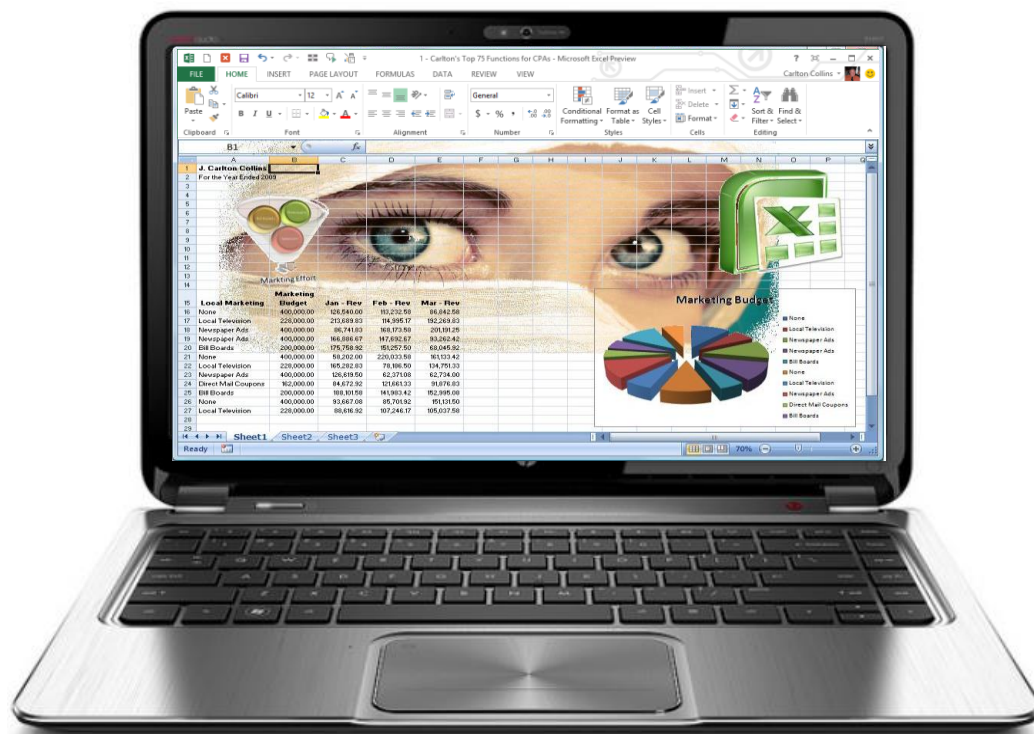# ASA Research

Excel 2013 for CPAs

J. Carlton Collins, CPA
ASA Research - Atlanta, Georgia
770.842.5902
Carlton@ASAResearch.com

Table of Contents

Excel 2013 for CPAs
CPE Course Information

Learning Objectives	To increase the productivity of accountants and CPAs using Excel's newest commands, features and functions
Course Level	Intermediate
Pre-Requisites	Familiarity with Microsoft Excel
Advanced Preparation	None
Presentation Method	Live lecture using full color projection systems and live Internet access with follow up course materials
Recommended CPE Credit	8 hours
Handouts	Templates, checklists, web examples, manual
Instructors	J. Carlton Collins, CPA

AdvisorCPE is registered with the National Association of State Boards of Accountancy (NASBA) as a sponsor of continuing professional education on the National Registry of CPE Sponsors. State boards of accountancy have final authority on the acceptance of individual courses for CPE credit. Complaints regarding registered sponsors may be addressed to the national Registry of CPE Sponsors, 150 Fourth Avenue, Nashville, TN, 37219-2417. Telephone: 615-880-4200.

Copyright © May 2013, ASA Research and Accounting Software Advisor, LLC
4480 Missendell Lane, Norcross, Georgia 30092 770.842.5904

Contact Information for J. Carlton Collins
Carlton@ASAResearch.com
www.Facebook.com/CarltonCollins

Random Numbers

Excel provides two tools for generating random numbers as follows:

1. **RAND**
2. **RANDBETWEEN** (You must first activate the Analysis ToolPak)

RAND - The RAND function in Microsoft Excel allows you to generate random numbers in Excel. Specifically, type RAND() in a given cell to produce a random number between 0 and 1, as shown.
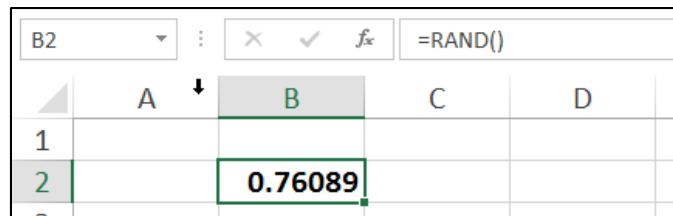
Comments

1. RAND is a volatile function, which means it will be recalculated any time the enter key is pressed, so the random number constantly changes. To prevent random numbers from changing, most people copy and paste them as values.

2. Excel's **RAND** function can be used to generate random numbers from the Uniform distribution, however, be aware that prior to Excel 2003, this function should not be used with large simulation models because the older versions of Excel use the generation algorithm which has a relatively small period (less than 1 million numbers), so if your model contains hundreds of variables and you are running the simulation tens of thousands of times, you can run out of random numbers. This problem has been fixed in Excel 2003 and later versions.

3. Note that there is a known bug in Excel 2003 causing the RAND function to return negative numbers, which can be negated using the **ABS** (absolute function).

RANDBETWEEN - In Excel 2010, 2007 and 2003, you must first activate Analysis Tool Pack add-in as follows. In Excel 2010 and 2007, select **File, Options, Add-ins, GO** and place a check in the check box labeled **Data Analysis ToolPak**, then click **OK**. In Excel 2003, select **Tools, Add ins,…**

The **RANDBETWEEN** returns a random integer between two specified numbers, as shown.

B2	▼	⋮	×	✓	*fx*	=RANDBETWEEN(2000,6000)		
	A		B		C	D	E
1							
2			**2770**				
3							

Suppose you wanted to select 100 random numbers from three different ranges of the population. There are several approaches you might take. The first approach might be simply to list all possible values, then use RAND to create a random number adjacent to those values, and then sort. The screen shots below show the data before and after sorting. Once sorted, simply take the desired number of samples from the top of the randomly sorted list, as suggested by the top 7 values shaded in the second screen shot.

	K	L	M		Invoices #'s
7					
8		Invoices #'s	RAND		12099
9		1000	0.7083		12099
10		1001	0.0191		1001
11		1002	0.0025		6054
12		1003	0.7310		6051
13		1004	0.1678		6055
14		1005	0.8405		1004
15		6050	0.0335		6056
16		6051	0.4653		1000
17		6052	0.7973		12100
18		6053	0.4083		1003
19		6054	0.7150		6050
20		6055	0.8662		6052
21		6056	0.7748		12097
22		12095	0.2045		12096
23		12096	0.1231		1002
24		12097	0.6091		1005
25		12098	0.7585		12095
26		12099	0.2055		12098
27		12100	0.0849		6053

This method takes up a lot of Excel screen real estate, but so what? Excel has millions of rows and the generation of such a report is fairly straight forward and fast. Just use the **FILL** command to fill in the necessary ranges, then add **RAND** and sort – it might take you 2 to 3 minutes.
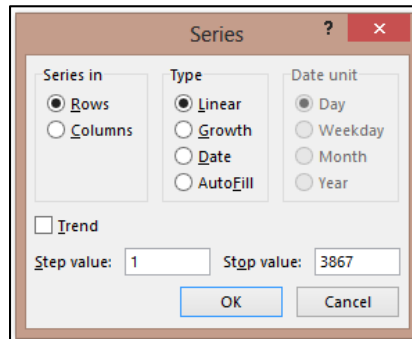
Random Numbers Given Three Ranges of Population Data

Another way to generate random numbers is to use RANDBETWEEN, and assigning the probability that a random number is selected from a given range based upon the percentage that range represents compared to the total population. For example, consider the following example:

The formula bar shows:
`=IF(I3<C9,RANDBETWEEN($C$4,$C$5),IF(I3>($C$8+$D$8),RANDBETWEEN($E$4,$E$5),RANDBETWEEN($D$4,$D$5)))`

Random Numbers Given Three Ranges of Population Data

	1st Range	2nd Range	3rd Range	
Low Number	3,333	6,500	12,000	
High Number	4,444	7,777	12,055	
Difference	1,111	1,277	55	2443
Percentage Diff	45%	52%	2%	

	Random Number Between 1% and 100%	Random Number
1	49%	7731
2	85%	6507
3	2%	6792
4	53%	7617
5	27%	7304
6	34%	7461
7	45%	7107
8	40%	7238
9	85%	7455
10	48%	6619
11	63%	7476
12	28%	6656
13	2%	7016
14	85%	6741
15	31%	6675
16	46%	6835
17	46%	7114
18	32%	7098
19	39%	7545
20	35%	7442

Cells C4 through E5 contain the low and high values for three separate ranges of data making up the total population. We start by calculating the number of occurrences in each range (1,111, 1,277 and 55 in this example), and then calculate the percentage each range represents for the total population (45%, 52% and 2% in this example).

Thereafter, a series of **RANDBETWEEN** functions are used to produce random number triggers between 1% and 100% (contained in cells **I3** through **I22** in this example), and then an **IF** function is used to calculate within which range each random number trigger falls. For example, the first random number trigger is 49% (in cell **I3**), which falls within the second range data. The RANDBETWEEN function in cell **J3** thusly calculates a random number using the second range of data's low and high values (6,500 and 7,777 in this example), and the first random number generated is 7,731 in this example.

This method could theoretically be used to calculate random numbers for many separate ranges of data, with each member of the population having an equal chance to be selected.

Download this workbook at **www.CarltonCollins.com/5random.xlsx**.

Consolidating Data in Excel
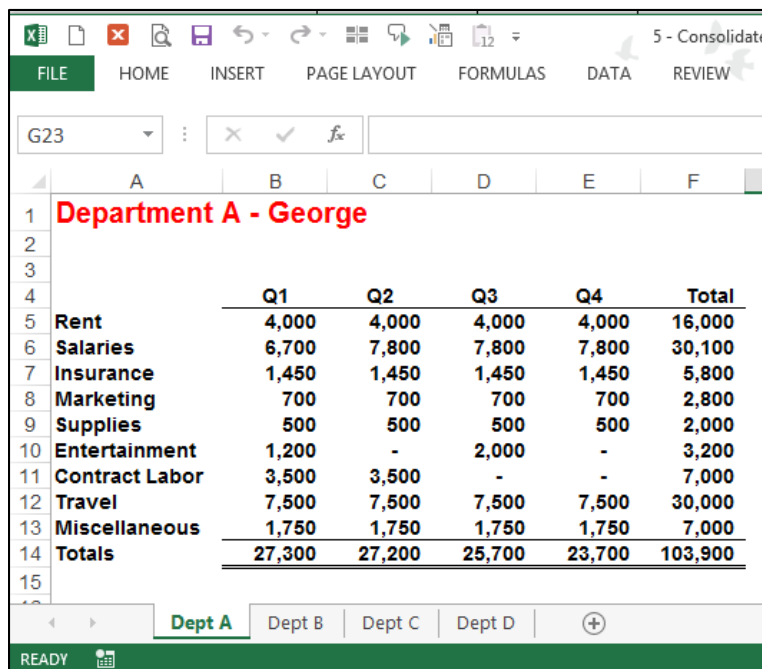
Consolidating data is a common task for CPAs, and Excel offers a variety of methods for performing this task. The particular method you use will probably depend on the layout of your data, and you may need to clean, edit or manipulate your data a bit to prepare it for consolidation. CPAs often have a need to consolidate data such as budgets, months, departments, locations, warehouses and sale representatives.

Following I will explain four different consolidation methods - two methods for consolidating data with similar layouts, and two more methods for consolidating data with dis-similar layouts. These four methods are as follows:

A. Simple formulas.
B. Spearing formulas.
C. The "Data Consolidate Command".
D. The "PivotTable Wizard".

A. Using Simple Formulas To Consolidate Similar Data

The workbook below contains budgets with identical layouts for Departments A, B, C and D. The goal is to consolidate these four budgets into a single consolidated budget.

1. **Insert a New Worksheet on which the consolidation will appear**

    i.   **Don't click the New Sheet or Add Sheet Option** - Because there is a better and quicker approach.

    ii. **CTRL + Drag Tab –** To insert a new worksheet, select worksheet labeled "Dept D"; then use the CTRL + Drag Tab keystroke combination to create a duplicate worksheet of Dept D. The advantage is that the data, column widths, page footers and headers, and margin settings are all duplicated automatically, so you don't have to create a new page from scratch.

    iii. (The menu method for achieving this same procedure is to right click on the tab and select Move or Copy, but **CTRL + Drag Tab** is quicker.)

    iv. **Clean the Page –** Clean the new worksheet by deleting the data in the grid area, so that new formulas can be inserted.

    v.   **Re-label –** Change the worksheet label in Cell A1 and on the Worksheet Tab to read "consolidated".

2. **Formula** – In cell B5, enter a formula adding the B5 cells in the four budget sheets. The formula should look like this:

='Dept A'!B5+'Dept B'!B5+'Dept C'!B5+'Dept D'!B5

3. **Copy** – Copy the formula down and across to complete the consolidation, and you are done.

B. Using Spearing Formulas To Consolidate Similar Data

The workbook below contains budgets with identical layouts for Departments A, B, C and D. The goal is to consolidate these four budgets into a single consolidated budget.

1. **Insert a New Worksheet on which the consolidation will appear**

    i.   **Don't click the New Sheet or Add Sheet Option** - Because there is a better and quicker approach.

    ii. **CTRL + Drag Tab –** To insert a new worksheet, select worksheet labeled "Dept D"; then use the CTRL + Drag Tab keystroke combination to create a duplicate worksheet of Dept D. The advantage is that the data, column widths, page footers and headers, and margin settings are all duplicated automatically, so you don't have to create a new page from scratch.

iii. (The menu method for achieving this same procedure is to right click on the tab and select Move or Copy, but **CTRL + Drag Tab** is quicker.)

iv. **Clean the Page** – Clean the new worksheet by deleting the data in the grid area, so that new formulas can be inserted.

v. **Re-label** – Change the worksheet label in Cell A1 and on the Worksheet Tab to read "consolidated".

