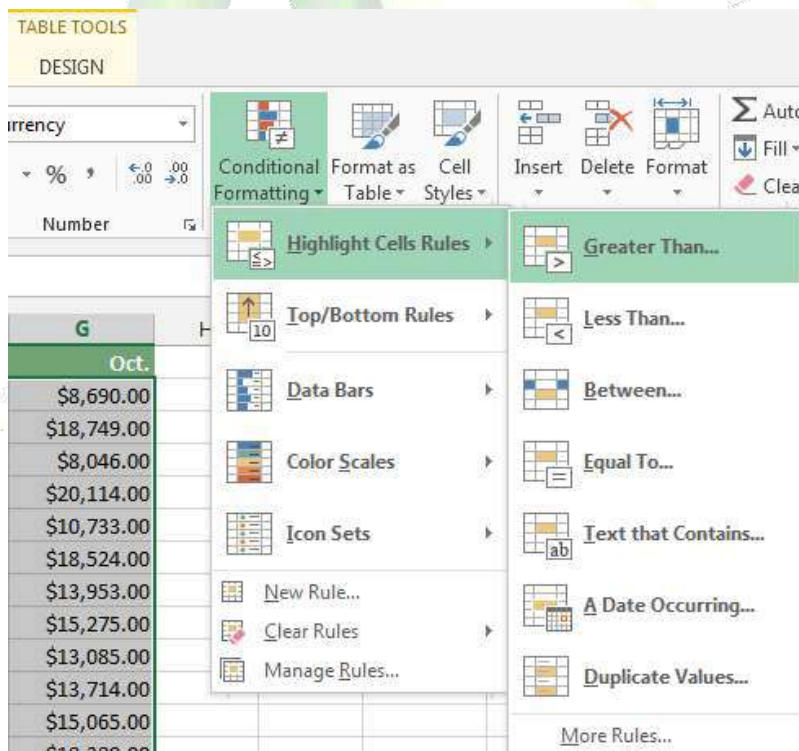
Note: When you create a conditional format, you can only reference other cells on the same worksheet; you cannot reference cells on other worksheets in the same workbook, or use external references to another workbook.

To create a conditional formatting rule

In our example, we have a worksheet containing sales data, and we'd like to see which salespeople are meeting their monthly sales goals. The sales goal is \$4000 per month, so we'll create a conditional formatting rule for any cells containing a value higher than 4000.

1. Select the **desired cells** for the conditional formatting rule.
2. From the **Home** tab, click the **Conditional Formatting** command. A drop-down menu will appear.


Mac Users – Same Tab



3. Hover the mouse over the desired **conditional formatting type**, then select the **desired rule** from the menu that appears. In our example, we want to **highlight cells** that are **greater than \$4000**.

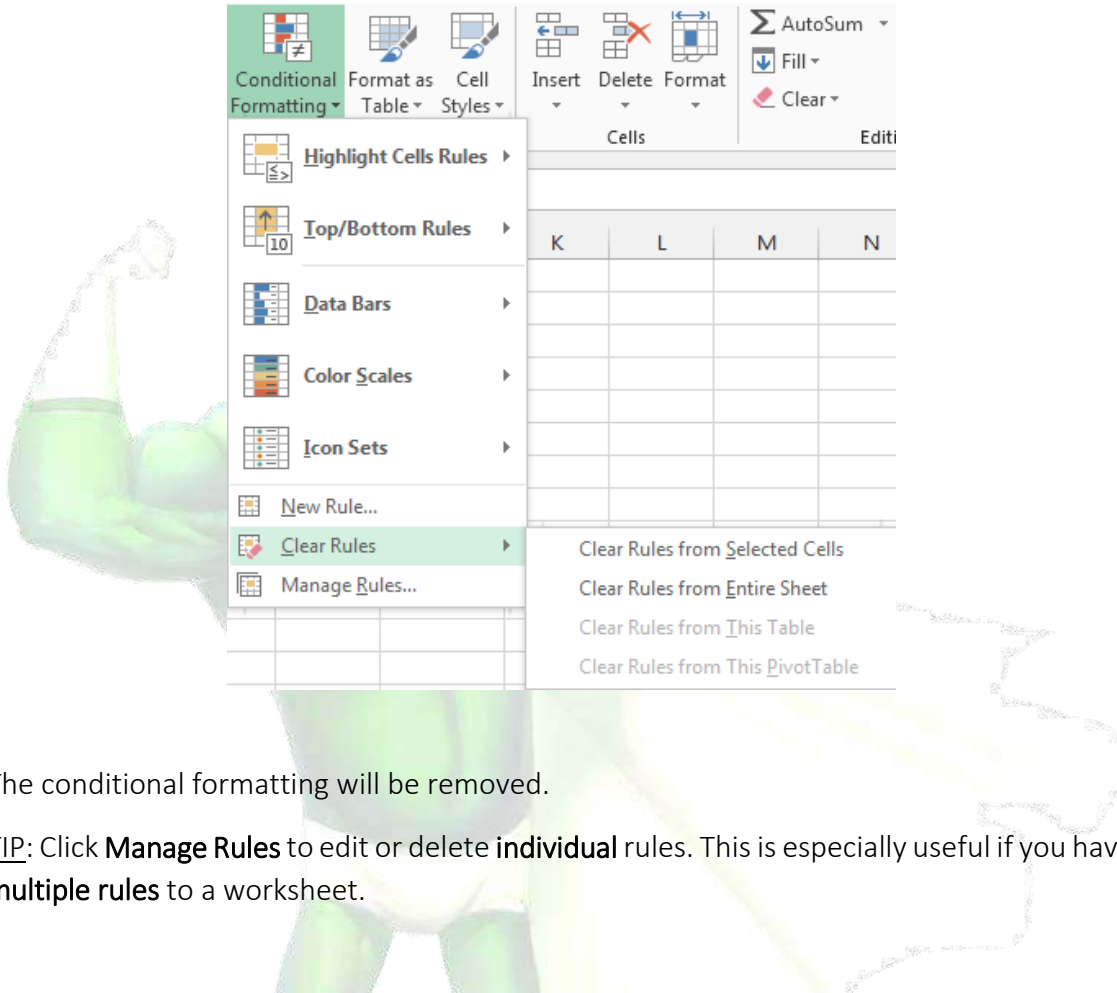
	A	B	C	D	E	F	G
1	Salesperson	May	June	July	Aug.	Sept.	Oct.
2	Albertson, Kathy	\$3,947.00	\$557.00	\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00
3	Allenson, Carol	\$4,411.00	\$1,042.00	\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00
4	Altman, Zoey	\$2,521.00	\$3,072.00	\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00
5	Bittiman, William	\$4,752.00	\$2,755.00	\$4,415.00	\$1,088.00	\$4,404.00	\$20,114.00
6	Brennan, Michael						
7	Carlson, David						
8	Collman, Harry						
9	Counts, Elizabeth						
10	David, Chloe						
11	Davis, William						
12	Dumlao, Richard	\$3,275.00	\$2,779.00	\$7,549.00	\$1,101.00	\$5,850.00	\$15,065.00
13	Farmer, Kim	\$3,860.00	\$3,470.00	\$3,862.00	\$1,040.00	\$10,024.00	\$18,389.00
14	Ferguson, Elizabeth	\$4,685.00	\$1,913.00	\$4,596.00	\$1,126.00	\$5,503.00	\$10,686.00
15	Flores, Tia	\$4,052.00	\$2,883.00	\$2,142.00	\$2,012.00	\$13,547.00	\$21,983.00
16	Ford, Victor	\$5,541.00	\$4,931.00	\$8,283.00	\$1,054.00	\$9,543.00	\$11,967.00
17	Hodges, Melissa	\$5,667.00	\$4,798.00	\$8,420.00	\$1,389.00	\$10,468.00	\$12,677.00
18	Jameson, Robinson	\$4,269.00	\$4,459.00	\$2,248.00	\$1,058.00	\$6,267.00	\$14,982.00
19	Kellerman, Frances	\$3,502.00	\$4,172.00	\$11,074.00	\$1,282.00	\$2,365.00	\$9,380.00
20	Mark, Katharine	\$5,853.00	\$2,011.00	\$3,807.00	\$1,348.00	\$11,110.00	\$18,047.00
21	Morrison, Thomas	\$2,586.00	\$2,398.00	\$2,453.00	\$1,020.00	\$4,612.00	\$20,525.00
22	Moss, Pete	\$5,714.00	\$4,960.00	\$11,507.00	\$1,010.00	\$6,599.00	\$11,626.00




4. A dialog box will appear. Enter the **desired value(s)** into the blank field. In our example, we'll enter 4000 as our value.
 5. Select a **formatting style** from the drop-down menu. In our example, we'll choose **Green Fill with Dark Green Text**, then click OK.
 6. The conditional formatting will be applied to the selected cells. In our example, it's easy to see which salespeople reached the \$4000 sales goal for each month.
-  **TIP:** You can apply multiple conditional formatting rules to a cell range or worksheet, allowing you to visualize different trends and patterns in your data.

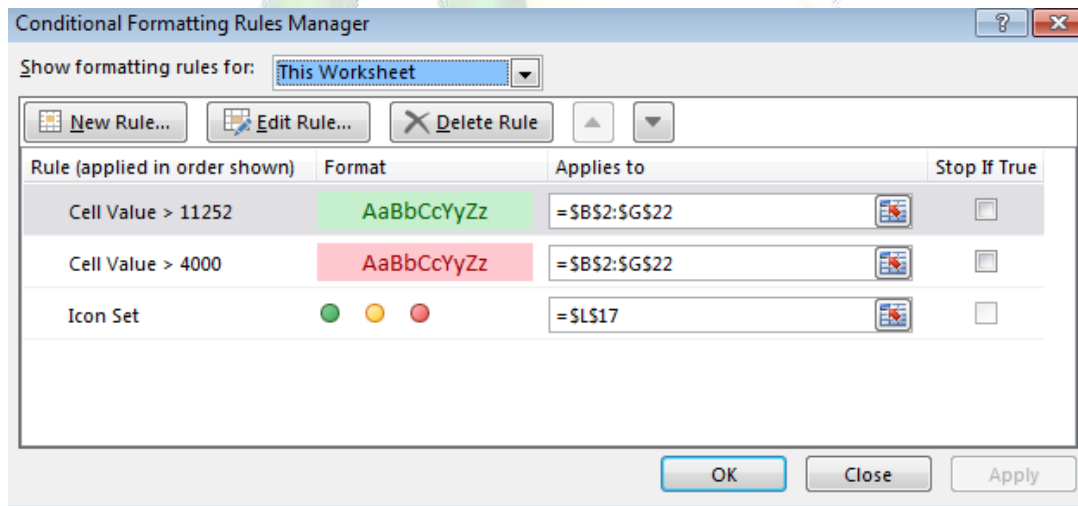
To remove conditional formatting

1. Click the **Conditional Formatting** command. A drop-down menu will appear.
2. Hover the mouse over **Clear Rules**, and choose which rules you wish to clear. In our example, we'll select **Clear Rules from Entire Sheet** to remove all conditional formatting from the worksheet.



