



Learning MS Excel 2016

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Introduction:

Chapter 1: Setting Up a Chart

Let's start learning how to use Microsoft Excel with chart and data building. If we have a whole bunch of data or information and we want it to be easily read and understood by viewers, the best way to do this is to put it in a chart.

Start by putting your data in a table in Excel. In the first row you'll want to name the values you are counting, like how many of something there are. For instance, let's make a table where we have four different types of animals and are recording how many of each different animal four people have.

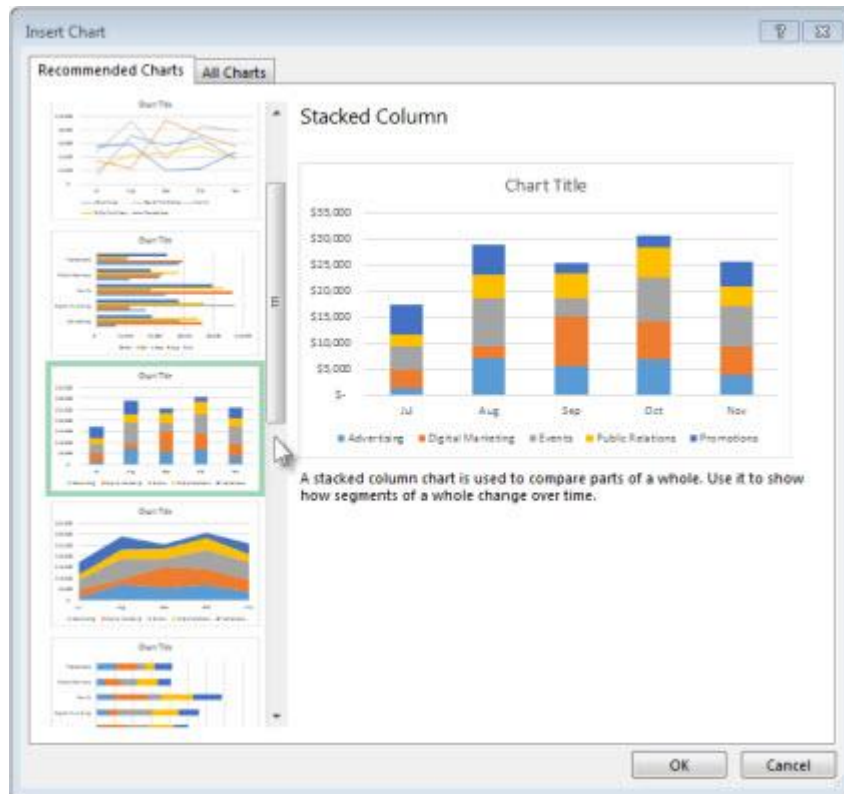
	A	B	C	D	E	F
1		Dogs	Cats	Fish	Turtles	
2	Max	2	0	5	0	
3	Althea	0	1	2	2	
4	Jonathan	4	0	10	0	
5	Maddy	3	2	3	1	
6						

Follow this format for whatever information or data you are collecting and recording. Next we will want to select all of this information, starting in box 1A and dragging our select box over the rest of the information, down to 6E.



*See Res. 1

With everything still selected, go to the **Insert** tab and choose **Recommended Charts**. This will display a new window showing us multiple options Excel thinks is best for our data set.



*See Res. 2

Pick the chart that best displays your information, and remember that the Recommended Charts are just suggestions and that you don't need to pick from these. If you want to see more options, click on the icon in the lower right-hand corner of the chart box.

Another important thing to note when creating charts is that there are default ways to do it faster:

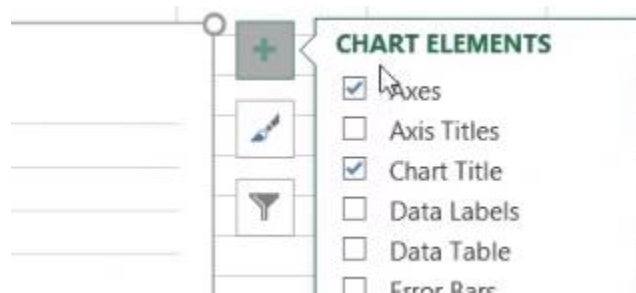
- By selecting the data you want and pressing **Alt + F1** on your keyboard, you can display your data in a default 2D bar chart on the same worksheet
- Instead of pressing Alt + F1, do the same as above but press **F11**. The chart will appear in another worksheet.

Chapter 2: Chart Basics

Now that we have a chart made, we can start making changes to the chart such as reversing rows and columns and adding or removing titles, tables, legends, and so much more!

When you create your chart, you can move it around by dragging it and increase or decrease its size by holding down the **shift** key and dragging one of the chart's corners. The shift key retains the height to width ratio of the chart.

Now, let's get into the fun stuff! When you select your chart you'll notice that you can change its title. Be sure to give it an appropriate name. On the right side of your chart are three square icons: **Chart Elements**, **Chart Styles**, and **Chart Filters**. These are all useful ways to customize our chart.



Click on the first box (the one with the plus icon) to expand the **Chart Elements** options. Here you can add **Axis Titles**, which let viewers know exactly what your X and Y axis are. You can also add other elements such as **Data labels** and a **Legend**. Be careful not to overly complicate your chart with added elements, as the simpler your data is, the less supporting elements you need.

7								
8	Company 1	166	166	167	163	165	161	164
9								

Suppose we have a list of monthly revenue from a startup company. If we select this company we can put it in a **2D line chart**. This throws the data in a line chart showing us a single line with each point one unit apart, giving us something like this:

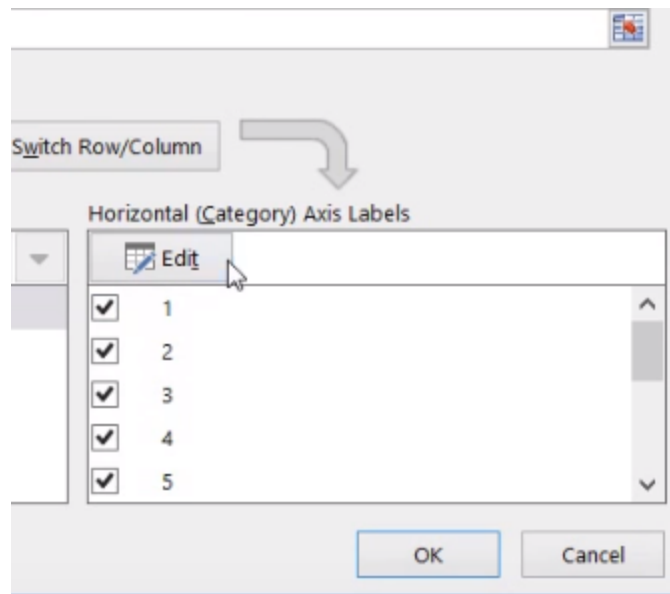


This is not exactly what our chart will look like, but it should be similarly formatted. We can go into our **Chart Elements** tab and add a **Legend** so that viewers know what the line means. In this case we can call it **Revenue** or any other appropriate title. Then we can add a **Data Label** titled **USD** to assign units to the numbers on the Y-axis.

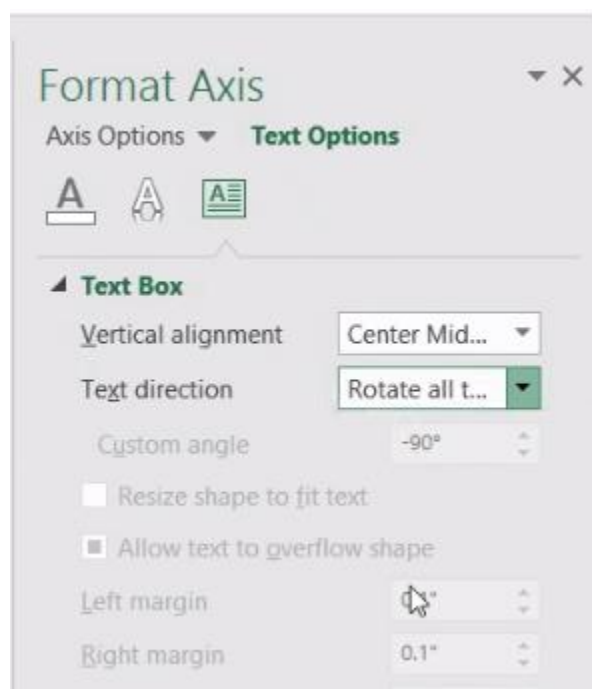
Next, let's clarify when this revenue was recorded. Below your data on the table, write out each month to go along with a number like so:

8	Company 1	166	166	167	163	165	161	164
9								
10		Dec	Jan	Fed	March	April	May	June
11								

Select and right-click the X-axis, and click **Select Data**. A **Select Data Source** window will pop up on your screen. Select the **Edit** button under the Horizontal Axis Labels column.



