# Follow-up notes for MS Excel

# Excel's Layout and essential tools

Excel is a spreadsheet program. A spreadsheet is a method of collecting and displaying information in rows and columns. Here are some essential parts of the Excel screen.
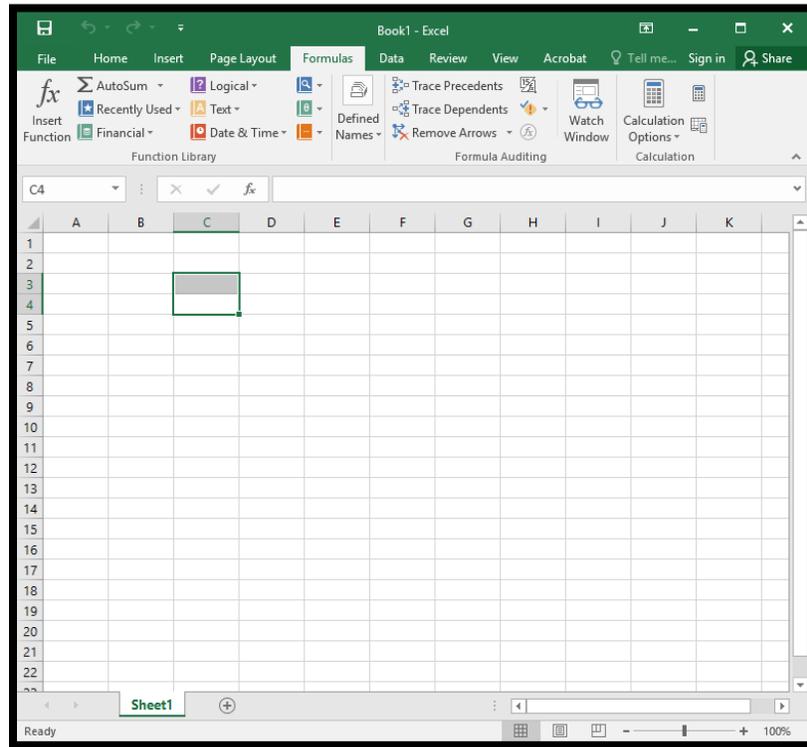


- At the top of the screen is Excel's **Title Bar**.
- At the far left side of the Title bar is the **Quick Access Toolbar**. This toolbar can be customized, but comes with these four basic buttons:
  - At the far left is a **Save** button.
  - Next to that is an **Undo** button.
  - Next to that is a **Redo** button. *(Redo undoes an undo that you regret.)*
  - The last one is a **Customize Quick Access Toolbar** button.
  - Saving, undoing and redoing are all quite familiar to computer users. But you may never have customized the Quick Access Toolbar before. Clicking that small little down arrow will take you into a screen where you can pick and choose what lives up in that area. BUT – here's an easier way!
1. Find a button that you use frequently.
2. Point your mouse and **Right-Click** on it. A list of options will appear.
3. Left click on **Add to Quick Access Toolbar** and that button will now appear for your ease of use any time.
4. If you have any regrets about placing this button up there, just point at it on the Quick Access Toolbar, **Right-click** on it and select **Remove from Quick Access Toolbar**.

MS Excel Review Notes

- To the right of the **Quick Access Toolbar** is the file name title area.
- At the right end of the Title bar are Excel's resizing and Close buttons. These include **Maximize, Minimize, Restore** and **Close** as found in 95% of Windows programs.
- Below the title bar is Excel's **Command Ribbon**. The ribbon is segmented by **Tabs**, and the tabs are divided into **Groups**. Each group contains related command **Buttons**. This is very similar to the way the MS Word ribbon is configured.
- As with the Word ribbon groups, some have a small diagonal arrow in the lower right corner that can be used to open a dialog box for you to access all of the possible commands for that topic.
- Below the ribbon is a long horizontal stretch of buttons and work/display area. It looks like this:



- On the left is the **Name Box**. This box tells you the address of your current location, the combination of a column letter and a row number. You can use this box to jump to another area if you know the exact address. Just type it in and tap the **Enter** key on your keyboard.
- The next two buttons are **Cancel** and **Enter**. These stay greyed out until you are actually typing. If you are entering or editing data, they become "alive" and usable. The **Cancel** button is like tapping the **Esc** key on your keyboard. It aborts and edit or an entry. The **Enter** button is just like tapping the **Enter** key on your keyboard, except that you do not move down to the next row.
- Next comes the **fx** button, officially called the **Insert Function** button. This is discussed in detail later.
- Next comes the **Formula Bar**. This is a critical area of your screen. The Formula Bar displays cell content. That is not necessarily what is shown in the spreadsheet below. In the spreadsheet you see **results**. In the formula bar you see what was typed to achieve those results. The common need for this is when you must fix a malfunctioning calculation. If you see a wrong result on your spreadsheet, click on it. Then look up at the Formula Bar to see what was typed to get that result. Typing in the Formula Bar is one way that you can edit cell content. You would:
  o Click on the cell.
  o Click in the Formula Bar to get a cursor.
  o Make the edit.
  o Tap your **Enter** key on the keyboard or click the **Enter** checkmark button.
- Below the Formula Bar is the spreadsheet itself which dominates the screen. In Excel is made up of a grid of 1,048,576 rows and 16,385 columns. The rows are numbered and the columns have letters to identify them. The areas where you see those letters and numbers are called row or column **headers**. For the columns the first letters progress as **A-Z**. Those are followed by **AA, AB, AC, AD,** etc. After that comes **BA, BB, BC** etc. The last column is lettered **XFD**.

- You can navigate around the spreadsheet in many ways.
  - Tapping **Enter** moves you down.
  - The **Arrow** keys on your keyboard move you in the direction of the arrow, one cell at a time.
  - The **Tab** key moves you horizontally to the right one cell at a time.
  - Use **Shift-Tab** to move horizontally to the left once cell at a time.
  - The **Home** key on the keyboard will jump you to the left of the spreadsheet.
  - **Ctrl-Home** will jump you to the upper-left of the spreadsheet, which is usually **A1**.
  - **Ctrl-End** will usually move you to the lower-right corner of your data. But it doesn't always work just as you expect, so be sure to check around where you land when you do this.
  - You can use **PgUp** and **PgDn** to move in vertical screenfuls.
  - You can use the **End** key followed by an **Arrow** keys to move through unbroken columns or rows of data. OR – to move through empty columns or rows. Use this if you are ever tempted to delete a row or a column. Be sure it is truly empty and that you are not in danger of deleting unseen data somewhere off your screen.
  - The Excel screen has vertical and horizontal scroll bars that you can also use to navigate. But beware, just because you scroll to a location and can see it, you won't actually **be there** until you click on it.
  - 

## Excel Data

All data entered into an Excel spreadsheet is either **Text** or a **Value**. All values are either **Constant** or **Variable**. Values may contain **0123456789 + - ( ) , / . $ % E e** as acceptable keystrokes. Any other keystroke will force the entry to become text, and text has a zero value.

By default, text is left aligned in the cell where you type it. Values are right aligned, like this:



You can change this to any alignment you prefer, but this is what Excel will do if you don't apply a different setting.

A **Constant** value is any number that you type into a cell. It is considered constant because it will not change unless you return to that cell and replace or delete it.

A **_Variable_** value is a number that results from a calculation that references other data in the workbook. If the other data changes, the variable value will adjust to show a new result.

Every time you press the **_Enter_** key on your keyboard, Excel recalculates all of the formulas on that spreadsheet, even if there are thousands of them!

## ENTERING CALCULATIONS

Excel uses most of the same symbols as we use when we are writing a calculation with pencil and paper:

| ^ | Indicates an exponent; for instance 3 to the 2nd power would be 3^2 |
|---|---|
| * | For multiplying |
| / | For dividing |
| + | For adding |
| - | For subtracting |

We use an asterisk instead of an "x" for multiplying because there is a column X. Computer programmers figured out early on that using an "x" for multiplying caused problems for the computer to understand what we might want.

It's important to remember that all formulas must begin with an equal sign. If you forget to type that, Excel will simply enter the formula as if it were text and no calculation would occur.