3. The conditional formatting will be removed.

 **TIP:** Click **Manage Rules** to edit or delete **individual** rules. This is especially useful if you have applied **multiple rules** to a worksheet.



Conditional formatting presets

Excel has a number of predefined styles, or **presets**, you can use to quickly apply conditional formatting to your data. They are grouped into three categories:

- **Data Bars** are horizontal bars added to each cell, much like a **bar graph**.

\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00
\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00
\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00
\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00

- **Color Scales** change the color of each cell based on its value. Each color scale uses a **two- or three-color gradient**. For example, in the **Green - Yellow - Red** color scale, the **highest** values are green, the **average** values are yellow, and the **lowest** values are red.

\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00
\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00
\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00
\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00

- **Icon Sets** add a specific icon to each cell based on its value.

↓ \$3,863.00	↓ \$1,117.00	↘ \$8,237.00	↘ \$8,690.00
↘ \$9,355.00	↓ \$1,100.00	↘ \$10,185.00	↑ \$18,749.00
↘ \$6,702.00	↓ \$2,116.00	↘ \$13,452.00	↘ \$8,046.00
↓ \$4,415.00	↓ \$1,089.00	↓ \$4,404.00	↑ \$20,114.00

To use pre-set conditional formatting

1. Select the **desired cells** for the conditional formatting rule.
2. Click the **Conditional Formatting** command. A drop-down menu will appear.
3. Hover the mouse over the **desired preset**, then choose a **preset style** from the menu that appears.
4. The conditional formatting will be applied to the selected cells.

Challenge!

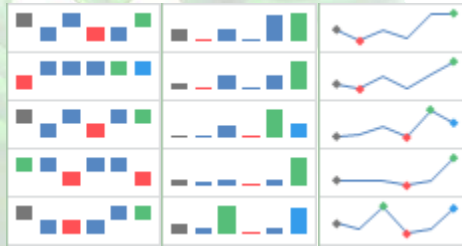
1. Open an **existing Excel workbook**.
2. Apply conditional formatting to a range of cells with **numerical values**.
3. Apply a second conditional formatting rule to the same set of cells.
4. Clear all conditional formatting rules from the worksheet.

2.4. Sparklines

Sometimes you may want to **analyze** and view **trends** in your data without creating an entire chart. **Sparklines** are miniature charts that fit into a **single cell**. Because they're so compact, it's easy to include several sparklines in a workbook.

2.4.1. Types of sparklines

There are three different types of sparklines: **Line**, **Column**, and **Win/Loss**. **Line** and **Column** work the same as line and column charts. **Win/Loss** is similar to **Column**, except it only shows whether each value is **positive** or **negative** instead of how **high** or **low** the values are. All three types can display **markers** at important points, such as the **highest** and **lowest** points, to make them easier to read.



Sparklines are ideal for situations when you need a clear overview of the data **at a glance** and when you don't need all of the features of a full chart. On the other hand, charts are ideal for situations when you want to represent the data in **greater detail**, and they are often better for **comparing** different data series.

To create sparklines

Generally, you will have one sparkline for each row, but you can create as many as you want in any location. Just like **formulas**, it's usually easiest to create a **single sparkline** and then use the **fill handle** to create sparklines for the adjacent rows. In our example, we'll create sparklines to help visualize **trends** in sales over time for each salesperson.

1. Select the **cells** that will serve as the source data for the **first sparkline**. In our example, we'll select the cell range **B5:G5**.

	A	B	C	D	E	F	G
1	Last Name	Sales	Country	Quarter			
2			Canada	Q1			
3							
4	Last Name	May	June	July	August	September	October
5	Smith	\$14,258.00	\$557.00	\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00
6	Johnson	\$25,822.00	\$1,042.00	\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00
7	Doe	\$19,854.00	\$3,072.00	\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00
8	Black	\$2,888.00	\$3,755.00	\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00
9	Williams	\$6,000.00	\$3,152.00	\$11,601.00	\$1,122.00	\$3,170.00	\$10,733.00
10	Brown	\$5,200.00	\$4,056.00	\$3,726.00	\$1,135.00	\$8,817.00	\$18,524.00

2. Select the **Insert** tab, then choose the desired **Sparkline** from the **Sparklines** group. In our example, we'll choose **Line**.



Mac Users – Same
(Insert Tab / Sparklines)

3. The **Create Sparklines** dialog box will appear. Use the mouse to select the cell where the sparkline will appear, then click **OK**. In our example, we'll select cell **H5**, and the cell reference will appear in the **Location Range:** field.

	A	B	C	D	E	F	G	H	I	J
1	Last Name	Sales	Country	Quarter						
2			Canada	Q1						
3										
4	Last Name	May	June	July	August	September	October			
5	Smith	\$14,258.00	\$557.00	\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00			
6	Johnson	\$25,822.00	\$1,042.00	\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00			
7	Doe	\$19,854.00	\$3,072.00	\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00			
8	Black	\$2,888.00	\$3,755.00	\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00			
9	Williams	\$6,000.00	\$3,152.00	\$11,601.00	\$1,122.00	\$3,170.00	\$10,733.00			
10	Brown	\$5,200.00	\$4,056.00	\$3,726.00	\$1,135.00	\$8,817.00	\$18,524.00			
11										
12										
13										
14										
15										
16										
17										

Create Sparklines

Choose the data that you want

Data Range: B5:G5

Choose where you want the sparklines to be placed

Location Range: \$H\$5

OK Cancel

4. The sparkline will appear in the specified cell.

4	Last Name	May	June	July	August	September	October	
5	Smith	\$14,258.00	\$557.00	\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00	
6	Johnson	\$25,822.00	\$1,042.00	\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00	
7	Doe	\$19,854.00	\$3,072.00	\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00	
8	Black	\$2,888.00	\$3,755.00	\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00	
9	Williams	\$6,000.00	\$3,152.00	\$11,601.00	\$1,122.00	\$3,170.00	\$10,733.00	
10	Brown	\$5,200.00	\$4,056.00	\$3,726.00	\$1,135.00	\$8,817.00	\$18,524.00	
11								

- Click, hold, and drag the **fill handle** to create sparklines in adjacent cells.
- Sparklines will be created for the selected cells. In our example, the sparklines show clear **trends** in sales over time for each salesperson in our worksheet.

Last Name	May	June	July	August	September	October	
Smith	\$14,258.00	\$557.00	\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00	
Johnson	\$25,822.00	\$1,042.00	\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00	
Doe	\$19,854.00	\$3,072.00	\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00	
Black	\$2,888.00	\$3,755.00	\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00	
Williams	\$6,000.00	\$3,152.00	\$11,601.00	\$1,122.00	\$3,170.00	\$10,733.00	
Brown	\$5,200.00	\$4,056.00	\$3,726.00	\$1,135.00	\$8,817.00	\$18,524.00	

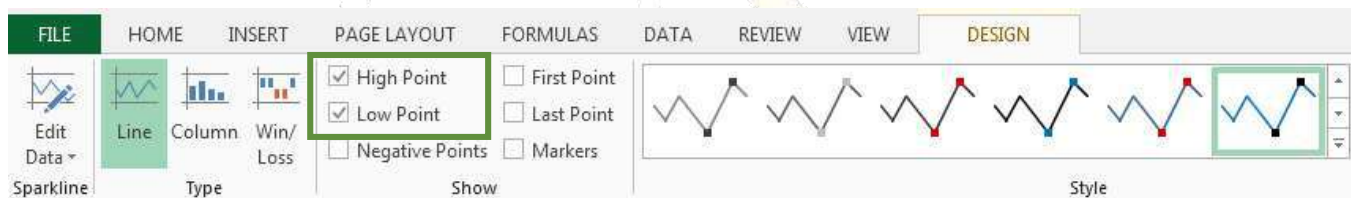
2.4.2. Modifying sparklines

It's easy to change the way sparklines appear in your worksheet. Excel allows you to customize a sparkline's **markers**, **style**, **type**, and more.

To display markers

Certain points on a sparkline can be emphasized with **markers**, or dots, making the sparkline more readable. For example, in a line with a lot of **ups and downs**, it might be difficult to tell which values are the highest and lowest points. Showing the **High Point** and **Low Point** will make them easier to identify.

- Select the **sparkline(s)** you want to change. If they are **grouped** in adjacent cells, you'll only need to click on one sparkline to select them all.
- From the **Design** tab, select the desired option(s) from the **Show** group. In our example, we'll select **High Point** and **Low Point**.



- The sparkline(s) will update to show the selected markers.

July	August	September	October
\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00
\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00
\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00
\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00
\$11,601.00	\$1,122.00	\$3,170.00	\$10,733.00
\$3,726.00	\$1,135.00	\$8,817.00	\$18,524.00

To change the sparkline style

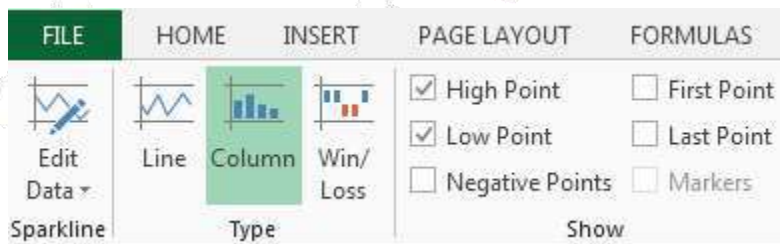
1. Select the **sparkline(s)** you want to change.
2. From the **Design** tab, click the **More** drop-down arrow.



3. Choose the desired **style** from the drop-down menu.
4. The sparkline(s) will update to show the selected style.


To change the sparkline type

1. Select the **sparkline(s)** you want to change.
2. From the **Design** tab, select the desired **Sparkline type**. In our example, we'll select **Column**.



3. The sparkline(s) will update to reflect the new type.

August	September	October	
\$1,117.00	\$8,237.00	\$8,690.00	
\$1,100.00	\$10,185.00	\$18,749.00	
\$2,116.00	\$13,452.00	\$8,046.00	
\$1,089.00	\$4,404.00	\$20,114.00	
\$1,122.00	\$3,170.00	\$10,733.00	
\$1,135.00	\$8,817.00	\$18,524.00	

 **TIP:** Some sparkline types will be better suited for certain types of data. For example, **Win/Loss** is best suited for data where there could be **positive** and **negative** values (such as **net earnings**).

Changing the display range

By default, each sparkline is scaled to fit the maximum and minimum values of its **own data source**: The maximum value will go to the top of the cell, while the minimum will go to the bottom. However, this doesn't show how high or low the values are when compared to the other sparklines. Excel allows you to modify the sparkline **display range**, which makes it easier to **compare** sparklines.

To change the display range:

1. Select the **sparklines** you want to change.
2. From the **Design** tab, click the **Axis** command. A drop-down menu will appear.
3. Below **Vertical Axis Minimum Value Options** and **Vertical Axis Maximum Value Options**, select **Same for All Sparklines**.
4. The sparklines will update to reflect the new display range.

Challenge!

