



MICROSOFT EXCLE



Microsoft Excel 2019 Fundamentals Workshop

Overview

This manual provides instructions with the fundamental spreadsheet features of Microsoft Excel 2019. Topics covered in this document will help you become more proficient with the Excel application. Specific focuses include building spreadsheets, worksheet fundamentals, working with basic formulas, and creating charts.

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I. Introduction

Microsoft Excel is a powerful electronic spreadsheet program you can use to automate accounting work, organize data, and perform a wide variety of tasks. Excel is designed to perform calculations, analyze information, and visualize data in a spreadsheet. Also this application includes database and charting features.

A. Launch Excel

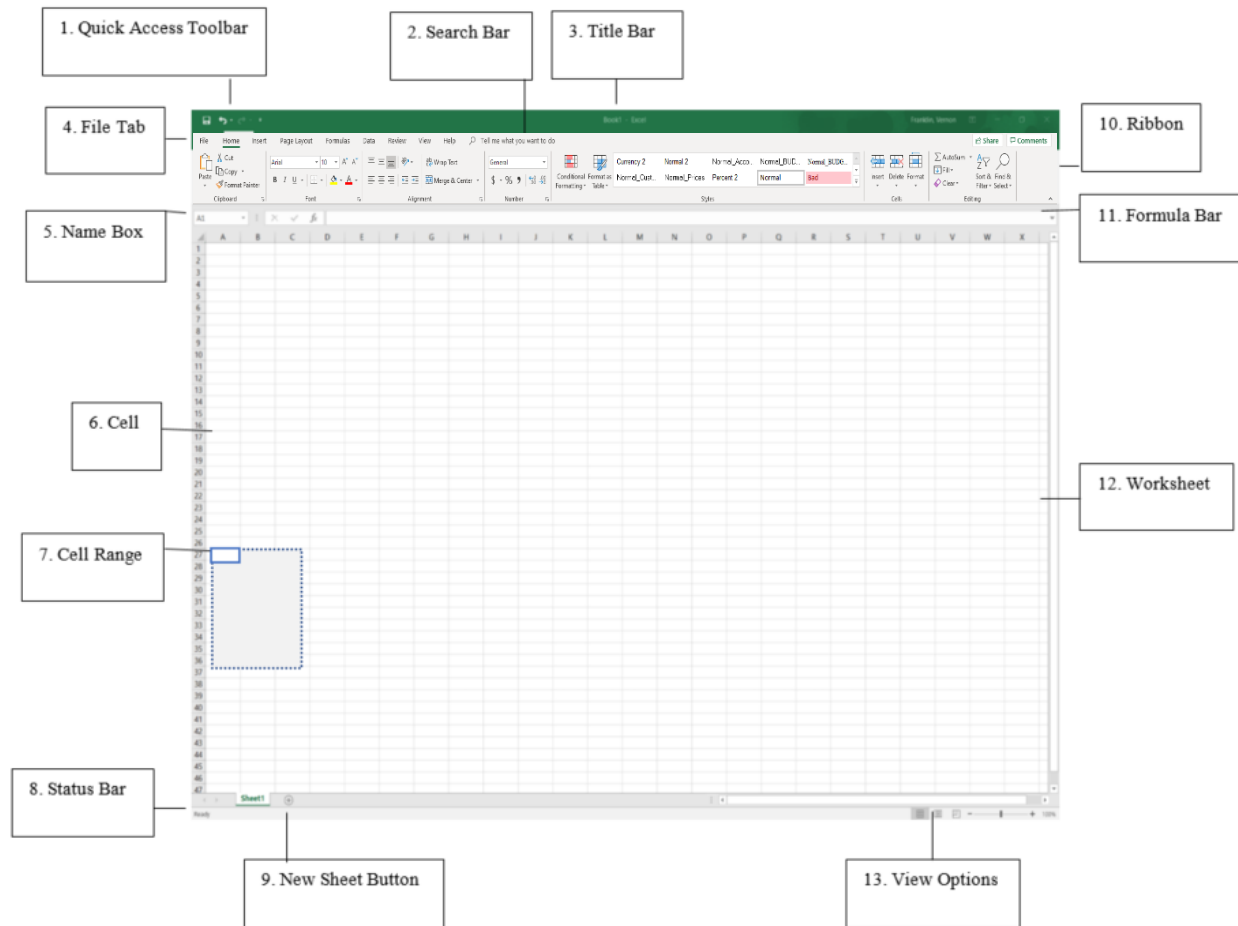
To launch Excel for the first time:

1. Click on the **Start** button.
2. Click on **All Programs**.
3. Select **Microsoft Office** from the menu options, and then click on **Microsoft Excel 2019**.

Note: After Excel has been launched for the first time, the **Excel**  icon will be located on the Quick Launch pane. This enables you to click on the **Start** button, and then click on the **Excel** icon to launch the Excel spreadsheet. Also, a shortcut for Excel can be created on your desktop.

B. Window Features

The purpose of the window features is to enable the user to perform routine tasks related to the Microsoft applications. All the Office applications share a common appearance and similar features. The window features provide a quick means to execute commands. Here are some pertinent Excel features:









C. Spreadsheet Terms

	Term	Description
1	Quick Access Toolbar	Displays quick access to commonly used commands.
2	Search Bar	Advance search will help you find and perform tasks.
3	Title Bar	Displays the name of the application file.
4	File Tab	The File tab has replaced the Office button. It helps you to manage the Microsoft application and provide access to its options such as Open, New, Save, As Print, etc.
5	Name Box	Displays the active cell location.
6	Cell	The intersection of a row and column; cells are always named with the column letter followed by the row number (e.g. A1 and AB209); cells may contain text, numbers and formulas.
7	Range	One or more adjacent cells. A range is identified by its first and last cell address, separated by a colon. Example ranges are B5:B8, A1:B1 and A1:G240.
8	Status Bar	Displays information about the current worksheet.
9	New Sheet	Add a new sheet button.
10	Ribbon	Displays groups of related commands within tabs. Each tab provides buttons for commands.
11	Formula Bar	Input formulas and perform calculations.
12	Worksheet	A grid of cells that are more than 16,000 columns wide (A-Z, AA-AZ, BA-BZ...IV) and more than 1,000,000 rows long.
13	View Option	Display worksheet view mode.


D. Mouse Pointer Styles

The Excel mouse pointer takes on many different appearances as you move around the spreadsheet. The following table summarizes the most common mouse pointer appearances:

Pointer	Example	Description
		The white plus sign will select a single cell to enter data, retype data or delete text from the selected cell. This pointer is also useful for selecting a range of cells.
		The white arrow will drag the contents of the selected cell to a new location (drag and drop).
		The black plus sign activates the fill handle of the selected cell and will fill the adjoining cells with some type of series, depending on the type of data (e.g., a formula or date) is in the beginning cell.

E. Spreadsheet Navigation

The following table provides various methods to navigation around a spreadsheet.

Method	Description
mouse pointer	Use the mouse pointer  to select a cell.
scroll bars	Use the horizontal and vertical scroll bars to move around the spreadsheet to view columns and rows not currently visible. Click the mouse pointer once the desired cell is visible.
arrow keys	Use the left ←, right →, up ↑, and down ↓ arrows to move accordingly among cells.
Enter	Press the Enter key to move down one cell at a time.
Tab	Press the Tab key to move one cell to the right.
Ctrl+Home	Moves the cursor to cell A1.
Ctrl+End	Moves the cursor to the last cell of used space on the worksheet, which is the cell at the intersection of the right-most used column and the bottom-most used row (in the lower-right corner).
End + arrow key	Moves the cursor to the next or last cell in the current column or row which contains information.

1. Practice moving around the spreadsheet.
2. Practice selecting cells and cell ranges.

F. Basic Steps for Creating a Spreadsheet

When creating a spreadsheet, it is recommended to do the following steps:

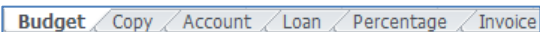
1. Made a draft of your spreadsheet idea on paper.
2. Enter the data from your draft onto the actual spreadsheet.
3. Format your data after entering onto the spreadsheet.
4. Calculate data by using mathematical formulas.
5. Save the document.
6. Preview and Print the spreadsheet.

II. Enter and Format Data

A. Create Spreadsheet

1. Illustration of spreadsheet to be completed in exercise below:

Budget for Guest Speakers				
Item	Fall	Spring	Summer	Annual
Research	20	20	10	50
Correspondence/Communication	30	30	15	75
Publicity	50	50	25	125
Honorariums	500	500	250	1250
Travel	750	750	325	1825
Lodging	300	300	150	750
Total	\$1,650.00	\$1,650.00	\$ 775.00	\$4,075.00

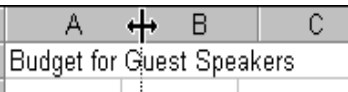
2. Open **Excel Practice File.xlsx** , and then click on the **Budget sheet** tab.
 

(The instructor will indicate the location for this file.)

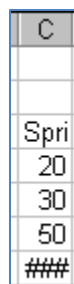
- a. Select cell **A1**, and then type **Budget for Guest Speakers**.
- b. Select cell **A3**, type **Item**, and then press the **Tab** key.
- c. Select cell **B3**, type **Fall**, and then press the **Tab** key.
- d. Select cell **C3**, type **Spring**, and then press the **Tab** key.
- e. Select cell **D3**, type **Summer**, and then press the **Tab** key.
- f. Select cell **E3**, type **Annual**, and then press the **Tab** key.

B. Adjust Column Width

Initially all columns have the same width in a spreadsheet. Often you will need to make columns wider or narrower. For example, a long text entry in one cell will be cut off/truncated when the cell to its right contains any information. Likewise, numbers will appear as pound symbols ### when larger than cell width. There are several ways to modify column width.

method	Description
dragging method 	Move the cursor up to the column heading area and point to the vertical line to the right of the column that you want to change. When the cursor becomes a "plus sign" with horizontal arrows, press the mouse button and drag in either direction to resize the column. Release the mouse button to accept the new size.
double click to auto fit	Move the cursor up to the column heading area and point to the vertical line to the right of the column that you want to change. When the cursor becomes a "plus sign" with horizontal arrows, double click to AutoFit this one column.
AutoFit a range	Use the mouse to select the range of cells that needs to be adjusted and on the Home ribbon in the Cells group, choose Format , and then select the AutoFit Column Width option.

1. **Increase** the width of **column A** via the dragging method so that all text entries are visible.
2. **Decrease** the width of **column C** via the dragging method until pound symbols ### appear.



C
Spri
20
30
50
###

3. **Increase** the width of **column C** to return to its original size.