This will open another window where you can select and drag across the months to add them as labels on this axis. Hit **OK** to finish selecting the labels, and on the Right hand side of the screen will be a **Format Axis** bar.

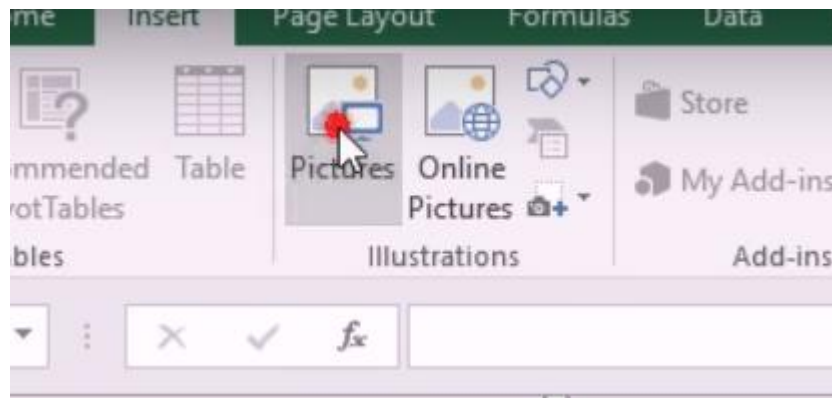


You can play around with **alignment** and other features on this and the other editors to display your text information just the way you want. By right-clicking inside any text area, we can select **font** and edit our **font type, style, size**, and any other effects.

Chapter 3: Chart Graphic Objects

Graphic objects in Excel help enhance the viewing experience beyond the basic things the chart itself can do. Using arrows, logos, and other objects can be very useful.

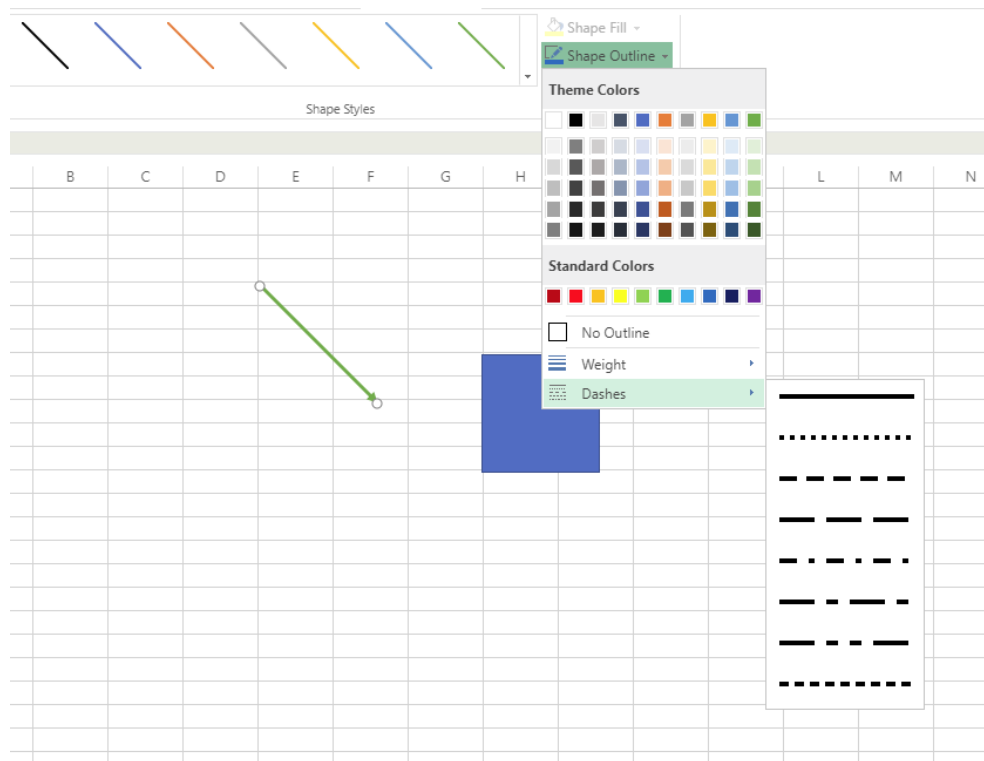
If we want to insert an image into our graph, such as a logo, we simply need to click on our chart, go to **Insert**, and under insert click on **Pictures**. Use the file navigation window Excel opens for you to choose an image and click on insert. You can then drag and resize this image.



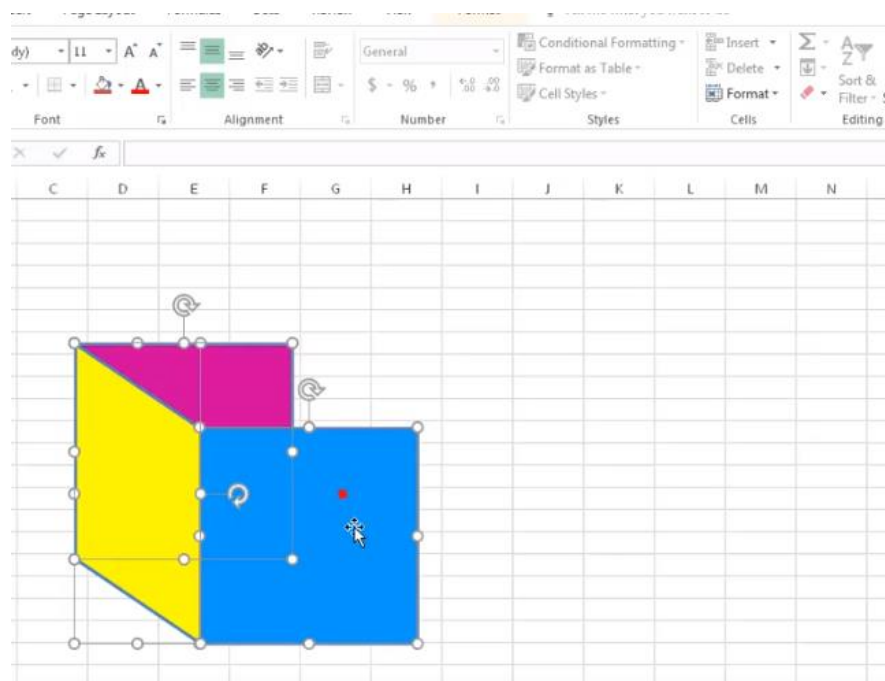
Under the **Format** tab, you can find multiple formatting options such as **Insert Shapes, Shape Styles**, and **WordArt Styles**. With the Insert Shapes tab, we can insert arrows and text boxes to point out specific information and improve readability. Shape Styles can help make text boxes appear more interesting and aesthetically pleasing. WordArt Styles makes it easy to create word art. Note that this is not the same as font style and is only meant to be used for a few short text items.

We can edit all the objects we make; for this instance, let's look at arrows. Under **Format** we can change the weight of the line (how thick it is) as well as the colors and look.

To practice, let's insert three differently colored squares. Under the **Arrange** tab we can click **Bring Forward** or **Backward**. The **Selection Pane** will allow us to



rearrange all the squares how we like. By adding a Parallelogram into this and with some rearranging, we can create 3D objects like below:



You can use shape making and rearranging to make even more interesting objects that could help support graphs, data, etc.

Chapter 4: Working With Data

In this section we are going to explore how to manage and filter data with a list. This can be useful in creating unique graphs and focusing on only the important information in a large collection of data.