2. **Formula** – In cell B5, enter a formula adding the B5 cells in the four budget sheets. The formula should look like this:

=SUM('Dept A:Dept D'!C5)

I use the mouse to accomplish this step. Start by typing "=SUM(", then click on cell B5 in Dept A, hold the shift key down, and click cell B5 in Dept D.

3. **Copy** – Copy the formula down and across to complete the consolidation, and you are done.

	A	B	C	D	E	F
	B5 ▼ : × ✓ *fx*		=SUM('Dept A:Dept D'!B5)			
1	**Consolidated**					
2						
3						
4		Q1	Q2	Q3	Q4	Total
5	Rent	14,500	14,500	14,500	14,500	58,000
6	Salaries	24,600	24,800	24,800	24,800	99,000
7	Insurance	4,130	3,600	3,600	3,600	14,930
8	Marketing	2,700	2,700	2,700	2,700	10,800
9	Supplies	1,460	1,460	1,460	1,460	5,840
10	Entertainment	3,205	1,660	4,830	1,800	11,495
11	Contract Labor	9,050	9,050	2,050	2,050	22,200
12	Travel	24,500	24,500	24,500	24,500	98,000
13	Miscellaneous	5,350	5,350	5,350	5,350	21,400
14	Totals	89,495	87,620	83,790	80,760	341,665
15						

◄ ► | Dept A | Dept B | Dept C | Dept D | **Consolidated** ... ⊕ : ◄

READY   AVERAGE: 9,491   COUNT: 36   SUM: 341,665

C. Using the "Data Consolidate Command"
To Consolidate Dissimilar Similar Data

The workbook below contains dis-similar budgets for Departments A, B, C and D. Specifically, the four worksheets contain budgets for separate departments, and some budgets contain more rows and different row descriptions than others. The goal is to consolidate these four departmental budgets using the **Consolidate** Command.

1. **Create A New Worksheet** – Insert a new worksheet. Because there is no need to duplicate a template from another worksheet you might be tempted to use the New Sheet button this time; however, this approach does not duplicate the worksheet's page footers, headers or margin settings. Therefore I would still recommend that you use the CTRL + Drag Tab method as described in examples 1 & 2 above to create a new sheet, and I would then eliminate the data on the new sheet by deleting those columns that contain data.

2. **Label** – As before, label the new worksheet in Cell A1 and on the Worksheet Tab to read "Consolidated".

3. **Select Cell** – Select a blank cell on the new worksheet such as B3.

4. **Use the Consolidate Command** - From the **Data** tab, select **Consolidate** to display the Consolidate dialog box as pictured below. Click the **Cell Chooser** button, then highlight the data only on **Dept A**, click **Enter**, and then click **Add**. Repeat this process for **Dept B**, **Dept C** and **Dept D**.
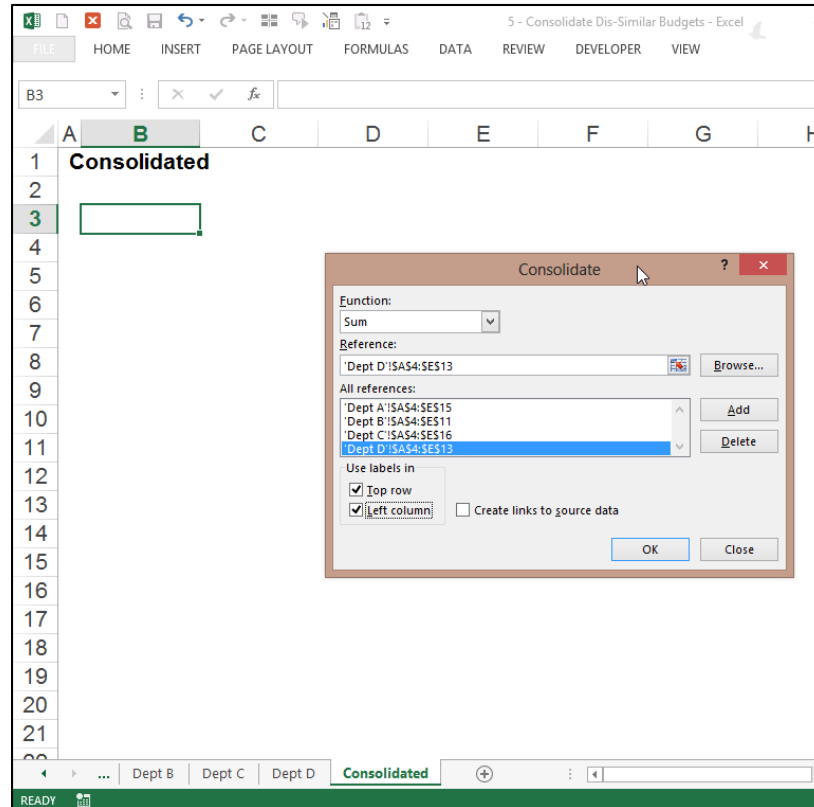
5. Check the check boxes to use Labels in the **Top Row** and **Left Column**.

6. **Finish** – Click **OK** to produce the results.

		Q1	Q2	Q3	Q4
1	Consolidated				
2					
3		Q1	Q2	Q3	Q4
4	Rent	14,500	14,500	14,500	14,500
5	Salaries	24,600	24,800	24,800	24,800
6	Fringe Benefits	1,005	1,170	1,170	1,170
7	Insurance	2,680	2,150	2,150	2,150
8	Marketing	1,000	1,000	1,000	1,000
9	Advertising	1,350	2,350	3,000	55
10	Supplies	1,460	1,460	1,460	1,460
11	Equipment	3,240	1,230	679	4,500
12	Client Gifts	500	500	500	500
13	Cell Phones	1,250	1,250	1,250	1,250
14	Entertainment	3,205	1,660	4,830	1,800
15	Contract Labor	7,050	7,050	50	50
16	Travel	24,500	24,500	24,500	24,500
17	Air Fare	4,000	4,000	5,000	2,300
18	Hotels	2,300	1,450	3,000	2,030
19	Miscellaneous	5,350	5,350	5,350	5,350

7. **Add Totals and Formatting** - Highlight your data and expand the selection to include a blank bottom row and blank right column. Click the **AutoSum** tool, add formatting and you are done.

	A B	C	D	E	F	G
1	Consolidated					
2						
3		Q1	Q2	Q3	Q4	Totals
4	Rent	14,500	14,500	14,500	14,500	58,000
5	Salaries	24,600	24,800	24,800	24,800	99,000
6	Fringe Benefits	1,005	1,170	1,170	1,170	4,515
7	Insurance	2,680	2,150	2,150	2,150	9,130
8	Marketing	1,000	1,000	1,000	1,000	4,000
9	Advertising	1,350	2,350	3,000	55	6,755
10	Supplies	1,460	1,460	1,460	1,460	5,840
11	Equipment	3,240	1,230	679	4,500	9,649
12	Client Gifts	500	500	500	500	2,000
13	Cell Phones	1,250	1,250	1,250	1,250	5,000
14	Entertainment	3,205	1,660	4,830	1,800	11,495
15	Contract Labor	7,050	7,050	50	50	14,200
16	Travel	24,500	24,500	24,500	24,500	98,000
17	Air Fare	4,000	4,000	5,000	2,300	15,300
18	Hotels	2,300	1,450	3,000	2,030	8,780
19	Miscellaneous	5,350	5,350	5,350	5,350	21,400
20	Totals	97,990	94,420	93,239	87,415	373,064
21						

Comments:

- **Row Descriptions** - Note that the consolidation works only to the extent that the different worksheets contain the same row descriptions. If your four department heads had used the descriptions: **Rent**, **Rent Exp.**, **Rent Expense**, and **Rental Expense,** then those rows would not actually be consolidated, rather they would be shown as four separate rows in the resulting consolidation. However, because all four department heads did use the phrase Rent to describe that row, the four respective rent rows were properly consolidated.

- **Account Numbers –** As an option, you might insert account numbers to the left of the row descriptions to consolidate dissimilar information which contains dis-similar row descriptions.

- **To Update –** To update the results, place your cursor in the upper left hand corner of the Consolidation range, and rerun the **Consolidate** command. If the resulting report is a different size, you may need to clean up your data and reapply totals.

- **Consolidate Different Workbooks** – Excel can also consolidate data from different workbooks. The procedure is exactly the same except that you use the **Browse** button instead of the **Cell Chooser** button to point to your data ranges.

The Problem with Data Consolidate

The problem with Data Consolidate occurs when you attempt to change the source data, for example when you insert a new row in Dept A; a comedy of errors ensues as follows:

1. When you change the source data, the consolidated report does not update automatically.

2. Pressing the Refresh button does nothing.

3. To update the consolidated report, you must rerun the data consolidate command. But upon re-running this command, you find that your cursor needs to be in the exact same location when you ran it last time.

4. You also find that you need to erase the previous data before re-running the Data Consolidate command.

5. Next you find that in Excel 2003, 2007 and 2010, you need to re-adjust your consolidating range for Dept A because the tool did not automatically expand the selection when the row was inserted in Dept A. (This issue has been corrected in Excel 2013.)

Because source data tends to change frequently, you are probably better off using the next method to consolidate your data - the **PivotTable and Chart Wizard** method.

D. Using A PivotTable To Consolidate Dissimilar Similar Data

The workbook below contains the same dis-similar budget data used in example 3 above. The four worksheets contain budgets for separate departments, and some budgets contain more rows and different row descriptions than others. The goal is to consolidate these four departmental budgets using the PivotTable approach.

1. **Create A New Worksheet** – Start by inserting a new worksheet. (Because there is no need to duplicate a template from another worksheet you might be tempted to use the New Sheet button this time; however, this approach does not duplicate the worksheet's page footers, headers or margin settings. Therefore I would still recommend that you use the CTRL + Drag Tab method as described in examples 1 & 2 above to create a new sheet, and I would then eliminate the data on the new sheet by deleting those columns that contain data.)

2. **Label** – Label the new worksheet in Cell A1 and on the Worksheet Tab to read **Consolidated**.

3. **Select Cell** – Select a blank cell such as B3.

4. **Add the PivotTable Wizard to Your Quick Access Toolbar** – The PivotTable Wizard in Excel 2003 allows you to pivot multiple consolidation ranges, but for unknown reason this tool is hidden in later versions of excel. Therefore, in Excel 2013, 2010 and 2007, you must first customize your Quick Access toolbar and insert the icon titled **PivotTable and PivotChart Wizard** as shown below.

To add this tool, right-click your **Quick-Access** toolbar, select **Customize Quick Access Toolbar**, select the option to **View All Commands**, locate the **PivotTable and PivotChart Wizard** icon and add it to your toolbar. The resulting toolbar will appear as follows. .
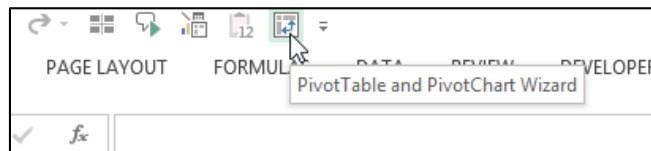
5.   **Run the PivotTable Wizard** – Click the **PivotTable and PivotChart Wizard** icon to display the PivotTable and PivotChart Wizard dialog box as shown below. Choose the **Multiple consolidation ranges** option and click Next, and Next again. The dialog box on the right should now be displayed.
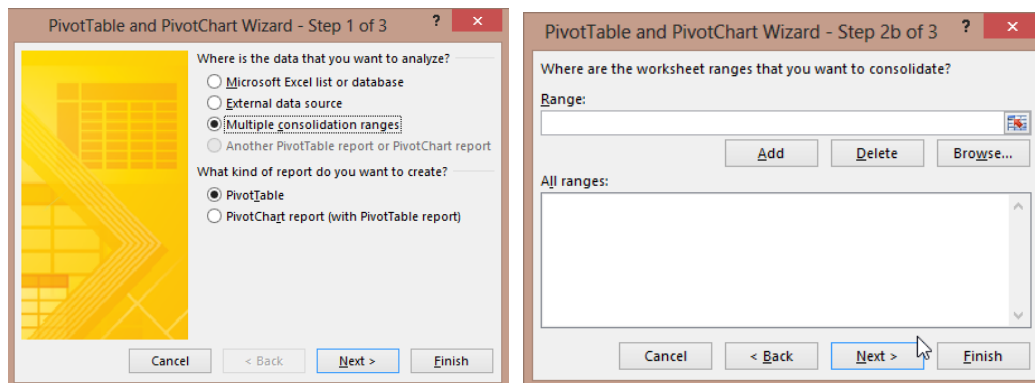
Click the Cell Chooser button, then highlight the ***data only*** on Dept A, click "Enter", and then click "Add".
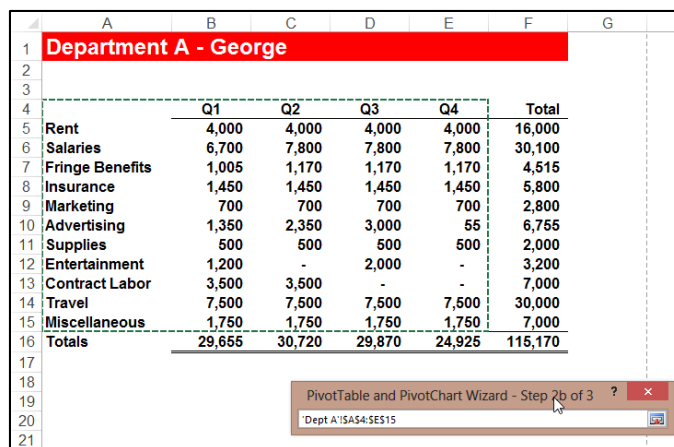
Repeat this process for Dept B, C and D until the PivotTable Wizard appears as follows.
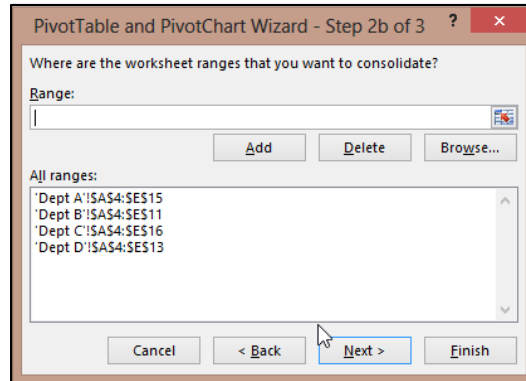
6. **Finish** – Click "FINISH" to produce the results.