1. Open an **existing Excel workbook**.
2. Create a **sparkline** on the first row of data.
3. Use the **fill handle** to create sparklines for the remaining rows.
4. Create markers for the **High Point** and **Low Point**.
5. Change the **sparkline type**.
6. Change the **display range** to make the sparklines easier to compare.

2.5. Collating Data from Several Worksheets

Mac Users – Same Options

Excel allows you to refer to any cell on any **worksheet**, which can be especially helpful if you want to reference a specific value from one worksheet to another. To do this, you'll simply need to begin the cell reference with the **worksheet name** followed by an **exclamation point (!)**. For example, if you wanted to reference cell **A1** on **Sheet1**, its cell reference would be **Sheet1!A1**.

To reference cells across worksheets

In our example below, we'll refer to a cell with a calculated value between two worksheets. This will allow us to use the **exact same value** on two different worksheets without rewriting the formula or copying data between worksheets.

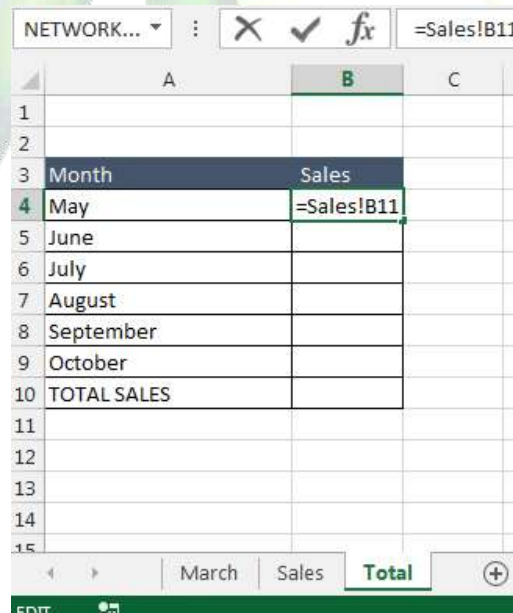
1. Locate the cell you wish to reference, and note its worksheet. In our example, we want to reference cell **B11** on the **Sales** worksheet.

	A	B	C	D	E	F	G	H
1	Last Name	Sales	Country	Quarter				
2			Canada	Q1				
3								
4	Last Name	May	June	July	August	September	October	
5	Smith	\$14,258.00	\$557.00	\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00	
6	Johnson	\$25,822.00	\$1,042.00	\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00	
7	Doe	\$19,854.00	\$3,072.00	\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00	
8	Black	\$2,888.00	\$3,755.00	\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00	
9	Williams	\$6,000.00	\$3,152.00	\$11,601.00	\$1,122.00	\$3,170.00	\$10,733.00	
10	Brown	\$5,200.00	\$4,056.00	\$3,726.00	\$1,135.00	\$8,817.00	\$18,524.00	
11	Total	\$74,022.00	\$15,634.00	\$39,662.00	\$7,679.00	\$48,265.00	\$84,856.00	
12								
13								
14								
15								


2. Navigate to the desired **worksheet**. In our example, we'll select the **Catering Invoice** worksheet.

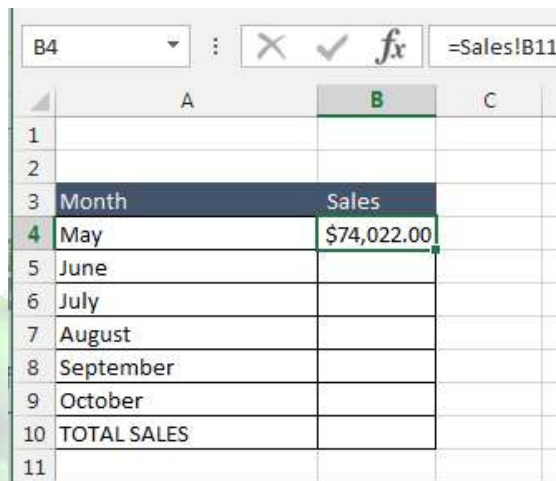


- The **selected worksheet** will appear.
- Locate and select the **cell** where you want the value to appear. In our example, we'll select cell **B4**.
- Type the **equals sign (=)**, the **sheet name** followed by an **exclamation point (!)**, and the **cell address**. In our example, we'll type **=Sales!B11**.



- Press **Enter** on your keyboard. The **value** of the referenced cell will appear.

 **TIP:** If you **rename** your worksheet at a later point, the cell reference will be updated automatically to reflect the new worksheet name.



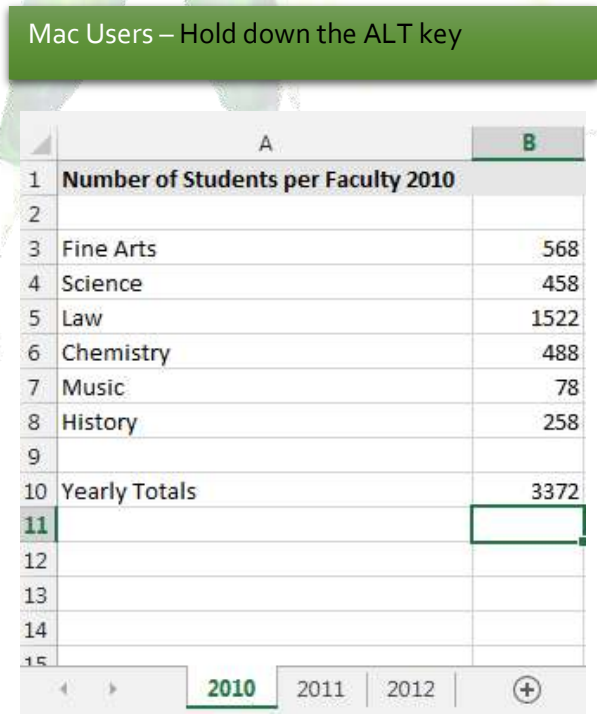
Month	Sales
May	\$74,022.00
June	
July	
August	
September	
October	
TOTAL SALES	

To replicate a worksheet

In our example, we'll create the following sheet in a workbook, saving the workbook as **Faculty.xls**

1. Rename the sheet from Sheet1 to **2010**
2. To create Sheet2, instead of retyping the information copy the sheet click on the 2010 tab and keep the mouse pressed, **hold down the Ctrl key**, and **release the mouse** to the right of the 2010 Tab.

Mac Users – Hold down the ALT key



Number of Students per Faculty 2010	Students
Fine Arts	568
Science	458
Law	1522
Chemistry	488
Music	78
History	258
Yearly Totals	3372

3. **Enter** the figures for 2011, by overwriting the 2010 figures. The Yearly Totals will automatically update.
4. **Change** the Year in cell A1 to 2011 and **Rename** the sheet to 2011.
5. To create the sheet for 2012, we can copy the 2011 sheet. Again change the figures and the Year to 2012 in cell A1. Rename the sheet to 2012.

Formulas – using cells from different worksheets

To calculate the Total for Arts for 2010, 2011 & 2012 using the manual option.

1. In cell **B2** of the **Faculty Totals** worksheet type the heading **Totals**.
2. Click in cell **B3** of the **Faculty Totals** worksheet and type the equals sign =
3. Click on **2010** sheet, and select the cell with the Arts figures, **B3** type the **+** addition symbol.
4. Click on **2011** sheet, and select the cell with the Arts figures, **B3** type the **+** addition symbol. Click on **2012** sheet and select the cell with the Arts figures, **B3** and press **Enter**.
5. Once you press **Enter**, it should return you to the Faculty Totals sheet with a totals figure for Arts in cell B3. Notice the formula in the formula bar.
6. Use the AutoFill to copy this formula for the other faculties.

	A	B	C	D
1	Number of Students per Faculty			
2		Faculty Totals		
3	Fine Arts	=2010!B3+2011!B3+2012!B3		
4	Science			
5	Law			
6	Chemistry			
7	Music			
8	History			
9				
10	Yearly Totals	1654		

Functions – using cells from different worksheets

To calculate the Average for Arts for 2010, 2011 & 2012 using the insert function option.

1. In cell C2 of the **Faculty Totals** type the heading **Average**.
2. Click into cell C3 of the Faculty Totals worksheet and **insert** the average function (use the Insert Function button either on the Formulas Tab or Formula Bar).
3. Click into **Number1** and click on **2010** sheet, and select the cell **B3**.
4. Click into **Number2** and click on **2011** sheet, and select the cell **B3**.
5. Click into **Number3** and click on **2012** sheet, and select the cell **B3**.
6. Click on **OK**, once you press **OK**, it will return to the Faculty Totals sheet displaying an average figure for Arts in cell B3. Notice the formula in the formula bar
7. Use the **AutoFill** to copy this function for the other faculties.

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H
1	Number of Students per Faculty 2012							
2								
3	Fine Arts	543						
4	Science	432						
5	Law	1100			2			
6	Chemis							
7	Music							
8	History							
9								
10	Yearly T							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								

The 'Function Arguments' dialog box for the AVERAGE function is open, showing the following arguments:

- Number1: '2010'!B3 = 568
- Number2: '2011'!B3 = 543
- Number3: '2012'!B3 = 543
- Number4: = number

The dialog box also displays the formula result as 551.3333333 and includes an 'OK' button and a 'Cancel' button.

3. Advanced Functions

There are a variety of functions. Here are some of the most common functions you'll use:


- SUM:** This function **adds** all the values of the cells in the argument.

- ☑ **AVERAGE:** This function determines the **average** of the values included in the argument. It calculates the sum of the cells and then divides that value by the number of cells in the argument.
- ☑ **COUNT:** This function **counts** the number of cells with numerical data in the argument. This function is useful for quickly counting items in a cell range.
- ☑ **MAX:** This function determines the **highest cell value** included in the argument.
- ☑ **MIN:** This function determines the **lowest cell value** included in the argument.

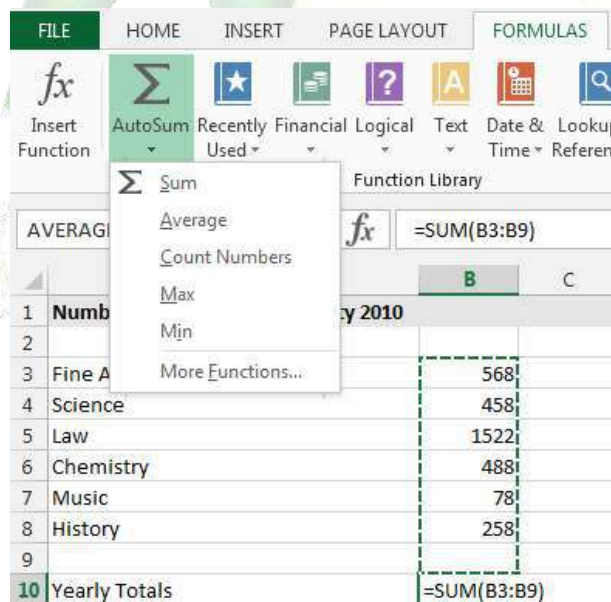
3.1. AutoSum

The SUM function is the most commonly used function so to make it more accessible there is an AutoSum button on the Home tab.