C. Type Text and Numbers



Use the plus sign mouse pointer to select a cell then begin typing in that cell to enter data. If there is existing text/data in a cell, the new text will replace the existing text. Press the **Enter** or **Tab** key after typing text in a cell.

1. Type the following text and numbers in rows 10 and 11:

10	Food	90	90	45
11	Total			

D. Undo and Redo


Use the **Undo**  button to undo (reverse) previous actions in reverse sequence. Choose this option immediately after performing an unwanted action. Note that Undo is not available for all commands. The **Redo**  button will restore the process that was just undone.

1. Click on the **Undo**  button. The last item that you typed is removed from the spreadsheet.
2. Click on the **Redo**  button. The text that you removed with Undo should be replaced.

E. Insert and Delete Rows and Columns


Insert rows and columns to add information between existing rows or columns of information.




Procedure	Description
Add Row	Select any cell of the row where you desire to add a new row above. On the Home ribbon in the Cell group, click on the Insert button, and then select Insert Sheet Rows . A new row will appear above your selected cell row.
Add Column	Select any cell of the column letter where you desire to add a new column to the left. On the Home ribbon in the Cell group, click on the Insert button, and then select Insert Sheet Columns . A new column will appear to the left of your selected column.
Delete Row or Column	Select any cell where you desire to delete a row or column. On the Home ribbon in the Cell group, click on the Delete button, and then select Delete Sheet Rows or Delete Sheet Columns . The row or column where the cell was selected will be deleted.

1. Select any cell in **column C**.
2. On the **Home** ribbon in the **Cell** group, click on the **Insert** drop-down arrow, and then select **Insert Sheet Columns**. A new column will appear to the left of your selected column.
3. Click the **Undo**  button.
4. Select any cell in **row 6**.
5. On the **Home** ribbon in the **Cell** group, click on the **Insert** drop-down arrow, and then select **Insert Sheet Rows**. A new row will appear above your selected cell row.
6. Select cell **A6**, and then type **Photocopy Services**.
7. Press **Tab** and complete the additional columns as follows:

B	C	D
75	65	30

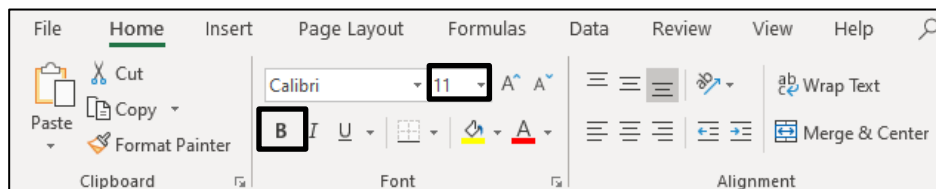
F. Text and Number Alignment

Microsoft Excel aligns data in a cell in three ways; left, center, and right. Also, a range of cells can be merged into one cell; this is good for text titles. The default text alignment is left, and the default number alignment is right. Alignment can be changed by using the alignment  icons located on the **Home** ribbon in the **Paragraph** group. Select a range before changing alignment to more than one cell at a time.

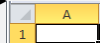
1. Select cell **A3**, and then click on the **Center**  alignment button, located on the **Home** ribbon.
2. Select the range **B3:E3**, and then click on the **Center**  alignment button, found on the **Home** ribbon.
3. Select the range **A1:E1**, and then click on the **Merge & Center**  button, found on the **Home** ribbon.

G. Format Fonts

Character formats include changing the font, point size, and style of text or numbers. The fastest way to change fonts is to use the associated buttons on the **Home** ribbon:

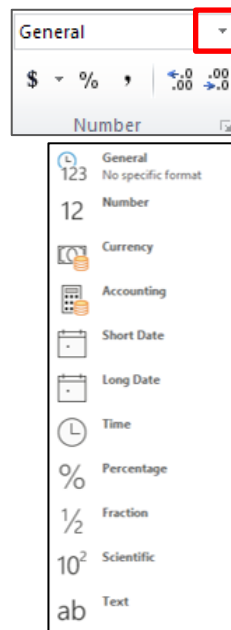





1. Select cell **A1**, and Increase the point size for the title, by clicking on the drop-down arrow on the **Font size** button.
2. Select cell range **A3:E3**, and then click on the **Bold** button to bold text.

Note: To select all cells on a worksheet, click the gray rectangle in the upper-left corner of a worksheet where the row and column headings meet.  Once you select the worksheet, any format changes you make will affect the entire sheet.

H. Format Numbers

Excel gives many types of numeric formats including currency, percent, comma, scientific, etc. On the **Home** ribbon, the numeric formats are in the **Number** group. Select the drop-down arrow next to **General** to view all format types. Select a range of cell/s before choosing format. In fact, this range can include cell/s that does not yet hold data.






1. Select the cell range **B4:E12**.
2. Click on the **Comma**  button, found on the **Home** ribbon.
3. With that same range selected, click on the **Currency**  button, found on the **Home** ribbon.
4. To display only dollars and no cents, click on the **Decrease Decimal**  button, located on the **Home** ribbon.



Note: To remove a number format from cells, select the **General** format option from the Number group.

I. Cut, Copy, and Paste Text

Avoid retyping in Excel by moving or copying text and formulas. The following list includes commands and definitions involved in cut, copy, and paste.

Command	Description
Cut 	Removes the selected text from the document and places it in the clipboard (a temporary holding place for the item that has been cut or copied).
Copy 	Places a copy of the selected text in the clipboard and leaves the selected text unchanged.
Paste 	Places text from the clipboard in the document where the active cell is located.

Suppose you want to show an identical budget for an additional year. In this exercise, you will copy data in cell range A3:E13, then paste it to sheet2.


1. Select cell range **A3:E13**.
2. Click on the **Copy** button, found on the **Home** ribbon.
3. Click on the **Copy sheet**  tab.
4. **Select** cell **A3**, and then click on the **Paste** button, found on the **Home** ribbon.
5. Click on the **Undo**  button to clear data from spreadsheet. This sheet will be used again for another exercise.

Note: When you copy a range, a moving border will appear around the selected area. Once you paste the data to remove the moving border, double click in any cell outside of the selected range.

K. Print a Spreadsheet

Click on the **File** tab and select the **Print** option. Preview your spreadsheet on the right-hand side of the File screen. If you are satisfied with the preview, click the **Print** button, otherwise click on the Home tab to return to the document and edited document. (**Page Setup** options are covered in the **Additional Features** section on page 47.)

L. Exit Excel

When you are finished using Excel, use click on the **File** tab, and select the **Exit** option or click on the Close  button in the upper right-hand corner of the Excel window. If your file has recently been saved, Excel will exit promptly. However, if the file needs to be saved before quitting, Excel will prompt you to save.

III. Basic Formulas

Microsoft Excel is an electronic spreadsheet that automates manual calculations involved in accounting and bookkeeping. After you have typed the basic text and number entries in a spreadsheet cell, Excel can perform the math calculations for you. You will learn how to create formulas and functions to perform calculations in a spreadsheet.

Example formulas are: **=D15+D18+D21: =B4-B12: =A10/B15: =(B16+C16) *1.07**

Do not use any spaces in formulas. Also, when creating formulas, you may choose to either type the cell address or use the mouse to select the cell address.

A. Create Formula

You can create any type of math calculation on your own using the following mathematical operators:

Symbol	Meaning
=	equals - used to begin a calculation
+	addition
-	subtraction
*	multiplication
/	division
^	exponentiation
(open parenthesis - used to begin a grouping
)	close parenthesis - used to close a grouping

The **numeric keypad** on the right side of the keyboard provides most of these operators. Excel follows the **mathematical order of hierarchy** where operators are processed in the order: negation, exponentiation, multiplication/division, and then addition/subtraction. Use parentheses to clarify the order of calculation in a formula.

B. Basic steps for creating a formula:

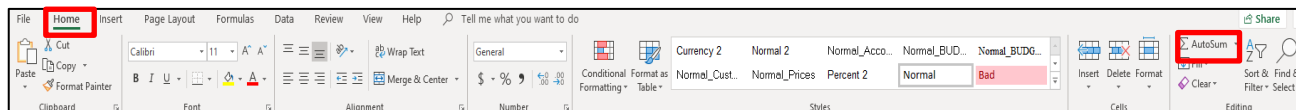
1. Click in the empty cell which will contain the formula.
2. Type an equal sign (=).
3. Type the cell address or click the cell that contains the first number.
4. Type the math operator (+ - / * ^).
5. Type the cell address or click the cell that contains the second number.
6. Continue in this manner until the formula is complete.
7. Use parenthesis for clarification.
8. Press the **Enter** key.

The following image depicts various formulas in an Excel spreadsheet which will be created in a following exercise:

	Budget	Actual	Variance
Office Supplies	300	226	=C20-D20
Office Postage	200	255	=C21-D21
Office Equipment & Furniture	800	679	=C22-D22
Miscellaneous Supplies	100	71	=C23-D23
Total:	=C20+C21+C22+C23	=SUM(D20:D23)	=C24-D24








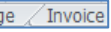
C. AutoSum

Adding is the most common math operation performed in Excel. The **Home** ribbon includes an **AutoSum** Σ button for adding. This button provides a shortcut to typing formulas.




Basic Steps for using AutoSum:

1. Move to the empty cell that will contain the formula.
2. Click on the **AutoSum** button.

3. **Proofread** the formula that Excel provides, make any necessary changes.
 4. Press the **Enter** key or click the **check**   50 mark on the formula bar.
- Click back on the **Budget sheet**       tab.

12	Total	=SUM(B4:B11)
13		SUM(number1, [number2], ...)

1. Select cell **B12**, click on the **AutoSum**  button, and then press the **Enter** key.
2. Repeat the **AutoSum** process for **cells C12, D12, E12**.




Note: You can copy formulas that refer to empty cells. After you type numbers in the empty cells, the formulas will be updated.

3. Click in cell **B4** and change the amount \$20 to \$50, and then press **Enter** key.

Note: Formula results are updated automatically in Excel. As you change any values that are referred to in a formula, the formula will reflect these changes.



4. Complete the AutoSum process for column E. Click in cell **E4**.

	A	B	C	D	E
1	Budget for Guest Speakers				
2					
3	Item	Fall	Spring	Summer	Annual
4	Research	\$ 20	\$ 20	\$ 10	=SUM(B4:D4)
5	Correspondence/Communication	\$ 30	\$ 30	\$ 15	



5. Click on the **AutoSum**  button to add the Research expenses for the three semesters.
6. Press the **Enter** key.
7. Select the cell range **B5:E5**, click the **AutoSum**  button, and then press **Enter** key.
8. **Auto Fill**  this formula to the cell range **E6:E11**.
9. Copy this formula to the cell range E6:E11 by using the **Auto Fill** method illustrated above. Place the mouse pointer on the small solid square on lower right corner of cell E5, when the mouse pointer changes to a plus sign (Fill handle), then hold down on the right mouse button and drag the mouse down the designed cells (E6:E11) to copy the formula. The **Auto Fill** feature is explained in more detail in the **Additional Features** section on page 44.