	A	B	C	D	E	F	G
1		Page1	(All)				
2							
3		Sum of Value	Column Labels				
4		Row Labels	Q1	Q2	Q3	Q4	Grand Total
5		Advertising	1350	2350	3000	55	6755
6		Air Fare	4000	4000	5000	2300	15300
7		Cell Phones	1250	1250	1250	1250	5000
8		Client Gifts	500	500	500	500	2000
9		Contract Labor	7050	7050	50	50	14200
10		Entertainment	3205	1660	4830	1800	11495
11		Equipment	3240	1230	679	4500	9649
12		Fringe Benefits	1005	1170	1170	1170	4515
13		Hotels	2300	1450	3000	2030	8780
14		Insurance	2680	2150	2150	2150	9130
15		Marketing	1000	1000	1000	1000	4000
16		Miscellaneous	5350	5350	5350	5350	21400
17		Rent	14500	14500	14500	14500	58000
18		Salaries	24600	24800	24800	24800	99000
19		Supplies	1460	1460	1460	1460	5840
20		Travel	24500	24500	24500	24500	98000
21		Grand Total	97990	94420	93239	87415	373064
22							

7. **Add Formatting** - Highlight your data and add comma formatting with no decimals, adjust the columns widths to taste, center the column headings; then you are done.

	A	B	C	D	E	F	G
1		Page1	(All)				
2							
3		Sum of Value	Column Labels				
4		Row Labels	Q1	Q2	Q3	Q4	Grand Total
5		Advertising	1,350	2,350	3,000	55	6,755
6		Air Fare	4,000	4,000	5,000	2,300	15,300
7		Cell Phones	1,250	1,250	1,250	1,250	5,000
8		Client Gifts	500	500	500	500	2,000
9		Contract Labor	7,050	7,050	50	50	14,200
10		Entertainment	3,205	1,660	4,830	1,800	11,495
11		Equipment	3,240	1,230	679	4,500	9,649
12		Fringe Benefits	1,005	1,170	1,170	1,170	4,515
13		Hotels	2,300	1,450	3,000	2,030	8,780
14		Insurance	2,680	2,150	2,150	2,150	9,130
15		Marketing	1,000	1,000	1,000	1,000	4,000
16		Miscellaneous	5,350	5,350	5,350	5,350	21,400
17		Rent	14,500	14,500	14,500	14,500	58,000
18		Salaries	24,600	24,800	24,800	24,800	99,000
19		Supplies	1,460	1,460	1,460	1,460	5,840
20		Travel	24,500	24,500	24,500	24,500	98,000
21		Grand Total	97,990	94,420	93,239	87,415	373,064

Comments:

The **PivotTable Wizard** approach is superior to the **Data Consolidate** approach for many reasons as follows:

1. Totals are automatic inserted with the PivotTable method.

2. Total column and row labels are automatically inserted with the PivotTable method.

3. AutoFilter buttons are automatic inserted with the PivotTable method.

4. If the source data changes, such as inserting a new row in Dept A, simply click refresh to update.

5. The resulting PivotTable is drillable.

6. The resulting PivotTable can be pivoted.

7. The PivotTable report offers many PivotTable tools such as PivotTable formatting which Data Consolidate does not offer.

Download these Consolidation example templates at:

www.CarltonCollins.com/consolidatesimilarbudgets.xlsx

www.CarltonCollins.com/consolidatedissimilarbudgets.xlsx

Benford's Law

Benford's Law predicts the occurrence of digits in large sets of data. Simply put, this law maintains that we can expect some digits to occur more often than others. For example, the numeral 1 should occur as the first digit in any multiple-digit number about 30.1% of the time, while the numeral 9 should occur as the first digit only 4.6% of the time. We also can apply the law to determine the expected occurrence of the second digit of a number, the first two digits of a number and other combinations.

How can such predictions help you red-flag potential irregularities? When someone creates false transactions or commits a data-entry error, the resulting numbers often deviate from the law's expectations. This is true when someone creates random numbers or intentionally keeps certain transactions below required authorization levels.

For example, in 2008, Bernie Madoff famously created fictitious data to hide an estimated $65 billion in losses resulting from Madoff's investment Ponzi scheme. – Had the CPAs looked at this data using Benford's Law, they might have found that the digits smelled of fraud, perhaps triggering a deeper investigation.

Applying Benford's Law Using Excel

According to Benford's Law, the various digits should occur as the first digit position according to the following percentages.

Benford's Law

Number	Occurrence As First Digit
1	30.10%
2	17.60%
3	12.50%
4	9.70%
5	7.90%
6	6.70%
7	5.80%
8	5.10%
9	4.60%
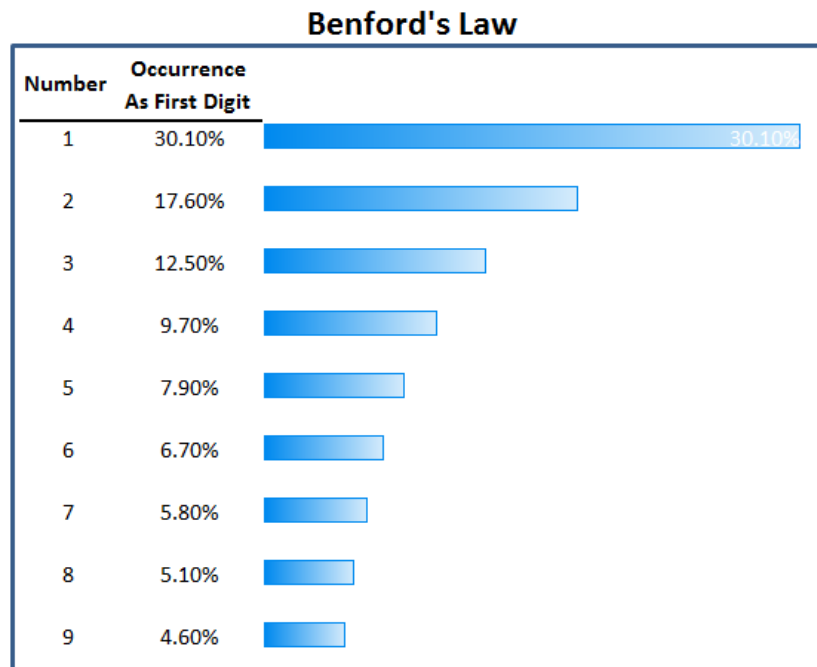
To analyze data, simply use the LEFT function to extract the leading digits, and then add them up as follows. As a simple example, I found a random workbook containing 136 rows of revenue amounts. I entered a formula in cell C4 to extract the first digit and copied this formula down. Next I used the COUNTIF function to count the number of occurrences of each of the nine digits, and calculated their rate of occurrence, then charted the results.
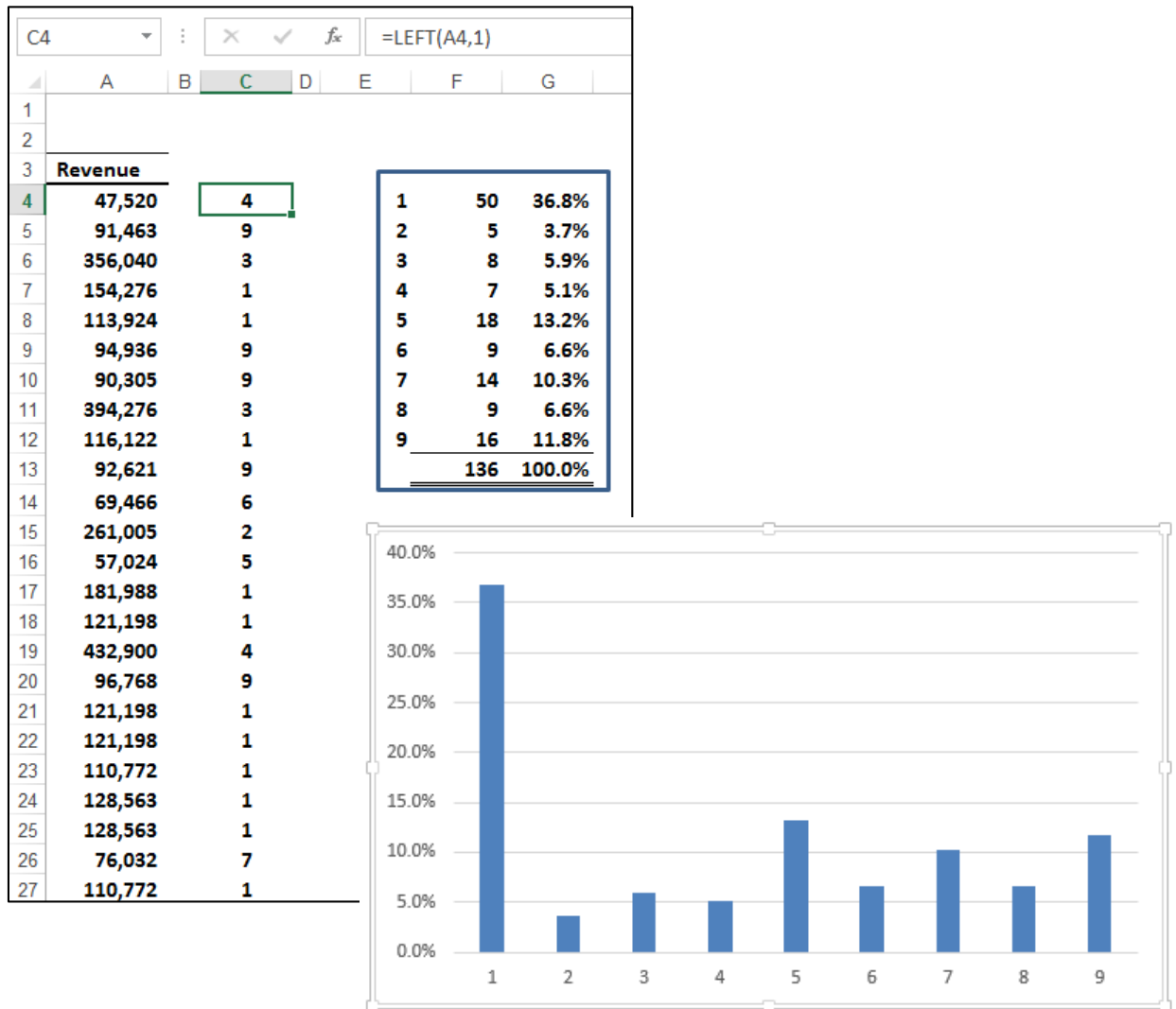
You can clearly see that this data pattern does not conform to Benford's law, and yes, I fabricated this particular set of data years ago.

When Excel helps you spot a deviation like this, it raises a red flag. Considerable statistical research supports the effectiveness of Benford's Law, making it a valuable tool for CPAs. The technique isn't guaranteed to detect fraud in all situations but is useful in analyzing the credibility of accounting records.

A Note of Caution

Benford's Law is not effective for all financial data. If the data set is small, the law becomes less accurate because there are not enough items in the sample and so the rules of randomness don't apply—or at least apply with less predictability.

Also, if the data include built-in minimums and maximums, they also might not conform well to the law's predictions. For example, consider a petty-cash fund where all disbursements are between a $10 minimum and a $20 maximum. All first digits would be either 1 or 2, and the expected distribution of first digits would not apply. Likewise, when a company's major product sells for, say, $9.95, most sales totals will be a multiple of 995, again offsetting the value of the process. Finally, when a data set consists of assigned numbers, such as a series of internally generated invoice numbers, the data will not follow a Benford distribution.

History of Beford's Law

Newcomb, 1881 - The discovery of Benford's law dates back to 1881, when the American astronomer Simon Newcomb noticed that in logarithm tables (used at that time to perform calculations) the earlier pages (which contained numbers that started with 1) were much more worn than the other pages. Newcomb's published result is the first known instance of this observation and includes a distribution on the second digit, as well. Newcomb proposed a law that the probability of a single number N being the first digit of a number was equal to $\log(N + 1)$ – $\log(N)$.

Benford, 1938 - The phenomenon was again noted in 1938 by the physicist Frank Benford, who tested it on data from 20 different domains and was credited for it. His data set included the surface areas of 335 rivers, the sizes of 3259 US populations, 104 physical constants, 1800 molecular weights, 5000 entries from a mathematical handbook, 308 numbers contained in an issue of Readers' Digest, the street addresses of the first 342 persons listed in American Men of Science and 418 death rates. The total number of observations used in the paper was 20,229. This discovery was later named after Benford.

Varian, 1972 - In 1972, Hal Varian suggested that the law could be used to detect possible fraud in lists of socio-economic data submitted in support of public planning decisions. Based on the plausible assumption that people who make up figures tend to distribute their digits fairly uniformly, a simple comparison of first-digit frequency distribution from the data with the expected distribution according to Benford's law ought to show up any anomalous results.

Nigrini, 1999 - Following this idea, Mark Nigrini showed that Benford's law could be used in forensic accounting and auditing as an indicator of accounting and expenses fraud. In practice, applications of Benford's law for fraud detection routinely use more than the first digit.