1. **Position the cell pointer** in the cell that will contain the result of the function.
2. Click on the **AutoSum** button Excel will guess the range of cells to be calculated and it will insert the =SUM function. If the range of cells is not correct use the mouse to select the correct range of cells to be added.

 **TIP:** use the mouse and the Ctrl key to select non-adjacent cells.

3. Press **return** to display the results in the cell or click on the tick on the formula bar.



Using the Average, Count, Max and Min Functions

1. Click on the down arrow to the right of the **AutoSum** button and select the required function e.g. **Average**.
2. **Excel will guess the range of cells** to be calculated and it will insert the =Average function. If the range of cells is not correct use the mouse to select the correct range of cells to be included in the calculation.
3. Press **return** to display the results in the cell or click on the tick on the formula bar.

3.2. IF Function

The **IF function** checks whether a condition is met, and returns one value if TRUE and another value if FALSE.

Use the IF function, one of the logical functions, to return one value if a condition is true and another value if it's false.

Syntax: **IF(logical_test, value_if_true, [value_if_false])**

- **logical_test** (required) = the condition you want to test.
- **value_if_true** (required) = the value that you want returned if the result of logical_test is TRUE.
- **value_if_false** (optional) = the value that you want returned if the result of logical_test is FALSE.

For example:

- ❑ =IF(A2>B2,"Over Budget","OK")
- ❑ =IF(A4=500,B4-A4,"")
- ❑ =IF(A2<B2,TRUE, IF(A3>B3,"over budget","OK"))
- ❑ =IF(AND(A1>15, B1<3),"Correct","Incorrect")
- ❑ =IF(A2>89,"A",IF(A2>79,"B",IF(A2>69,"C",IF(A2>59,"D","F"))))

Use nested functions in a formula

Using a function as one of the arguments in a formula that uses a function is called nesting, and we'll refer to that function as a nested function.

Nested IF functions work by replacing one or both of the TRUE/FALSE calculations with another IF function.

For example, imagine you have a sales team of five people, and you need to calculate their commission for the month based on their sales figures.

	A	B	C
1	Sales Team		
2			
3	Salesperson	Sales	Commission
4	Bob	1255	
5	Shelly	235	
6	Rajiv	750	
7	Li	450	

Your commission plan works as follows:

- ✓ If someone sells less than \$400 in a month, they get **7%** commission.
- ✓ For sales between \$400 and \$750, they get **10%** commission.
- ✓ For sales between \$750 and \$1000, they get **12.5%**
- ✓ For sales over \$1000, they get **16%**

Rather than calculate each of these commission figures individually, you decide to use a nested IF formula instead. The logical tests you would use in this case are these:

- ☑ Is commission less than \$400? If TRUE, then calculate commission.
- ☑ If FALSE, then is commission less than \$750? If TRUE then calculate commission.
- ☑ If FALSE, then is commission less than \$1000? If TRUE then calculate commission.
- ☑ If FALSE, then calculate commission (because it must be more than \$1000 - we don't need to do another logical test for this).

The formula to represent this to calculate commission for Bob looks like this:

=IF(B4<400,B4*7%,IF(B4<750,B4*10%,IF(B4<1000,B4*12.5%,B4*16%)))

Sometimes the VLOOKUP function can sometimes be a better solution in a scenario like this.

3.3. vLookup Function

Use VLOOKUP, one of the lookup and reference functions, when you need to find things in a table or a range by row. For example, look up an employee's last name by her employee number, or find her phone number by looking up her last name (just like a telephone book).

The secret to VLOOKUP is to organize your data so that the value you look up (employee's last name) is to the left of the return value you want to find (employee's phone number).

Syntax: **VLOOKUP (lookup_value, table_array, col_index_num, [range_lookup])**

- **lookup_value** (required) = the value you want to lookup. The value you want to look up must be in the first column of the range of cells you specify in table-array. For example, if table-array spans cells B2:D7, then your lookup_value must be in column B. See the graphic below. Lookup_value can be a value or a reference to a cell.
- **Table_array** (required) = the range of cells that VLOOKUP will search for the Lookup_value and the return value. The first column in the cell range must contain the Lookup_value (for example, Last Name in the graphic below.) The cell range also needs to include the return value (for example, First Name in the graphic below) you want to find.
- **col_index_num** (required) = the column number (starting with 1 for the left-most column of table-array) that contains the return value.
- **range_lookup** (optional) = tells VLOOKUP if it should look for **approximate** or **exact** matches: FALSE searches for the exact value in the first column; TRUE assumes the first column in the table is sorted either numerically or alphabetically, and will then search for the closest value. This is the default method if you don't specify one.

In our example, it will search for the **Product ID** number on the **Products** worksheet. It first searches **vertically down** the first column (VLOOKUP is short for "vertical lookup"). When it finds the desired product ID, it **moves to the right** to find the product name and product price.

	A	B	C
1	Product ID	Product Name	Product Price
2	MEA7879	Measuring cups	\$4.99
3	LAD7890	Ladle	\$7.25
4	SLO7881	Slotted spoon	\$4.50
5	COP7882	12" copper skillet	\$89.79
6	GAR7883	Garlic press	\$3.99
7	CAN7884	Can opener	\$6.49
8	FOI7885	Foil wrap	\$7.87
9	COL7886	Colander	\$14.09
10	MES7887	Mesh sieve	\$8.89
11	CHE7888	Cheesecloth	\$2.89
12	COP7889	9" copper pot	\$55.59
13	RAM7890	Ramekin	\$11.89

1. We'll start by typing an equals sign (=), followed by the function name and an open parenthesis:
=VLOOKUP(
2. Next, we'll add each of the four arguments, separate them with commas, then close the parentheses: **=VLOOKUP(A2, Products!\$A\$2:\$C\$13, 2, FALSE)**

Note that we're using absolute references so this range won't change when we copy the formula to other cells.

	A	B	C	D	E
1	Product ID	Product Name	Product Price	Units	Subtotal
2	MEA7879	Measuring cups			\$0.00
3	GAR7883	Garlic press			\$0.00
4	CHE7888	Cheesecloth			\$0.00
5				Tax	\$0.00

3.4. What-If Analysis Mac Users – Same (Data Tab / What-If Analysis)

What-If Analysis in Excel allows you to try out different values (scenarios) for formulas. This feature can help you **experiment** and **answer questions** with your data, even when the data is incomplete.

Goal Seek

Whenever you create a formula or function in Excel, you put various parts together to calculate a **result**. **Goal Seek** works in the opposite way: It lets you start with the **desired result**, and it calculates the **input value** that will give you that result.

Let's imagine you're enrolled in a class. You currently have a grade of 65, and you need at least a 70 to pass the class. Luckily, you have one final assignment that might be able to raise your average. You can use Goal Seek to find out **what grade you need on the final assignment** to pass the class.

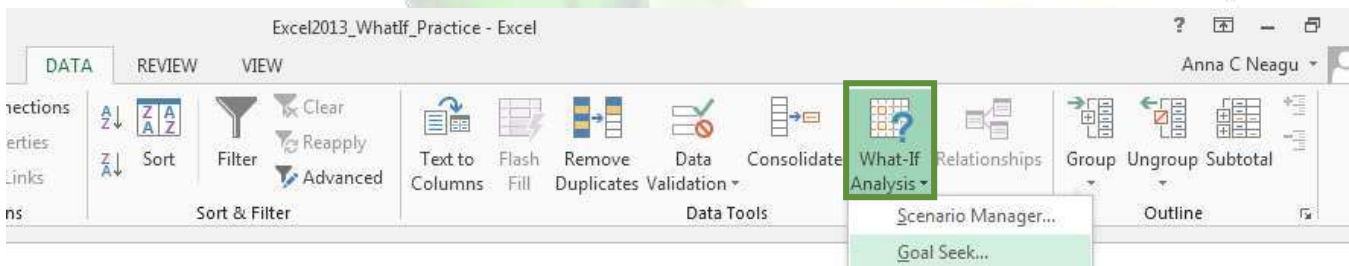
In the image below, you can see that the grades on the first four assignments are **58, 70, 72, and 60**. Even though we don't know what the fifth grade will be, we can write a formula, or function, that calculates the final grade. In this case, each assignment is weighted equally, so all we have to do is average all five grades by typing **=AVERAGE(B2:B6)**. Once we use Goal Seek, cell **B6** will show us the minimum grade we'll need to make on that assignment.

	A	B	C	D
1	Assignment	Grade		
2	Test 1	58		
3	Paper 1	70		
4	Test 2	72		
5	Paper 2	60		
6	Test 3			
7	Final Grade	=AVERAGE(B2:B6)		
8				

1. Select the cell whose value you wish to change. Whenever you use Goal Seek, you'll need to select a cell that already contains a **formula** or **function**. In our example, we'll select cell **B7** because it contains the formula **=AVERAGE(B2:B6)**.

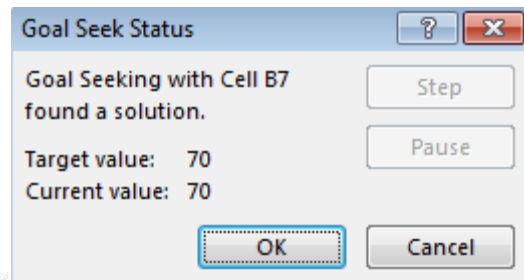
	A	B	C	D
1	Assignment	Grade		
2	Test 1	58		
3	Paper 1	70		
4	Test 2	72		
5	Paper 2	60		
6	Test 3			
7	Final Grade	=AVERAGE(B2:B6)		
8				

2. From the **Data** tab, click the **What-If Analysis** command, then select **Goal Seek** from the drop-down menu.



3. A dialog box will appear with three fields:
 - **Set cell:** This is the cell that will contain the desired result. In our example, cell **B7** is already selected.
 - **To value:** This is the desired result. In our example, we'll enter **70** because we need to earn at least that to pass the class.
 - **By changing cell:** This is the cell where Goal Seek will place its answer. In our example, we'll select cell **B6** because we want to determine the grade we need to earn on the final assignment.

4. When you're done, click **OK**.
5. The dialog box will tell you if Goal Seek was able to find a solution. Click **OK**.



6. The result will appear in the specified cell. In our example, Goal Seek calculated that we will need to score at least a 90 on the final assignment to earn a passing grade.

	A	B	C
1	Assignment	Grade	
2	Test 1	58	
3	Paper 1	70	
4	Test 2	72	
5	Paper 2	60	
6	Test 3	90	
7	Final Grade	70	

3.5. Name Ranges

A **name range** is a description that you assign to a cell or group of cells. Names are an alternative to cell references. Once a name has been defined, you can refer to it in a formula; for example, =sum(Year1). You can use names to move quickly to a certain area of the workbook or to specify print ranges.

Excel named ranges are formula boosters.

When assigning range names to a cell or cell range, you need to follow a few guidelines:

- ❑ Range names must begin with a letter of the alphabet, not a number.

For example, instead of 01Profit, use Profit01.

- ❑ Range names cannot contain spaces.