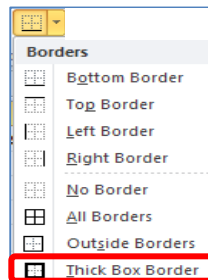
Note: If Excel has to make a choice regarding adding values to the left (horizontally) of the formula cell or above (vertically) the formula cell, it will choose vertically. This can occasionally present a problem. Therefore, you may decide to select a range including the values to be added and the empty cell that will contain the formula then click the AutoSum button.


D. Borders and Shading

Use borders to separate different areas of the spreadsheet. Borders can be applied to one cell or a range of cells. Use the **Borders**  button, on the **Home** ribbon to apply border styles. Also, the **Fill Color**  button will add or remove color/shading for a cell or range.

When you apply borders to data on your spreadsheet, you may want to print the data without gridlines (applying and removing gridlines is covered in the Preference section).

1. Use a border to emphasize the Total row for the Budget for Guest Speakers spreadsheet.
2. Select the cell range **A12:E12**.
3. Click on the **Border**  drop-down arrow, located on the **Home** ribbon, and then choose the **Thick Box Border**  option.



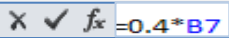
3. Click on any single cell to deselect the range to see the border.
4. Select the cell range **A12:E12** again.
5. Click on the **Fill Color**  drop-down arrow, located on the **Home** ribbon to add color/shading to this range.

E. Manual Formula

You can make manual entries for mathematical formula by typing the numbers, cell location, and mathematical function in the spreadsheet cell.

14	Calculate 40% of the publicity expense (which the departmental general fund provides):	=0.4*B7
----	--	---------


- Click in Cell **B14** and create a formula that will calculate 40% of the **Fall** publicity amount (e.g. =.4*B6).

Note: Use the **formula bar**  to view and edit the data or formula in the selected cell. The X is to ignore what you are currently typing and return the original contents of the cell; the green check mark is to accept what you have typed (same as pressing Enter). These buttons are only available when you are typing in the cell.

14	Calculate 40% of the publicity expense (which the departmental general fund provides):	20				
15						
16						+

- Copy** this formula to the cell the range **C14:E14** by using the **Auto Fill** illustrated above.
Place the mouse pointer on the small solid square on lower right corner of cell B14, when the mouse pointer changes to a plus sign (Fill handle), then hold down on the right mouse button and drag the mouse across the designed cells (C14:E14) to copy the formula.

IV. Formula Functions

Functions provide an automated method for creating formulas in the following categories: financial, date and time, math and trigonometry, statistical, lookup and reference, database, text, logical and information. Excel contains more than 200 functions. For example, specific functions are available to calculate a sum, an average, a loan payment, logarithms and random numbers. Functions can be typed, if you know the syntax, or can be inserted by clicking on the **Function**  button located left of the formula bar.

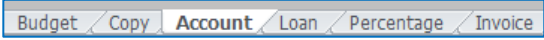



All functions are formatted in a similar manner, for example: **= function name (parameters)**. The parameters vary depending upon the function. Functions and cell addresses may be typed in upper case or lower case.

A. Sum

Adding is the most common function performed in Excel. The SUM function adds values. Specify values, individual cell addresses and/or range addresses in the numberx variables.

syntax **=SUM(number1,number2,...)**

examples =SUM(A10:A25)
 =SUM(B15:C20)
 =SUM(D45,D60:D70,D80:D85)

1. Click on the **Account sheet**  tab.
2. Select cells **C12 and D12**, and then click on the **AutoSum**  button.
3. Select cells **C24 and D24**, and then click on the **AutoSum**  button.
4. Select cells **C36 and D36**, and then click on the **AutoSum**  button.

The following exercises will complete formulas in cells on the **Account** sheet where function methods do not apply.


4	201	Telecommunication Services	\$	850	\$	638	=C4-D4
---	-----	----------------------------	----	-----	----	-----	--------

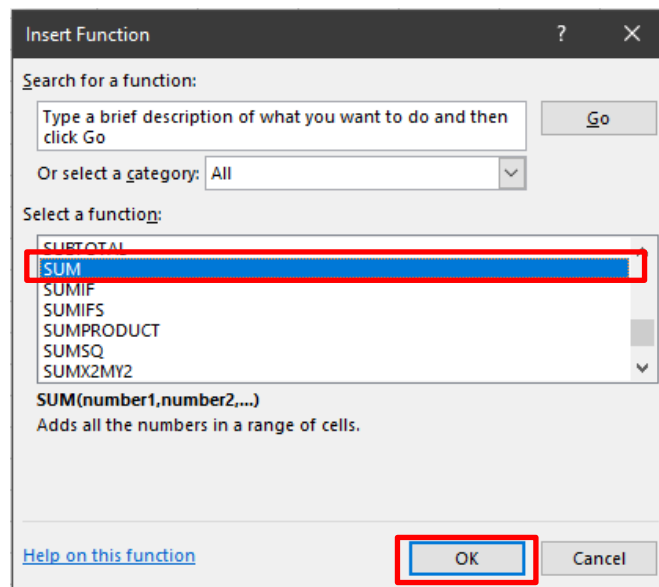
6. Select cell **E4**, type **=C4-D4**, and then press the **Enter** key. This formula will calculate the difference between cells C4 and D4.
7. **Auto Fill** this formula through the cell range **E5:E12**.
8. Select cell **E20**, type **=C20-D20**, and then press the **Enter** key. This formula will calculate the difference between cells C20 and D20.
9. **Auto Fill** this formula through the cell range **E21:E24**.
10. Select cell **E32**, type **=C32-D32**, and then press the **Enter** key. This formula will calculate the difference between cells C32 and D32.
11. **Auto Fill** this formula through the cell range **E33:E35**.

43		Grand Total:		=C12+C24+C36
----	--	---------------------	--	--------------

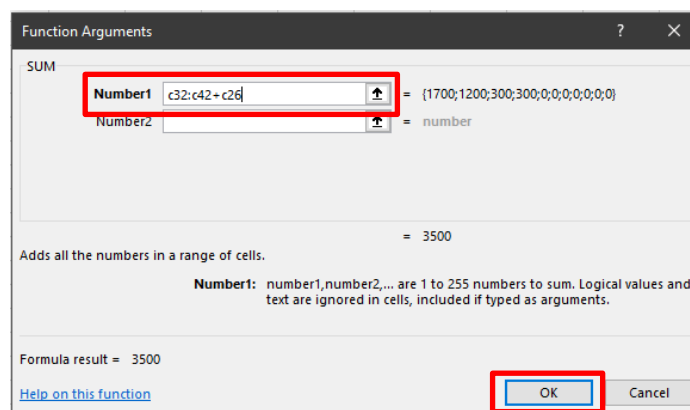
12. Select cell **C43**, type **=C12+C24+C36**, and then press the **Enter** key. This formula will calculate the grand total for all budget totals.
13. **Auto Fill** this formula to cell **D43**.
14. Select Cell **E43**, type **=C43-D43**, and then press the **Enter** key. This formula will calculate the difference between cells C43 and D43.
15. Remain on this sheet for the next example.

B. Insert Function

This selection demonstrates how to use the **Insert Function** menu to creation a formula. Click on the **Insert Function**  button or from the AutoSum drop-down arrow and select **More Functions** to display a list of over 200 functions available in Excel. The **Insert Function** dialog box displays the function categories from the drop-down menu list. The function names will appear in the function name box below.



Once you select a category and a function name, click on the **OK** button. The Function Arguments palette will appear.




Type any numbers, cell addresses, ranges, or any other parameters in the required boxes, and then click on the **OK** button to insert the completed formula in the spreadsheet.

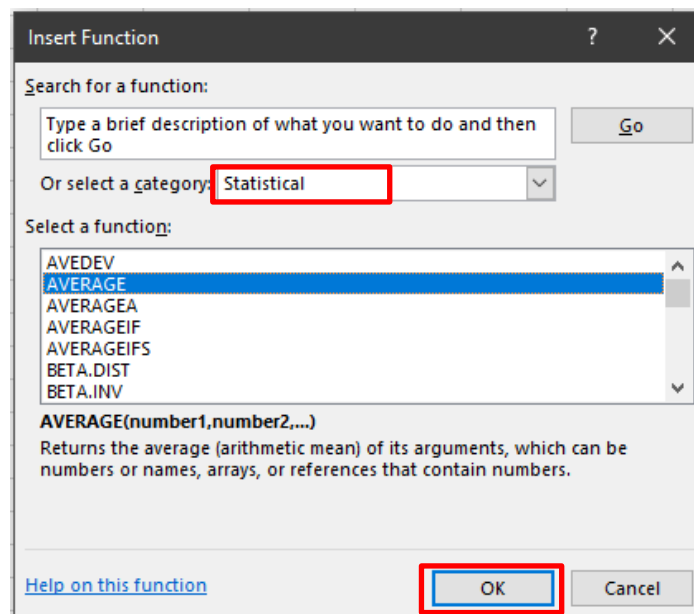
C. Average

An average sum all values and divides by the total number of values. Specify values, individual cell addresses and/or range addresses in the numbers variables.

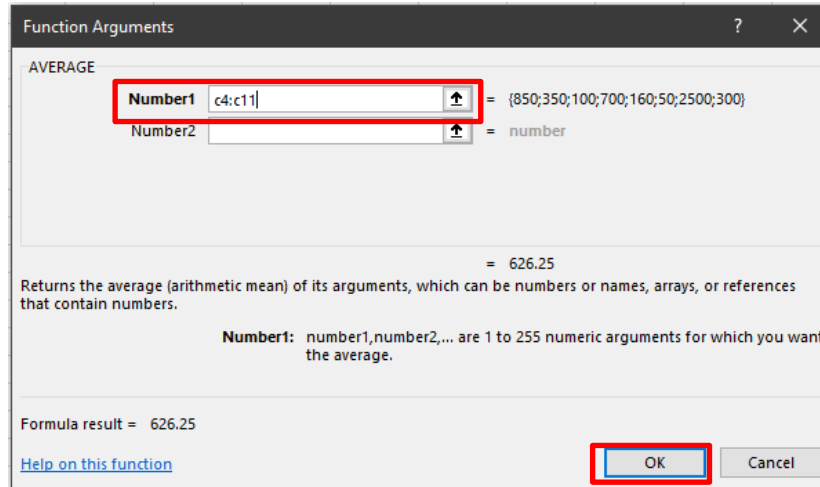
syntax **=AVERAGE(number1,number2,...)**



examples =AVERAGE(15,255,45)
 =AVERAGE(B2:B18)
 =AVERAGE(B15,B33,B52)
 =AVERAGE(C22:C24,C30:C33)



1. Confirm that **Account** is active.
2. Insert a function to average the budget items for Subcontractors & Services. Select cell **C14**.
3. Click on the **Insert Function**  button.