Excel follows the same calculation **_Order of Operations_** as we were taught in middle school. Calculations that have more than one thing happening perform the calculations from left to right using the order I have them listed above. So, for instance, in this calculation,

**=D4\*B17^2-G15/K92+47**

The exponent would be figured first. Then the multiplication and division. Finally, the adding and subtracting would be done, all in five steps, like this:
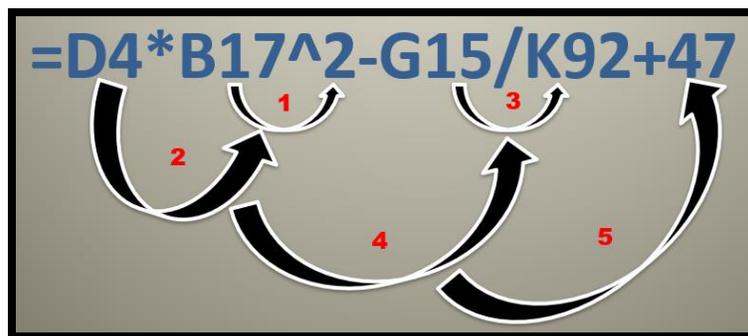


But, let's say that you wanted the value in **D4** to be multiplied by the value in **B17** before the exponent was calculated. You would need to make that change with parenthesis, like this:

**=(D4\*B17)^2-G15/K92+47**

## ENTERING DATA

To enter data into the spreadsheet, simply click on the cell where you wish it to be displayed. Type the entry and then use **Enter** or **Tab** to move to the next cell where you need to make another entry. The act of moving out of the cell will enter the data for you.

When creating a formula, it is always best to use **Cell References** instead of plain numbers to do the calculation. If you don't use a reference, the formula will not be variable. That means that it won't adjust if the data gets changed. For instance, in this example, I'd like to calculate the tax at .0875 of the cost.

| C | D |
|---|---|
| | |
| | |
| **Cost** | **Tax** |
| 12.99 | |

I could type **=12.99*.0875**

That would actually do the calculation for me. **But** if that cost figure ever got changed, I'd have to retype the formula. Too Much Work! Also, if I had 200 of rows of data, I'd like to be able to copy that formula down the **Tax** column instead of having to type it 199 more times. So, it would be much smarter for me to type the formula into the first Tax cell this way:

# =C4*.0875

Doing it this way makes this a variable value. It's now a formula that will look into that first cost cell as it calculates.

| C | D |
|---|---|
| | |
| | |
| **Cost** | **Tax** |
| 12.99 | |
| 13.99 | |
| 12.99 | |
| 17.99 | |
| 15.99 | |
| 12.99 | |
| 14.99 | |
| 12.99 | |
| 15.99 | |

If you are entering formulas that will be repeated across a row or down a column, you can have Excel fill in those repetitions for you instead of having to enter them all yourself. For instance, in this worksheet, all I have to do is create the first calculation at the top of the Tax column. Then I can have Excel copy it down for me. And because I used a reference instead of just the **12.99** number, Excel will adjust the reference for me on each row. So, **C4** would be come **C5** in the next cell down. And then **C6**, and then **C7**, etc. This is as huge time saver. And it helps to avoid you making possible typos if you type less!

# THE FILL HANDLE

=C4*0.0875

| C | D |
|---|---|
| **Cost** | **Tax** |
| 12.99 | 1.136625 |
| 13.99 | |
| 12.99 | |
| 17.99 | |
| 15.99 | |
| 12.99 | |
| 14.99 | |
| 12.99 | |
| 15.99 | |

When copying across a row or down a column, you can use *CTRL-C* followed by *CTRL-V*. But that involves a few extra steps. Instead it is MUCH easier to rely on your new best friend called the *Fill Handle*. Here I have typed the formula into cell **D4**. Because that is where I am currently located, I see the result in the cell but the formula *(cell content)* in the *Formula Bar* up above.

Do you notice the very small black square located at the lower right corner of the line surrounding the cell where I am? That is the *Fill Handle*. If you point directly at it, your mouse pointer should shift to look like a crosshair. You must be careful, because it's easy to point at the border instead of the *Fill Handle* and the crosshair suddenly will have arrows on it. That's a different tool. So make sure your pointer has no arrows at the tips.

You want this:

**Tax**
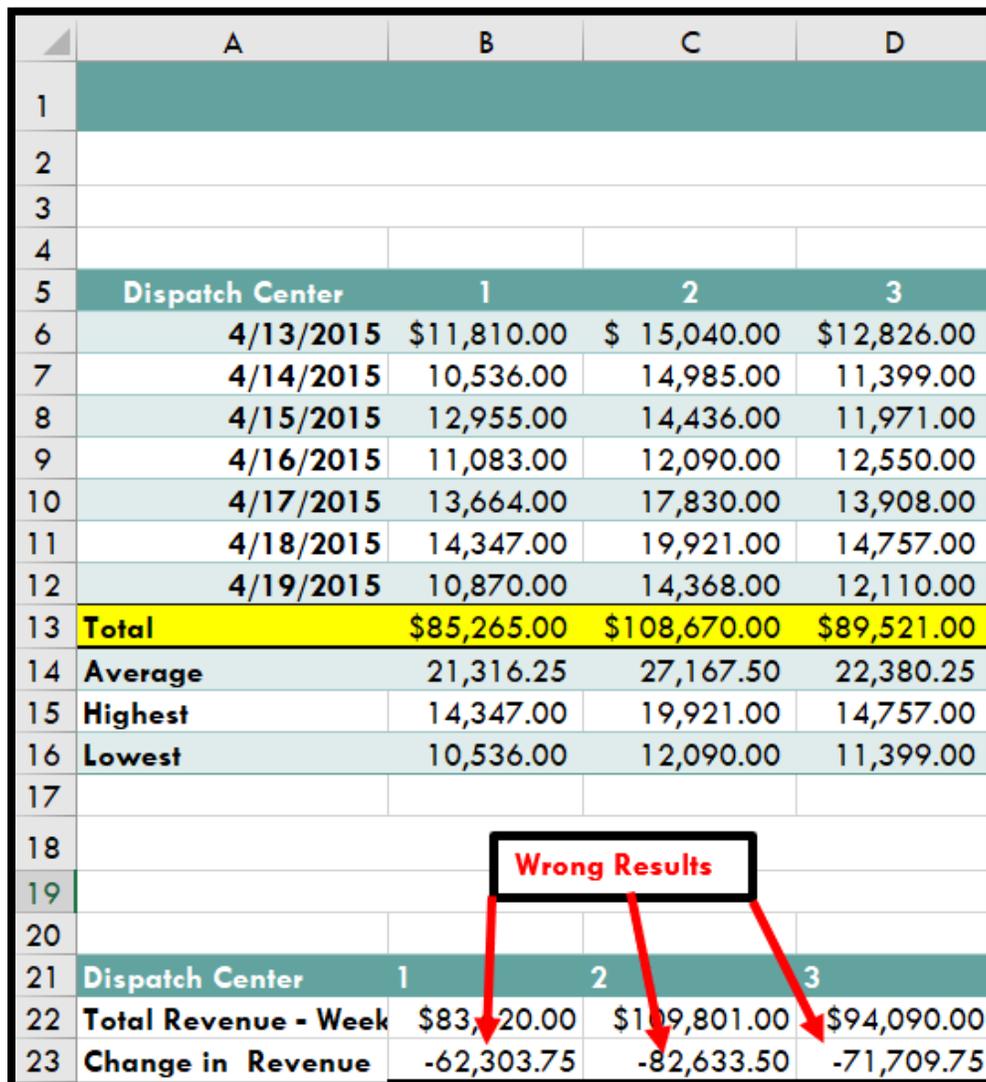1.136625

Not this:

**Tax**
1.136625
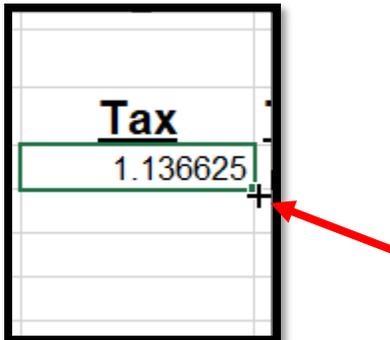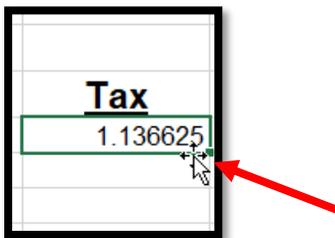
That second mouse pointer will move cell content, not copy it. If you have the correct crosshair, you can simply drag and drop the formula down the column or across a row, as needed.