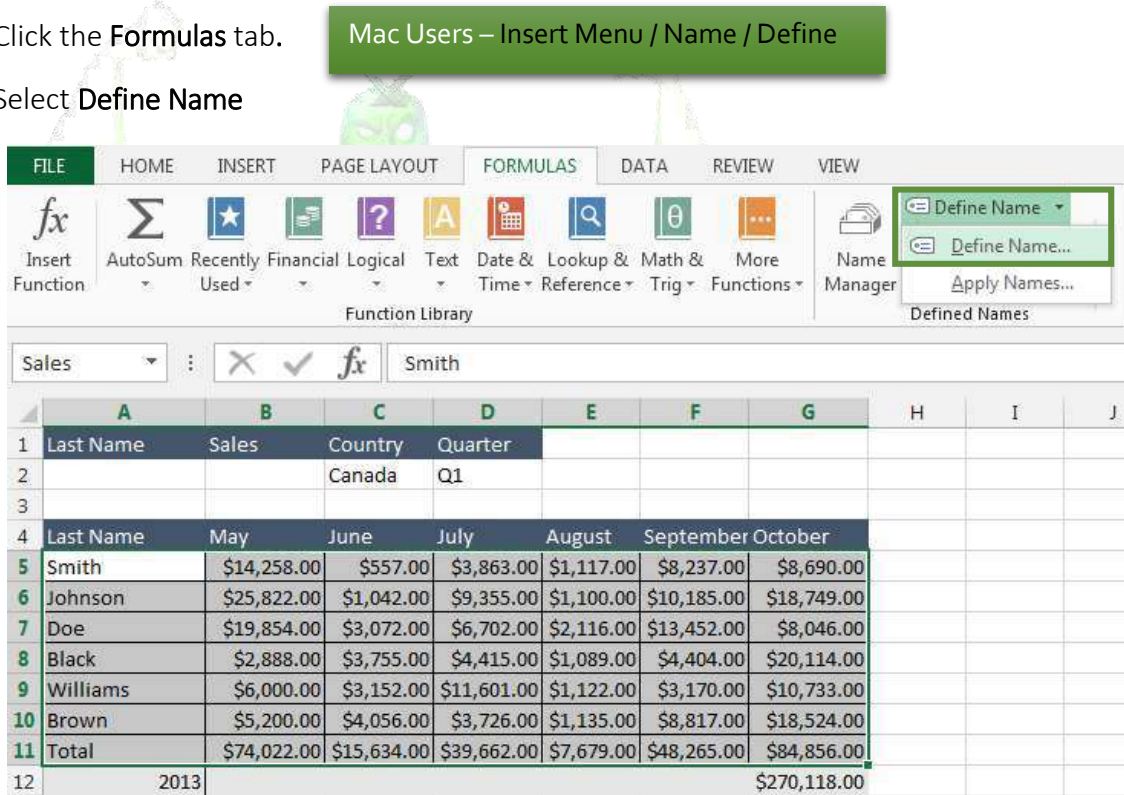
Instead of a space, use the underscore (Shift+hyphen) to tie the parts of the name together. For example, instead of Profit 01, use Profit_01.

- ❑ Range names cannot correspond to cell coordinates in the worksheet.

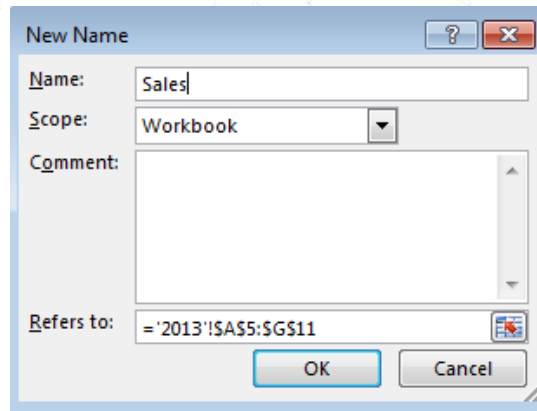
For example, you can't name a cell Q1 because this is a valid cell coordinate. Instead, use something like Q1_sales.

To name a cell or cell range

1. Select the cell or cell range that you want to name.
2. Click the **Formulas** tab.
3. Select **Define Name**



4. Type the name for the selected cell or cell range in the Name Box.
5. Press Enter.



You can use the **Name Manager** box to work with all of the defined names in the workbook.

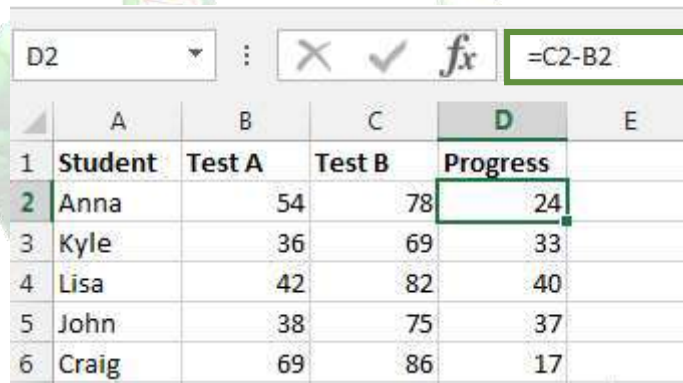
3.6. Array formulas

An array formula is a formula that can perform multiple calculations on one or more of the items in an array. Single cell array formulas perform multiple calculations in one cell.

Without Array Formula

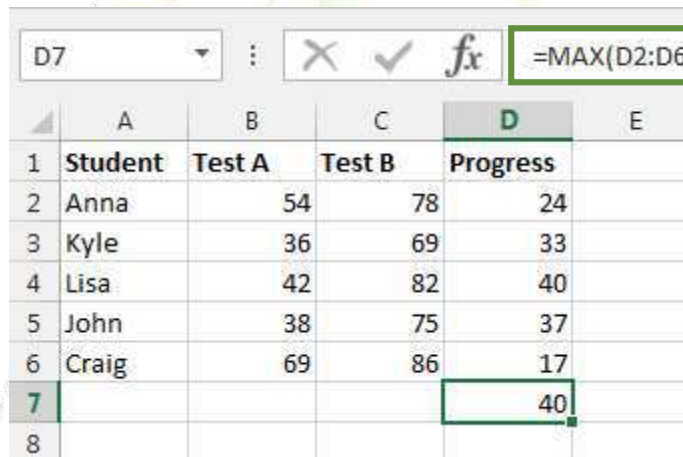
Without using an array formula, we would execute the following steps to find the greatest progress.

1. First, we would calculate the progress of each student.



	A	B	C	D	E
1	Student	Test A	Test B	Progress	
2	Anna	54	78	24	
3	Kyle	36	69	33	
4	Lisa	42	82	40	
5	John	38	75	37	
6	Craig	69	86	17	

2. Next, we would use the MAX function to find the greatest progress.



	A	B	C	D	E
1	Student	Test A	Test B	Progress	
2	Anna	54	78	24	
3	Kyle	36	69	33	
4	Lisa	42	82	40	
5	John	38	75	37	
6	Craig	69	86	17	
7				40	
8					

With Array Formula

We don't need to store the range in column D. Excel can store this range in its memory. A range stored in Excel's memory is called an **array constant**.

1. We already know that we can find the progress of the first student by using the formula below.

	A	B	C	D	E
1	Student	Test A	Test B		24
2	Anna	54	78		
3	Kyle	36	69		
4	Lisa	42	82		
5	John	38	75		
6	Craig	69	86		

2. To find the greatest progress, add the **MAX** function, replace C2 with C2:C6 and B2 with B2:B6.

	A	B	C	D	E	F
1	Student	Test A	Test B		C6-B2:B6)	
2	Anna	54	78			
3	Kyle	36	69			
4	Lisa	42	82			
5	John	38	75			
6	Craig	69	86			

3. Finish by pressing **CTRL + SHIFT + ENTER**.

Mac Users – **ALT+SHIFT+ENTER**

	A	B	C	D	E	F
1	Student	Test A	Test B		40	
2	Anna	54	78			
3	Kyle	36	69			
4	Lisa	42	82			
5	John	38	75			
6	Craig	69	86			

Note: The formula bar indicates that this is an array formula by enclosing it in curly braces {}. Do not type these yourself. They will disappear when you edit the formula.

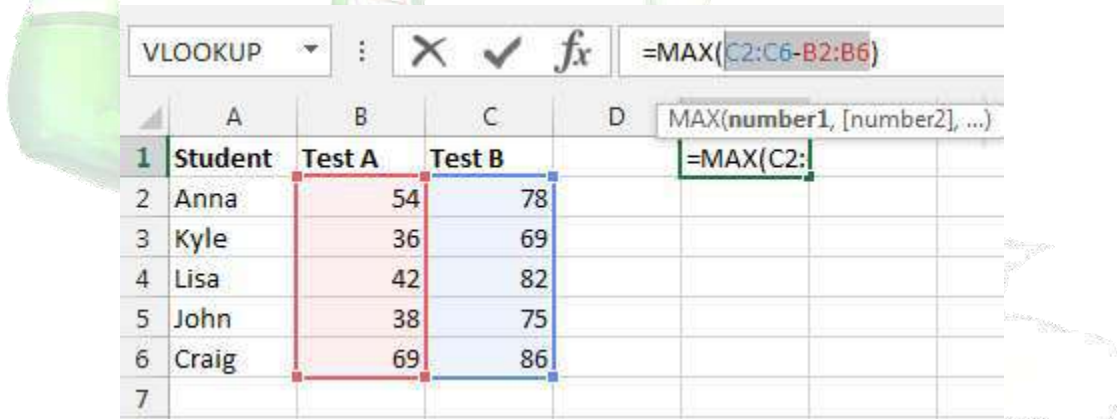
Explanation: The range (array constant) is stored in Excel's memory, not in a range. The array constant looks as follows: {24;33;40;37;17}

This array constant is used as an argument for the MAX function, giving a result of 40.

F9 Key

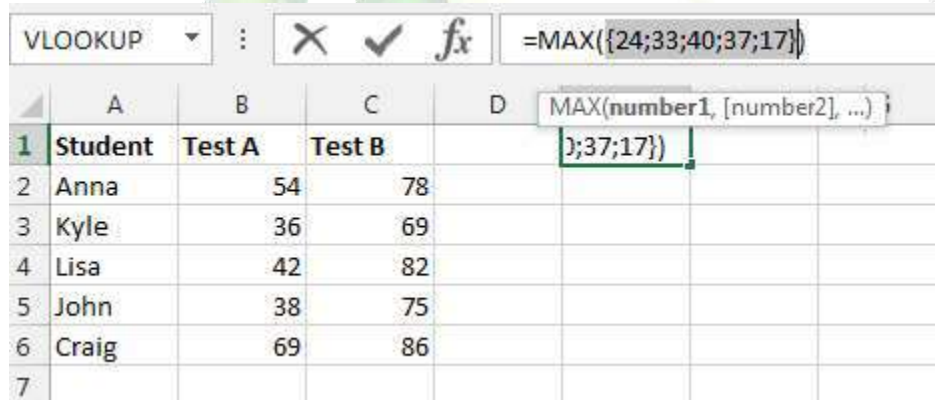
When working with array formulas, you can have a look at these array constants yourself.