4. Choose the **Statistical** category, and then click on the Function name: **Average**.
5. Click on the **OK** button.
6. The Function Arguments palette will appear. Indicate the range **C4:C11**.



7. The Function Arguments palette may select a different cell range than you want. If so, make any necessary changes in the palette before accepting the defaults.
8. Click on the **OK** button to complete the function.
9. Select cell **C26**, and then click on the **Insert Function**  button to find the *average* of the budget items for Supplies and Materials.
10. Select cell **C38**, and then click on the **Insert Function**  button to find the *average* of the budget items for Facilities Overhead.
11. Remain on this sheet for the next example.

The Function Arguments palette can be moved around on the screen so that you can see the intended cell or range. Point to any gray space in the palette and drag the window around on the screen until you see the desired area in the spreadsheet. You can also click the range  button to temporarily remove the palette from the screen so that you can view the spreadsheet area. A small palette range entry box  appears and you can select the cell or range as necessary. You may want to delete any existing information in this box before selecting a new range.




D. Maximum (MAX)

Maximum indicates the largest value in the designated list of numbers.

syntax **=MAX (number1, number2,...)**

examples =MAX (A15:A35)
 =MAX (D10:D200, D225:D325)

15	Maximum:	=max(C4:C11)
----	----------	--------------




1. Select cell **C15**, and then click on the **Insert Function**  button to *calculate the maximum* budget cost for Subcontractors & Services.
2. Select cell **C27**, and then click on the **Insert Function**  button to *calculate the maximum* budget cost for Supplies and Materials.
3. Select cell **C39**, and then click on the **Insert Function**  button to *calculate the maximum* budget cost for Facilities Overhead.

E. Minimum (MIN)

Minimum indicates the smallest value in the designated list of numbers.

syntax **=MIN(number1,number2,...)**

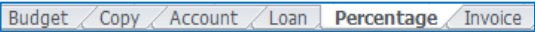
examples =MIN(A15:A35)
 =MIN(D10:D200,D225:D325)

1. Select cell **C16**, and then click on the **Insert Function**  button to *calculate the minimum* budget cost for Subcontractors & Services.
2. Select cell **C28**, and then click on the **Insert Function**  button to *calculate the minimum* budget cost for Supplies and Materials.
3. Select cell **C40**, and then click on the **Insert Function**  button to *calculate the maximum* budget cost for Facilities Overhead.

F. Relative versus Absolute Cell Addresses

As you move and copy formulas, Excel automatically adjusts the part of the cell reference in the formula that changes as you move down or to the right. For example, when you copy a formula from a cell to columns to the right, Excel changes the column letters in the formula without touching the row numbers. Excel assumes that everything is relative; that is, relocated and copied formulas will reference information according to the number of columns and rows they have moved.

There are situations where automatic adjustment of the cell references does not calculate correctly. This is especially true with percentage formulas where the denominator should remain constant. A dollar sign (\$) placed before the column letter and row number (e.g. \$B\$6) will lock the address or make it absolute.

1. Click on the **Percentage** sheet  sheet tab.

2	Office Supplies	\$ 449	=B2/B6
---	-----------------	--------	--------

2. Click in cell **C2**, and then type **=B2/B6** to create a formula to calculate the *percentage* of Office Supplies costs out of the total cost.





Note: You may want to select the range C2:C6, and then click on the **Percent Style** button location in the **Number** group of the **Home** ribbon to convert the fractional numbers to percentages.

	A	B	C
1	Description	Cost	Percentage
2	Office Supplies	\$ 449	13%
3	Furniture & Fixtures	\$ 700	#DIV/0!
4	Office Equipment	\$ 1,935	#DIV/0!
5	Building Maintenance	\$ 280	#DIV/0!
6	Total:	\$ 3,364	#DIV/0!

3. **Auto Fill** this formula down through the cell range **C3:C6**. The sheet should appear as shown above. Notice the errors in cells **C3:C6**.
4. Click on each cell individually to read the formula in the **formula bar**.

Note: Compress the **Ctrl** and **`** keys (` - accent mark, to the left of the number 1 on the alphabetic keyboard) to display (and hide) formulas throughout a sheet. More information on displaying and hiding formulas is in the Reference section of this document.

	A	B	C
1	Description	Cost	Percentage
2	Office Supplies	449	=B2/B6
3	Furniture & Fixtures	700	=B3/B7
4	Office Equipment	1935	=B4/B8
5	Building Maintenance	280	=B5/B9
6	Total:	=SUM(B2:B5)	=B6/B10

Note: When you encounter an error, an Error  symbol may appear in the upper left corner of the cell. When you select the cell with the Error  symbol, then an Alert error  symbol may display. Click on the Alert error  symbol for a list of options to remedy or ignore the error.

- The reason that the copied formula resulted in errors is that Excel copied this formula assuming relative references for each formula (adjusting the denominator in each cell). Make sure that formulas are not displaying.
- Select the range **C2:C6**, and press on the **Delete** key to clear these formulas.

2	Office Supplies	\$ 449	=B2/\$B\$6
---	-----------------	--------	------------

- Click in cell **C2**, and then type =B2/\$B\$6 to create the formula to calculate the *percentage* again. The \$ sign locks the address or make it absolute.
- Auto Fill** this formula down through the cell range **C3:C6**. The sheet should appear as follows:

	A	B	C
1	Description	Cost	Percentage
2	Office Supplies	\$ 449	13%
3	Furniture & Fixtures	\$ 700	21%
4	Office Equipment	\$ 1,935	58%
5	Building Maintenance	\$ 280	8%
6	Total:	\$ 3,364	100%

9. Press the **Ctrl** and **⇧** keys to display/hide formulas:

	A	B	C
1	Description	Cost	Percentage
2	Office Supplies	449	=B2/\$B\$6
3	Furniture & Fixtures	700	=B3/\$B\$6
4	Office Equipment	1935	=B4/\$B\$6
5	Building Maintenance	280	=B5/\$B\$6
6	Total:	=SUM(B2:B5)	=B6/\$B\$6

Note: To make a cell address absolute, click on the **F4** key after selecting the cell location, instead of typing dollar signs (\$) in the appropriate location.



G. Payment (PMT) (Optional Exercise)

Payment returns the periodic payment of an annuity based on constant payments and a constant interest rate.

syntax =PMT(rate,nper,pv)

examples =PMT(.09/12,360,100000)
 =PMT(.09/12,60,18000)

When using interest rates, the rate may need to be converted to a percentage and divided by 12 (assuming an annual percentage rate). For example, 8.25 percent equals .0825. This number needs to be divided by 12 (.0825/12) to calculate the rate.

1. Click on the **Loan sheet** tab .
2. Select cell **B7**. Calculate the payment amount for Plan 1.
3. Click on the **Insert Function**  button.
4. Choose the **Financial** category, and then select the Function name: **PMT**.
5. Click on the **OK** button.
6. The Function Arguments palette will appear.

Function Arguments

PMT

Rate	(b5/100)/12	=	0.005208333
Nper	b6	=	36
Pv	b4	=	10000
Fv		=	number
Type		=	number


= -305.3534152

Calculates the payment for a loan based on constant payments and a constant interest rate.

Pv is the present value: the total amount that a series of future payments is worth now.

Formula result = -305.3534152

[Help on this function](#) OK Cancel

7. Complete the dialog box as shown:
7. Click on the **OK** button to complete the function.
8. Select cell **C7** and use the **Insert Function**  button to calculate the payment for Plan 2.

Function Arguments

PMT

Rate	(b5/100)/12	=	0.005208333
Nper	c6	=	48
Pv	c4	=	10000
Fv		=	number
Type		=	number

= -235.9981987

Calculates the payment for a loan based on constant payments and a constant interest rate.

Pv is the present value: the total amount that a series of future payments is worth now.

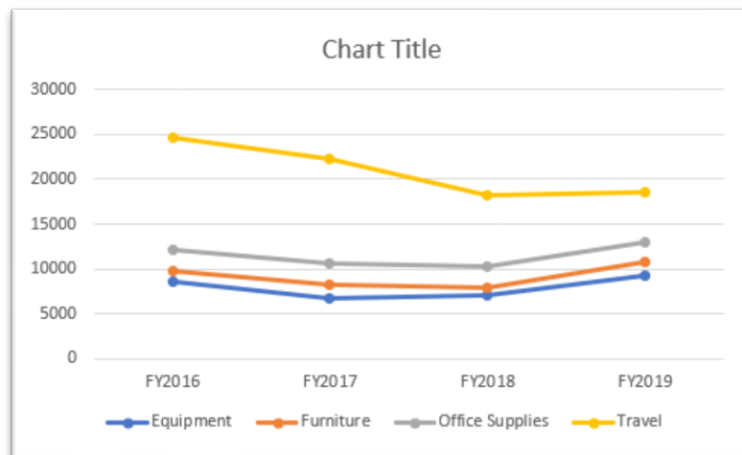
Formula result = -235.9981987

[Help on this function](#) OK Cancel

9. **Auto Fill** this formula to cell **D7**.

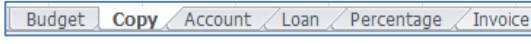
V. Charts

Microsoft Excel can display data graphically in a chart. Excel displays values from worksheet cells as bars, lines, columns, pie slices, or other shapes in a chart. When you create a chart, the values from the worksheet are automatically represented in the chart. Presenting data in a chart can make it easier to read and more interesting to interpret. Charts can also help you evaluate your data and make comparisons between different values.



A. Enter Data

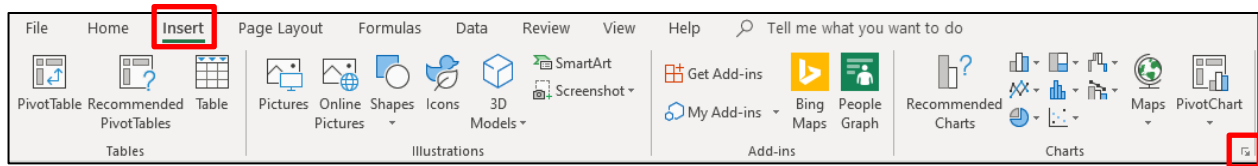
The following exercise will create a simple spreadsheet that will provide the data from which a chart will be created.