## SHOW FORMULAS

Imagine that you are given an Excel file by a co-worker who asks you to help find mistakes. You open the file and see that some of the results are incorrect. So you'll need to examine the formulas to find the mistake(s). But examining each formula by having to look up into the **Formula Bar** to see how that calculation was constructed could be very time consuming and tedious. Instead, Excel offers us a way to see all the formulas at once.

For instance, here's a worksheet where a student had to find a change in revenue by comparing the total in cell B13 to the new value in cell B22. She had to subtract the **B22** from **B13**. Then she could just copy the formula across row **23** to fill in her worksheet. However a coworker noticed that the numbers that show in row **23** don't look right.

Here's the regular view of her worksheet:

| | A | B | C | D |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | Dispatch Center | 1 | 2 | 3 |
| 6 | 4/13/2015 | $11,810.00 | $ 15,040.00 | $12,826.00 |
| 7 | 4/14/2015 | 10,536.00 | 14,985.00 | 11,399.00 |
| 8 | 4/15/2015 | 12,955.00 | 14,436.00 | 11,971.00 |
| 9 | 4/16/2015 | 11,083.00 | 12,090.00 | 12,550.00 |
| 10 | 4/17/2015 | 13,664.00 | 17,830.00 | 13,908.00 |
| 11 | 4/18/2015 | 14,347.00 | 19,921.00 | 14,757.00 |
| 12 | 4/19/2015 | 10,870.00 | 14,368.00 | 12,110.00 |
| 13 | Total | $85,265.00 | $108,670.00 | $89,521.00 |
| 14 | Average | 21,316.25 | 27,167.50 | 22,380.25 |
| 15 | Highest | 14,347.00 | 19,921.00 | 14,757.00 |
| 16 | Lowest | 10,536.00 | 12,090.00 | 11,399.00 |
| 17 | | | | |
| 18 | | | Wrong Results | |
| 19 | | | | |
| 20 | | | | |
| 21 | Dispatch Center | 1 | 2 | 3 |
| 22 | Total Revenue - Week | $83,420.00 | $109,801.00 | $94,090.00 |
| 23 | Change in Revenue | -62,303.75 | -82,633.50 | -71,709.75 |

A quick look with **Review Formulas** shows that she was subtracting from row 14, not row 13. So all she needed to do was fix the first formula in **B23** and then copy that across the row using the **Fill Handle**. She entered **=B14-B22** into cell **B23** instead of **=B13-B22**. Then she copied that across the row producing incorrect results in row **23**.

| ◢ | A | B | C | D |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | Dispatch Center | 1 | 2 | 3 |
| 6 | 42107 | 11810 | 15040 | 12826 |
| 7 | 42108 | 10536 | 14985 | 11399 |
| 8 | 42109 | 12955 | 14436 | 11971 |
| 9 | 42110 | 11083 | 12090 | 12550 |
| 10 | 42111 | 13664 | 17830 | 13908 |
| 11 | 42112 | 14347 | 19921 | 14757 |
| 12 | 42113 | 10870 | 14368 | 12110 |
| 13 | Total | =SUM(B6:B12) | =SUM(C6:C12) | =SUM(D6:D1 |
| 14 | Average | =AVERAGE(B6:B | =AVERAGE(C6: | =AVERAGE(D |
| 15 | Highest | =MAX(B6:B12) | =MAX(C6:C12) | =MAX(D6:D1 |
| 16 | Lowest | =MIN(B6:B12) | =MIN(C6:C12) | =MIN(D6:D12 |
| 17 | | | | |
| 18 | | | | |
| 19 | | | | |
| 20 | | | | |
| 21 | Dispatch Center | 1 | 2 | 3 |
| 22 | Total Revenue - Week of April 6, 2015 | 83620 | 109101 | 94090 |
| 23 | Change in Revenue | =(B14-B22) | =(C14-C22) | =(D14-D22) |

**Show Formulas** is a toggle that can be turned on or off two ways:

- Use **CTRL-Accent** on your keyboard. *(Accent is located just below the Esc key.)*

- Or, click on the **Show Formulas** button in the **Formula Auditing** group on the **Formula** tab of the ribbon.

## Selecting Non-Contiguous Ranges

Sometimes you may need to select two or more ranges of cells that are not all next to each other. Perhaps you need them for a chart. Perhaps you want to apply a font change to them all at once instead of having to do each group individually. Here's how to make that selection:

1. Select the first range.

2. Press and hold down the **CTRL** key on your keyboard.

3. Using your mouse select each additional range.

4. Release the **CTRL** key.

It's very important to **not** start by holding down the **CTRL** key. Only do that after you have selected the first range. Then, do not let it go until you have all the ranges selected.

## Commonly Used Functions

Excel has dozens of **Functions**. These are predesigned calculation tools for things that we often need. Functions always have a specific syntax. First comes the name of the function. It is then followed by a left parenthesis. Then may come one or more **Arguments** that Excel uses to determine how to perform the task you want. The last keystroke is a right parenthesis. If there is more than one **argument**, they are separated by commas. Some functions have no arguments at all. But they still must have parenthesis, even when empty.

The most common function of all is the **SUM** function. We don't normally subtract, multiply or divide long columns or rows of numbers. But we busy bee humans are always adding things up. Here's an example of how it might look:

**=SUM(B2,B3,C9:C15)**

In this example, Excel would add together all of the values found in cells **B2** and **B3** and the range starting at **C9** and ending at **C15**. *(Ranges are always noted with a beginning cell address and an ending cell address separated by a colon.)*

You can type this into a cell where you wish to see the result, but Excel offers a button called **AutoSum** that will do this for you. The button is found in the **Editing** group on the **Home** tab of the ribbon. It usually looks like this:



On some computers screen resolution can change how this looks so that you only see the symbol and don't see the word.

Notice that this button has a down-pointing triangle. That's an indicator of an option list. If you click directly in the middle of the button, the SUM function will be presented in your cell. But if you click that option indicator, a list of other common functions like **AVERAGE, MIN** and **MAX** will be offered.

When you insert a function in this manner using the button, you ***must never assume*** that Excel is calculating with the correct cell references. Depending on the layout of your data, Excel can very easily be wrong. When that happens, simply use your mouse to indicate the correct range before you tap ***Enter*** to finalize the formulas.

## Formatting the Worksheet

Excel let us apply many different styles and formatting choices to our worksheet. We can add color, change fonts, create borders, etc. to any portion of the sheet we wish to enhance. You will always need to begin by highlighting the cells you want to alter, then use the tools on ribbon to make your changes. Most of these are located on the ***Home*** tab. You'll want to explore the ***Font, Alignment*** and ***Styles*** groups for these. You can use skills that are already familiar to you from working in MS Word for many of these settings. Excel also offers some preset ***Styles*** accessed by clicking the ***Cell Styles*** button in the ***Styles*** group.