1. Select **C2:C6-B2:B6** in the formula.



2. Press **F9**.

Mac Users – Fn + F9



 **TIP:** Elements in a vertical array constant are separated by semicolons. Elements in a horizontal array constant are separated by commas.

4. Using Tables

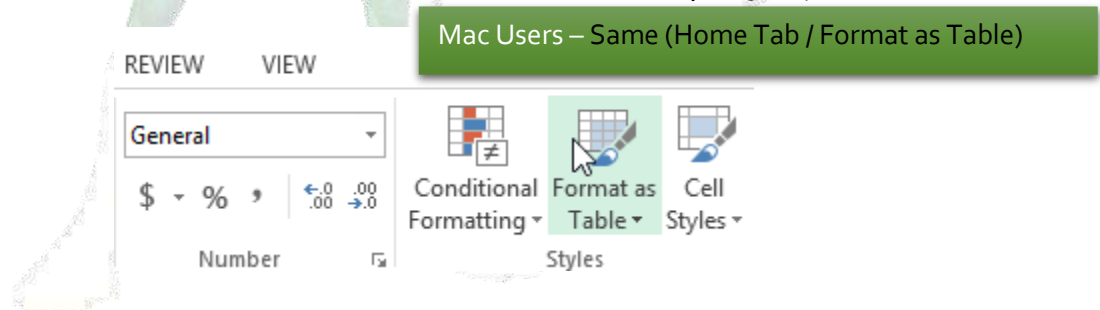
Once you've entered information into a worksheet, you may want to format your data as a **table**. Just like regular formatting, tables can improve the **look and feel** of your workbook, but they'll also help to **organize** your content and make your data easier to use. Excel includes several **tools** and **predefined table styles**, allowing you to create tables quickly and easily.

To format data as a table

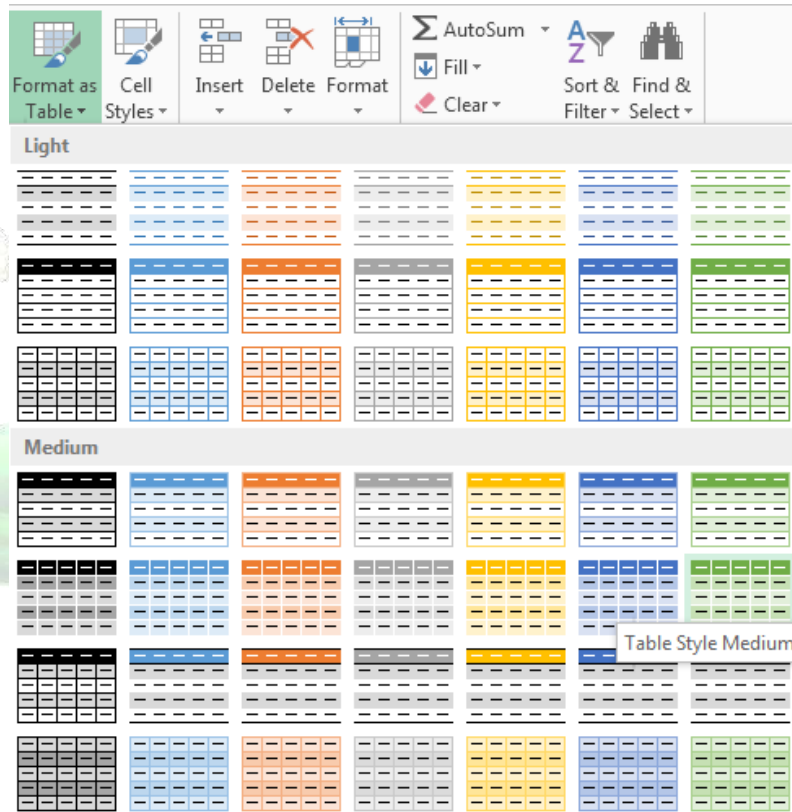
1. Select the **cells** you want to format as a table. In our example, we'll select the cell range **A4:G12**.

	A	B	C	D	E	F	G
1	Last Name	Sales	Country	Quarter			
2			Canada	Q1			
3							
4	Last Name	May	June	July	August	September	October
5	Smith	\$14,258.00	\$557.00	\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00
6	Johnson	\$25,822.00	\$1,042.00	\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00
7	Doe	\$19,854.00	\$3,072.00	\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00
8	Black	\$2,888.00	\$3,755.00	\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00
9	Williams	\$6,000.00	\$3,152.00	\$11,601.00	\$1,122.00	\$3,170.00	\$10,733.00
10	Brown	\$5,200.00	\$4,056.00	\$3,726.00	\$1,135.00	\$8,817.00	\$18,524.00
11	Total	\$74,022.00	\$15,634.00	\$39,662.00	\$7,679.00	\$48,265.00	\$84,856.00
12	2013						\$270,118.00

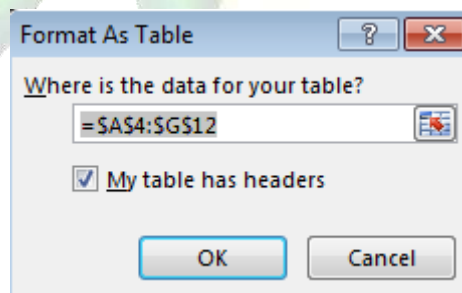
2. From the **Home** tab, click the **Format as Table** command in the **Styles** group




3. Select a **table style** from the drop-down menu.



4. A dialog box will appear, confirming the selected **cell range** for the table.
5. If your table has **headers**, check the box next to **My table has headers**, then click **OK**.



6. The cell range will be formatted in the selected table style.

 **TIP:** Tables include **filtering** by default. You can filter your data at any time using the **drop-down arrows** in the header cells.

Modifying tables

It's easy to modify the look and feel of any table after adding it to a worksheet. Excel includes different options for customizing a table, including **adding rows or columns**, changing the **table style**, and more.

To add rows or columns to a table:

If you need to fit more content in your table, Excel allows you to modify the **table size** by including additional rows and columns. There are two simple ways to change the table size:

- ☑ Begin typing new content after the last row or column in the table. The row or column will be included in the table automatically.
- ☑ Click, hold, and drag the **bottom-right corner** of the table to create additional rows or columns.

Last Name	May	June	July	August	September	October
Smith	\$14,258.00	\$557.00	\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00
Johnson	\$25,822.00	\$1,042.00	\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00
Doe	\$19,854.00	\$3,072.00	\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00
Black	\$2,888.00	\$3,755.00	\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00
Williams	\$6,000.00	\$3,152.00	\$11,601.00	\$1,122.00	\$3,170.00	\$10,733.00
Brown	\$5,200.00	\$4,056.00	\$3,726.00	\$1,135.00	\$8,817.00	\$18,524.00
Total	\$74,022.00	\$15,634.00	\$39,662.00	\$7,679.00	\$48,265.00	\$84,856.00
2013	\$270,118.00					
Brown						

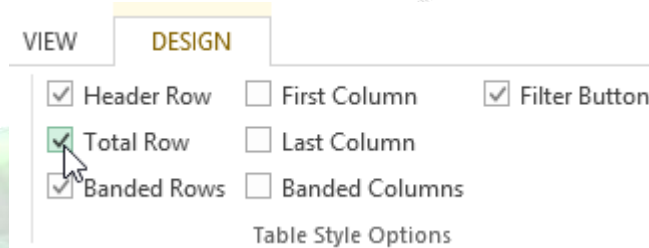
To change the table style

1. Select **any cell** in your table, then click the **Design** tab.
2. Locate the **Table Styles** group, then click the **More** drop-down arrow to see all available table styles.
3. Select the **desired style**.
4. The selected **table style** will appear.

To modify the table style options

You can turn various options **on** or **off** to change the appearance of any table. There are six options: **Header Row**, **Total Row**, **Banded Rows**, **First Column**, **Last Column**, and **Banded Columns**.

1. Select **any cell** in your table.
2. From the **Design** tab, **check** or **uncheck** the desired options in the **Table Style Options** group. In our example, we'll check **Total Row** to automatically include a **total** for our table.



To remove a table

Sometimes you may not want to use the additional features included with tables, such as the Sort and Filter drop-down arrows. You can **remove** a table from the workbook while still preserving the table's formatting elements, like font and cell color.

1. Select **any cell** in your table. The **Design** tab will appear.
2. Click the **Convert to Range** command in the **Tools** group.



3. A dialog box will appear. Click **Yes**.
4. The range will no longer be a table, but the cells will retain their data and formatting.

Challenge!

1. Open an existing Excel workbook.
2. Format a range of cells as a **table**.
3. **Add** a row or column to the table.
4. Choose a new **table style**.
5. Change the **table style options**.
6. **Remove** the table.

5. Chart Tools

Creating a chart in Microsoft Office Excel is quick and easy. Excel provides a variety of chart types that you can choose from when you create a chart. Excel offers Pie, Line, Bar, and Column charts to name but a few. Showing data in a chart can make it clearer, more interesting and easier to read. Charts can also help you evaluate your data and make comparisons between different values. Try the **Recommended Charts** command, new to Excel 2013, on the Insert tab to quickly create a chart that's just right for your data.