1. Click on the **Copy sheet**  tab.
2. **Type** the information in the cells as shown below:

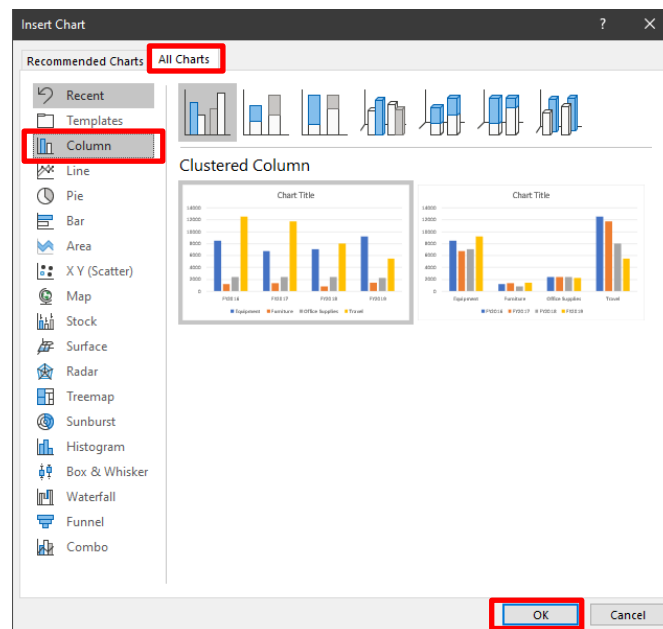
	A	B	C	D	E	F
1		FY2016	FY2017	FY2018	FY2019	
2	Equipment	8500	6750	7100	9200	
3	Furniture	1200	1400	800	1500	
4	Office Supplies	2450	2390	2400	2275	
5	Travel	12500	11750	8000	5500	
6						

B. Create a Chart

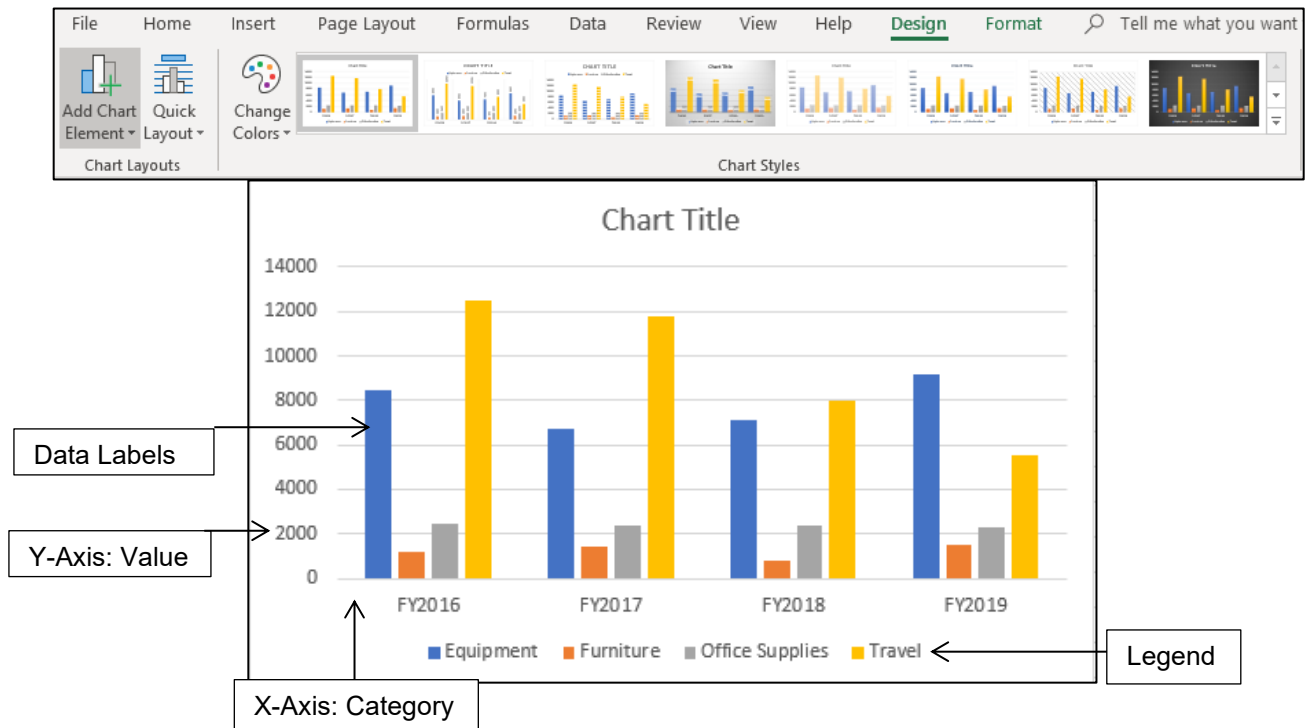
To create a chart, select the cells that contain the data and text that you want to appear in the chart.





2. Select the **Insert** tab, then in the **Charts** group, click on the **Chart** button of your choose. The chart sub-types will appear which will provide you more chart options to select from. To view all chart types, click on the **dialog** box on the **Charts** group. The **Insert Chart** window will appear with all chart types.



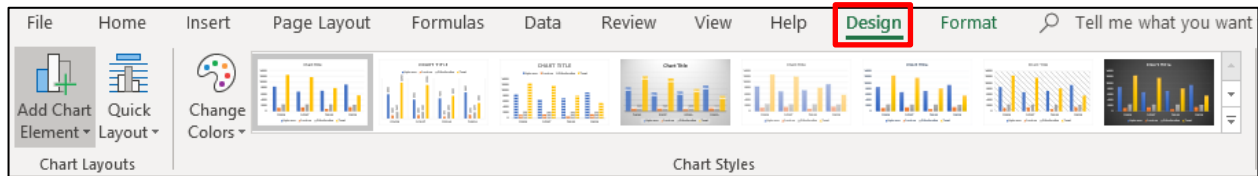
3. Select the **All Charts** tab.
4. Click on the first **Column** button in the window.
5. Click on the **OK** button.
6. Your chart selection will appear on the spreadsheet.



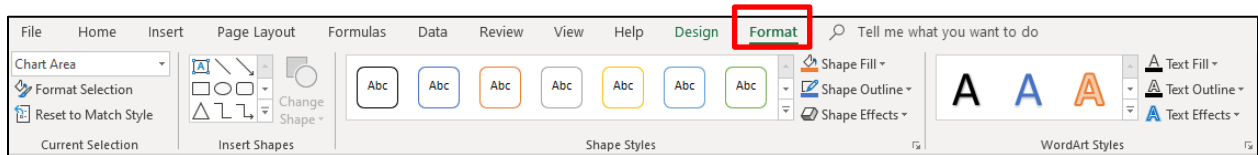
7. When the chart appears on the spreadsheet it will have a selection border around it. Charts are similar to graphical images which can be moved and resized.
8. **Practice selecting and unselecting the chart.** Click any cell in the spreadsheet to deselect the chart. Single click anywhere inside the chart border to select the chart area.
9. **Move** the chart. With the chart object selected, point inside of the object border . Click and drag to move the chart to a new location (the mouse pointer changes to a four-way arrow).
10. **Resize** the chart. With the chart object selected, position the mouse pointer on any handle and drag in the direction indicated by the double arrow pointer  .

C. Chart Tools

Microsoft Excel provides many editing options for your chart. When your chart is selected, the **Chart Tools** tab will appear on the Ribbon. This enables you to edit your chart with a variety of designs, layouts, and formats.



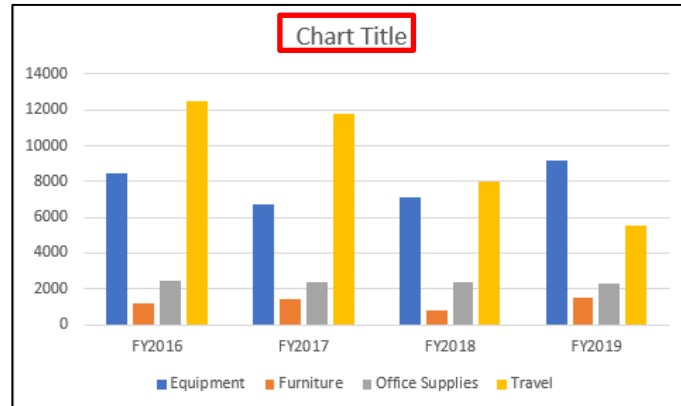
1. Click on the **Design** tab.
 - a. The **Design** ribbon allows you to change your chart type, layout, and style. By selecting the appropriate ribbon button, you can change your chart **Layout, Style, and Type**.



2. Click on the **Format** tab.
 - a. The **Format** ribbon allows you to edit the format of your chart. By selecting **Shape Styles** and **WordArt Styles** you can apply a variety of formatting options within the chart labels and axes groups.

D. Add Chart Title

When a chart is created from the spreadsheet data the text **Chart Title** will appear above your chart data.



1. Click on the **Chart Title** text box.
2. Select or delete text.
3. Type your desired title. For this class exercise, type **Fiscal Year Comparisons**.

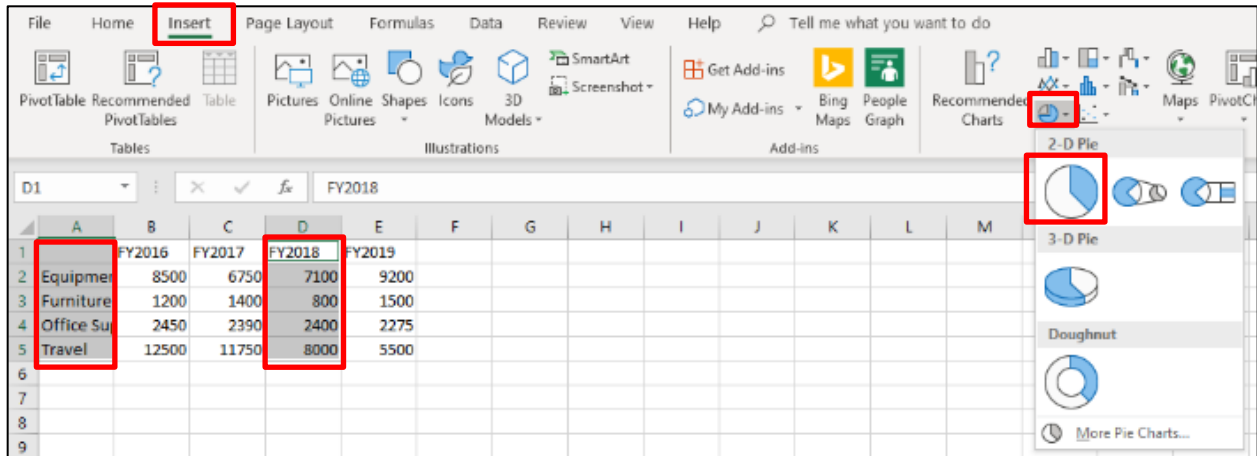
E. Change Data Values

Charts are linked to the worksheet data and are updated when you change the worksheet data.