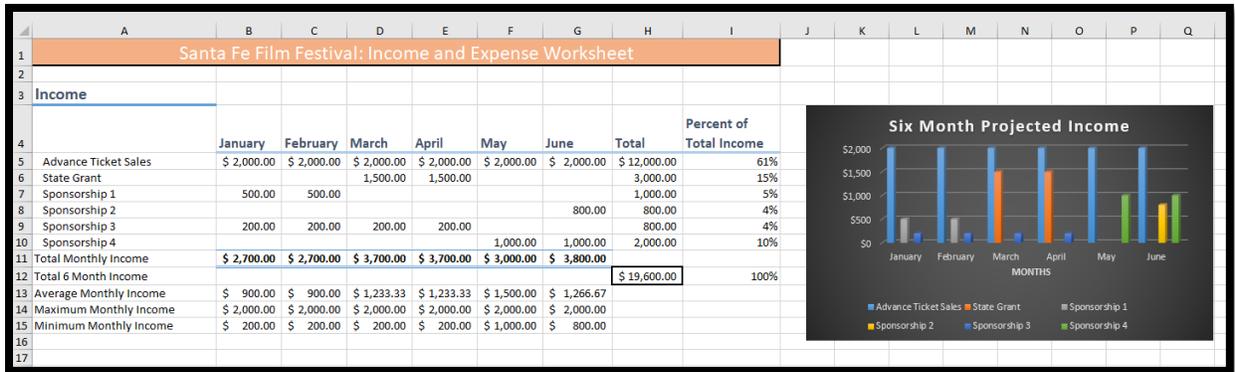You can apply these changes to text and/or numbers, as you need.

### *Numeric Formatting*

Numbers have special formats that give us a visual clue as to their value. These formats are controlled through the ***Number*** group on the ***Home*** tab. Here are examples of the effect of these formats, all applied to the same set of keystrokes, "1234.56".

| Value | Format type |
|---|---|
| 1234.56 | General |
| $ 1,234.56 | Accounting |
| 123456% | Percent |
| 1,234.56 | Comma |
| 1234.5600 | Increased decimal |
| 1235 | Decreased decimal |

## Charting the data

Charts and graphs are presentation tools that you can use to help coworkers or other people understand and appreciate your data. There are some very simple steps to creating a chart, although it can get complex depending on what you want the final result to display. There are many formatting and style choices you can explore. But here are the basic steps to create a chart that you can then enhance. Here is a column chart that represents some income data:

| | January | February | March | April | May | June | Total | Percent of Total Income |
|---|---|---|---|---|---|---|---|---|
| **Santa Fe Film Festival: Income and Expense Worksheet** | | | | | | | | |
| **Income** | | | | | | | | |
| Advance Ticket Sales | $ 2,000.00 | $ 2,000.00 | $ 2,000.00 | $ 2,000.00 | $ 2,000.00 | $ 2,000.00 | $ 12,000.00 | 61% |
| State Grant | | | 1,500.00 | 1,500.00 | | | 3,000.00 | 15% |
| Sponsorship 1 | 500.00 | 500.00 | | | | | 1,000.00 | 5% |
| Sponsorship 2 | | | | | 800.00 | | 800.00 | 4% |
| Sponsorship 3 | 200.00 | 200.00 | 200.00 | 200.00 | | | 800.00 | 4% |
| Sponsorship 4 | | | | | 1,000.00 | 1,000.00 | 2,000.00 | 10% |
| Total Monthly Income | $ 2,700.00 | $ 2,700.00 | $ 3,700.00 | $ 3,700.00 | $ 3,000.00 | $ 3,800.00 | | |
| Total 6 Month Income | | | | | | | $ 19,600.00 | 100% |
| Average Monthly Income | $ 900.00 | $ 900.00 | $ 1,233.33 | $ 1,233.33 | $ 1,500.00 | $ 1,266.67 | | |
| Maximum Monthly Income | $ 2,000.00 | $ 2,000.00 | $ 2,000.00 | $ 2,000.00 | $ 2,000.00 | $ 2,000.00 | | |
| Minimum Monthly Income | $ 200.00 | $ 200.00 | $ 200.00 | $ 200.00 | $ 1,000.00 | $ 800.00 | | |

Here are the steps used for this chart:

1.  Highlight the range providing the source of the data. This must always be your first step. In this case the user highlighted from *A4:G10*. This provided Excel with the values and also labels needed to complete the chart. Even though cell *A4* is empty, it had to be included in order for all of the labels to be used. Notice that no totals or summary figures were included. You must never chart summary figures along with the data that makes up those summaries. It is not a sensible comparison.

2.  Click the **Insert** tab of the ribbon.

3.  In the **Charts** group, click the **Column** button. It looks like this:



4.  A list of column chart types will appear. Click on any one you'd like to try and it will appear on your worksheet.

The good news about charts is that you cannot hurt your data when you make a chart. So if it's a disaster, don't worry. Just delete it and start over.

While the chart is selected, two new **contextual tabs** will appear on the ribbon called **Display** and **Format**. You can use these to play with styles and color.

## EXTRAS

### ABSOLUTE REFERENCES

When you type a formula into any cell, most of the references you make to other cells will be "Relative". What that means is that if/when that formula is copied to any new location, the reference(s) in it will adjust ***relative*** to the new location on the worksheet, as in the payroll example below. In cell **D4**, the formula **=B4*C4** was typed to obtain the gross pay amount for that one employee. Because the references to **B4** and **C4** are **relative** references, that formula can just be copied down the column for the remaining employees. Excel will adjust to multiply **B5** times **C5** for the gross pay in **D5**. It will figure **B6** times **C6** for the gross in **D6**, etc. This is a huge time saver. Without this feature, we would have to type every formula in column **D** manually and in a large payroll worksheet with hundreds or even thousands of employees that would cost us hours or even days of time.

Here is what was typed in D4 with relative references and then copied down the column, adjusting in each new cell:

| | A | B | C | D |
|---|---|---|---|---|
| 1 | Payroll | | | |
| 2 | | | | |
| 3 | Employees | hours | pay rate | gross |
| 4 | Chavez, V. | 40 | 20 | =B4*C4 |
| 5 | Daniels, S. | 43 | 15 | =B5*C5 |
| 6 | Martinez, S. | 35 | 15 | =B6*C6 |
| 7 | Pedersen, U. | 41 | 25 | =B7*C7 |
| 8 | Walters, B. | 42 | 12 | =B8*C8 |
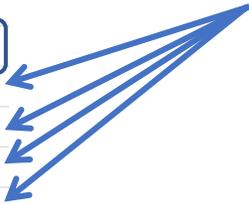
The results:

| | A | B | C | D |
|---|---|---|---|---|
| 1 | Payroll | | | |
| 2 | | | | |
| 3 | Employees | hours | pay rate | gross |
| 4 | Chavez, V. | 40 | 20 | 800.00 |
| 5 | Daniels, S. | 43 | 15 | 645.00 |
| 6 | Martinez, S. | 35 | 15 | 525.00 |
| 7 | Pedersen, U. | 41 | 25 | 1,025.00 |
| 8 | Walters, B. | 42 | 12 | 504.00 |

Sometimes, however, you do not want a cell reference to be relative. Sometimes you do ***not*** want it to adjust when/if a formula is copied. Consider this next formula we need for the payroll worksheet. Here we want to figure out the tax amount that will be withheld from each employee's paycheck. But there is just one fixed point on the worksheet where that tax percentage is indicated, **B11**. *(Having that fixed point allows us to easily change the tax*

*percentage, as needed, without having to rewrite any formulas.)* For the first employee we want to simply type **=C4\*B11**. That will work easily for him. BUT, when we try to copy that formula down the column for the remaining employees, we do not want the reference to **B11** to change. We want it to be **_absolute_**. For our formula in **E5**, we do NOT want it to become **C5** times **B12**. We want it to be **C5** times **B11**. Then in **E6** we want it to be **C6** times **B11**, and so on down the column.