Analyzing All Digits

Building on the simple example described above, we can expand our Excel formulas to analyze all of the digits included in a set of data as follows: In the example shown below, I have used the MID function to extract each digit from the column of values in column **A**, and the resulting individual numerals are displayed in columns **C** through **H**. Next, I totaled the occurrence for each number 1 through 9 in the summary box and charted the results.

E4 =MID($A4,E$3,1)

	A	B	C	D	E	F	G	H	I	J	K	L
3	Revenue		1	2	3	4	5	6				
4	47,520		4	7	5	2	0				1	123	18.3%
5	91,463		9	1	4	6	3	.			2	80	11.9%
6	356,040		3	5	6	0	4	0			3	57	8.5%
7	154,276		1	5	4	2	7	5			4	66	9.8%
8	113,924		1	1	3	9	2	3			5	68	10.1%
9	94,936		9	4	9	3	6	.			6	60	8.9%
10	90,305		9	0	3	0	5	.			7	90	13.4%
11	394,276		3	9	4	2	7	5			8	62	9.2%
12	116,122		1	1	6	1	2	1			9	66	9.8%
13	92,621		9	2	6	2	0	.				672	100.0%
14	69,466		6	9									
15	261,005		2	6									
16	57,024		5	7									
17	181,988		1	8									
18	121,198		1	2									
19	432,900		4	3									
20	96,768		9	6									
21	121,198		1	2									
22	121,198		1	2									
23	110,772		1	1									
24	128,563		1	2									
25	128,563		1	2									
26	76,032		7	6									
27	110,772		1	1									
28	110,772		1	1		0	7	7	2				
29	91,224		9	1		2	2	4					

In this example, the data does appear to ever so slightly adhere to Benford's Law as the first 4 bars in the chart and a few others seem to come close to matching Benford's declining curve.

According to Benford's Law one would expect lower numerals to appear more frequently than higher values, but why? Lower digits (1, 2,& 3) tend to appear more frequently than higher digits (7, 8, & 9) because it is easier to own 1 acre than 9 acres; and more people have $100 than $900. Lower numbers are typically more achievable than higher numbers in many situations. For this

reason, we would expect to see an analysis of numbers form a slightly curved declining chart like this one:
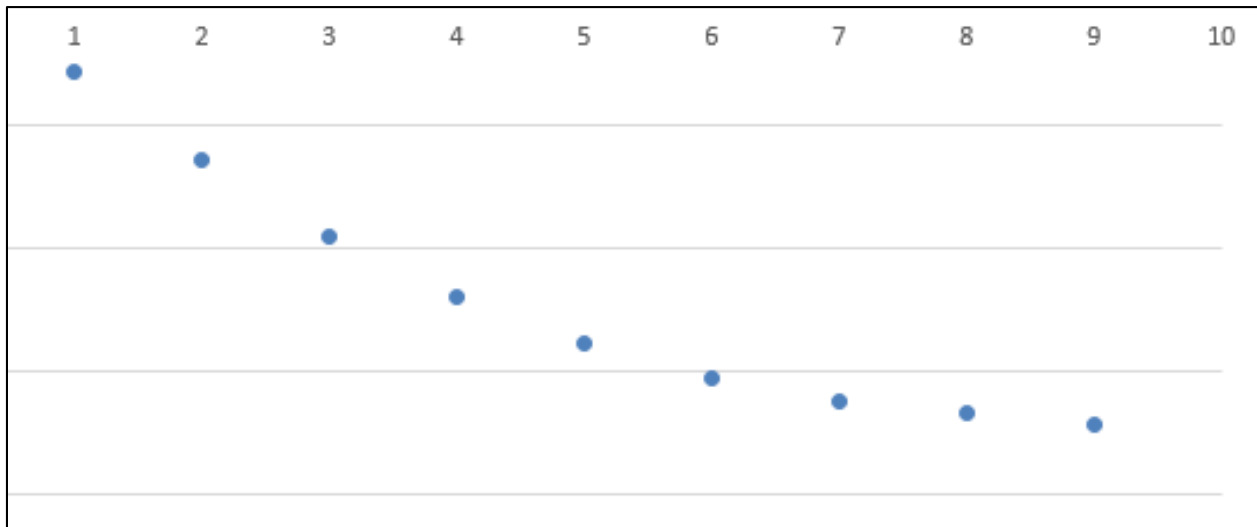
However, the presence of the leading digit may significantly skew the data, therefore, we could ignore the leading digit and analyze the occurrence of the remaining 8 numerals in an effort to determine whether or not the data appears to roughly follow Benford's Law. Ignoring the leading digit reveals the following analysis.
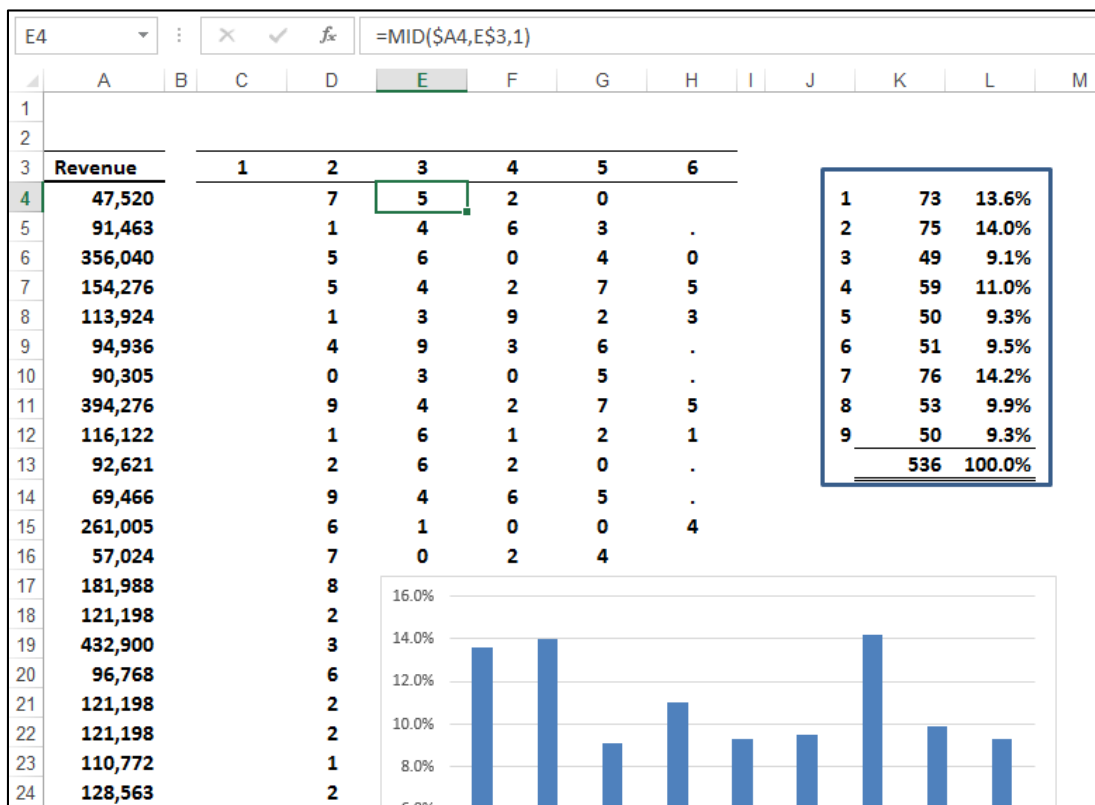
As expected, the numeral 1 occurs less often than when the leading digits were included. Still, with the leading digit ignored, the data appears not to follow Benford's Law.
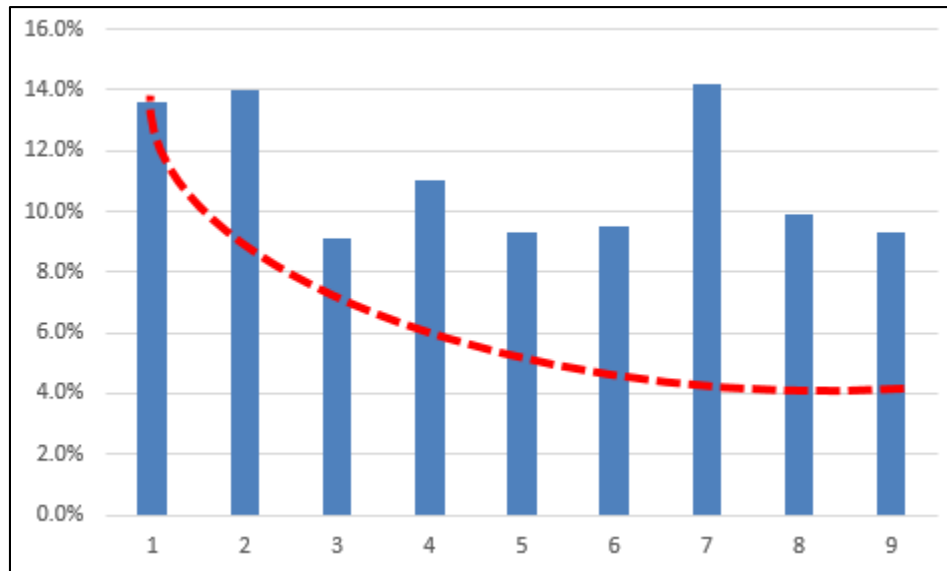
Conclusion

This case study was intentionally brief and is only intended to convey the general ideas related to Benford's law. The forensic CPA may choose to run these numbers to help confirm suspicions or beliefs related to the authenticity of a large data set of numbers in question. There are probably many instances where this approach would offer little value, however in a high ticket audit with high potential for fraud, running Benford's Law analysis is a rather quick exercise which may offer insights to help the forensic CPA determine how to best proceed.

Using Regression to Create Budgets &

Using Budgets to Detect and Prevent Fraud

Excel provides the ability to extrapolate data from your accounting system to produce budgets, projections or forecasts using the least squares method of linear regression. The process is extremely easy as illustrated in the following example.

A Quick Example:

In this example I have exported the income statements for the past six years from my QuickBooks accounting system. The next step is to highlight these five columns (from 2009 through 2013 as shown below), and drag the Fill Handle to project 2014 beginning budget values. *(Please note that in this example I have selected the entire columns and the Fill Handle is shown in the upper right hand corner of the selected range.)*

Using the Fill Handle to Create a Budget for 2014 based on Five Years of Actual Data

Why Does This Work?

But why does this work? How can a simple drag of a mouse create a sophisticated budget? To better understand the underlying workings of this concept, let's start with a more simplified example using simple regression.

Simple Regression Example:

In the screen below we start with three columns of data for the months of *January*, *February* and *March*.

	A	B	C	D	E	F	G
1	Sales Forecast for the Second Quarter						
2							
3		Jan	Feb	Mar			
4	Dept 1	343	476	588			
5	Dept 2	455	459	755			
6	Dept 3	327	633	589			
7	Dept 4	432	455	512			
8		1,557	2,023	2,444			
9							Jun

Start with Three Simple Columns of Data

Simply highlight the three columns and drag the Fill Handle out an additional three columns. The result is that Excel fills in new columns for *April*, *May* and *June* – including column headings, column totals and forecast data, as pictured below.

	A	B	C	D	E	F	G
1	Sales Forecast for the Second Quarter						
2							
3		Jan	Feb	Mar	Apr	May	Jun
4	Dept 1	343	476	588	714	837	959
5	Dept 2	455	459	755	856	1,006	1,156
6	Dept 3	327	633	589	778	909	1,040
7	Dept 4	432	455	512	546	586	626
8		1,557	2,023	2,444	2,895	3,339	3,782

*The Fill Handle Uses Regression to Project **April, May** and **June***

Explaining Regression:

So where does this new data come from? The answer is that Excel uses linear regression to produce this data. Excel evaluates the data for *January, February,* and *March* on a row by row basis, and uses this information to project the subsequent variables. To help you better understand this concept, here is how regression works from a visual perspective:

1. Once again, a simple example using Excel's Fill handle. The 8 month's of data yields a projected value of 5,967.

	A	B	C	D	E	F	G	H	I	J
1	1	2	3	4	5	6	7	8	9	
2	4,325	5,433	4,776	5,223	4,766	5,788	6,223	5,344	5,967	
3										5,967

2. This time we use the same data, but instead of using the Fill handle, we use the **SLOPE** and **INTERCEPT** functions to solve for month 9's projected value.

As you can see above, the slope and intercept functions produce the exact same result as does dragging the Fill Handle, thus proving that the math used by Excel is accurate.

Yet another way to produce the same results is to use the **FORECAST** function, as follows:

As you can see in this above example, the **FORECAST** function also produces the same result as the Fill Handle and the **SLOPE** & **INTERCEPT** calculations.