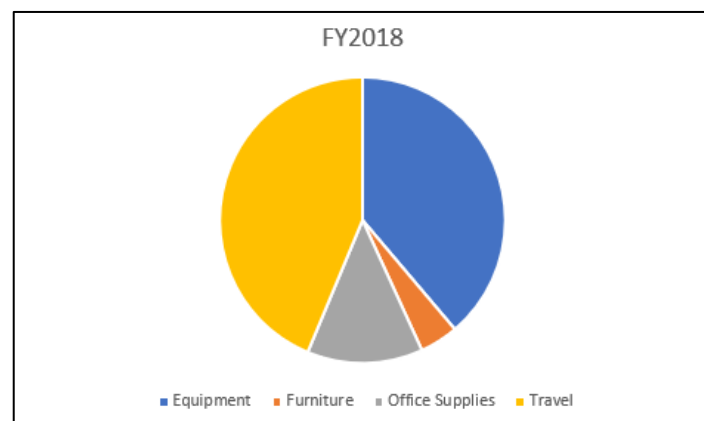
1. Click in cell **D5**, change the Travel expense to **1000**, and press the **Enter** key.
2. Review the change on your chart.

F. Create Pie Chart

Noncontiguous cell ranges can be selected from your spreadsheet to view specific data groupings.



1. Select **A1:A5**, then compress the **Ctrl** key, and select **D1:D5**.
2. Click on the **Insert** tab, click on the **Pie** button location in the **Chart** group, and then select the first **2-D Pie** button from the options panel.
3. Your created Pie chart will appear on the spreadsheet.



G. Print Chart

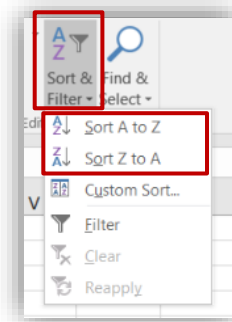
If a chart is not selected on the spreadsheet, then both the spreadsheet data and chart will print. If a chart is selected on the spreadsheet, then only the chart will print. Click on the **File** tab, select the **Print** option, and then click on the **Print** button.

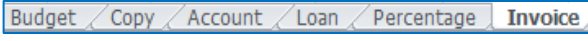
VI. Sort and Filter

A. Sort Data

The sorting feature in Excel allows you to place records in order alphabetically or numerically. You may specify up to three sort levels (e.g. sort first by state, then by city, then by last name). Sorts may be **ascending** (A-Z or 0-9) or **descending** (Z-A or 9-0). You should always **save** the workbook before you sort.

Use the **Sort A to Z** (ascending) or **Sort Z to A** (descending) buttons to sort the records, so that the highest or lowest values are at the top of the column.



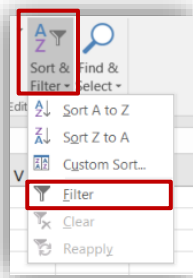
Click on the **Invoice sheet**  tab.

1. Click on any cell within the **Department** column, and then click on the **Sort & Filter** button located on the **Home** ribbon in the **Editing** group.
2. Click on the **Sort A to Z** button, to view data in ascending order.
3. Click on the **Sort Z to A** button, to view data in ascending order.

B. AutoFilter




The spreadsheet **AutoFilter** allows you to view and quickly locate data that meet specific criteria. This feature is faster and more productive than scroll through your entire spreadsheet to find specific data criteria. Once the information is filtered, you can printout the displayed data. Once filtering is turned on, click arrows in the column header to choose a filter for the column.

1. Click on any cell in the database.



2. Click on the **Sort & Filter** button, located on the **Home** ribbon in the **Editing** group, and then select the **Filter** from the options window.
3. Drop-down arrows are placed next to each column field name.

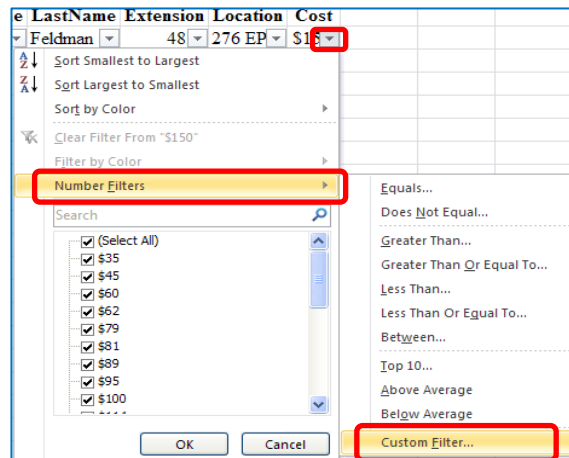
Invoice	Subcode	Department	First Name	Last Name	Extension	Location	Cost
			Linda	Feldman	4857	276 EP	\$150
			Rob	Fletcher	6522	352 LS	\$175
			Katrina	Jefferson	7900	265 AH	\$130
			Melissa	Adams	2546	214 CH	\$62
			Sean	O'Brien	9243	918 EH	\$89
			Fran	Wilson	9951	263 SH	\$81
			Susan	Hayes	7539	306 SH	\$60
			William	Grant	5799	455 CH	\$120
			Alan	Thompson	8600	200 SH	\$79
			Peter	Fraser	4458	662 EH	\$45
			Ann	Devon	3812	445 SH	\$142
			Norman	Jones	8426	315 EP	\$231
			Howard	Snyder	3559	267 LS	\$213
			Bill	Lee	2668	307 CH	\$45
			Leslie	Gilman	4448	252 SB	\$123
			Elizabeth	Lincoln	7682	318 SH	\$225
			Shannon	MacArthur	7780	554 CH	\$128
9	96100475	432 Admissions	Pat	Parkes	4682	141 SH	\$35
0	96100476	658 History	Susan	Davenport	8665	718 EP	\$95
1	96100477	354 Law	Sylvia	Dunn	1542	185 LS	\$114

4. Click on the **Department** drop-down arrow. In the Search display window, deselect the **Select All** option, and then select **Biology**.
5. Click on the **OK** button. Now, only records from the Biology department are listed. Two records should display.
6. Click on the **Filter**  button next to **Department**, then deselect **Biology** and select **Law**. Four records should display.
7. Turn off Filter, click on the **Filter**  button next to **Department** again, and select the **Select All** option. All records in the database display.
8. Click on the **Subcode** drop-down arrow. In the **Search** display window, deselect the **Select All** option, and then select **521**.
9. Click on the **OK** button. Now, only records from the **521 Subcode** are listed. Three records should display.
10. Turn off Filter, click on the **Filter**  button next to **Subcode**, then deselect **521** and select the **Select All** option. All records in the spreadsheet database display.

You can choose one item from many different fields to narrow down a search. For example, to display all of the Smiths who work in the Law department, filter both of these fields set to the desired criteria.

C. Custom Filter

When you need more flexibility in choosing records, use the **Custom Filter** option. The Custom option provides the ability to use math operators such as “less than,” “greater than,” and “does not equal.” You can also select two conditions using the **And** or **Or** options. And will find records that meet both criteria, while Or will find records that meet either criteria.



1. Click on the **Cost** drop-down arrow, click on the **Number Filters** option, and then select **Custom Filter** option.
2. The **Custom AutoFilter** window will appear.



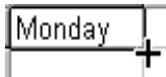
3. Create a custom filter that will display records that have a cost that is greater than 100. Select **is greater than** from the first operator drop-down arrow in the **Show rows where:** section.
4. Click the drop-down arrow to the right of the **Show rows where:** box. Scroll through the numbers and select **100**.
5. Click on the **OK** button. 17 records should appear.
6. Turn off **AutoFilter**.

VII. Additional Features

A. Auto Fill

Excel has an **Auto Fill** feature that automatically completes data in a series. This data includes numbers, formulas, sequential dates, week days, months, and years. To use Auto Fill to copy data, place the mouse pointer on the small solid square (fill handle) on lower right corner of the cell you desire to copy, when the mouse pointer changes to a plus (+) sign, then hold down the right mouse button and drag the mouse across the cell/s to copy data in series desired.

1. Click in a blank cell (with plenty of blank cells to the right or below).
2. Type the word Monday.
3. Position the cursor over the fill handle.

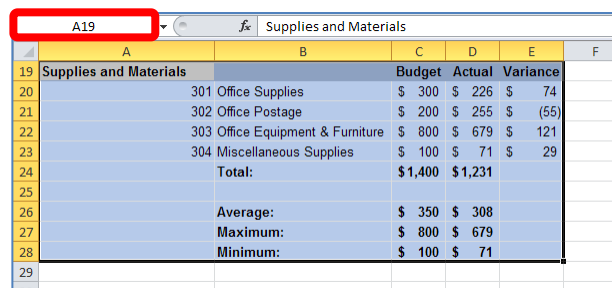


4. Hold the mouse button down as you **drag** across or down to complete a series such as Monday - Friday.
5. Release the mouse button.

B. Named Ranges

When cell or range names become tedious to memorize in a spreadsheet, use the **Named Ranges** feature. Named Ranges provide a word method of referring to cell addresses. For example, you may frequently need to print a range that is difficult to type or remember. Use the **Name Box** to create a name for a range.

1. When a cell range is selected the first cell location will appear in the Name box.

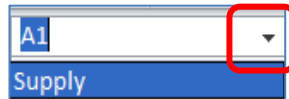


	A	B	C	D	E	F
19	Supplies and Materials		Budget	Actual	Variance	
20		301 Office Supplies	\$ 300	\$ 226	\$ 74	
21		302 Office Postage	\$ 200	\$ 255	\$ (55)	
22		303 Office Equipment & Furniture	\$ 800	\$ 679	\$ 121	
23		304 Miscellaneous Supplies	\$ 100	\$ 71	\$ 29	
24		Total:	\$1,400	\$1,231		
25						
26		Average:	\$ 350	\$ 308		
27		Maximum:	\$ 800	\$ 679		
28		Minimum:	\$ 100	\$ 71		
29						
30						

- Click on the cell location that appears in the **Name box**. The cell location will appear selected.



- Type your desired name, example: **Supply** and press the **Enter** key.
- Select a cell anywhere on spreadsheet.