## We need to fill in column E:

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Payroll | | | | |
| 2 | | | | | |
| 3 | Employees | hours | pay rate | gross | tax amount |
| 4 | Chavez, V. | 40 | 20 | 800.00 | |
| 5 | Daniels, S. | 43 | 15 | 645.00 | |
| 6 | Martinez, S. | 35 | 15 | 525.00 | |
| 7 | Pedersen, U. | 41 | 25 | 1,025.00 | |
| 8 | Walters, B. | 42 | 12 | 504.00 | |
| 9 | Totals | | | | |
| 10 | | | | | |
| 11 | Tax Percentage | 18% | | | |

We do NOT want what you see in this next image. See how the relative reference to cell **B11** keeps changing? We don't want that. We DO want the reference for **D4** to be relative. We need it to become **D5** and then **D6**, etc. But we need the reference to **B11** to be absolute; it must not change when the formula is copied.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Payroll | | | | |
| 2 | | | | | |
| 3 | Employees | hours | pay rate | gross | tax amount |
| 4 | Chavez, V. | 40 | 20 | =B4*C4 | =D4*B11 |
| 5 | Daniels, S. | 43 | 15 | =B5*C5 | =D5*B12 |
| 6 | Martinez, S. | 35 | 15 | =B6*C6 | =D6*B13 |
| 7 | Pedersen, U. | 41 | 25 | =B7*C7 | =D7*B14 |
| 8 | Walters, B. | 42 | 12 | =B8*C8 | =D8*B15 |
| 9 | Totals | | | | |
| 10 | | | | | |
| 11 | Tax Percentage | 0.18 | | | |
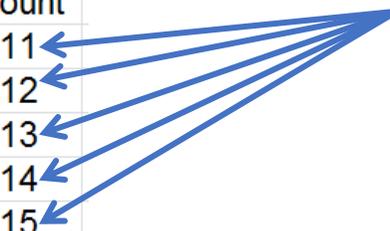
## What we DO want:

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Payroll | | | | |
| 2 | | | | | |
| 3 | Employees | hours | pay rate | gross | tax amount |
| 4 | Chavez, V. | 40 | 20 | =B4*C4 | =D4*$B$11 |
| 5 | Daniels, S. | 43 | 15 | =B5*C5 | =D5*$B$11 |
| 6 | Martinez, S. | 35 | 15 | =B6*C6 | =D6*$B$11 |
| 7 | Pedersen, U. | 41 | 25 | =B7*C7 | =D7*$B$11 |
| 8 | Walters, B. | 42 | 12 | =B8*C8 | =D8*$B$11 |
| 9 | Totals | | | | |
| 10 | | | | | |
| 11 | Tax Percentage | 0.18 | | | |
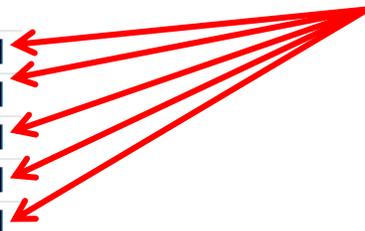
## So that our results will be like this:

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Payroll | | | | |
| 2 | | | | | |
| 3 | Employees | hours | pay rate | gross | tax amount |
| 4 | Chavez, V. | 40 | 20 | 800.00 | 144.00 |
| 5 | Daniels, S. | 43 | 15 | 645.00 | 116.10 |
| 6 | Martinez, S. | 35 | 15 | 525.00 | 94.50 |
| 7 | Pedersen, U. | 41 | 25 | 1,025.00 | 184.50 |
| 8 | Walters, B. | 42 | 12 | 504.00 | 90.72 |
| 9 | Totals | | | | |
| 10 | | | | | |
| 11 | Tax Percentage | 18% | | | |

## Instead of this:

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Payroll | | | | |
| 2 | | | | | |
| 3 | Employees | hours | pay rate | gross | tax amount |
| 4 | Chavez, V. | 40 | 20 | 800.00 | 144.00 |
| 5 | Daniels, S. | 43 | 15 | 645.00 | - |
| 6 | Martinez, S. | 35 | 15 | 525.00 | - |
| 7 | Pedersen, U. | 41 | 25 | 1,025.00 | - |
| 8 | Walters, B. | 42 | 12 | 504.00 | - |
| 9 | Totals | | | | |
| 10 | | | | | |
| 11 | Tax Percentage | 18% | | | |

There are four different "states of relativity". Here are their descriptions:

| Notation Example | Name | Description |
| --- | --- | --- |
| B11 | Relative | This reference, with no dollar signs, will adjust itself when used in a formula that gets copied to a new location on a worksheet. |
| $B$11 | Absolute | This reference, with dollar signs, will NOT adjust itself when used in a formula that gets copied to a new location on a worksheet. Nothing will change. |
| B$11 | Mixed | In this cell reference, with a dollar sign before the row reference, the column is relative but the row is absolute. So the column letter could change when the formula is copied, but the row reference will not change. |
| $B11 | Mixed | In this reference, with a dollar sign before the column reference, the row is relative but the column is absolute. So the row number could change when the formula is copied, but the column reference will not change. |

## THE IF FUNCTION

We use the *IF Function* when we need excel to examine our data and make a choice before displaying results.

The IF function's syntax has three "arguments" separated by commas:

**=IF(Criteria Statement, display if true, display if false)**

| Argument | Description |
|---|---|
| Criteria Statement | • What you are looking for. <br><br> • Tell Excel to analyze part of your worksheet by making a statement about it. <br><br> • This statement must be either true or false. |
| Display if True | Tell Excel what to display if your criteria statement is true. |
| Display if False | Tell Excel what to display if your criteria statement is false. |

Here's an example. I used an *IF Function* to tell me if each customer owed more than $15,000. If they do, they need new invoices.

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | People who owe me money | | | | | | | |
| 2 | | | | | | | | |
| 3 | Customer Name | Beginning Balance | Purchases | Payments | Credits | Service Charge | New Balance | Send Invoice? |
| 4 | Kawika, Antwaa | 23,671.45 | 2,982.75 | 16,923.00 | 2,734.25 | $699.70 | $7,696.65 | No |
| 5 | Milowski, Zacha | 15,918.30 | 3,823.15 | 4,250.00 | 435.00 | $1,505.65 | $16,562.10 | Yes |
| 6 | Valdes, Maria | 17,129.75 | 975.00 | 8,350.00 | 923.00 | $883.18 | $9,714.93 | No |
| 7 | Chang, Rita | 11,555.70 | 7,600.00 | 6,983.00 | 150.00 | $1,202.27 | $13,224.97 | No |
| 8 | Manley, Cosey | 21,917.60 | 1,596.10 | 4,560.00 | 800.75 | $1,815.30 | $19,968.25 | Yes |
| 9 | McGilicuty, Ryar | 13,919.80 | 1,367.25 | 3,000.00 | 0.00 | $1,228.71 | $13,515.76 | No |
| 10 | Sasha, Nipul | 25,728.75 | 3,474.00 | 2,950.00 | 52.00 | $2,620.08 | $28,820.83 | Yes |
| 11 | Totals | | | | | | | |

Here are the three **arguments** I used:

| Argument: | What I typed: |
|---|---|
| Criteria Statement | G4>15000 |
| Display if True | "Yes" |
| Display if False | "No" |

So, my formula in cell **H5** looked like this:

**=IF(G4>15000,"Yes","No")**

- This looked at G4, where the new balance is for the first customer.
- It determines whether or not that customer owes over $15,000.
- It then tells the user whether or not they need a new invoice.
- Copying this down the column analyzed for each customer.

To make your life extra easy, ***don't*** type this yourself. Use the ***Insert Function Dialog Box*** to help you build the correct syntax!

## Calculating Across Multiple Worksheets

Sometimes you may have a workbook that contains multiple worksheet of dat. It is then possible that a formula on one worksheet might need to read data on another sheet. There is a very specific syntax for this kind of formula.

For instance, perhaps you have a business with an East Coast location and also a West Coast location. You might need a "Master" sheet that uses values from the East and West coast sheets to come up with a grand total. The East coast worksheet might have the number you need in cell **C10**. The West coast sheet might have the number you need in cell **D10**.

To add up the numbers from those two cells into your "Master" sheet the formula would look like this:

**='East Coast'!C10+'West Coast'!D10**

There are a lot of very specific keystrokes in this formula. Notice that each worksheet tab name must be surrounded by single quotes. The name of the tab must be separated from the cell reference by an exclamation point. If you try to type this out manually, it's very easy to have a typo and get it wrong. This is a time when it's much easier to let your mouse help you in the process. Just follow these steps:

1. Click into the cell on the **Master** sheet where you wish to see your result.

2. Type an equal sign. This sets Excel into calculate mode.
3. Click your mouse on the worksheet table that you've called **East Coast**.
4. Click your mouse onto cell **C10** to grab the value from that cell.
5. Type a plus sign to indicate addition.
6. Click your mouse on the worksheet table that you've called **West Coast**.
7. Click your mouse onto cell **D10** to grab the value from that cell.
8. Press the **Enter** key on your keyboard.