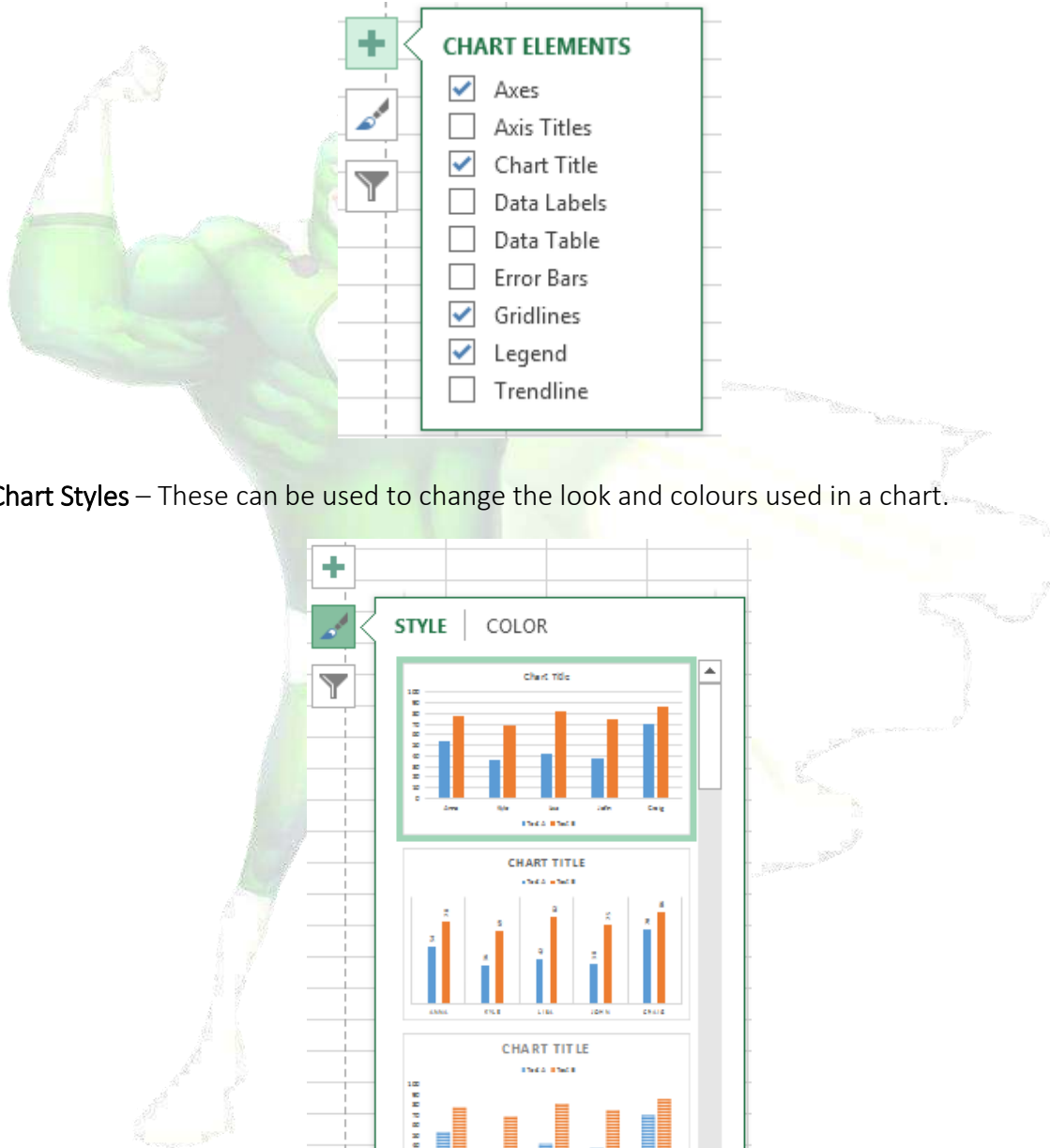
To create a Chart

1. **Select the data** that you want to use in the chart – remember for non-adjacent cells use the Ctrl key with the mouse.
2. Click on to the **Insert** Tab
3. In the Chart Group select the **Chart Type** that you require. From the drop down list select the version of the chart you require or Click on the **Recommend Charts** button and select a chart layout that excel recommends for your data.
4. The chart will display on your worksheet and the Chart Tools Tabs will display.

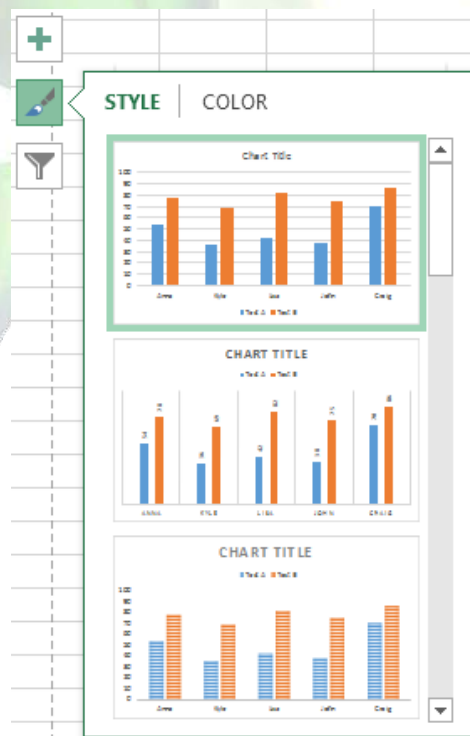
Student	Test A	Test B
Anna	54	78
Kyle	36	69
Lisa	42	82
John	38	75
Craig	70	86

Chart Shortcuts

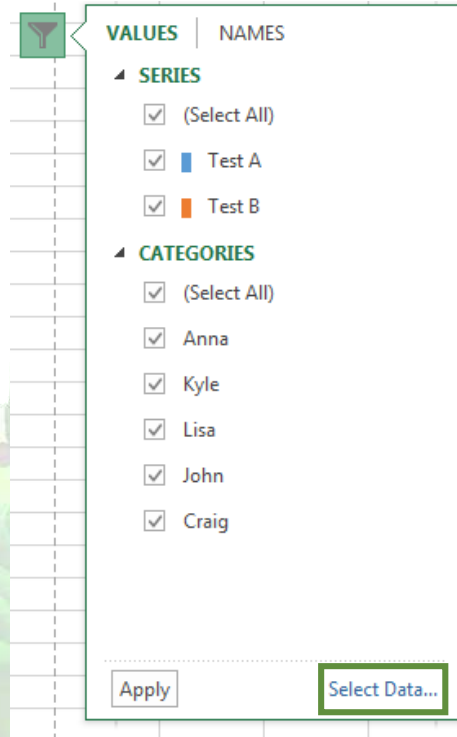
- ☑ **Chart Elements** – Add, remove or change chart elements such as the title, legend, gridlines, and data labels.



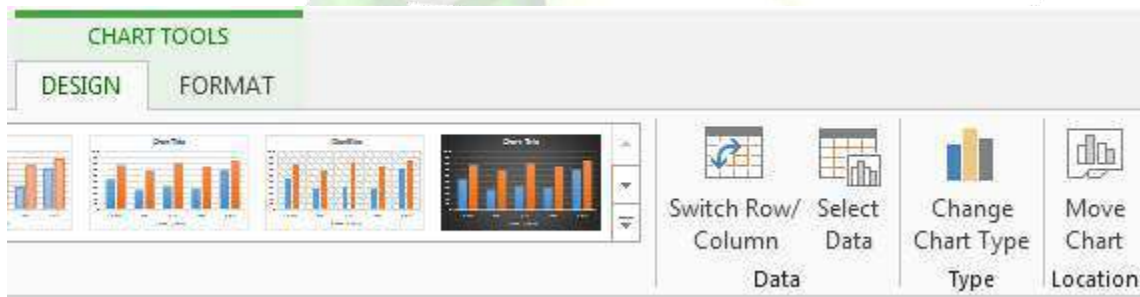
- ☑ **Chart Styles** – These can be used to change the look and colours used in a chart.



- ☑ **Chart Filters** – Edit what data points and names are visible on your chart.



To access additional design and formatting features, click anywhere in the chart to add the **Chart Tools** to the ribbon, and then click the options you want on the **Design** and **Format** tabs.



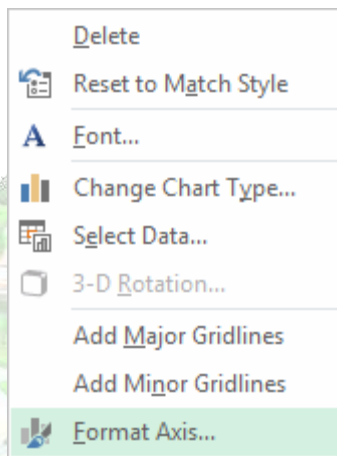
5.1. Formatting a chart

Although the **Chart Tools** ribbon is full of cool things you can do to your chart, sometimes you might want more control. In earlier versions of Office, advanced formatting options were buried deeply in hard to find, complex dialog boxes. Now these options are available in clean, shiny, new task panes.

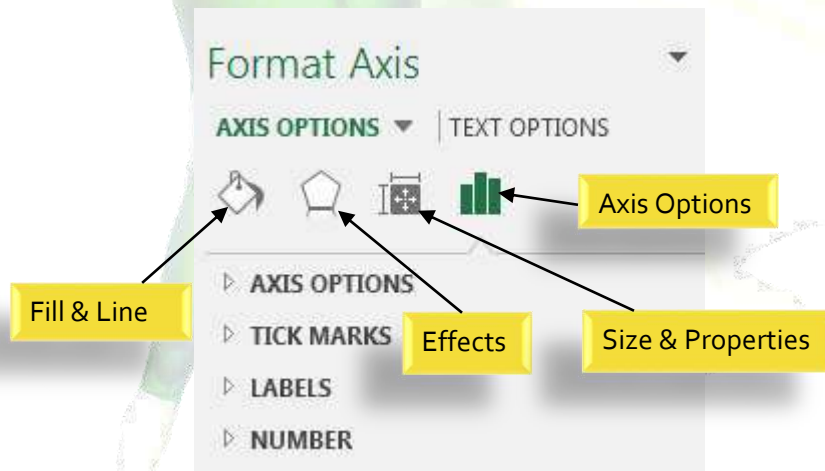
1. Select the chart element (for example, data series, axes, or titles), right-click it.
2. Click **Format <chart element>**. The new **Format** pane appears with options that are tailored for the selected chart element.

For example, to format an axis:

1. Right-click the chart axis, and click **Format Axis**.



2. In the **Format Axis** task pane, make the tweaks you want.



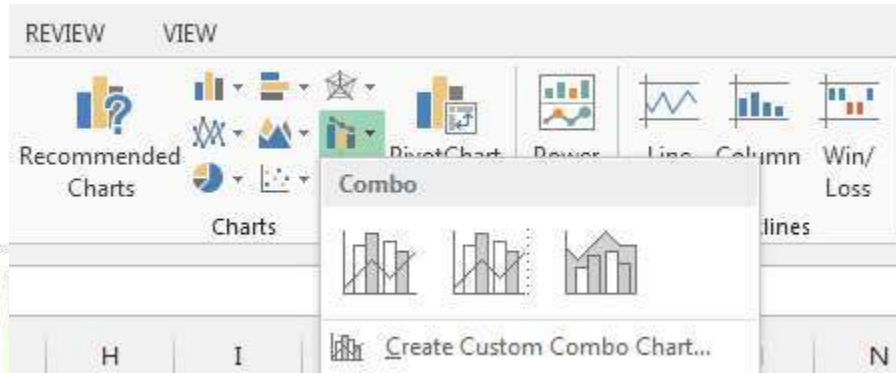
5.2. Creating a Combo Chart

A **combination chart** is a chart that combines two or more chart types in a single chart.

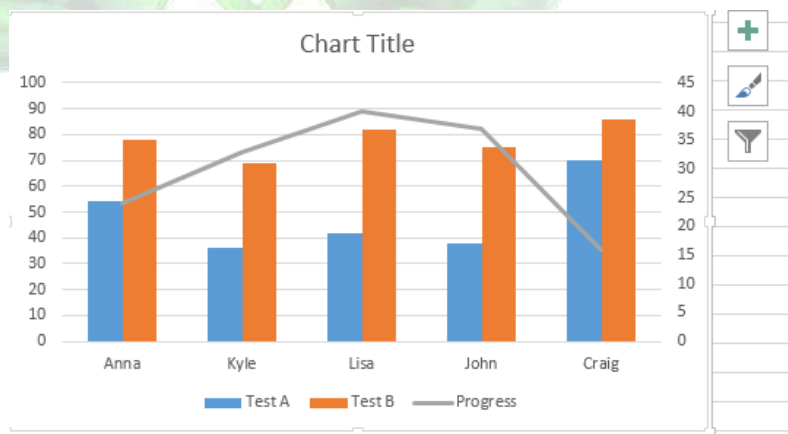
To create a combination chart, execute the following steps.