Below is an example of a set of information of people checking different electronic devices in and out. We will use this data set as an example of manipulating and working with information sets.

	A	B	C	D	E
1	ID #	Type	Details	Checked-Out	Checked-In
2	2001	Camera	Luminia Digital Camera	19-Jun-18	21-Jun-18
3	2050	Laptop	Mac Book Pro	21-Jun-18	12-Jul-18
4	2100	Laptop	ASUS i7 Core	22-Jun-18	6-Jul-18
5	2115	Camera	RED Video Camera	5-Jul-18	1-Aug-18
6	3005	Laptop	ASUS i7 Core	9-Jul-18	30-Jul-18
7	3200	Camera	Saris Zoom Digital Camera	19-Jul-18	5-Aug-18
8	3220	Camera	RED Video Camera	31-Jul-18	
9					

In order to manipulate all this data, it is important to make sure you select it all (from **A1** to **E8**). Under **Insert**, click on **Table**. Also, make sure the **My table has headers** box is checked.

	A	B	C	D	E
1	ID #	Type	Details	Checked-Out	Checked-In
2	2001	Camera	Luminia Digital Camera	19-Jun-18	21-Jun-18
3	2050	Laptop	Mac Book Pro	21-Jun-18	12-Jul-18
4	2100	Laptop	ASUS i7 Core	22-Jun-18	6-Jul-18
5	2115	Camera	RED Video Camera	5-Jul-18	1-Aug-18
6	3005	Laptop	ASUS i7 Core	9-Jul-18	30-Jul-18
7	3200	Camera	Saris Zoom Digital Camera	19-Jul-18	5-Aug-18
8	3220	Camera	RED Video Camera	31-Jul-18	

Now, under the **DATA** tab, we can select **Filter** to make sure a dropdown is placed under each header, as seen above. Sometimes this step isn't needed.

Click on one of the dropdowns and you'll find multiple options to filter this data. Excel can sort different columns by **Data**, **Ascending**, **Descending**, and **Type**.

A	B	C
ID #	Type	Details
2001	Camera	
2050	Laptop	
2100	Laptop	
2115	Camera	
3005	Laptop	
3200	Camera	
3220	Camera	

In this dropdown you'll also find a **Filter...** button. Clicking on this will give us a pop-up window where we can choose to see all item types, Camera, or just Laptop. Hovering over **Text Filters** will give us options like so:

21-Jun-18	12-Jul-18					
22-Jun-18	6-Jul-18					
5-Jul-18	1-Aug-18					
9-Jul-18	30-Jul-18					
19-Jul-18	5-Aug-18					
31-Jul-18						

Custom Filter

Show items where: **Type**

equals

OK Cancel

If we type *Laptop*, our data table will only show items with the **Type** equal to **Laptop**. The dropdown allows us to manipulate data in similar and very useful ways. The other operator types are *Does not equal*, *Begins with*, *Contains*, etc. Depending on the type of data that is being displayed, different options to filter it will appear. For example, under **Checked-In** and **Checked-Out**, the option **Date Filters** appears instead of Text Filters.

You can use more than one Filter; for example, let's apply a filter to this table that only shows items with the **Laptop** type.

	A	B	C	D	E
1	ID #	Type	Details	Checked-Out	Checked-In
3	2050	Laptop	Mac Book Pro	21-Jun-18	12-Jul-18
4	2100	Laptop	ASUS i7 Core	22-Jun-18	6-Jul-18
6	3005	Laptop	ASUS i7 Core	9-Jul-18	30-Jul-18
9					

Then, let's add a filter than organizes it by a descending date.

	A	B	C	D	E
1	ID #	Type	Details	Checked-Out	Checked-In
3	3005	Laptop	ASUS i7 Core	9-Jul-18	30-Jul-18
4	2100	Laptop	ASUS i7 Core	22-Jun-18	6-Jul-18
6	2050	Laptop	Mac Book Pro	21-Jun-18	12-Jul-18

To clear a filter, you can use the **Clear Filter from...** button. This clears all filters in that column, so if multiple filters are set up, they will all be cleared and no longer affect your column.

Another thing to note is that there are numerous options that can change the way data is displayed in a table under the **Sort & Filter** tab. You'll find similar routes to get to the same way of sorting, so don't be afraid to look around.

It is also important to consider the design of your table and make sure that the sorting is used not to just mindlessly sort rather but to make quantitative data easier to read and enhance a reader's experience. For example, if you aim to show trends in similar products over time, you would want to sort by **Type** and then by **Date - Descending**.

Chapter 5: Math in Excel

Whether it is a spreadsheet to make a budget, do taxes, or record client information, math in Excel is very common and very practical.

Take the data below:

	A	B	C	D	E
1		February	March	April	May
2	John	11	14	18	17
3	Jacob	5	1	22	14
4	Jingle-hiemer	13	11	14	12
5	Schmitt	11	10	8	14
6	Sarah	18	12	17	19

To take the sum of each person over all four months, the SUM function is required. In column F create a column labeled **Total**. Under Total, in F2, write **=SUM(B2:E2)**.

A	B	C	D	E	F	G
	February	March	April	May	Total	
	11	14	18	=SUM(B2:E2)		
John	5	1	22	SUM (number1, [number2], ...)		
Dehiemer	13	11	14	12		
Hitt	11	10	8	14		
1	18	12	17	19		

The result:

	May	Total	
18	17	60	
22	14		
14	12		
8	14		
17	19		

This takes the sum of all integer values from block B2 to E2, or all of John's month by month sales. This will give us 60, the added total. When putting in the **SUM function**, dragging over the desired area to be added together also works.

B and E are the Column letters and 2 is the Row number. The colon (" : ") tells Excel to take values in B2 *from* E2. The function =SUM(B2, E2) instead would take values from *only* B2 and E2, giving us a sum of 28 not 60.

	B	C	D	E	F
	February	March	April	May	Total
	11	14	18	=SUM(B2,E2)	
	5	1	22	14	
er	13	11	14	12	
	11	10	8	14	
	18	12	17	19	

By typing in the equal sign, =, in a block in Excel it declares what is called a **Function**. A function can be an addition function, which takes the sum of something. When you start typing after the equals sign there will be a drop down that shows you what options you have to pick from. This can be very useful if you aren't sure which function you need.

There are other *statistical* functions we can use, such as getting mathematical averages, ranges, and more from our data. Let's take a look back at John and his sales. In column G, row 2, let's create a section for his average monthly sales. We do this by starting out all function with the = sign, then typing **AVERAGE**.

1		February	March	April	May	Total	Average
2	John	11	14	18	17	=AVERAGE(B2:E2)	
3	Jacob	5	1	22	14		
4	Jingle-hiemer	13	11	14	12		

As you start typing "Average", you'll notice more options for different kinds of averages. Be sure to select the regular AVERAGE function. This will be the output

	A	B	C	D	E	F	G
1		February	March	April	May	Total	Average
2	John	11	14	18	17	60	15

There are other functions we can call to help us as well.

MAX - Returns the largest number in a given list:

fx		=MAX(A1:G1)						
	A	B	C	D	E	F	G	
1	0	3	2	5	6	1	4	
2								
3	6							
4								

MIN - Returns the smallest number in a given list:

fx		=MIN(A1:G1)							
	A	B	C	D	E	F	G	H	
1	0	3	2	5	6	1	4		
2									
3	0								
4									

LARGE - Returns the Nth largest number in a given list. In this case it is the second largest. The Nth letter is separated by a comma.

fx		=LARGE(A1:G1, 2)							
	A	B	C	D	E	F	G	H	
1	0	3	2	5	6	1	4		
2									
3	5								
4									

SMALL - Returns the Nth smallest number in a given list:

fx		=SMALL(A1:G1, 3)							
	A	B	C	D	E	F	G	H	
1	0	3	2	5	6	1	4		
2									
3	2								
4									

STDEV - Calculates the Standard Deviation of a set of numbers. This tells us how spread out the data is.

fx		=STDEV(A1:G1)						
	A	B	C	D	E	F	G	
1	0	3	2	5	6	1	4	
2								
3	2.16							
4								

Another function in Excel is the **COUNT** function. This counts the number of numeric values in an array. Numeric values can be Numbers OR Dates unless specifically stated in the count statement.