Excel will return you to the **Master** sheet with the result displayed. The computer will have placed all the exclamation points and quotation marks where you need them so that you don't have to worry about typing that out yourself.

## Dates are Values

In order to be able to calculate with a date, it must actually be a value. Every day is a number to Excel. That way the computer can compute things like due dates. If you have an accounts receivable job, you'd need to know how long it's been since invoices were sent out. That means the computer must count days. It can only do that if each day is a number.

But ... what number? What is today worth? What was yesterday's value? How about tomorrow? It's all a mystery to we mere mortals.

Sometime in the past the folks who were developing computer systems made an arbitrary decision. January 1st, 1900 is equal to the number one. January 2nd, 1900 is equal to the number two. Every day that has elapsed since the 1/1/1900 is incremented by one. So today is the number of days that have passed since that date. Want to see it? Here's how:

1. Open a blank workbook and type 1/1/1900 into cell A1.
2. Type 1/2/1900 into cell A2.
3. Type the function *=Today()* into cell A3. That will input the current date.
4. Type your own birthday into cell **A4**.
5. Because you typed this information in a date format dd/mm/yyyy, Excel is displaying what you typed as legible dates. But let's turn these dates into numbers.
6. Highlight all four cells.
7. In the **Number** group on the **Home** tab, it will be displaying the word **Date**.
8. Change that to **General.**

All the dates will turn into numbers. You will suddenly see how many days have passed since 1/1/1900. You'll also see how many days have passed from 1/1/1900 until the day you were born. Want to see how many days you've been alive? Type this formula into cell **A5**.

**=A3-A4**

There ya go!

## The Insert Function Dialog Box

Excel has a wonderful tool that helps you build functions. It is triggered with the **fx** button next to the **Formula Bar** that we mentioned earlier. When you click on this button an **Insert Function** dialog box will open up. It will look like this:
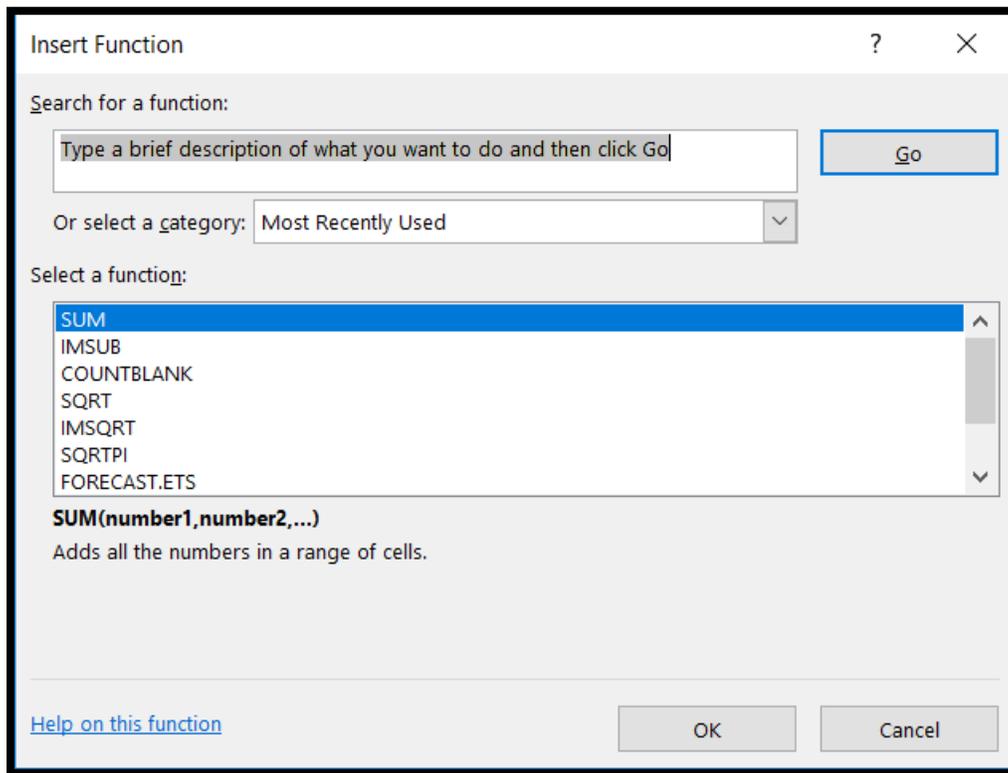


In the **Search for a function** area at the top, you can type in a phrase telling Excel what you want to do. Then click the **Go** button. Excel will try to interpret your needs and then it will present possible functions in the **Select a function** list.

Or, if you know that your task pertains to a certain kind of work, like working with text data or financial numbers or logical yes/no information, you can use the **Or select a category** option list to narrow things down to your pertinent area of need. As you can see the default setting for that section is **Most Recently Used**.

The **Select a function** list shows the result of what you asked for. Excel will provide helpful information about whichever function is highlighted in that list. For instance, in this example the **SUM** function is highlighted. Below that in bold lettering, Excel displays the syntax that the function requires. Below that it gives you a definition of what the function can do for you.

Once you have highlighted the function you wish to use, click the **OK** button at the lower right corner of the window. A new step in the dialog sequence will appear, something like this:
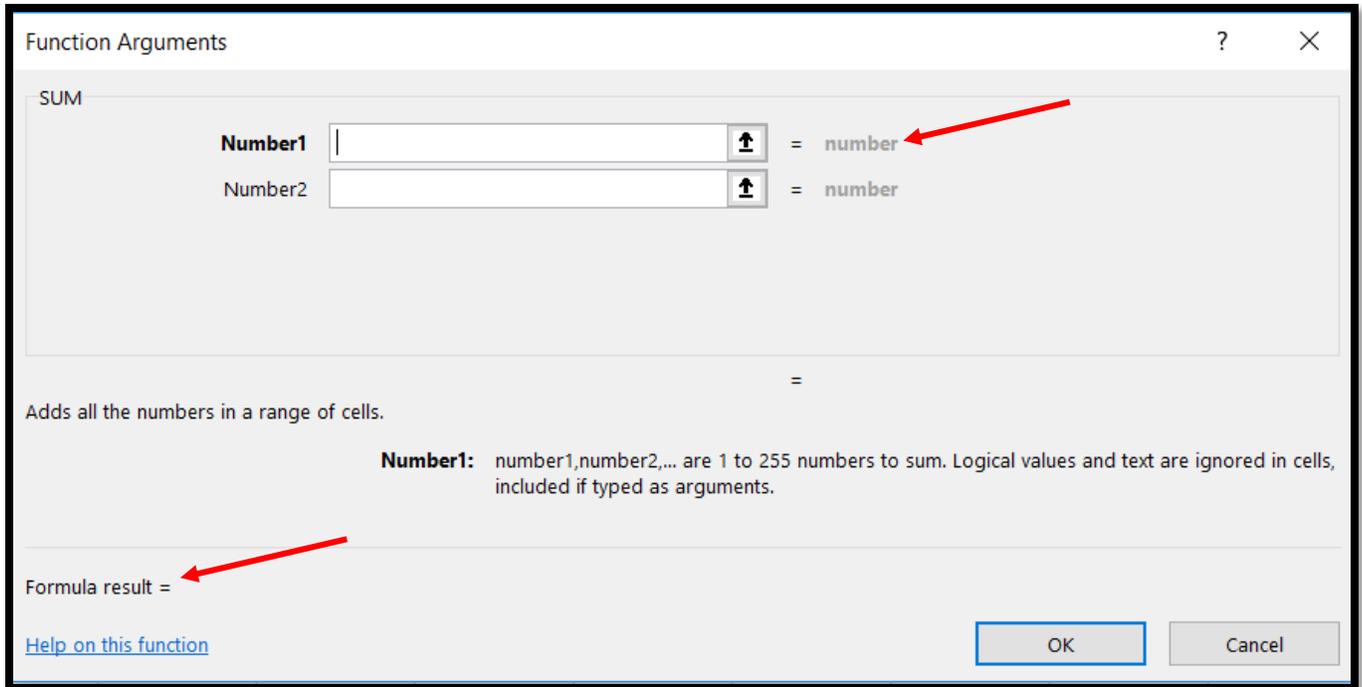
Here you will be presented with boxes to fill in any arguments required for completion of the function. The SUM function requires at least one cell or range of cells to be added up. You would type the first one in the first box, and if there are more, you'd click in the second box for the next one. Each time you add an argument for this function a new box will appear in case you need it. Many functions just have a set number of arguments and don't provide those extra boxes.