All three of these forecast calculations, which produce the same identical values, can be viewed visually by creating a **Scatter Chart**, and then applying a **Trendline**, as follows:
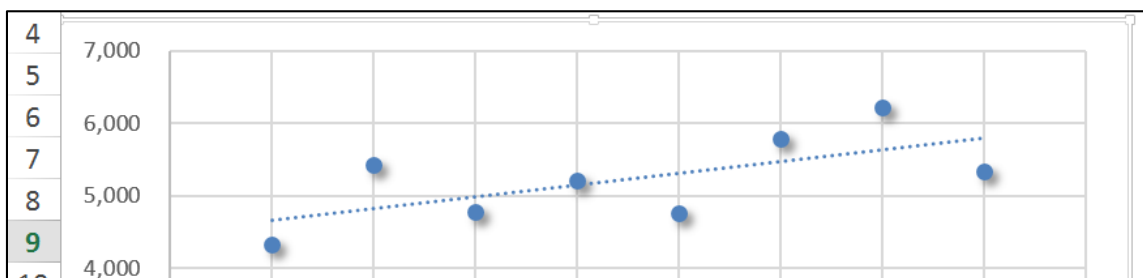
The dotted trend line above is based on linear regression as described in the preceding paragraphs. To forecast future values, Excel simply extends this trend line, and then uses the intervals of the original data to plot future values, as suggested by the red dotted arrows below.
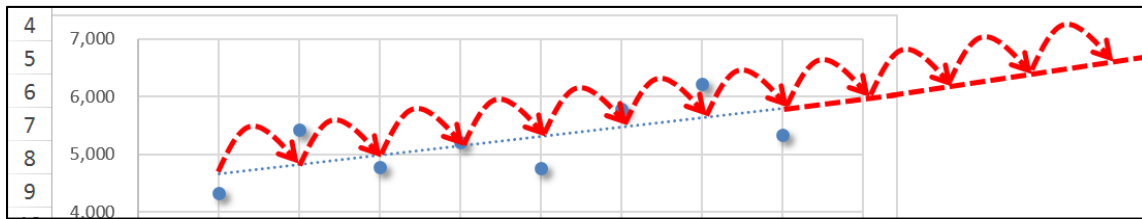
Now watch what happens when we base the trendline on logarithmic regression instead of linear regression. In the chart below, we see that the trendline is now curving slightly.
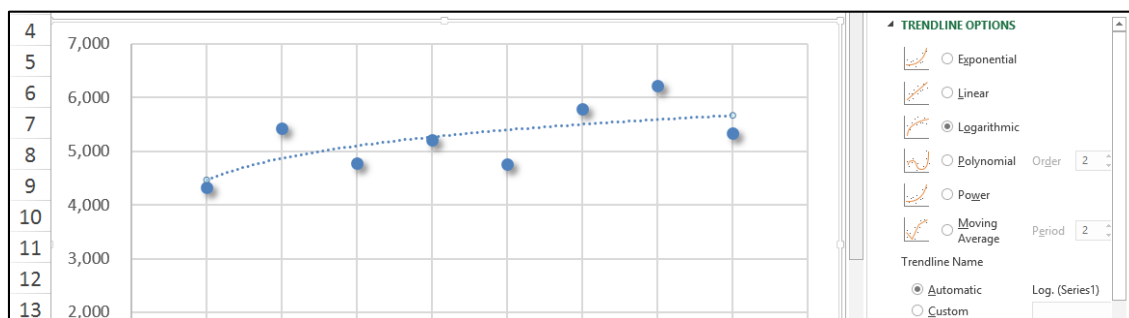
Non-Linear Regression:

Excel provides 5 forms of non-linear regression *(as shown in the Trendline Options box in the image above)* – Exponential, Logarithmic, Polynomial, Power and Moving Average. Collectively, these 5 Trendline options are based on different forms of non-linear regression, which is explained in detail on this Wikipedia page http://en.wikipedia.org/wiki/Nonlinear_regression**.** The Wikipedia's explanation is very complicated, but to simplify: non-linear calculations weight the data points differently based on their position on the trendline (with linear regression all data points are weighted the same). Some mathematicians and CPAs maintain that non-linear methods produce more accurate results as more recent data points tend to be more relevant to producing a trend than older data points.

You can calculate forecast values in Excel using the Exponential form of regression by using the **GROWTH** function, as follows.

Notice that the projected value for month 9 is 5,995.86 using Exponential regression, which in this example which is 29.22 higher than the projected value based on linear regression.

The simplest way to forecast values using **Exponential** regression is to drag the **Fill Handle** while holding down the right mouse button, then selecting Growth from the popup menu as pictured below.
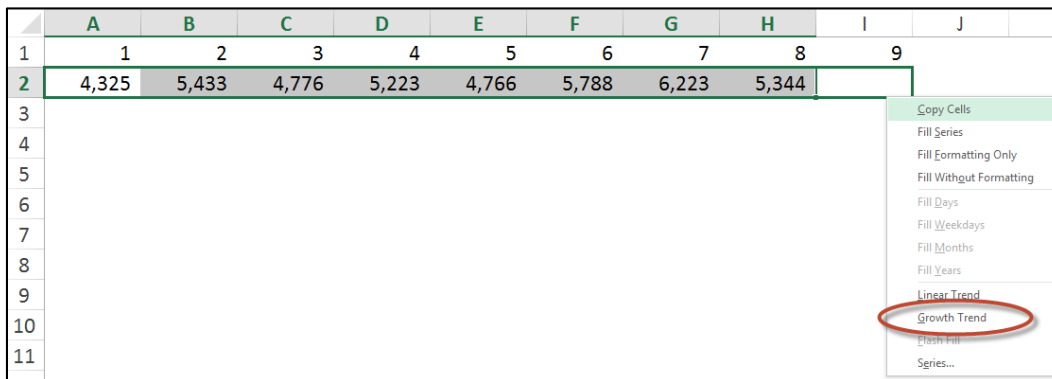
This action will fill in the 9th month with a forecast value based on exponential regression instead of linear regression.

LINEST and TREND Functions

Although not used in this case study, you should be aware that Excel provides two additional forecasting functions - **LINEST** and **TREND.** These functions basically forecast values using linear regression exactly like the **FORECAST** function. The **FORECAST** and **TREND** functions are simpler to use than **LINEST**, but the advantage of the **LINEST** function is that it can also be used as an **Array** function to fill in values for a large range of data. Presented below is a simple example of the **LINEST** function.
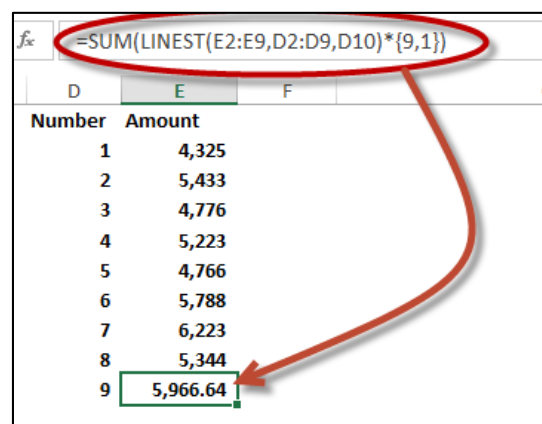
Data Analysis ToolPak

To use the LINEST function most efficiently, you should first load Excel's Analysis ToolPak, as follows. From the **File** tab, select **Options**, **Add-Ins**. In the Manage box, select **Excel Add-ins,** then click **Go**. In the Add-Ins dialog box, select the **Analysis ToolPak** check box, and then click OK. The Data Analysis ToolPak will then appear in your Data Ribbon.
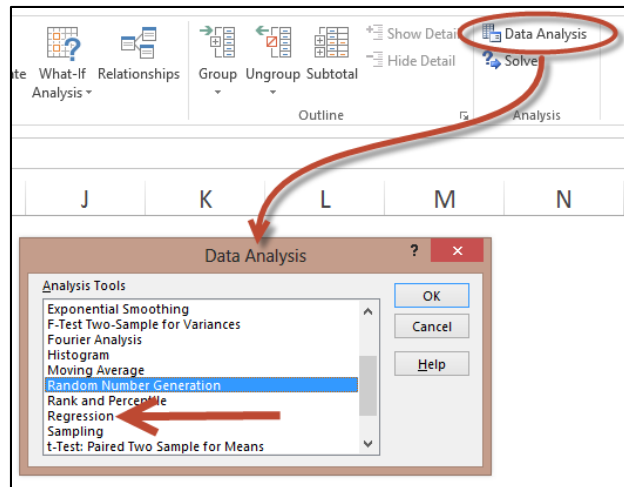
The **Data Analysis ToolPak's** Regression analysis tool uses the **LINEST** function to perform more complicated regression analysis which includes controlling the confidence levels and calculating and plotting residuals. The screenshot below shows an example of the Analysis ToolPak's Regression tool along (shown in the dialog box) and an example of the output generated by this tool beginning in column H. As you can see the output is very complicated, but the resulting output can then be used to fine tune various regression calculations.

Closer inspection of the ToolPak's regression tool reveals options for setting the **Constant to Zero**, adjusting the **Confidence Level**, and utilizing a combination of **Residuals**, **Standardized Residuals**, **Residual Plots**, **Line Fit Plots**, and **Normal Probability Plots**.
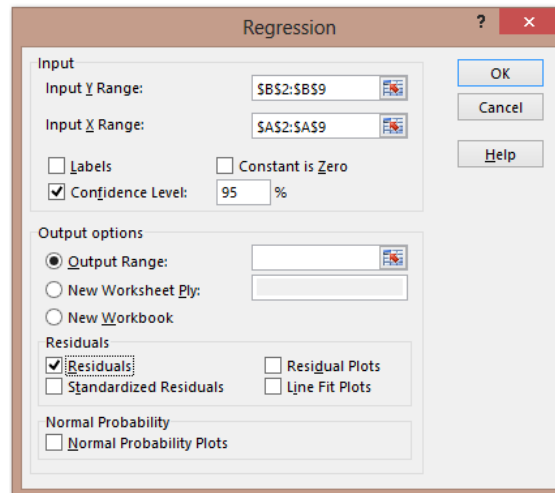
These detailed aspects of regression are beyond the scope for our particular budgeting purposes, but following are links for those that wish to delve further:

1. The 2002 report *Using Dummy Variables in Regression* by Hun Myoung Park of Indiana University (www.iuj.ac.jp/faculty/kucc625/documents/dummy.pdf is a good place to start for educating yourself about these variables.

2. This Wikipedia page titled *Errors and residuals in statistics* goes further in depth into residuals. (http://en.wikipedia.org/wiki/Errors_and_residuals_in_statistics)

3. A 6-page Duke University report walking you through an example for using the Data Analysis ToolPak's Regression tool is available here (http://tinyurl.com/cueqap2).

Shortcomings with the Data Analysis ToolPak's Regression Tool:

To be fair, I should point out that Excel's ToolPak Regression tool has a number of shortcomings, including:

1. *Missing Functionality* – Other regression tools offer hierarchical regression and case weighting, but Excel's tool does not.

2. *Inadequate Diagnostic Charts* - Several common diagnostic charts are not included in Excel (for example, scatterplot charts, residuals against predicted values, and normality plot of the residuals.) Charting typically goes hand-in-hand with forecasting to help visualize the results.

3. *No Standardized Coefficients* – Without a standardized coefficient, it may be difficult to interpret your results.

4. *Inadequate Diagnostic Statistics* – The lack of collinearity diagnostics makes it more difficult to understand the forecast data model, although Excel's **PEARSON, RSQAURE** and **SKEW** functions could be used to aide in understanding.

Regression Warning

Regression only works when the underlying data follows a consistent trend. If revenue has grown steadily for the past six years, then regression will likely project a reasonable value for year seven. However if revenue has jumped all over the board for the past six years, then regression will likely give you a worthless projection for year seven.

> *For example, consider that in the past five years gasoline prices jumped from $1.60 per gallon to more than $4.00 per gallon. If you use regression to predict gasoline prices for future years based on this prior increase, regression will likely predict gasoline prices in the $10.00+ per gallon range – but let's hope that such a prediction would be inaccurate – right?*

Testing Data's Suitability for Regression Calculations

Therefore, you should always visit each line item in the projection and consider whether the projected values make sense. Excel provides at least two good functions to help you accomplish this task – **PEARSON** and **RSQUARE**. For example, in the screen shot below, I have calculated the suitability of 5 different sets of data for regression, using both the **PEARSON** and **R SQUARE** functions. The first data set on row three has a perfect trend and scores a 100% in both the **PEARSON** and **R SQUARE** calculations. However, the data sets that follow are comprised of an increasingly less perfect trend, and the declining **PEARSON** and **R SQUARE** scores reflect this decline.

J3			fx	=PEARSON(A3:H3,A2:H2)							
	A	B	C	D	E	F	G	H	I	J	K
1										Pearson	R Square
2	1	2	3	4	5	6	7	8			
3	20	40	60	80	100	120	140	160		100%	100%
4											
5	1	2	3	4	5	6	7	8			
6	20	55	111	80	100	120	140	160		93%	86%
7											
8	1	2	3	4	5	6	7	8			
9	20	55	111	80	100	222	140	160		81%	66%
10											
11	1	2	3	4	5	6	7	8			
12	20	55	111	80	100	222	140	333		86%	74%
13											
14	1	2	3	4	5	6	7	8			
15	20	444	111	80	100	222	140	333		21%	4%

For example, I might conclude that the first four sets of data were found to have a sufficient trend as to provide a suitable basis for regression calculations but that the data set in row 15 does not. You should establish your threshold and consistently stick to that threshold. In this case, I might require a minimum 80% **PEARSON** score and 65% **R Square** score in order to justify reliance on that data as a basis for regression forecasting.

Two More Statistical Measures

Two other Excel functions that might also be useful for analyzing the suitability of data for regression include **KURTOSIS** and **SKEW**, which both measure the symmetry of data along a bell curve. For example, data that is perfectly symmetrical will yield a **SKEW** score of 0 (zero). The closer a data's **SKEW** is to zero, the less suitable that data is for regression, because the data's trend is considered unreliable, be it trending upwards or downwards. The **KURTOSIS** works similarly, although it's scoring is different as it is designed to measure multiple peaks, whereas the **SKEW** measures a single Peak.

Alternatives To Regression

If data is found to be inadequate for regression calculations, then other forecasting methods will be necessary. For example, you might:

1. **Inflation Forecasting -** Forecast future amounts based on prior year amounts inflated for inflation, increases in the consumer price index, or some other inflation factor.

2. **Percentage Forecasting** - Forecast future amounts as a percentage of another line item, such as sales or payroll. For example, **Cost of Goods Sold (COGS)** might be forecast as 45% of forecast **Sales** since historically, COGS does approximate that percentage amount. Or you might forecast **Fringe Benefits** as 15% of **Payroll** since historically, **Fringe Benefits** do approximate that percentage amount.

3. **Best Guess Forecasting** - You might come up with another forecast amount based on discussions with department heads. For example, the training budget might be forecast much higher than regression, inflation, or percentage methods because you know that since the new version of Windows 8 and Office 2013 will be implemented, a significantly higher than normal amount of training will be needed to bring everyone up to speed on those products.