8			
9	2	0 Count Function Example	
10	text	=COUNT(A9:A12)	
11	2/9/1999		
12	FALSE		
13			

9	2	0 Count Function Example	
10	text		2
11	2/9/1999		
12	FALSE		
13			

This is an example of counting the numeric values in A9 to A12. The date and the number two are the only numeric values so it returns two

8			
9	2	0 Count Function Example	
10	text	=COUNT(A9:A12, B9)	
11	2/9/1999	COUNT (value1, [value2], [value3], ...)	
12	FALSE		
13			

8			
9	2	0 Count Function Example	
10	text		3
11	2/9/1999		
12	FALSE		
13			

This is example counts data from the array A9 through A12 and also the singular box B9, appended on by the separating comma. Because B9's value is a 0, a numeric value, it adds to the count.

We can also call the function COUNTIF

This function takes in a **Range** and a **Criteria** like so: **=COUNTIF(Range, Criteria)**. In this we can actually tell it to count text if you wrap the word/text in quotes. Look at the data table below.

Functions	Tables	Illustrations	Add-ins	Charts	Links	Com
=COUNTIF(A1:A9, "<>Wednesday")						
	A	B	C	D	E	F
1	Sunday	7-Sep-08	0	TRUE		6
2	Monday	8-Sep-08	2.1	TRUE		2
3	Wednesday	10-Sep-08	2	TRUE		2
4	Thursday	11-Sep-08	3	FALSE		
5	Wednesday	17-Sep-08	2.5	FALSE		
6	Tuesday	23-Sep-08	3	FALSE		
7	Wednesday	24-Sep-08	6	FALSE		
8	Sunday	5-Oct-08	4	FALSE		
9	Saturday	11-Oct-08	0	FALSE		
10						

Cell Number	Equation	Result	Description
F1	=COUNTIF(A1:A9,"<>Wednesday")	6	Counts a cell between A1 and A9 if it doesn't equal Wednesday.
F2	=COUNTIF(B1:B9, ">10/1/2008")	2	Counts a cell between B1 and B9 if the date is greater than the date October 1st, 2008.
F3	=COUNTIF(C1:C9, 0)	2	Counts a cell between C1 and C9 if it equals the number integer

There are a few important things to note when looking at the equations. To find a value greater or less than something, we use similar mathematical **operators**, the less than (<) and greater than (>) signs. Also, the **date format** can be changed for cells but you must make sure that you follow the same format as the cells when counting dates.

The "<>" means "Does not equal". So in F1 we are looking for everything not equal to the string "wednesday". **Excel is not case sensitive**, meaning WEDNESDAY is the same thing as wednesday.

The PERMUT Function

Another useful statistical function is the **PERMUT** function, which returns the number of permutations from a specified amount of objects in a list/set of objects. A permutation amount is the number of combinations numbers can have with each other in each given

order. This means the number 2 and 3 can be combined into two different ways (2&3, 3&2). That is a permutation.

The Syntax goes as follows: **=PERMUT(number of objects, number of objects in each permutation)** also seen as =PERMUT(n, k). Below is the equation for permutations
For example, if we have =PERMUT(3, 2), it will take in each permutation seen below:

$$P_{k,n} = \frac{n!}{(n-k)!}$$

We have the numbers 1, 2, 3 and want them in sets of two.

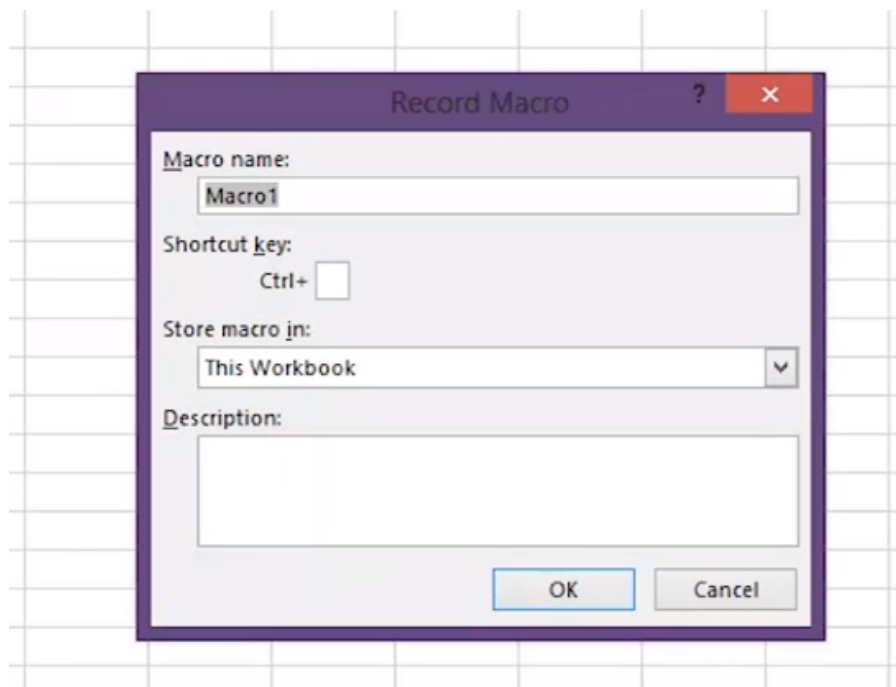
Permutation 1	Permutation 2	Permutation 3	Permutation 4	Permutation 5	Permutation 6
1,2	2,1	1,3	3,1	2,3	3,2

Our result from the above function would then be 6, because there are 6 permutations of numbers 1 through 3 in unique combinations of 2.

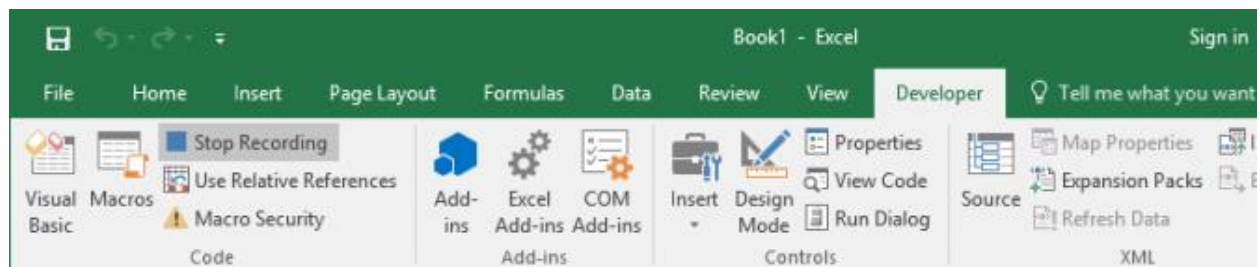
Chapter 6: Using Macros

A Macro in Excel automates certain tasks. It records keystrokes to later be used whenever a user needs.

The **Macro Recorder** records keystrokes and can be located in the **Developer** tab, under **Code**. Click **Record Macro** and a Box will appear. **Title** the Macro to what task it will be automating. Add a **shortcut** to it as well, but be careful not to override any used regularly. A **description** can be added as well.



You can press OK and then all key clicks and strokes are recorded. For instance, if a user wanted to automate changing the headers to a table, they would record once a table was set up and then change the table headers to the desired look.

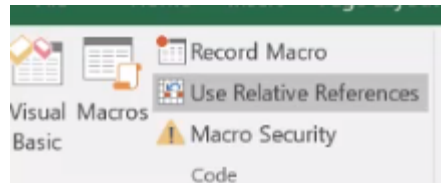


Once you finish your moments, go back to the Developer tab and press stop recording. Now, everytime you use the command you set up, it will format the exact rows and columns you did the same way. Careful, though, as if you formatted a table header, in order to have another table header formatted the same way, it must be in the same cell array.