1. **Select the data** that you want to use in the chart.
2. On the **Insert** tab, in the Charts group, choose **Combo**.

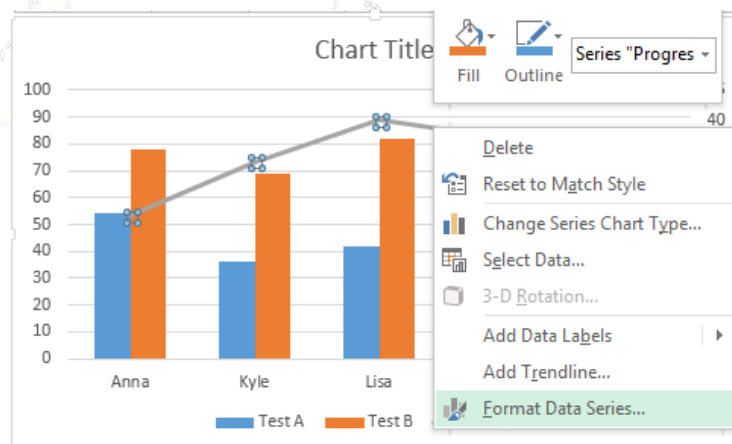
Mac Users – Option Not Available



3. The Combo chart will display on your worksheet.



 **TIP:** When you are comparing data series that have a wide “gap” between them – e.g. comparing actual sales in a month (large number) – to Profit % in each month (small number), you will want to create a Secondary Vertical (Value) Axis in your Combination Chart. Begin by selecting the series that you want to plot and Right Mouse Click to Format the Series on a Secondary Vertical Axis. I recommend that you add in Axis Titles for both the Primary and Secondary Vertical Axes.



6. Applying Formatting

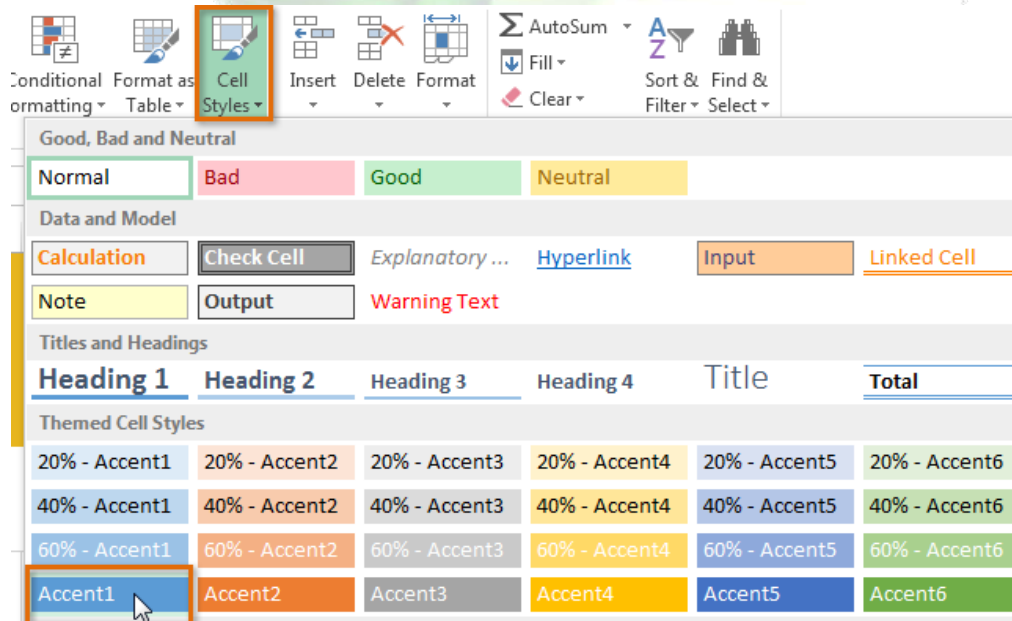
All cell content uses the same **formatting** by default, which can make it difficult to read a workbook with a lot of information. Basic formatting can customize the **look and feel** of your workbook, allowing you to draw attention to specific sections and making your content easier to view and understand.

6.1. Working with Styles

Rather than formatting cells manually, you can use Excel's **predesigned cell styles**. Cell styles are a quick way to include professional formatting for different parts of your workbook, such as **titles** and **headers**.

To apply a cell style

1. Select the **cell(s)** you wish to modify.
2. Click the **Cell Styles** command on the **Home** tab, then choose the **desired style** from the drop-down menu. In our example, we'll choose **Accent 1**.



3. The **selected cell style** will appear.

Last Name	May	June	July	August	September	October
Smith	\$14,258.00	\$557.00	\$3,863.00	\$1,117.00	\$8,237.00	\$8,690.00
Johnson	\$25,822.00	\$1,042.00	\$9,355.00	\$1,100.00	\$10,185.00	\$18,749.00
Doe	\$19,854.00	\$3,072.00	\$6,702.00	\$2,116.00	\$13,452.00	\$8,046.00
Black	\$2,888.00	\$3,755.00	\$4,415.00	\$1,089.00	\$4,404.00	\$20,114.00
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Brown	\$5,200.00	\$4,056.00	\$3,726.00	\$1,135.00	\$8,817.00	\$18,524.00
Total	\$74,022.00	\$15,634.00	\$39,662.00	\$7,679.00	\$48,265.00	\$84,856.00
2013						\$270,118.00

Formatting text and numbers

One of the most powerful tools in Excel is the ability to apply **specific formatting** for text and numbers. Instead of displaying all cell content in exactly the same way, you can use formatting to change the appearance of **dates, times, decimals, percentages (%), currency (\$),** and much more.

To apply number formatting:

1. Select the **cells(s)** you wish to modify.
2. Click the **drop-down arrow** next to the **Number Format** command on the **Home** tab. The **Number Formatting** drop-down menu will appear.
3. Select the **desired formatting option**. In our example, we will change the formatting to **Long Date**.



4. The selected cells will change to the **new formatting style**

6.2. Insert headers and footers

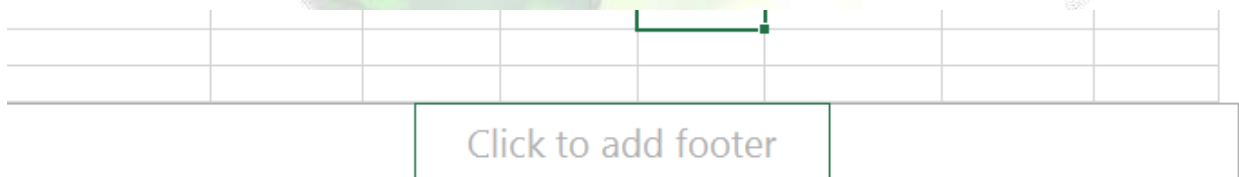
Mac Users – Same Options

You can make your workbook easier to read and look more professional by including **headers and footers**. The **header** is a section of the workbook that appears in the **top margin**, while the **footer** appears in the **bottom margin**. Headers and footers generally contain information such as page number, date, and workbook name.

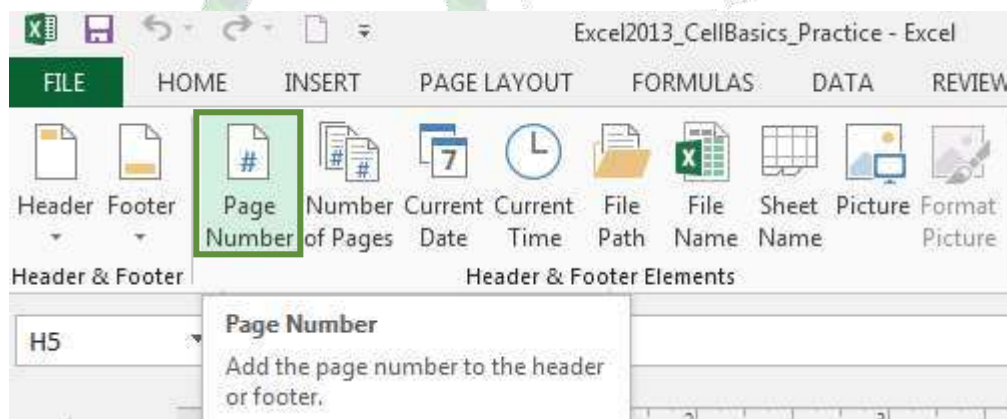
1. Locate and select the **Page Layout view** command at the bottom of the Excel window. The worksheet will appear in Page Layout view.



2. Select the desired **header** or **footer** you wish to modify. In our example, we'll modify the **footer** at the bottom of the page.



3. The **Header & Footer Tools** tab will appear on the **Ribbon**. From here, you can access commands that will automatically include page numbers, dates, and workbook names. In our example, we'll add **page numbers**.

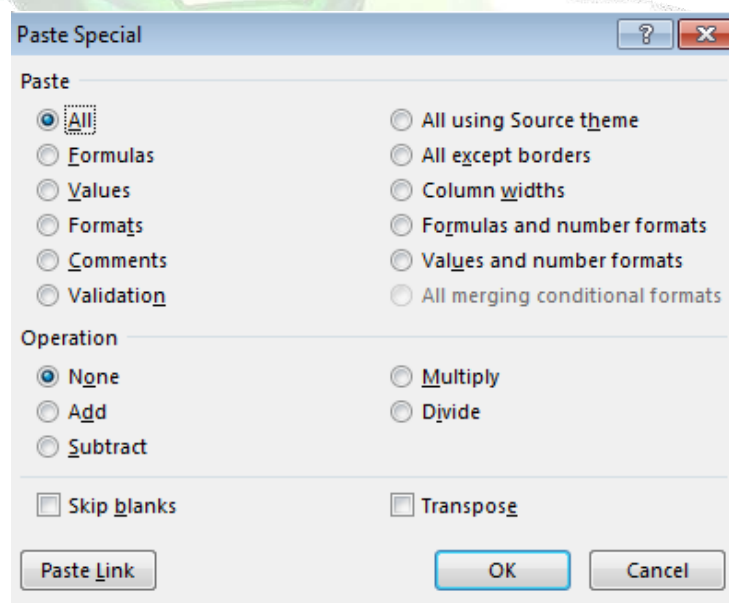


4. The footer will change to include page numbers automatically.

6.3. Paste Special

Paste Special is useful to copy only values, formulas, comments, or cell formats. Instead of copying entire cells, you can copy specified contents from the cells — for example, you can copy the resulting value of a formula without copying the formula itself.

1. Select the cells you want to copy.
2. Right click and select **Copy**.
3. Select the paste area.
4. Right click and select **Paste Special**. The following dialogue box appears:



- All** - pastes all cell contents and formatting. This option is the same as using the Paste command on the Edit menu.
- Formula** - pastes only the formulas as entered in the formula bar.
- Values** - pastes only the values as displayed in the cells.
- Formats** - pastes only cell formatting.

5. Select an option under the Paste heading, and then click **OK**.

- Transpose** - changes columns of copied data to rows, and vice versa.
- Paste Link** - links the pasted data to the active worksheet.