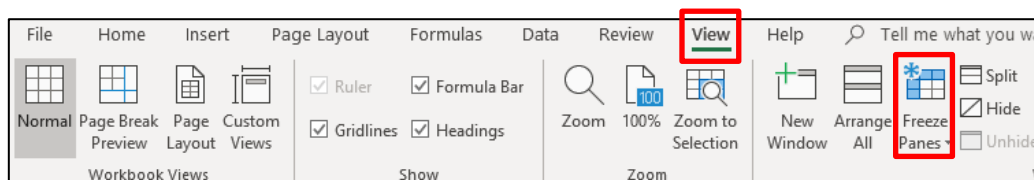
- Click on the **Name box** drop down arrow, the name you entered will appear on a menu list. Select your desired name and the cell range associated with the name will appear.

Note: Guidelines for naming ranges

- The first character of a name must be a letter or an underscore character. Remaining characters in the name can be letters, numbers, periods, and underscore characters.
- Names cannot be the same as a cell reference, such as FY99, Z\$100 or R1C1.
- Spaces are not allowed. Underscore characters and periods may be used as word separators; for example, First.Quarter or Sales_Tax.
- A name can contain up to 255 characters.
- Names are not case sensitive in Excel. For example, if you have created the name Sales and then create another name called SALES in the same workbook, the second name will replace the first one.

C. Freeze Panes

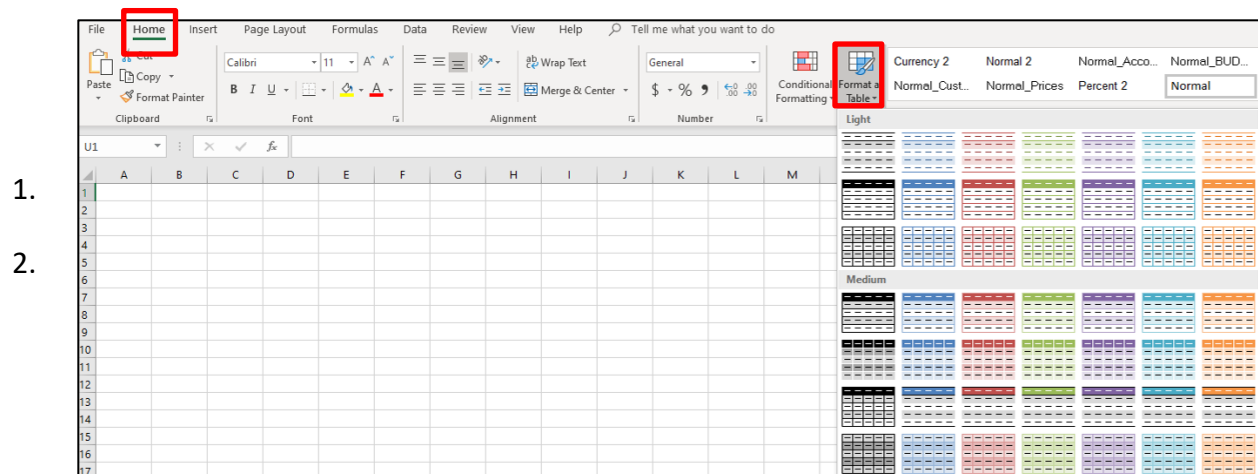
Freeze Panes is an Excel feature that allows you to keep row or column titles on the screen while you scroll through long lists on a worksheet. Freezing panes on a worksheet does not affect printing.



1. To freeze panes, click the cell where you want to freeze the rows and/or columns (to the immediate right of the desired column and/or below the desired row).
2. Select the **View** tab, click on the drop-down arrow next to the **Freeze Panes** button, and then select the **Freeze Panes** option.
3. To remove these panes, Select the **View** tab, click on the drop-down arrow next to the **Freeze Panes** button, and then select the **Unfreeze Panes** option.

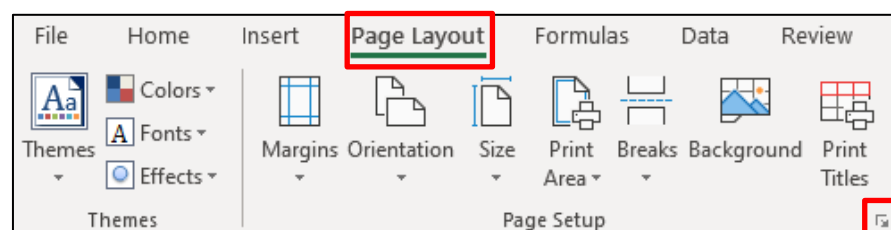
D. Auto Format

Excel includes numerous pre-defined formats you can quickly apply to the design of your spreadsheet.

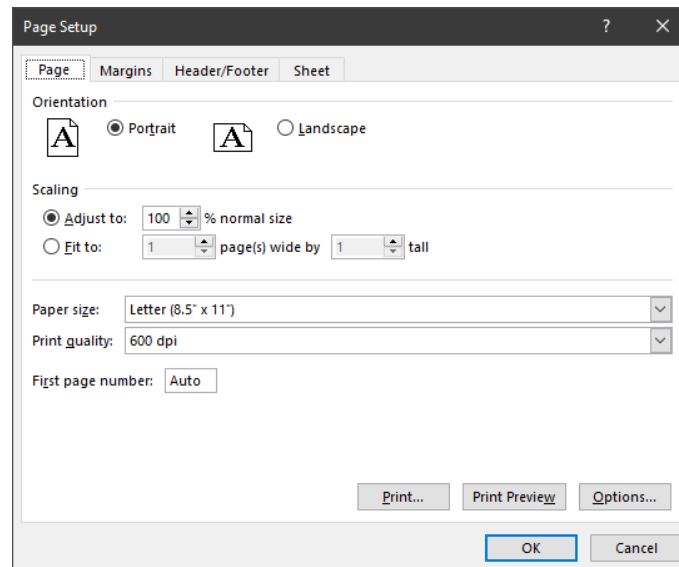


E. Page Setup

Excel allows you to setup the page layout of your spreadsheet to be viewed on screen or printout. Click on the **Page Layout** ribbon, and then click on the **Page Setup** dialog box button to setup the best way to layout your data for your printout.



1. Page tab

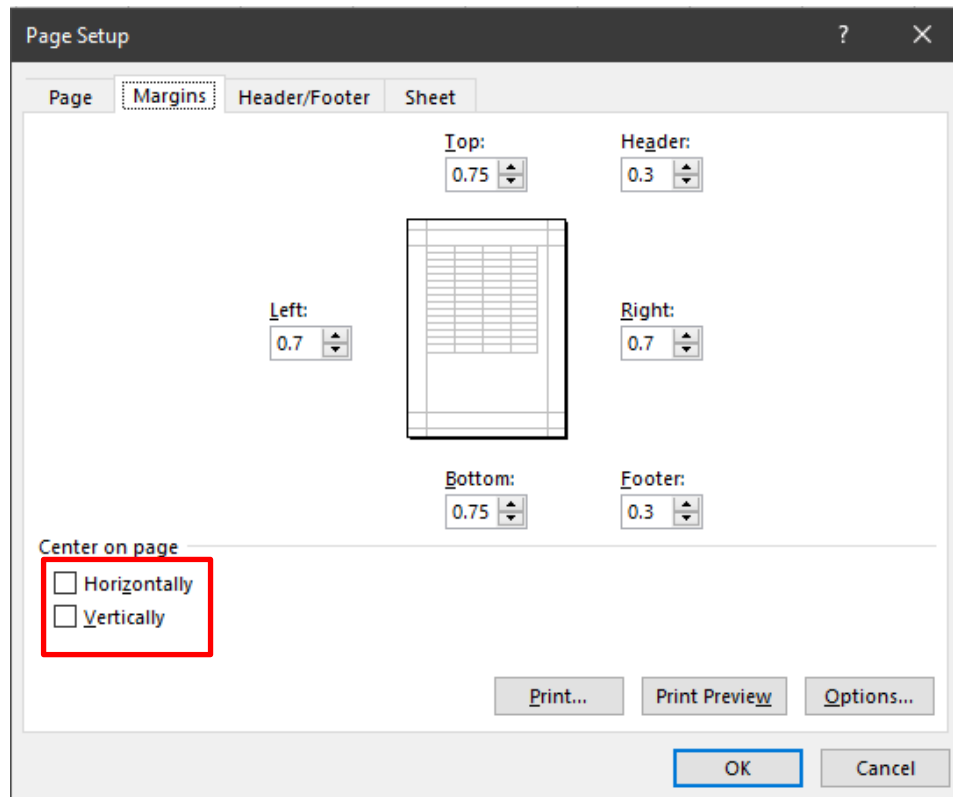


- a) **Orientation section:** Click on the **Landscape** button to change from Portrait, and then click on the **OK** button.

- b) **Scaling section:** Click on the **Adjust to:** button, and type a number smaller than 100 (e.g., type 85 to have Excel reduce the fonts and size of your data to 85% of the original amount). Click on the **Fit to:** button, and type in the number of pages that you want your data to print on (e.g., wide represents pages going horizontally across your spreadsheet and tall represents pages going vertically down your spreadsheet); Excel will automatically determine the scaling percentage needed. Click on the drop-down arrow on the **Paper Size** window to change to legal.

2. Margins tab

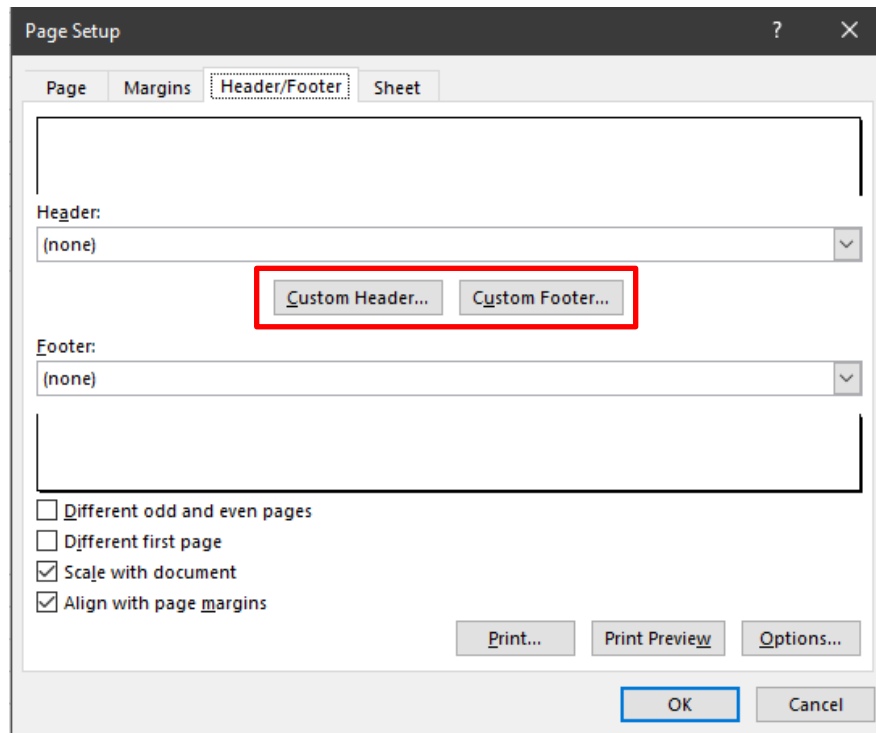
Because scaling is flexible, it is not very common to change the margins of the spreadsheet. However, the **Center on Page** (Horizontally and Vertically) feature is nice, especially if you are printing data that does not take up the entire printed page.