Always Use Your Better Numbers When You Have Them

(This should be obvious to all, but I will say it anyway…) Of course some budget line items should never be forecast using regression or other forecasting methods because they are known amounts. For example, regression may suggest that rent expense might be $236,433.12 for January 2014, but since I have signed a lease agreement, I know that rent expense will be exactly $220,000 for January 2014, so that is the amount I will use. The same goes for known line items such as depreciation expense, web-hosting expenses, interest payments on outstanding loans,

and any other contractually known obligations. You would always use these more accurate numbers instead of regression's projected numbers.

Critical Key Point to Understand

The key point is that regression represents a starting point for many of the budget line items, but not all budget line items. In all probability, a combination of forecasting methods will need to be applied depending on each particular line item – regression should not be relied upon for all forecast data.

Detailed Budget Example Using Regression

Starting with Dynamics GP

Now that we've discussed the various concepts related to regression, you are now ready to see it in action. In this example, we will start by exporting 4 years' worth of income statement data from Dynamics GP to Microsoft Excel (virtually every accounting system on the planet enables users to complete this step). In Dynamics GP, we start by printing a 36-month income statement to the screen (as pictured below) and exporting it to Excel.

Next in Excel, Regression Creates the Initial Budget

Once in Excel, to create the initial budget, select the 36 columns with numeric data, then left click and drag the "Fill Handle" out twelve additional columns to create the 2014 budget, as suggested below.
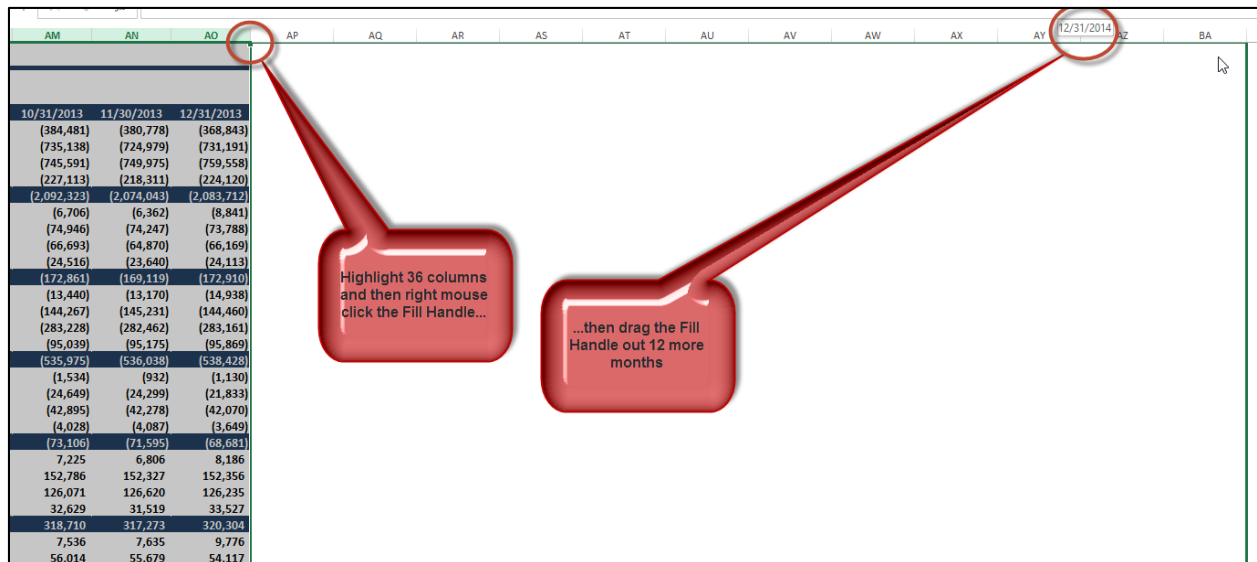
The result is that Excel uses linear regression analysis to predict the future values. Keep in mind that this is just an initial starting point.

Overwrite those line items where you have better numbers

Once we have completed this process, we then insert better numbers on those line items where we have better budget amounts. For example, the current lease agreement will provide the most accurate amount to use for rent expense. We would use our depreciation schedule to provide the most accurate amounts for depreciation expense. For interest expense, we would look to the loan amortization schedule to prove these numbers (and so on). However for those numbers where you have no better basis to use for budget preparation purposes, why not use linear regression analysis to provide the answer?

To accomplish this task, it is best to use the split screen tool to split the screen into four areas so you can easily see the row descriptions and column headings for the corresponding budget line items you are working with. (Excel 2013 no longer provides split screen tools on the scroll bars as did Excel 2003, 2007 and 2010 – you must click the **Split Screen** tool icon on the **View** tab and then adjust the splits by dragging them). Now scroll each line item and ask yourself if you have a more accurate basis for forecasting that line item, and if so, insert those more accurate values. For example, I have inserted new depreciation values (highlighted in grey) in the screenshot below.

		AP	AQ	AR	AS	AT	AU
Category	**Description**	**1/31/2014**	**2/28/2014**	**3/31/2014**	**4/30/2014**	**5/31/2014**	**6/30/2014**
Insurance	Liability Insurance	1,058	976	895	813	732	650
Insurance	Casualty Insurance	9,899	9,863	9,827	9,792	9,756	9,720
Insurance Total		13,169	12,800	12,431	12,063	11,694	11,325
Depreciation	Depreciation Expense - Furniture & F	5,100	5,100	5,100	5,100	5,100	5,100
Depreciation	Depreciation Expense - Computer Eq	3,800	3,800	3,800	3,800	3,800	3,800
Depreciation	Depreciation Expense - Machinery &	2,400	2,400	2,400	2,400	2,400	2,400
Depreciation	Depreciation Expense - Fleet Vehicles	22,000	22,000	22,000	22,000	22,000	22,000
Depreciation	Amortization - Software	2,379	2,355	2,332	2,308	2,284	2,260
Depreciation Total		35,679	35,655	35,632	35,608	35,584	35,560
Repairs	Repairs & Maintenance Expense-Staf	10,666	10,789	10,912	11,034	11,157	11,280
Repairs	Repairs & Maintenance Expense-Line	1,652	1,529	1,405	1,282	1,158	1,035
Repairs Total		12,318	12,317	12,317	12,316	12,316	12,315
Purchases	Fixed Assets- Computer Cabinets	(1,365)	(1,477)	(1,588)	(1,700)	(1,812)	(1,924)
Purchases	Salaries and Wages - Purchasing/Rec	8,059	8,025	7,992	7,959	7,925	7,892

Document Your Budget Values

For each line item you change, you should document the basis for that budget line item with an Excel comment, (or some other method such as an adjacent in-cell comment). For example, in the screenshot below, I have inserted **Comments** next to each account description indicating the line item's forecasting basis. Comments are indicated by small red triangles in the upper right corner of a cell and the comment is displayed whenever you hover over the red tick mark with your mouse.

To print comments, select **Page Setup** from the **Page Layout** tab, and on the **Sheet** tab select **At end of the sheet** from the **Comments** dropdown box, as pictured on the left below. Note that the comments do not show up in Print Preview, but they do appear as a printed page at the end of your print out; an example of which is pictured on the right below.
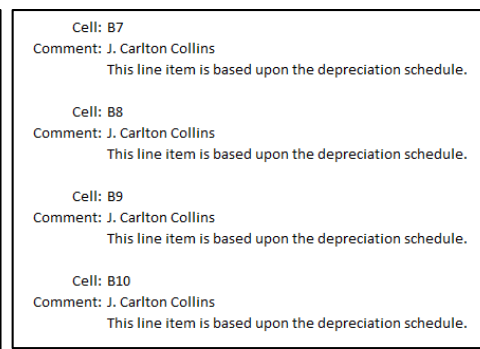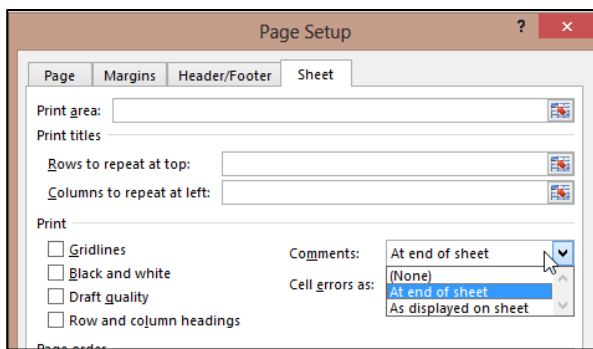
Testing Data for Regression Suitability

Next we will test each line item's data for regression suitability. This step will help us determine which rows, if any, need to be forecast using a method other than regression. We start this process by labeling a couple of blank columns **Pearson** and **R Square**, then enter the respective formulas to test the 36 columns of data row–by–row, as shown below, on the left.

Notice that both the **PEARSON** and **R SQUARE** formulas return percentage values that are both negative and positive, which means the data is trending upward or downward. Since we don't care which direction the data is trending, (we only care that it scores high), we can edit the formulas to include the **ABSOLUTE** function (**ABS**) which changes all amounts to positive numbers, as picture above on the right.

Now we can set our thresholds to minimum scores, let's say 50% (Pearson) and 40% (R Square) for example, then apply conditional formatting to flush out those line items that meet our stated criteria. As pictured to the right, those line items in columns BB and BC containing formatting are not suitable for regression based on our stated criterion level, and another forecasting method will need to be used to forecast those amounts. For example, we may simply use last year's number inflated by the consumer price index.

Budget Totals

Now that we have generated regression amounts, and overwritten those amounts where we have more accurate numbers and also those where regression is not suitable, we continue by totaling the 12 months to produce the annual 2014 budget amounts, as pictured below.

BB6			f_x	=SUM(AP6:BA6)	
AV	AW	AX	AY	AZ	BB
8/31/2014	**9/30/2014**	**10/31/2014**	**11/30/2014**	**12/31/2014**	**2014 Total**
(366,455)	(366,156)	(365,857)	(365,559)	(365,260)	(4,402,830)
(751,798)	(754,374)	(756,949)	(759,525)	(762,101)	(8,975,209)
(763,546)	(764,044)	(764,543)	(765,041)	(765,540)	(9,153,578)
(214,475)	(213,270)	(212,064)	(210,858)	(209,653)	(2,595,401)
(2,096,273)	(2,097,844)	(2,099,414)	(2,100,984)	(2,102,554)	(25,127,018)
(9,643)	(9,743)	(9,843)	(9,943)	(10,044)	(113,907)
(73,397)	(73,349)	(73,300)	(73,251)	(73,202)	(881,646)
(66,731)	(66,801)	(66,872)	(66,942)	(67,012)	(799,508)
(24,921)	(25,021)	(25,122)	(25,223)	(25,324)	(297,230)
(174,692)	(174,914)	(175,137)	(175,360)	(175,582)	(2,092,292)
(15,155)	(15,182)	(15,209)	(15,236)	(15,263)	(181,370)
(144,112)	(144,068)	(144,025)	(143,981)	(143,938)	(1,730,125)
(282,923)	(282,894)	(282,864)	(282,834)	(282,804)	(3,395,614)
(97,073)	(97,224)	(97,374)	(97,524)	(97,675)	(1,162,169)
(539,263)	(539,367)	(539,472)	(539,576)	(539,680)	(6,469,278)
(140)	(17)	107	231	354	(3,909)

The purpose of totaling the annual budget is so we can adjust the monthly budget for seasonality, as discussed below.

Adjusting for Seasonality

Annual budget amounts are not very useful because they do not allow you to compare actual to budgeted results on a monthly basis – you must produce monthly budget amounts. However, simply dividing an annual budget by 12 to produce monthly amounts is not good enough because many line items are typically seasonal. For example, actual revenue may be twice as high in some months compared to other months, but comparing these seasonal sales amounts to a non-seasonal budget is virtually meaningless because you can't tell whether you are on target, off target, or by how much. Therefore, it is difficult to determine whether corrective measures are needed on a month to month basis.

Seasonal budgets make a big difference. I believe one of the primary reasons companies fail to properly analyze their budgets to actuals throughout the year is because their budgets are not seasonal to begin with, and therefore such comparisons are virtually meaningless.

To add seasonality to your budget; simply spread the annual amount of each budget line item across the 12 months based on the ratio of last's year's monthly amounts compared to last year's annual amount, as follows.

Start by creating column headings for the seasonal budget, as pictured below.

	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN
	10/31/2014	11/30/2014	12/31/2014	2014 Total	1/31/2014	2/28/2014	3/31/2014	4/30/2014	5/31/2014	6/30/2014	7/31/2014	8/31/2014	9/30/2014	10/31/2014	11/30/2014	12/31/2014
	(365,857)	(365,559)	(365,260)	(4,402,830)												
	(756,949)	(759,525)	(762,101)	(8,975,209)												

Next, enter a formula using last year's January value (as of January 2013) as a the numerator and the **SUM** of all of 2013's values as the denominator, and then multiplied times the 2014 annual budget amount (**=AD6/SUM($AD6:$AO6)*$BB6**), as pictured below.

=AD6/SUM($AD6:$AO6)*$BB6

	AZ	BA	BC	BD	BE
2014	12/31/2014	2014 Total	1/31/2014	2/28/2014	3/31/20
5,559)	(365,260)	(4,402,830)	(362,903.88)		
9,525)	(762,101)	(8,975,209)			
5,041)	(765,540)	(9,153,578)			
0,858)	(209,653)	(2,595,401)			
0,984)	(2,102,554)	(25,127,018)			

Notice in this formula I have used dollar signs to anchor the column references so that I may copy the formula down and across to complete the seasonality adjustments.