As you enter the argument details, Excel will let you know how things are going by giving you results along the way. For instance, if you typed B3:C9 into the first box, Excel would add up that range and show you that one results where you see the **number** indicator. All the arguments would be added up where it says **formula results** at the bottom left. This lets you keep an eye on how things are going as you construct the formula.

Once you are done, click the **OK** button to complete the function and have it inserted into the cell where you started. If you keep an eye on your **Formula Bar** as you do this, you'll see that Excel is providing all the keystrokes you need to have proper syntax. You provide the arguments and Excel does the rest.

## Conditional Formatting

Sometimes you may wish to enhance certain data in a **conditional** manner. That means that the style may change depending on the content of the cell or even of surrounding cells. For instance, in a financial worksheet, you may wish to have all of the losses be red, bold with a yellow background, like this. See how those numbers "pop" off the page? Because this was done with a conditional format, if the data changes, the format will adjust if necessary.

| Symbol | # of Shares | Purchase Price | Original Value | Current Price | Current Value | Gain/Loss |
|---|---|---|---|---|---|---|
| ADI | 1600 | 9.08 | 14,528.00 | 53.69 | 85,900.00 | 71,372.00 |
| BMY | 800 | 13.19 | 10,550.00 | 70.38 | 56,300.00 | 45,750.00 |
| CSCO | 400 | 11.75 | 4,700.00 | 51.00 | 20,400.00 | 15,700.00 |
| DELL | 400 | 31.40 | 12,560.00 | 22.44 | 8,975.00 | (3,585.00) |
| ESV | 800 | 7.50 | 6,000.00 | 31.00 | 24,800.00 | 18,800.00 |
| GE | 1200 | 9.47 | 11,364.00 | 49.81 | 59,775.00 | 48,411.00 |
| HD | 300 | 41.04 | 12,312.00 | 39.56 | 11,868.75 | (443.25) |
| INTC | 2000 | 3.56 | 7,125.00 | 42.03 | 84,062.40 | 76,937.40 |
| JNJ | 400 | 22.00 | 8,800.00 | 100.13 | 40,050.00 | 31,250.00 |
| MSFT | 500 | 10.00 | 5,000.00 | 67.00 | 33,500.00 | 28,500.00 |
| PIVCX | 108.507 | 92.16 | 10,000.01 | 52.41 | 5,686.85 | (4,313.15) |
| TYC | 1 | 55.00 | 55.00 | 55.63 | 55.63 | 0.63 |
| VVVV | 1 | 20.00 | 20.00 | 2.97 | 2.97 | (17.03) |
| WMT | 200 | 45.25 | 9,050.00 | 49.00 | 9,800.00 | 750.00 |
| XOM | 947.078 | 22.25 | 21,072.49 | 93.06 | 88,137.45 | 67,064.96 |

Or in a statistical worksheet, you may wish to have a column of numbers enhanced showing their relative values with colors and/or symbols. Here's a list of baseball stats, showing the players standings compared to each other:

| Player | Home Runs | |
|---|---|---|
| Hank Aaron | ⬆ | 755 |
| Babe Ruth | ⬆ | 714 |
| Willie Mays | ↗ | 660 |
| Frank Robinson | ↘ | 586 |
| Mark McGwire | ↘ | 583 |
| Harmon Killebrew | ⬇ | 573 |
| Barry Bonds | ⬇ | 567 |
| Reggie Jackson | ⬇ | 563 |
| Mike Schmidt | ⬇ | 548 |
| Mickey Mantle | ⬇ | 536 |
| Jimmie Foxx | ⬇ | 534 |
| Willie McCovey | ⬇ | 521 |

To do this:

1. Highlight the range of cells where you want to apply the conditional format.

2. Click the **Conditional Formatting** button located in the **Styles** group of the **Home** tab. An option list will appear like this:
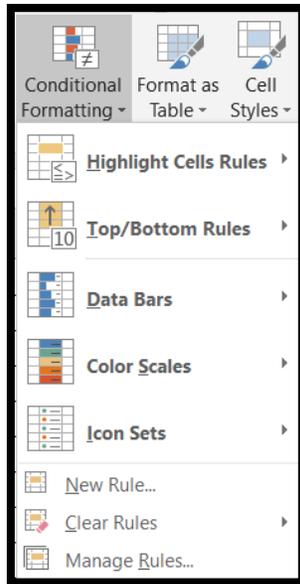
3. You can peruse the first five options that are presets with the bold titles. I used an ***Icon Set*** for the baseball example.

4. Or you can click on the ***New Rule*** button to create your own rule. This will open another dialog box screen, with many tools to consider. It looks like this:
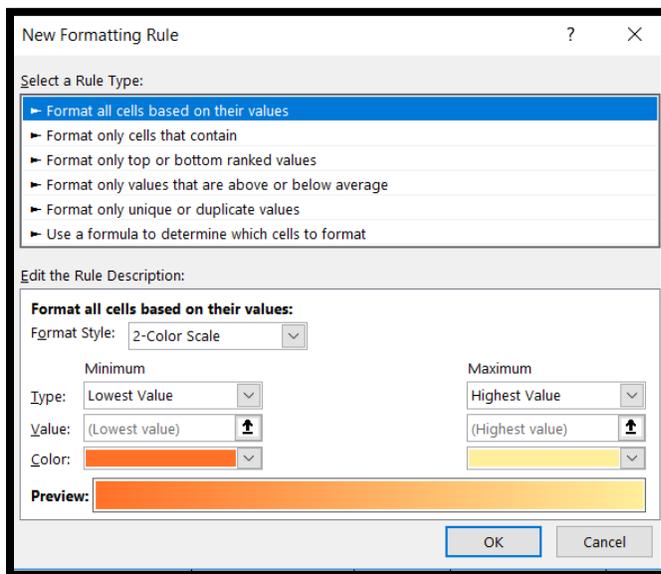


5. For the financial example above, I did this:

    a. Click on ***Format only cells that contain***.

    b. Click ***OK***.

    c. The screen shifted like this:

MS Excel Review Notes
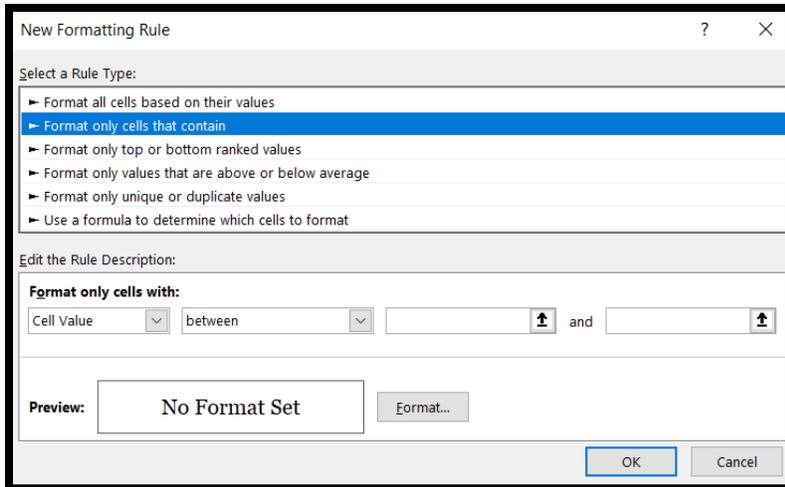
d. I changed the **Between** option to **Less Than**.

e. I provided the value of zero to tell Excel to look for losses.