- a) In the **Center on page**, click on the **Horizontally and/or Vertically** button to center your document horizontally and/or vertically.
- b) Click on the **OK** button.

3. Header/Footer tab

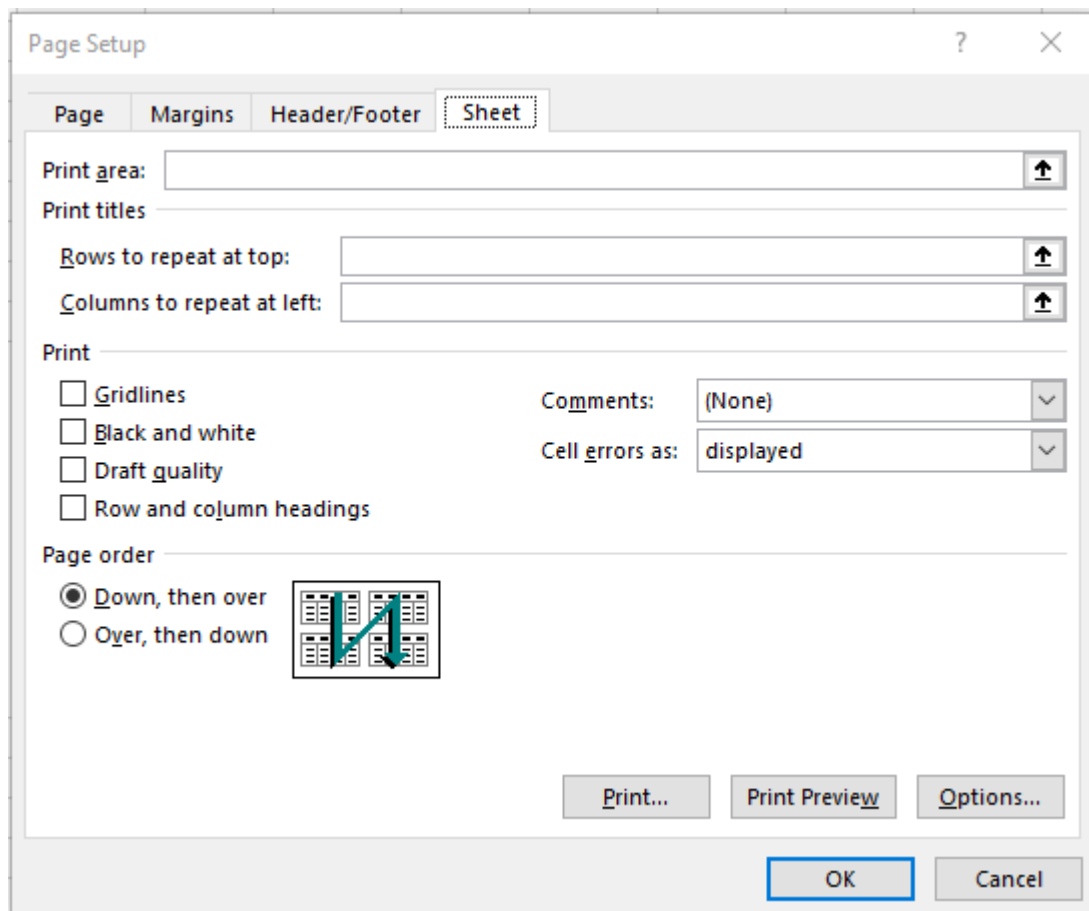
A **Header** is information that prints at the top of each page in the printout, while a **Footer** is information that prints at the bottom of each page in the printout. Both Headers and Footers are divided into three text placement areas: left, center and right. These three areas allow you to separate and align the information. Excel's default Header and Footer are blank.



- a) To add information in the Header or Footer, click on the **Custom Header** or **Custom Footer** button, and then type your desired text in the box provided.
- b) Click on the **OK** button.

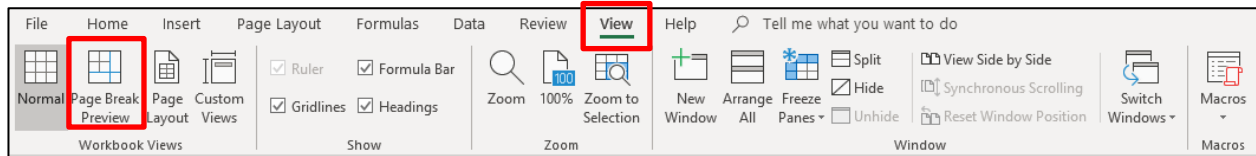
4. Sheet tab

The **Sheet** tab contains items like print areas, print titles, print items and page order. Use **Print area** will set a specific range of cells to print as the default. **Print titles** section will place rows and/or columns of data that print at the top of each page. The **Print** section on the Sheet tab is helpful for turning Gridlines on or off (gridlines are the thin lines which surround each cell). **Page order** section will control the order in which data is numbered and printed when it does not fit on one page.



F. Page Breaks

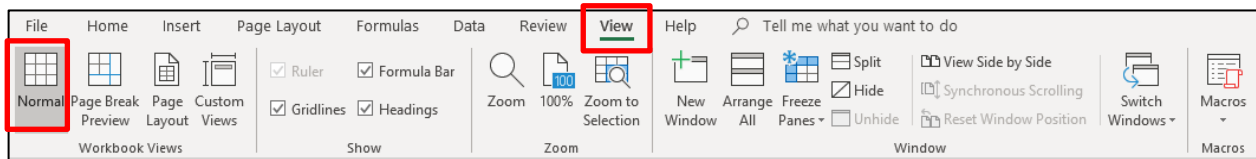
When a spreadsheet is printed or previewed for the first time, Excel defines the print area and determines page breaks as necessary. A page break occurs when data cannot fit on one page. These automatic page breaks appear as dashed lines in the worksheet. If the pages are not separated at the location you desire, then you can insert both vertical and horizontal manual page breaks. Excel provides a Page Break Preview for managing page breaks.



1. Select **View** tab and click on the **Page Break Preview** button.
2. The **Page Break Preview** window will appear. Thick blue lines indicate Page breaks and **page numbers are illustrated by watermark gray text**.

Expense	Fiscal Year 2010												Fiscal Year 2011											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Telephone Lines	250	300	331	400	310	243	339	505	405	375	150	179	260	312	344	416	322	259	415	525	421	390	156	186
Fax Lines	125	210	100	250	220	190	300	279	150	160	110	57	130	218	104	260	229	198	312	290	156	166	114	59
Photocopier Rental	300	315	250	200	225	75	350	321	215	75	44	32	312	328	260	208	234	78	364	334	224	78	46	33
Paper Supplies	43	53	35	45	45	21	65	60	37	24	15	9	44	55	36	47	46	28	68	62	38	24	16	9
Voice Mail	38	45	50	60	47	37	60	76	61	56	23	27	39	47	52	62	48	39	62	79	63	59	23	28
Total	755	923	766	955	846	578	1,174	1,241	867	690	342	304	785	959	796	993	880	601	1,221	1,290	902	717	356	316
Projected Growth Rate is:	4%																							

3. To move the page break to your desired location, position the mouse pointer on the **blue line**, hold the right mouse button down, and then drag to the desired location.
4. To return to the normal spreadsheet view.



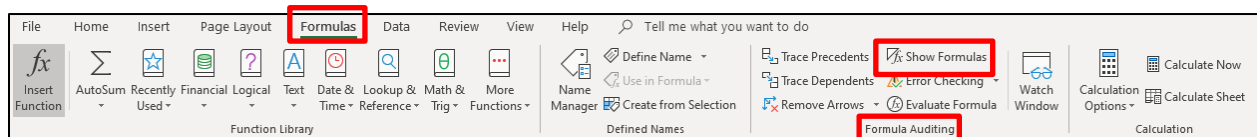
5. Click on the **Normal** button, located on the **View** ribbon.

G. Display Formulas

At times you may want to display the contents of cells containing formulas since formulas only appear when they are being typed or edited. A printout of the spreadsheet with the formulas displayed may be helpful for backup or formula troubleshooting purposes.

	A	B	C	
1	Budget for Guest Speakers			
2				
3	Item	Fall	Spring	Sum
4	Research	20	20	10
5	Correspondence/Communication	30	30	15
6	Publicity	50	50	25
7	Honorariums	500	500	250
8	Travel	750	750	325
9	Lodging	300	300	150
10	Food	90	90	45
11	Total	=SUM(B4:B10)	=SUM(C4:C10)	=SUM(D4
12				
13	Calculate 40% of the publicity expense (which the departmental general fund provides):	=0.4 * B6		
14	Average	=AVERAGE(B5:B11)	=AVERAGE(C5:C11)	=AVERA

1. Select the **Formulas** ribbon, click on the **Show Formulas** button, located on the **Formula Auditing** group. The formulas will appear on your spreadsheet as seen in the figure above. Use this same command sequence to turn off the display of formulas.



Note: The keyboard shortcut for this feature is **Ctrl** and **`** (accent mark character, to the left of the number 1 key on the alphabetic keyboard).

H. Range Finder

Range Finder makes it easy to trace, modify, and understand which figures make up a formula.

4	Research	\$ 20
5	Correspondence/Communication	\$ 30
6	Publicity	\$ 50
7	Honorariums	\$ 500
8	Travel	\$ 750
9	Lodging	\$ 300
10	Food	\$ 90
11	Total	\$ 1,740
12		
13	Calculate 40% of the publicity expense (which the departmental general fund provides):	=0.4 * B6

1. Double click on cell that contains an equation (or click on the cell and press F2). Each part of the equation is highlighted with its own color so you can see the pieces of the formula at a glance. The Range Finder also works with data used in a chart. For example, if you click on a data series on a bar chart, the range in your original data is highlighted. Range Finder also allows you to use drag and drop to modify your formula or chart range.

VIII. Advance Search

To get help click in the Advance search box, on the top center of the Excel window. Type the excel function that you desire and the command window will appear. For example, if you type in **Chart**, the **Insert Chart** window will appear to help you perform the task.