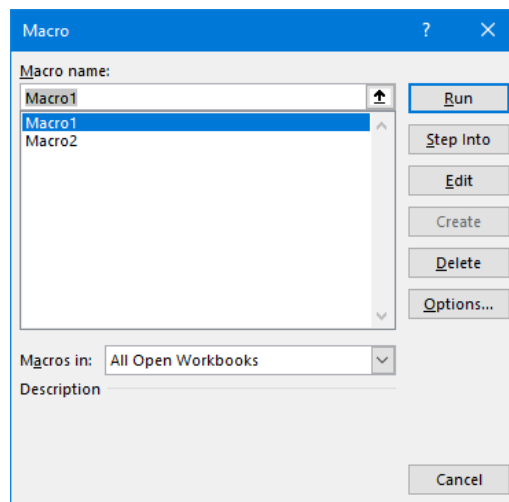
If we want our macro to work in any cell, not just the one we were working in when it was recorded, we can **Use Relative References**. This means if I build a 3 by 3 red square

with a middle at F8, then when I run the command to make the square, it will run not on F8 but on whatever square I have selected.

To edit a Macro, you must use Visual Basic Application, a programming language. For



now you can manage your Macros in the development tab.



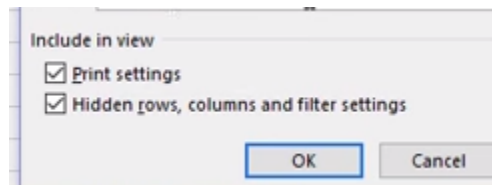
Chapter 7: Customizing The Work Area

In Excel, the work area can be customized and changed to fit your needs. The top bar containing commands for the Home, View, etc. can be changed along with the data table itself.

Under the **VIEW** tab, there are multiple layout options. By default the Workbook View is on **Normal**. You can also change the layout to your own **Custom View**, make it **Full Screen**, or make it more presentable to others with the **Page Break Preview**.

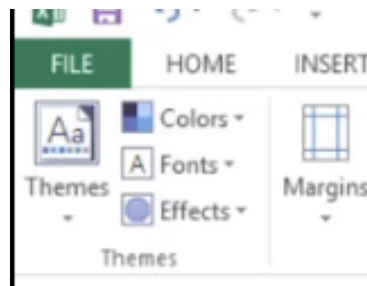
The Custom View takes from the current work area. To create one, you simply need to create rows and columns the way you like them with custom labels, values, etc., then add

a new view under Custom View. Two checkboxes will appear where you can also name the view.

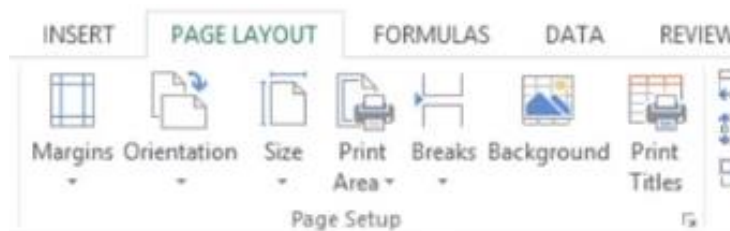


After making sure these are checked, press OK and the view will be stored for later use.

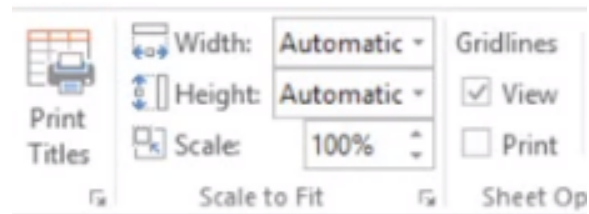
Under **PAGE LAYOUT**, there are themes to customize your work area. Here you can change Colors, Fonts, and Effects to make your work area unique.



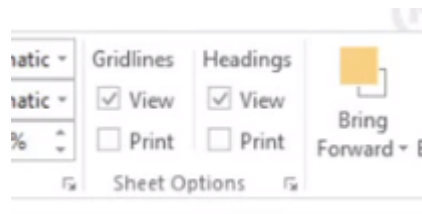
Under **Page Setup**, further customization can be done to your workspace to enhance it. The **Margins** control how close text and information can get to the edge of a piece of paper. **Orientation** controls whether the information is displayed vertically or horizontally. **Size** and **Print** area control how information will show when printed on paper. **Breaks** and **Backgrounds** add further customization such as ensuring data gets cut off onto another sheet of paper at a specified point.



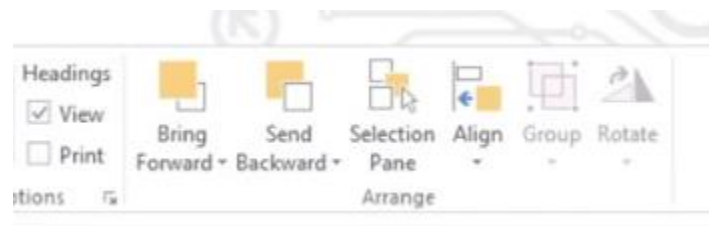
The **Width** and **Height** values in the **Scale to Fit** tab is usually set to **Automatic**, but you can manipulate the scale at which a table of data will be displayed on a paper



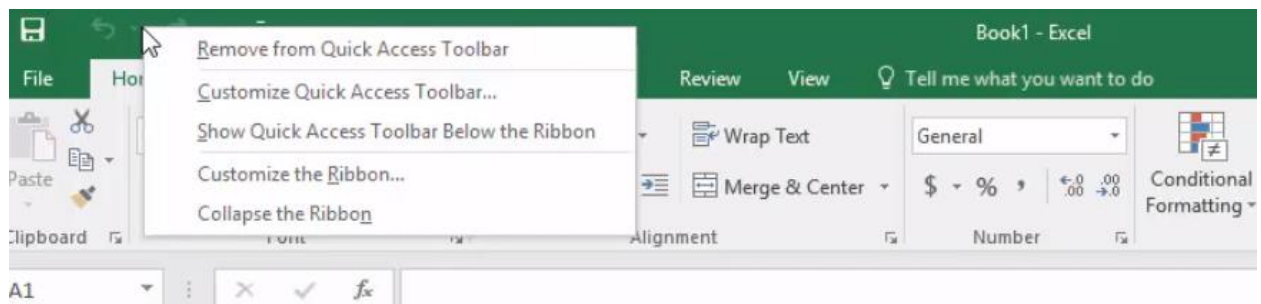
Sheet Options allows for customization of the sheet layout, with options to put in a **Heading** and **Gridlines** in both the editing view and on the printed paper copy.



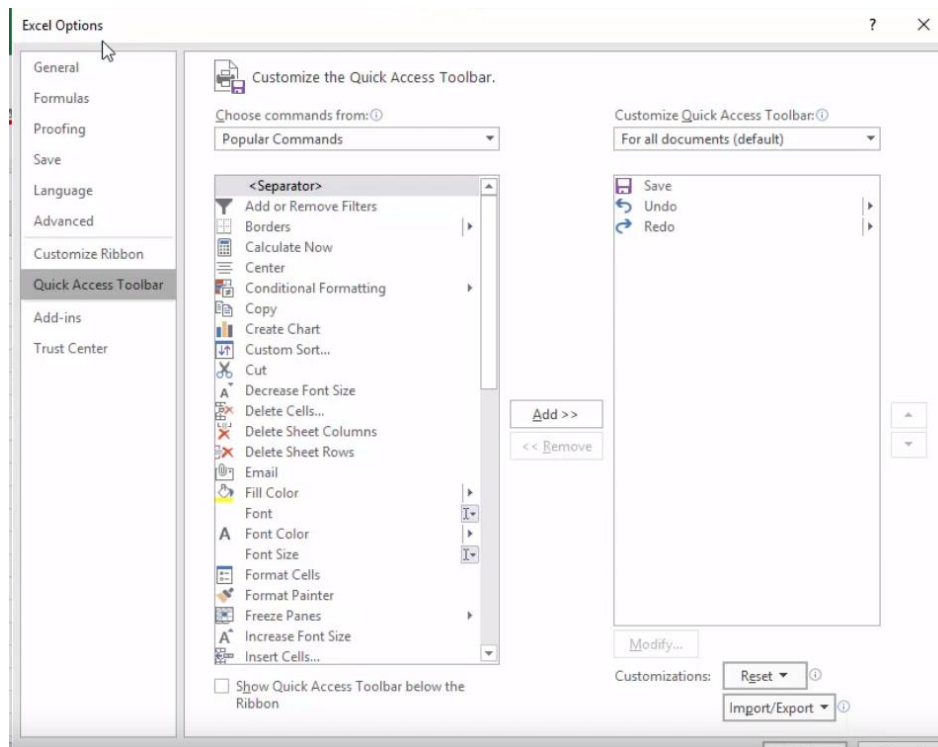
Arrange has been shown previously to be used for layout options and customization. Adding panes and rearranging objects allows for a wide range of work area customization.