MS Excel Review Notes

f.  Then I clicked the **Format** button. It opens another dialog box that I could use to find the colors I wanted. It looks like this:
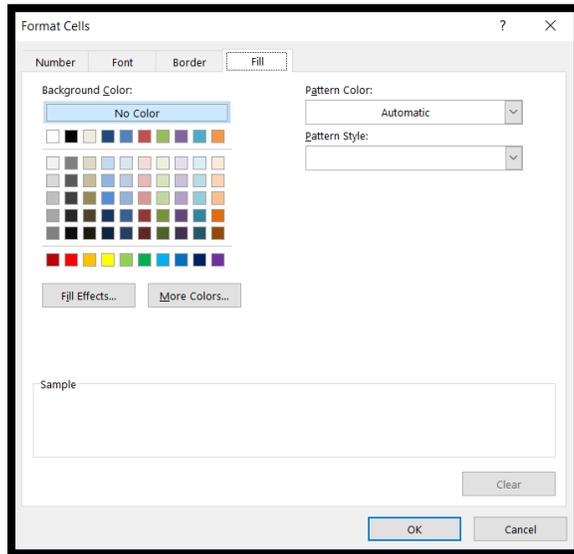


g.  I used the **Font** tab and the **Fill** tab to determine the red numbers on a yellow background.

h.  Then I clicked **OK** to finish the formatting portion.

i.  Then I clicked **OK** a last time to complete the operation.

There are dozens of ways to use **Conditional Formatting**. You won't want to overdo it with your co-workers. But it's fun and can really enhance someone's appreciation of your data.

## NAVIGATING LARGE WORKSHEETS

When you have a really large worksheet with lots of data it is sometimes problematic when you scroll around because titles at the tops of columns or at the left of rows will scroll off the screen. The you are in dangers of making mistakes if you need to edit or enter data.

Here's a worksheet I found on Google. It is a police report with over 1,000 rows of data. The titles of each column are critical. Without those titles, I'd have no clue what each column meant.

As soon as I start to scroll down, this happens:



What's the difference between columns J, K, M and N? Who could say?

The same issue arises if you scroll to view data on the right side. Immediately the *Case Number* is lost and there's no way to know which case you are reviewing, like this:

| | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DATE | TIMETM9 | COUNTY | LOCATION | REASON_FOR | VEHICLE_YE | VEHICLE_MA | VEHICLE_MO | CONSENT_RE | CONSENT_GI | stolen goods_| | K9_USED | K9_stolen god | LOCATION_O |
| 2 | 1/5/1995 | 23400000 | Washington | I-81 | T | 1990 | BMW | 325I | Y | N | N | N | N | NA |
| 3 | 1/6/1995 | 01200000 | Queen Anne's | Rt. 18 | T | 1984 | Oldsmobile | Cutlass | Y | Y | N | N | N | NA |
| 4 | 1/7/1995 | 23590000 | St. Mary's | Rt.5 | T | 1993 | Chevy | Truck | Y | Y | N | N | N | NA |
| 5 | 1/7/1995 | 13100000 | Somerset | Rt.413 | T | 1988 | Acura | Legend | Y | N | N | N | N | NA |
| 6 | 1/8/1995 | 00280000 | St. Mary's | Rt.235 | T | 1983 | Ford | Ranger | Y | Y | N | N | N | NA |
| 7 | 1/9/1995 | 23550000 | St. Mary's | Rt.246 | T | 1987 | Dodge | Colt | Y | Y | N | N | N | NA |
| 8 | 1/9/1995 | 01000000 | Washington | I-81 | T | 1985 | Buick | Regal | Y | Y | N | N | N | NA |
| 9 | 1/10/1995 | 12250000 | Wicomico | Rt.13 | T | 1994 | Mercury | Topaz | Y | Y | Y | N | N | Under front seat |
| 10 | 1/10/1995 | 00410000 | Talbot | Rt.50 | T | 1981 | Honda | Accord | Y | Y | Y | N | N | Passenger floorboard |
| 11 | 1/10/1995 | 21200000 | Talbot | Rt.50 | E | 1988 | Oldsmobile | Cutless | Y | Y | N | N | N | NA |
| 12 | 1/10/1995 | 16200000 | Talbot | Rt.328 | T | 1984 | Chevrolet | Caprice | Y | Y | Y | N | N | On driver |
| 13 | 1/10/1995 | 11050000 | Wicomico | Rt.13 | T | 1981 | Honda | Accord | Y | Y | N | N | N | NA |
| 14 | 1/10/1995 | 18300000 | Harford | I-95 | T | 1986 | Chevrolet | Celebrity | Y | Y | Y | N | N | Portable stereo |
| 15 | 1/11/1995 | 00560000 | Worcester | Rt.13 | T | 1983 | Buick | LeSabre | Y | Y | Y | N | N | Behind driver's door |
| 16 | 1/11/1995 | 09010000 | Wicomico | Rt.13 | T | 1985 | Toyota | Cressida | Y | Y | Y | N | N | Hidden in dashboard |
| 17 | 1/11/1995 | 00390000 | Anne Arundel | I-97 | T | 1984 | Nissan | 300ZX | Y | Y | N | N | N | NA |
| 18 | 1/11/1995 | 11000000 | Talbot | Rt.328 | T | 1984 | Dodge | 2S | N | N | N | N | N | NA |
| 19 | 1/11/1995 | 22160000 | Allegany | I-95 | T | 1984 | Mercury | Topaz | N | N | Y | Y | Y | Rear seat in bag |
| 20 | 1/12/1995 | 16210000 | Harford | I-95 | T | 1995 | Ford | Escort | Y | Y | Y | N | N | Tennis shoe in trunk |
| 21 | 1/12/1995 | 12200000 | Worcester | U.S.113 | T | 1993 | Pontiac | Grand Am | Y | Y | N | N | N | NA |
| 22 | 1/12/1995 | 15080000 | Harford | I-95 | T | 1979 | Pontiac | 4DR | N | N | Y | Y | Y | Front seat-purse |
| 23 | 1/12/1995 | 12300000 | Kent | Rt.30 | T | 1987 | Peterbilt | Tractor | Y | Y | N | N | N | NA |
| 24 | 1/12/1995 | 22000000 | Anne Arundel | Rt.295 | T | 1983 | Datsun | SX | Y | Y | N | N | N | NA |
| 25 | 1/14/1995 | 09560000 | St. Mary's | Rt.235 | E | 1985 | Chevy | Van | Y | Y | N | N | N | NA |
| 26 | 1/14/1995 | 23350000 | Frederick | I-270 | E | 1983 | Ford | Mustang | N | N | N | Y | N | NA |
| 27 | 1/15/1995 | 01100000 | Frederick | I-270 | E | 1987 | Pontiac | Grand Am | Y | Y | N | N | N | NA |
| 28 | 1/16/1995 | 20120000 | Anne Arundel | I-97 | T | 1993 | MITS | Eclyse | Y | Y | N | N | N | NA |
| 29 | 1/16/1995 | 03100000 | Frederick | I-270 | T | 1987 | Chevrolet | Cavalier | Y | Y | N | N | N | NA |
| 30 | 1/16/1995 | 10550000 | Kent | Rt.301 | T | 1988 | Kenworth | Tractor | Y | Y | N | N | N | NA |

Column A has disappeared. With data looking like this, doing any kind of data editing or entry would be dangerous.

But we can use a feature called *Freeze Panes* to help us out. That button is found in the *Window* group on the *View* tab of the ribbon. It offers us three options:

- We can freeze all rows above our location and all columns to the left of our current location.

- We can freeze row the top row *(row 1)*.

- We can freeze the first column *(column A)*.

In the above example, we'd wan to use the first option. If we begin by clicking into cell *B2*, that first option would freeze row 1 *(above us)* and also column A *(to the left of us)*. Now it would not matter how far down or how far to the right you scrolled. You'd never lose the column titles or the case number.

The next time you click that button, the first option will display as *Unfreeze Panes*.