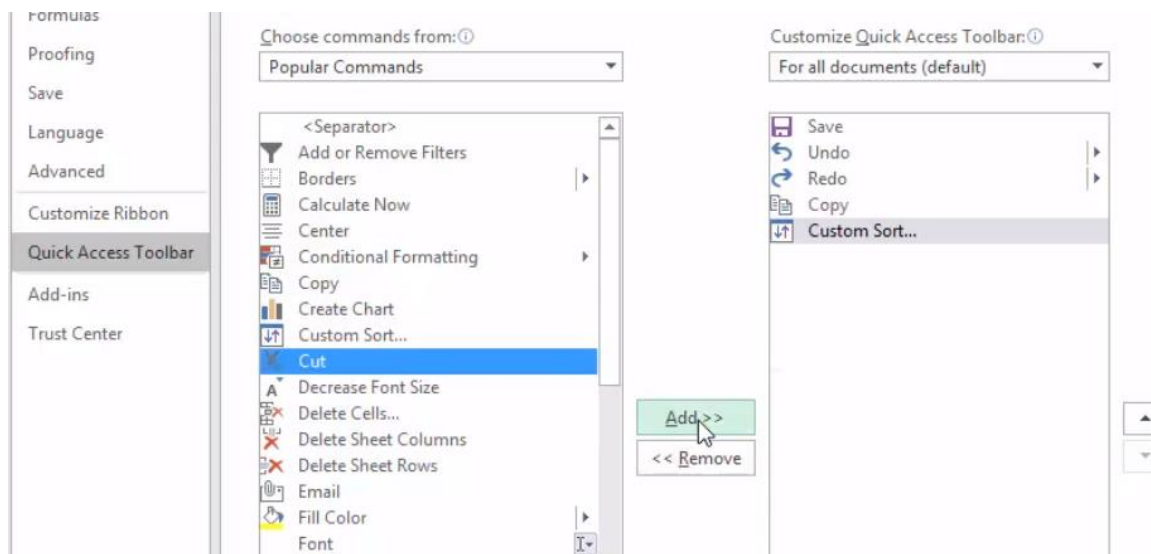
To customize the **Quick Access Toolbar** or the **Ribbon**, right click anywhere at the top of the tool bar area.



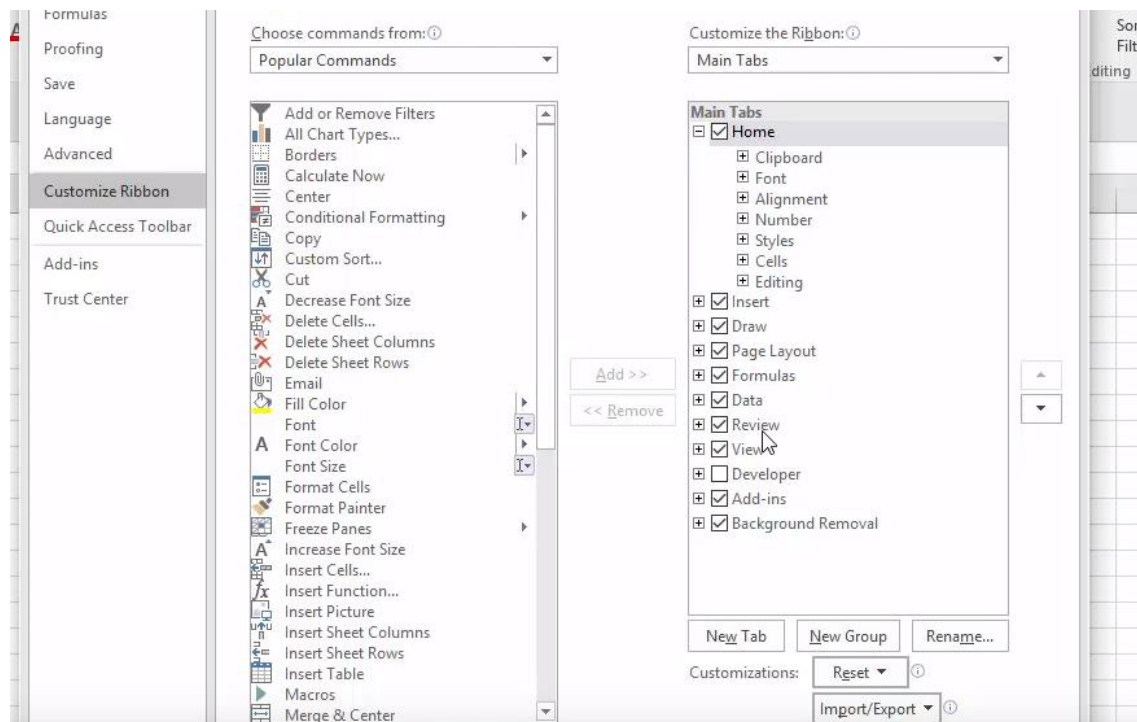
The Quick Access Toolbar includes the Save Icon and the Undo and Redo button by default. Click on Customize Toolbar to change what it does and doesn't have.



The **Excel Options Window** has tabs to edit the Ribbon and Toolbar. To add a feature, browse through the command list and click “**Add >>**”. To remove a feature, click on the right-hand panel with the current features on it and click the **Remove** button.



The same process applies to the ribbon, where you have options to make new tabs with different features on them. There are also options to **export** and import data for a custom ribbon.



These are the basics of creating a customized workspace, toolbar, and ribbon area.

Chapter 8: Pivot Tables

Pivot tables are tables that sort information. Ideally, they calculate and summarize large tables of information to get the exact data needed.

These can be created by going to the **INSERT** tab and creating a Pivot Table manually or with the Recommended Pivot Table button. Start with a set of data:

	A	B	C	D
1	MONTH	CATEGORY	AMOUNT	
2	January	Transportation	\$74.00	
3	January	Household	\$68.00	
4	January	Groceries	\$230.00	
5	February	Transportation	\$92.00	
6	February	Household	\$39.00	
7	February	Groceries	\$184.00	
8	February	Entertainment	\$66.00	
9	March	Transportation	\$78.00	
10	March	Groceries	\$192.00	
11				

After pressing the Pivot Table it automatically creates a new table in a new tab. The new Pivot Table is then created and can be adjusted in the tab on the right.

fx

Row Labels

	A	B	C
1			
2			
3	Row Labels	Sum of AMOUNT	
4	February	381	
5	Entertainment	66	
6	Groceries	184	
7	Household	39	
8	Transportation	92	
9	March	270	
10	Groceries	192	
11	Transportation	78	
12	January	372	
13	Groceries	230	
14	Household	68	
15	Transportation	74	
16	Grand Total	1023	
17			

ant to analyze

et1!\$A\$1:\$C\$10

PivotTable report to be pl

OK

PivotTable Fields

Choose fields:

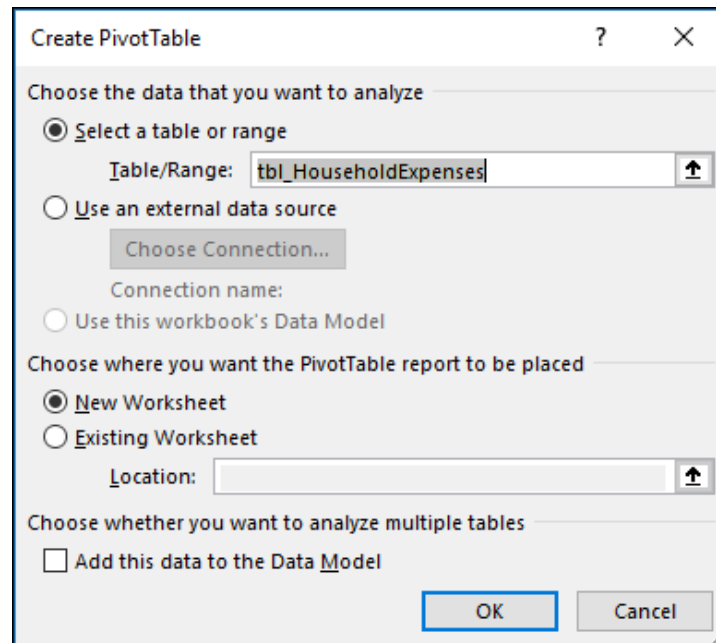
- ☒ MONTH
- ☒ CATEGORY
- ☒ AMOUNT

To manually create a pivot table, click the PivotTable button on the far left. A dialogue box will appear. Select **New Worksheet**, for **Existing Worksheet** option a worksheet

and specific cell will need to be called to place the table. To analyze multiple tables click **Add this data to the Data Model**.

Chapter 9: Use Advanced Functions

Beyond simple mathematical and statistical functions, there are also some advanced



functions that can help with performing specific tasks.

The function we will cover first is VLOOKUP.

VLOOKUP is an Excel function that is used to lookup and retrieve data from a specific column in a table.

The syntax goes as followed: =VLOOKUP (value, table, col_index, [range_lookup])

value: The value to look for in the first column of the table

table: The table from which to retrieve the information

col_index: The column in the table to retrieve the information from

[range_lookup]: This is optional. If a value is not entered, the default will be TRUE.

TRUE will result in an approximate match and FALSE will result in an exact match.

fx =VLOOKUP(H2, B2:E6, 2, FALSE)									
	A	B	C	D	E	F	G	H	I
1		ID Number	First	Last	Email				
2		153	Josh	Anderson	j.anderson@mail.com		ID	602	
3		221	Harold	Smith	h.smith@mail.com		First	Julie	
4		602	Julie	Ye	j.ye@mail.com		Last	Ye	
5		154	Angela	Tan	a.tan@mail.com		Email	j.ye@mail.com	
6		864	Guy	Monet	g.monet@mail.com				
7									

In this example, we are getting the **First Name**, **Last Name**, and **Email** of the person with **ID 602**. The **value** is **H2**, which is the cell containing the ID (602) we are matching to the table. The **table** is **B2:E6** as that block is where the table we are taking information from is located. The **col_index** is **2** as the First Name is in the second column of the table. Finally, the **[range_lookup]** is set to **FALSE** because we want an exact match rather than an approximate match.

The function first looks for “**602**” in the “**ID Number**” column. Once “**602**” is found, the function moves over to the column indicated by the **col_index**. In this case, it is **2**. The function moves over to column 2, which is the “**First**” column. Now, it returns that value, which is “**Julie**”.

The rest of the equations go as followed:

ID	602
First	=VLOOKUP(H2, B2:E6, 2, FALSE)
Last	=VLOOKUP(H2, B2:E6, 3, FALSE)
Email	=VLOOKUP(H2, B2:E6, 4, FALSE)

Now, let's move onto using names.

Have you ever felt that it is inconvenient putting in table ranges such as “**a1:e64**” every single time you do something with it? This is where names come in handy.

Names are shorthands that makes it easier to understand the purpose of cell references, constants, formulas, or tables.

These are some examples of how names may be used.

Example Type	Example with no name	Example with name
Cell Reference	=SUM(D4:D20)	=SUM(Total_Cost)
Constant	=PRODUCT(D10, 1.083)	=SUM(Price, Tax)

Formula	=VLOOKUP(H2, B2:E6, 2, FALSE)	=First_Name
Table	=A1:D23	=

All names in Excel have a **scope**. A scope is the location where the name will be recognized without qualification. The scope can be set to a specific worksheet or the entire workbook.

For example, if a name called **Price** is created in a worksheet named **Sheet1** and the scope is set to the worksheet, the name will **not** be recognized in **Sheet2**.

However, the name made in Sheet1 can be used in Sheet2 if it is **qualified**. To do this, the name must be preceded by the worksheet title it was made in.

Example: Sheet1!Price

Additionally, **duplicate names cannot** be created within the same scope.

There are several syntax rules that names must follow. The following is a list of those rules.

1. The first character of a name must be a **letter**, an **underscore** (_) or a **backslash** (/). The remaining characters can be **letters**, **numbers**, **periods**, and **underscores**.
2. Cell references **cannot** be used in names. For example, A2 cannot be a name.
3. **Spaces** are **not allowed** in names.
4. Names must be within 255 characters long.
5. Names are not case sensitive. Therefore, price and PRICE are not distinct names and both cannot be used in the same scope.

There are multiple methods to define a name. The first way is by using the Name box to define a cell or cell range on a worksheet.

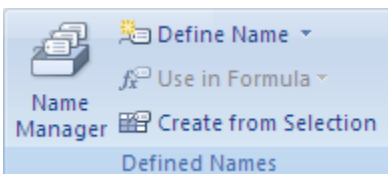
1. Select the cell or cell range that you want to name.
2. Click the **Name** box at the left end of the formula bar.



3. Type the name you want to use to refer to your selection.
4. Press ENTER.

Another method to define a name is by using **Create By Selection**:

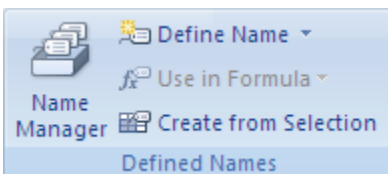
1. Select the range you want to name, including the labels for the columns and rows.
2. In the **Formulas** tab, in the **Defined Names** group, click **Create from Selection**.



3. In the dialog box, designate the location that contains the labels for the columns and rows by selecting the checkboxes.
4. By defining a name with this method, the labels for the columns and rows are not contained in the name. Only the cells that contain the values are contained.

The final method to define a name is by using the **New Name** dialog box.

1. On the **Formulas** tab, in the **Defined Names** group, click **Define Name**.



2. In the **Name** box, type the name you want to use.
3. The scope can be specified. You can either select the workbook or a specific sheet.
4. While it is **optional**, a comment can be included as a description.
5. In the Refers to box, do one of the following:
 - a. Enter a cell reference
 - i. Example: **=Sheet1!\$A\$3**
 - b. Enter a constant
 - i. Example : **=5.193**
 - c. Enter a formula
 - i. Example : **=VLOOKUP(Sheet1!H2, Sheet1!B2:E6, 2, FALSE)**
6. Finally, click OK.

The last function we will cover is IF.

The IF function is highly versatile and it allows you to make a logical comparison between a value and an expected value.

The IF function says the following:

IF(something is true, then do something, otherwise do something else)

The actual syntax goes as following:

=IF(logical_test, [value_if_true], [value_if_false])

logical_test: What we are testing the IF with. Example: **A2 = 2**

[value_if_true]: The result when the condition is true. Example: **“Yes”**

[value_if_false]: The result when the condition is false. Example: “No”

fx =IF(A1 = 12, "Yes", "No")				fx =IF(A1 = 12, "Yes", "No")			
	A	B	C		A	B	C
1	12	Yes		1	10	No	
2				2			

Above is a simple example of how the IF function can be used. The photo on the left is the situation where the condition is satisfied (A1 = 12) and the photo on the right is the situation is where the condition is not satisfied (A1 != 12).

When we use the IF function, we are able to make it perform much more complicated tasks.

Here is an example of a more complex use.

fx =IF(B3 = VLOOKUP(C3, B3:C7, 2, FALSE), "Yes", "No")					
	A	B	C	D	E
1					
2		Name	First Choice	Second Choice	First Choice - First Choice
3		Harold Smith	George Monet	Josh Anderson	Yes
4		Ashley Ye	Lily Tangela	Josh Anderson	Yes
5		George Monet	Harold Smith	Ashley Ye	Yes
6		Josh Anderson	Harold Smith	George Monet	No
7		Lily Tangela	Ashley Ye	Harold Smith	Yes
8					

What we are trying to solve in this situation is whether or not two people have each other down as the first choice.

For example: If Harold’s first choice (George Monet) has Harold down as his first choice, the formula returns “Yes”. This is true in this situation. However, if we look at Josh, he has Harold down for his first choice. However, Harold does not have Josh down for his first choice. Therefore, the formula returns “No”.

Let's break the formula down to make it easier to understand.

The full formula is **=IF(B3 = VLOOKUP(C3, B3:C7, 2, FALSE), "Yes", "No")**.

Let's just look at **VLOOKUP(C3, B3:C7, 2, FALSE)** for now.

What this function is doing is looking at C3 (George Monet) and looking for that value in the B column, which is the column containing the names. When that is found, the function goes to the second column that includes the first choice and returns that value. This value is "Harold Smith".

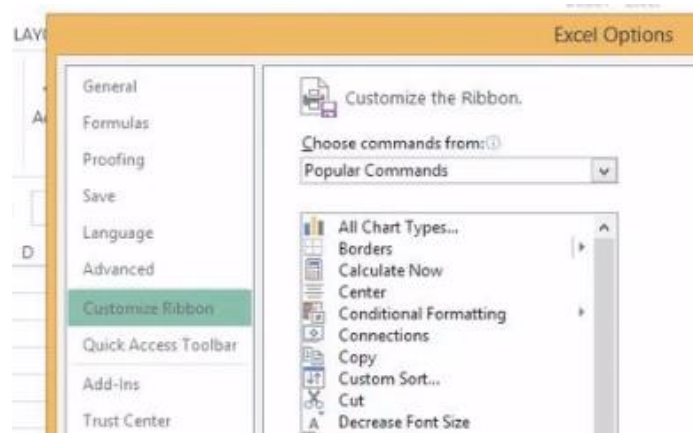
If we just look at **B3 = VLOOKUP(C3, B3:C7, 2, FALSE)**, this logic statement is checking if B3 (Harold Smith) is the same as George's first pick. This evaluates as true because George's first choice is "Harold Smith".

Finally, if we go back to **=IF(B3 = VLOOKUP(C3, B3:C7, 2, FALSE), "Yes", "No")**, This is taking the logic statement from above and seeing if it is true. If it is true, the cell returns "Yes". If it is false, the cell returns "No".

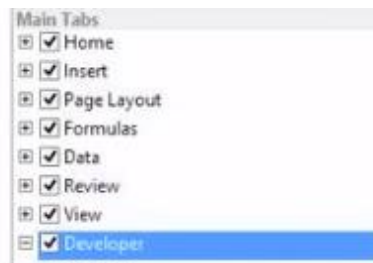
Chapter 10: Visual Basic for Applications

Visual Basic for Application is the main programming language for Microsoft Excel. This can be used to code Macros and message boxes. Currently discontinued, it still has a wide use in businesses today.

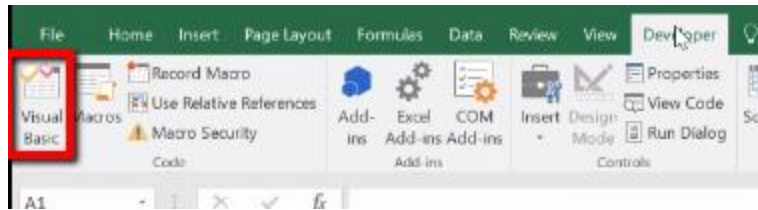
To get started, the **Developer** tab must be visible. If this isn't already on the ribbon it is easy to add by going to File and then options.



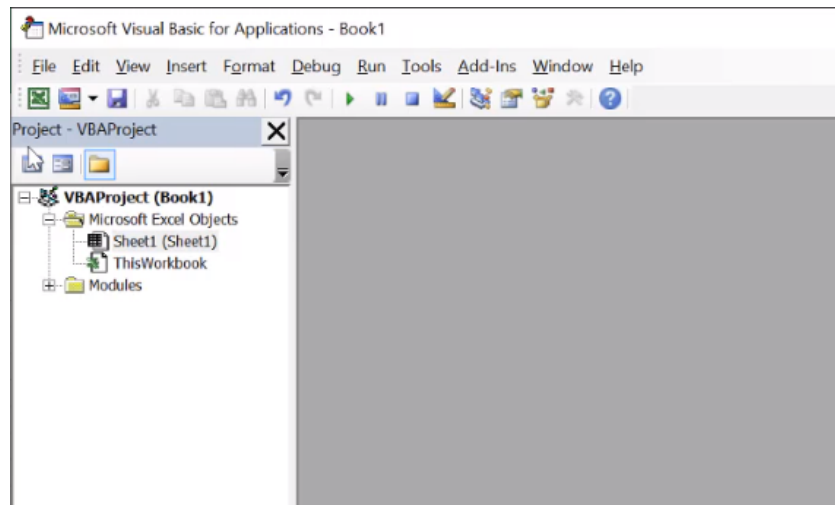
Under Customize Ribbon, click on the Developer checkbox to make sure it has a checkmark next to it. This will allow the tab to appear.



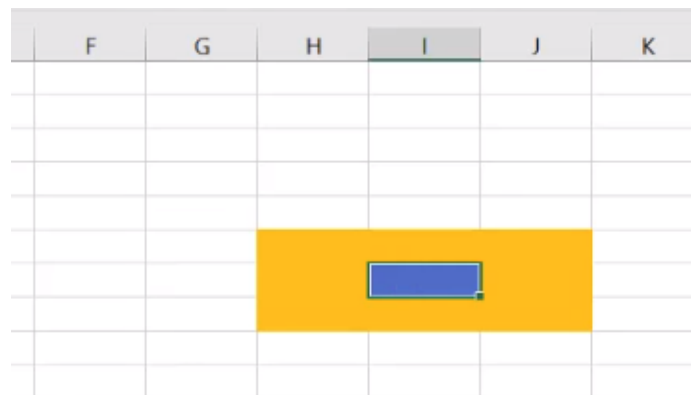
Now under the Developer tab, under the Code box, click on the Visual Basic icon



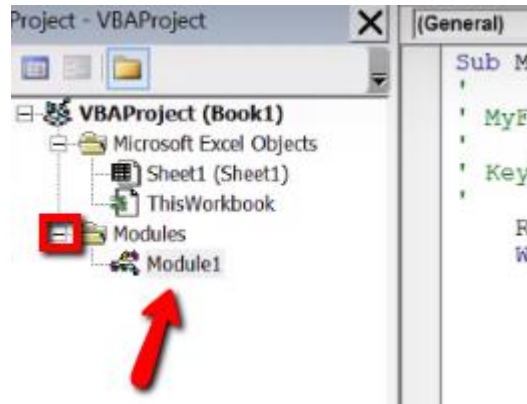
This will bring up a new window called **Microsoft Visual Basic for Application**. To code in VBA, it is best to begin working with a reference. When you create a Macro,



Excel actual creates code for it. If you haven't already, go back into the Macro chapter and see if you can make a macro that creates a square of colored cells.



To edit this click on the plus sign on the Modules Folder. Then, find the macro you wish to edit and double click it.



When we open this we will see code, specifically, the code that makes up the macro made to make a colored rectangle. Before we learn to code, I want to give you an idea of how everything works. Look at the difference between hard coded cells and not:

Hard Coded cells

```
Range("I7").Select
With Selection.Interior
    .Pattern = xlSolid
    .PatternColorIndex = xlAutomatic
    .Color = 192
    .TintAndShade = 0
    .PatternTintAndShade = 0
End With
Range("I6").Select
With Selection.Interior
    .Pattern = xlSolid
    .PatternColorIndex = xlAutomatic
    .ThemeColor = xlThemeColorAccent2
```

Not hardcoded

```
End With
ActiveCell.Offset(-1, 0).Range("A1").Select
With Selection.Interior
    .Pattern = xlSolid
    .PatternColorIndex = xlAutomatic
    .ThemeColor = xlThemeColorAccent4
    .TintAndShade = 0
    .PatternTintAndShade = 0
End With
ActiveCell.Offset(0, -1).Range("A1").Select
With Selection.Interior
```

Instead of telling excel what the cell should look like, the off set tells what the cell to the left of the one the user was in should look like.

Resources:

1. <https://support.office.com/en-us/article/create-a-chart-with-recommended-charts-cd131b77-79c7-4537-a438-8db20cea84c0>