11/30/2014	12/31/2014	2014 Total	1/31/2014	2/28/2014	3/31/2014	4/30/2014	5/31/2014	6/30/2014
(365,559)	(365,260)	(4,402,830)	(362,903.88)			(359,212.72)	(366,632.67)	(362,603.60)
(759,525)	(762,101)	(8,975,209)	(719,09.39)	(730,040.66)	(739,117.82)	(741,515.58)	(741,454.61)	(751,384.88)
(765,041)	(765,540)	(9,153,578)	(774,8.41)	(778,065.95)	(772,370.68)	(762,877.96)	(748,564.47)	(754,722.33)
(210,858)	(209,653)	(2,595,401)	(218,17.23)	(222,228.44)	(215,202.27)	(207,136.46)	(225,332.28)	(222,209.34)
(2,100,984)	(2,102,554)	(25,127,018)	#######	##########	##########	##########	##########	##########
(9,943)	(10,044)	(113,907)	(10,15.66)	(10,269.79)	(9,882.86)	(11,154.00)	(10,221.24)	(9,248.48)
(73,251)	(73,202)	(881,646)	(72,45.61)	(73,308.57)	(73,421.22)	(73,625.58)	(74,218.75)	(74,338.14)
(66,942)	(67,012)	(799,508)	(65,8.95)	(66,629.06)	(66,019.55)	(64,704.74)	(65,976.11)	(66,504.31)
(25,223)	(25,324)	(297,230)	(24,0.33)	(24,931.59)	(23,714.28)	(22,712.10)	(23,429.60)	(24,292.01)
(175,360)	(175,582)	(2,092,292)	(172,717.78)	(175,009.99)	(173,019.74)	(172,033.21)	(173,814.05)	(174,467.23)
(15,236)	(15,263)	(181,370)	(15,265.20)	(15,186.54)	(14,107.76)	(14,323.45)	(15,310.63)	(15,901.71)
(143,981)	(143,938)	(1,730,125)	(142,188.25)	(143,089.06)	(144,130.55)	(145,264.64)	(145,668.30)	(145,382.17)

Rounding & Formatting

It is rather senseless to produce budgets with pennies, or even dollars; I recommend rounding the results by editing the seasonality formula. Edit the seasonality formula adding the ROUND function in front of the formula and "-2" to the end of the formula to round to the nearest hundredths, as pictured.

=ROUND((AD6/SUM($AD6:$AO6)*$BB6),-2)

Now recopy this revised formula (overwriting the previous seasonally adjusted budget data) to update the budget.

11/30/2014	12/31/2014	2014 Total	1/31/2014	2/28/2014	3/31/2014	4/30/2014	5/31/2014	6/30/2014
(365,559)	(365,260)	(4,402,830)	(362,900.00)			(359,200.00)	(366,600.00)	(362,600.00)
(759,525)	(762,101)	(8,975,209)	(719,500.00)	(730,000.00)	(739,100.00)	(741,500.00)	(741,500.00)	(751,400.00)
(765,041)	(765,540)	(9,153,578)	(775,100.00)	(778,100.00)	(772,400.00)	(762,900.00)	(748,600.00)	(754,700.00)
(210,858)	(209,653)	(2,595,401)	(218,200.00)	(222,200.00)	(215,200.00)	(215,200.00)	(207,100.00)	(222,200.00)
(2,100,984)	(2,102,554)	(25,127,018)	##########	##########	##########	##########	##########	##########
(9,943)	(10,044)	(113,907)	(10,100.00)	(10,300.00)	(9,900.00)	(11,200.00)	(10,200.00)	(9,200.00)
(73,251)	(73,202)	(881,646)	(72,500.00)	(73,300.00)	(73,400.00)	(73,600.00)	(74,200.00)	(74,300.00)
(66,942)	(67,012)	(799,508)	(65,900.00)	(66,600.00)	(66,000.00)	(64,700.00)	(66,000.00)	(66,500.00)
(25,223)	(25,324)	(297,230)	(24,300.00)	(24,900.00)	(23,700.00)	(22,700.00)	(23,400.00)	(24,300.00)
(175,360)	(175,582)	(2,092,292)	(172,700.00)	(175,000.00)	(173,000.00)	(172,000.00)	(173,800.00)	(174,500.00)
(15,236)	(15,263)	(181,370)	(15,300.00)	(15,200.00)	(14,100.00)	(14,300.00)	(15,300.00)	(15,900.00)
(143,981)	(143,938)	(1,730,125)	(142,200.00)	(143,100.00)	(144,100.00)	(145,300.00)	(145,700.00)	(145,400.00)

Finally, select a formatted column (such as column BA in this example) and click the Format Painter tool; then highlight the twelve months budget to apply the formatting, as suggested below.
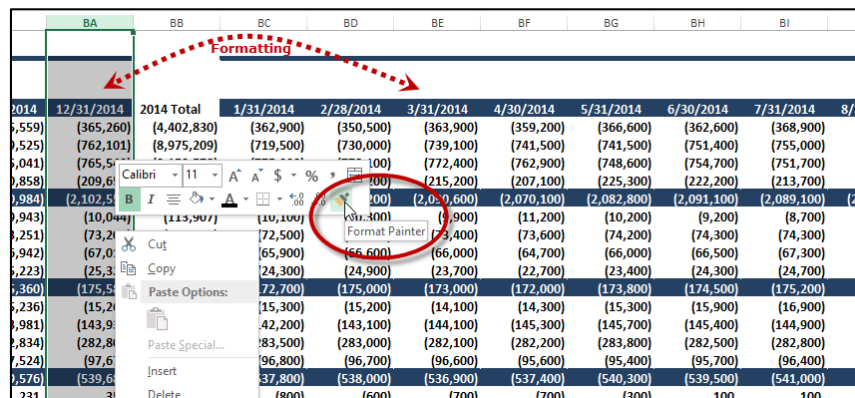
This Income Statement Budget Is Not Yet Completed

At this point, we have prepared a complete monthly budget using regression supplemented with other forecasting methods, and this effort may be sufficient for your needs. However, please be aware that this budget example was simplified in order to more easily convey Excel's regression tools and concepts. There is more to the process for those truly dedicated to creating the most accurate budget possible – keep reading.

Forecasting Revenue

In the example above, for the purpose of explaining regression as simply as possible, I treated the budgeting process for revenue exactly the same as the budgeting process for expenses, but in reality budgeting revenue is usually a different process from budgeting expenses.

For established companies, many projected expenses can be reasonably determined using regression, inflation, percentage of sales or best guess forecasting methods. However, revenue is subject to far greater external factors such as competition, marketing, the state of the economy, inflationary pressures, changing attitudes, etc. For example, the appearance of a new competitor in the marketplace could steal away market share and thus negatively impact

revenue. For example, in late 2012 Apple shares fell from $700 a share to almost $400 a share for no other reason than the prospects that Microsoft's, Google's and Samsung's new tablet PC offerings were expected to eat into Apple's market share.

Negative press related to the quality of your product (such as the gas pedal sticking for Toyotas) could adversely affect sales. By contrast, your product may become wildly popular if a well know celebrity starts wearing or using your product. A good marketing campaign can help significantly, or hurt if it happens to make the wrong impression.

The point is that regression is unable to incorporate factors like this, therefore a more detailed forecasting approach is usually needed. A good budget will consider all of the relevant factors and in the end, you may produce multiple budgets given differing anticipated scenarios.

Simple Example of Revenue Projection Based on Units

In the following example, Crazy Fred's has listed the number of training courses scheduled for each month of the budget year, and has projected attendance for each month based on the average attendance achieved in previous years for those same months. Crazy Fred charges a course fee of $100 per attendee, which is input in cell **A8**. Crazy Fred also knows that the fixed cost of printing the training manual and having the food catered will be $22 and $27, respectively – as input into cells **A11** and **A12**.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**Crazy Fred's Training**														
2															
3			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
4		Number of Training Courses	10	20	25	10	-	10	10	30	30	25	20	20	
5		Projected Attendees Per Course	19.6	22.3	24.0	18.4	-	17.3	16.5	42.3	41.7	38.4	25.3	21.2	
6		Projected Total Attendees	196	446	600	184	-	173	165	1,269	1,251	960	506	424	6,174
7															
8	$ 100.00	Revenue	19,600	44,600	60,000	18,400	-	17,300	16,500	126,900	125,100	96,000	50,600	42,400	617,400
9															
10	**Vaiable Costs:**														
11	$ 22.00	Materials	4,312	9,812	13,200	4,048	-	3,806	3,630	27,918	27,522	21,120	11,132	9,328	
12	$ 27.00	Food	5,292	12,042	16,200	4,968	-	4,671	4,455	34,263	33,777	25,920	13,662	11,448	
13		Total Variable Costs	9,604	21,854	29,400	9,016	-	8,477	8,085	62,181	61,299	47,040	24,794	20,776	
14															
15	**Fixed Costs:**														
16		Meeting Room Lease	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	
17		Brochures & Marketing	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	
18		Miscellaneous	500	500	500	500	500	500	500	500	500	500	500	500	
19			3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	
20															
21	**Profit or (Loss):**		6,746	19,496	27,350	6,134	(3,250)	5,573	5,165	61,469	60,551	45,710	22,556	18,374	

Notice that this projection method does is not based on historical revenue amounts, only historical attendance figures have been used. In this example, the company knows how many classroom venues have been booked and has a fairly decent idea as to what attendance might be; therefore, regression based on historical revenue amounts would not be as accurate as using these known quantities to forecast revenues.

A more sophisticated example of forecasting revenues based on units of production is shown below. In this example, a CPA firm has listed each employee along with each employee's budgeted billable hours and billing rates by month.

CPA Firm Budget

			15.0%	11.4%	12.4%	11.1%	5.1%	4.8%	4.2%	6.0%	6.1%	6.3%	8.3%	9.3%	100.0%

Billable Hours

Employee Name	Title	Annua	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	
Jennifer W.	Partner	1,000	150.0	114.0	124.0	111.0	51.0	48.0	42.0	60.0	61.0	63.0	83.0	93.0	1,000.0
Lynne C.	Partner	1,000	150.0	114.0	124.0	111.0	51.0	48.0	42.0	60.0	61.0	63.0	83.0	93.0	1,000.0
Brenda J.	Manager	1,200	180.0	136.8	148.8	133.2	61.2	57.6	50.4	72.0	73.2	75.6	99.6	111.6	1,200.0
David S.	Manager	1,200	180.0	136.8	148.8	133.2	61.2	57.6	50.4	72.0	73.2	75.6	99.6	111.6	1,200.0
Billy T.	Supervisor	1,400	210.0	159.6	173.6	155.4	71.4	67.2	58.8	84.0	85.4	88.2	116.2	130.2	1,400.0
Craig R.	Supervisor	1,400	210.0	159.6	173.6	155.4	71.4	67.2	58.8	84.0	85.4	88.2	116.2	130.2	1,400.0
Sandra H.	Supervisor	1,400	210.0	159.6	173.6	155.4	71.4	67.2	58.8	84.0	85.4	88.2	116.2	130.2	1,400.0
Mary U.	Senior	1,650	247.5	188.1	204.6	183.2	84.2	79.2	69.3	99.0	100.7	104.0	137.0	153.5	1,650.0
Kris P.	Senior	1,650	247.5	188.1	204.6	183.2	84.2	79.2	69.3	99.0	100.7	104.0	137.0	153.5	1,650.0
Karen B.	Senior	1,650	247.5	188.1	204.6	183.2	84.2	79.2	69.3	99.0	100.7	104.0	137.0	153.5	1,650.0
Phillip L.	Senior	1,650	247.5	188.1	204.6	183.2	84.2	79.2	69.3	99.0	100.7	104.0	137.0	153.5	1,650.0
Nancy H.	Staff	1,800	270.0	205.2	223.2	199.8	91.8	86.4	75.6	108.0	109.8	113.4	149.4	167.4	1,800.0
Jerry M.	Staff	1,800	270.0	205.2	223.2	199.8	91.8	86.4	75.6	108.0	109.8	113.4	149.4	167.4	1,800.0
Benson G.	Staff	1,800	270.0	205.2	223.2	199.8	91.8	86.4	75.6	108.0	109.8	113.4	149.4	167.4	1,800.0
Gloria K.	Staff	1,800	270.0	205.2	223.2	199.8	91.8	86.4	75.6	108.0	109.8	113.4	149.4	167.4	1,800.0
Christine W.	Staff	1,800	270.0	205.2	223.2	199.8	91.8	86.4	75.6	108.0	109.8	113.4	149.4	167.4	1,800.0

Billing Rates   [10]

Employee Name	Title	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
Jennifer W.	Partner	215	215	215	215	215	215	225	225	225	225	225	225
Lynne C.	Partner	225	225	225	225	225	225	235	235	235	235	235	235
Brenda J.	Manager	165	165	165	165	165	165	175	175	175	175	175	175
David S.	Manager	175	175	175	175	175	175	185	185	185	185	185	185
Billy T.	Supervisor	125	125	125	125	125	125	135	135	135	135	135	135
Craig R.	Supervisor	115	115	115	115	115	115	125	125	125	125	125	125
Sandra H.	Supervisor	115	115	115	115	115	115	125	125	125	125	125	125
Mary U.	Senior	85	85	85	85	85	85	95	95	95	95	95	95
Kris P.	Senior	85	85	85	85	85	85	95	95	95	95	95	95
Karen B.	Senior	85	85	85	85	85	85	95	95	95	95	95	95
Phillip L.	Senior	85	85	85	85	85	85	95	95	95	95	95	95
Nancy H.	Staff	60	60	60	60	60	60	70	70	70	70	70	70
Jerry M.	Staff	60	60	60	60	60	60	70	70	70	70	70	70
Benson G.	Staff	60	60	60	60	60	60	70	70	70	70	70	70
Gloria K.	Staff	60	60	60	60	60	60	70	70	70	70	70	70
Christine W.	Staff	60	60	60	60	60	60	70	70	70	70	70	70

Total Revenue:

Employee Name	Title	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Total
Jennifer W.	Partner	32,250	24,510	26,660	23,865	10,965	10,320	9,450	13,500	13,725	14,175	18,675	20,925	219,020
Lynne C.	Partner	33,750	25,650	27,900	24,975	11,475	10,800	9,870	14,100	14,335	14,805	19,505	21,855	229,020
Brenda J.	Manager	29,700	22,572	24,552	21,978	10,098	9,504	8,820	12,600	12,810	13,230	17,430	19,530	202,824
David S.	Manager	31,500	23,940	26,040	23,310	10,710	10,080	9,324	13,320	13,542	13,986	18,426	20,646	214,824
Billy T.	Supervisor	26,250	19,950	21,700	19,425	8,925	8,400	7,938	11,340	11,529	11,907	15,687	17,577	180,628
Craig R.	Supervisor	24,150	18,354	19,964	17,871	8,211	7,728	7,350	10,500	10,675	11,025	14,525	16,275	166,628
Sandra H.	Supervisor	24,150	18,354	19,964	17,871	8,211	7,728	7,350	10,500	10,675	11,025	14,525	16,275	166,628
Mary U.	Senior	21,038	15,989	17,391	15,568	7,153	6,732	6,584	9,405	9,562	9,875	13,010	14,578	146,883
Kris P.	Senior	21,038	15,989	17,391	15,568	7,153	6,732	6,584	9,405	9,562	9,875	13,010	14,578	146,883
Karen B.	Senior	21,038	15,989	17,391	15,568	7,153	6,732	6,584	9,405	9,562	9,875	13,010	14,578	146,883
Phillip L.	Senior	21,038	15,989	17,391	15,568	7,153	6,732	6,584	9,405	9,562	9,875	13,010	14,578	146,883
Nancy H.	Staff	16,200	12,312	13,392	11,988	5,508	5,184	5,292	7,560	7,686	7,938	10,458	11,718	115,236
Jerry M.	Staff	16,200	12,312	13,392	11,988	5,508	5,184	5,292	7,560	7,686	7,938	10,458	11,718	115,236
Benson G.	Staff	16,200	12,312	13,392	11,988	5,508	5,184	5,292	7,560	7,686	7,938	10,458	11,718	115,236
Gloria K.	Staff	16,200	12,312	13,392	11,988	5,508	5,184	5,292	7,560	7,686	7,938	10,458	11,718	115,236
Christine W.	Staff	16,200	12,312	13,392	11,988	5,508	5,184	5,292	7,560	7,686	7,938	10,458	11,718	115,236
		366,900	278,844	303,304	271,506	124,746	117,408	112,896	161,280	163,968	169,344	223,104	249,984	2,543,284

In this example, projected revenue is again based upon units rather than historical revenue amounts, as regression methods applied to historical revenue amounts would likely yield less accurate projections.

Keep in mind that revenue is often more volatile than expenses. An effective marketing program might increase the number of units sold, a bad economy might adversely affect the number of units sold. Any foreseen or expected events like these should be incorporated into the budget and explained in detail.

In conclusion, while the regression example above was used to forecast both revenue and expenses, in many cases regression should probably only be used as a means of forecasting expenses only.

Budgeting Balance Sheets and Cash Flow

In many cases, budgets consist of a profit and loss statement only, but I believe this falls short.

By creating a budgeted balance sheet and cash flow statement, (which requires the creation of a budgeted balance sheet), a company can truly monitor expected results for every account, including the all-important cash flow balance. The process starts by forecasting the balance sheet and once created, forecasting cash flow is a simple matter of crunching the numbers.

To produce a budgeted balance sheet, assumptions are needed related to the days in accounts receivable, accounts payable and inventory. These day calculations are best derived by examining the historical days in accounts receivable, accounts payable and inventory for recent years, and using those amounts as a guide. For example:

1. **AR** - The budgeted accounts receivable balance may be calculated as 46 days of the prior month's sales.

2. **AP -** The budgeted accounts payable balance may be calculated as 28 days of the prior month's variable expenses.

3. **Inventory** - The budgeted inventory balance may be calculated as 62 days of the prior month's COGS amount.

4. **Loan Payments** – Loan repayments should be budgeted based on the actual amortization schedules, based on the principle payment amounts.

5. And so on.

Once the balance sheet items have been budgeted, the resulting cash flow budget is computed as follows:

	A	B	C	D	E	F	G	H	I
2		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
3	Beginning Cash		1,000	3,500	6,450	8,150	8,060	7,500	8,010
4									
5	**Budgeted P&L:**								
6	Revenue		10,000	11,000	12,100	8,000	6,200	15,000	16,500
7	COGS		4,000	4,400	4,840	3,200	2,480	6,000	6,600
8	Gross Margin		6,000	6,600	7,260	4,800	3,720	9,000	9,900
9									
10	Expense 1		500	-	-	-	500	-	-
11	Expense 2		600	1,450	1,750	1,200	800	600	600
12	Expense 3		200	200	200	700	700	1,000	1,000
13	Expense 4		400	400	400	-	-	600	600
14	Expense 5		700	200	450	500	600	600	300
15	Expense 6		1,200	1,200	2,800	3,300	2,100	4,300	3,000
16	Expense 7		100	200	100	200	50	50	100
17	Total Expenses		3,700	3,650	5,700	5,900	4,750	7,150	5,600
18									
19	Profit/Loss		2,300	2,950	1,560	(1,100)	(1,030)	1,850	4,300
20									
21	**Budgeted Balance Sheet:**								
22	A/R (46 days of sales)	1,150	1,260	1,390	1,520	1,010	780	1,890	2,080
23	A/P (28 days of expenses)	(270)	(270)	(270)	(410)	(430)	(350)	(520)	(410)
24	Inventory (62 days of COGS)	790	680	750	820	540	420	1,020	1,120
25	Loan Balance (From Amort. Schedule)	4,200	4,000	3,800	3,600	3,400	3,200	3,000	2,800
26									
27	Change in A/R		(110)	(130)	(130)	510	230	(1,110)	(190)
28	Change in A/P		-	-	140	20	(80)	170	(110)
29	Change in Inventory		110	(70)	(70)	280	120	(600)	(100)
30	Change in Loan		200	200	200	200	200	200	200
31									
32	Ending Cash		3,500	6,450	8,150	8,060	7,500	8,010	12,110

The area in yellow (rows 5 through 19) shows the profit and loss budget as projected using the methods described earlier above. The blue area (rows 21 through 25) depicts the assumptions and the changes in balance sheet balances. The green areas (rows 26 through 32) represent the forecast balance sheets and cash flow forecast. Because the income statement is seasonalized, the balance sheet balances and cash flow forecast will also be seasonalized.

Profit Margin Monitoring &
Calculating Your Desired Profit Margin

It is also useful for companies to budget and monitor their profit margins; a profit margin that misses its target speaks volumes. Once established, budget to actual profit margin comparisons can also be used as benchmarks to help detect fraud, errors or irregularities. To calculate your desired profit margin, I suggest that you work backwards by asking yourself (or your client) two simple questions, for example: Let's assume that Burt has owned and operated a construction company store for the past 17 years. As his CPA, I ask him two questions as follows: How much profit do you want to make next year and how much sales do you anticipate next year?

> *Burt responds – "that's easy, we've been growing at 8% a year for the past five years and last year (2013) we nearly reached $12 million sales, so we will probably hit $13 million in revenue next year (2014). Also, I'd like to make a million dollars profit – I think that's a reasonable goal."*

With just this little bit of data, we can work backwards based on Burt's prior year financial statements and advise him as follows:

	A	B	C	D	E	F	G	H	I	J
1	**Burt's Construction Company**									
2			Actual 2013	2014??						
3		40100 · Construction Income								
4		40100 · Construction Income:40110 · Design Income	1,011,878							
5		40100 · Construction Income:40130 · Labor Income	5,635,423							
6		40100 · Construction Income:40140 · Materials Income	3,225,563							
7		40100 · Construction Income:40150 · Subcontracted Labor Income	2,017,473							
8		40100 · Construction Income:40199 · Less Discounts given	(1,451)							
9		40500 · Reimbursement Income:40520 · Permit Reimbursement Income	36,713							
10		40500 · Reimbursement Income:40530 · Reimbursed Freight & Delivery	26,882							
11			11,952,479	13,000,000						
12										
13		50100 · Cost of Goods Sold	(1,006,290)							
14		54000 · Job Expenses:54200 · Equipment Rental	(9,000)							
15		54000 · Job Expenses:54300 · Job Materials	(2,696,701)							
16		54000 · Job Expenses:54400 · Permits and Licenses	(15,750)							
17		54000 · Job Expenses:54520 · Freight & Delivery	(21,825)							
18		54000 · Job Expenses:54500 · Subcontractors	(1,721,429)							
19		54000 · Job Expenses:54599 · Less Discounts Taken	6,054							
20			(5,464,940)							
21										
22		Gross Margin	6,487,539							
23										
24		60100 · Automobile:60110 · Fuel	(45,212)							
25		60100 · Automobile:60120 · Insurance	(85,507)							
26		60100 · Automobile:60130 · Repairs and Maintenance	(72,180)							
27		60600 · Bank Service Charges	(3,750)							
28		62100 · Insurance:62110 · Disability Insurance	(70,350)							
29		62100 · Insurance:62120 · Liability Insurance	(176,579)							
30		62100 · Insurance:62130 · Work Comp	(373,283)							
31		62400 · Interest Expense:62420 · Loan Interest	(58,892)							
32		62700 · Payroll Expenses:62710 · Gross Wages	(4,049,550)							
33		62700 · Payroll Expenses:62720 · Payroll Taxes	(429,660)							
34		62700 · Payroll Expenses:62730 · FUTA Expense	(9,660)							
35		62700 · Payroll Expenses:62740 · SUTA Expense	(67,350)							
36		63100 · Rent Expense	(382,320)							
37		63600 · Professional Fees:63610 · Accounting	(72,000)							
38		64200 · Repairs:64220 · Computer Repairs	-							
39		64200 · Repairs:64230 · Equipment Repairs	(40,500)							
40		64800 · Tools and Machinery	(60,320)							
41		65100 · Utilities:65110 · Gas and Electric	(31,244)							
42		65100 · Utilities:65120 · Telephone	(25,235)							
43		65100 · Utilities:65130 · Water	(7,920)							
44		69000 · Miscellaneous	(1,650)							
45		70100 · Other Income	3,098							
46		70200 · Interest Income	6,875							
47		Total Fixed Costs	(6,053,190)							
48										
49										
50	TOTAL		434,349	1,000,000						
51										

Plug these assumptions in

Burt's fixed costs are a little more than $6 million in 2012, but let's say that we can adjust this amount down to $5,200,000 because the company was able to renegotiate and sign a new lease agreement. The point is that we are using 2012's fixed cost amount along with any known adjustments. This allows us to work backwards to calculate the projected Gross Margin of $6,200,000.

20		(5,464,940)	
21			
22	Gross Margin	6,487,539	6,200,000
23			
24	60100 · Automobile:60110 · Fuel	(45,212)	
25	60100 · Automobile:60120 · Insurance	(85,507)	
26	60100 · Automobile:60130 · Repairs and Maintenance	(72,180)	
27	60600 · Bank Service Charges	(3,750)	
28	62100 · Insurance:62110 · Disability Insurance	(70,350)	
29	62100 · Insurance:62120 · Liability Insurance	(176,579)	
30	62100 · Insurance:62130 · Work Comp	(373,283)	
31	62400 · Interest Expense:62420 · Loan Interest	(58,892)	
32	62700 · Payroll Expenses:62710 · Gross Wages	(4,049,550)	
33	62700 · Payroll Expenses:62720 · Payroll Taxes	(429,6	
34	62700 · Payroll Expenses:62730 · FUTA Expense	(9,6	
35	62700 · Payroll Expenses:62740 · SUTA Expense	(67,3	
36	63100 · Rent Expense	(382,3	
37	63600 · Professional Fees:63610 · Accounting	(72,0	
38	64200 · Repairs:64220 · Computer Repairs		
39	64200 · Repairs:64230 · Equipment Repairs	(40,500	
40	64800 · Tools and Machinery	(60,320)	
41	65100 · Utilities:65110 · Gas and Electric	(31,244)	
42	65100 · Utilities:65120 · Telephone	(25,235)	
43	65100 · Utilities:65130 · Water	(7,920)	
44	69000 · Miscellaneous	(1,650)	
45	70100 · Other Income	3,098	
46	70200 · Interest Income	6,875	
47	Total Fixed Costs	(6,053,190)	5,200,000
48			
49			
50	TOTAL	434,349	1,000,000

Add Backwards to Derive Gross Margin

From here we can compute **Cost of Goods Sold**, and then divide **Cost of Goods Sold** and **Gross Margin** by **Sales** to derive the desired **Profit Margin** that will cover **Fixed Costs**, **Variable Costs** and still have the desired **Net Income** of $1,000,000 left over. In conclusion, a **Profit Margin** of 47.7% will yield the desired results.

	A / B	C	D	E	F
1	**Burt's Construction Company**				
2		**Actual 2013**	**2014??**		
3	40100 · Construction Income				
4	40100 · Construction Income:40110 · Design Income	1,011,878			
5	40100 · Construction Income:40130 · Labor Income	5,635,423			
6	40100 · Construction Income:40140 · Materials Income	3,225,563			
7	40100 · Construction Income:40150 · Subcontracted Labor Income	2,017,473			
8	40100 · Construction Income:40199 · Less Discounts given	(1,451)			
9	40500 · Reimbursement Income:40520 · Permit Reimbursement Income	36,713			
10	40500 · Reimbursement Income:40530 · Reimbursed Freight & Delivery	26,882			
11		11,952,479	13,000,000		100.0%
12					
13	50100 · Cost of Goods Sold	(1,006,290)			
14	54000 · Job Expenses:54200 · Equipment Rental	(9,000)			
15	54000 · Job Expenses:54300 · Job Materials	(2,696,701)			
16	54000 · Job Expenses:54400 · Permits and Licenses	(15,750)			
17	54000 · Job Expenses:54520 · Freight & Delivery	(21,825)			
18	54000 · Job Expenses:54500 · Subcontractors	(1,721,429)			
19	54000 · Job Expenses:54599 · Less Discounts Taken	6,054			
20		(5,464,940)	6,800,000		52.3%
21					
22	Gross Margin	6,487,539	6,200,000		47.7%
23					

Now that the optimum profit margin is known, let's say that further analysis reveals that the inventory and labor items on average are priced at just 44.5% above cost, as the following calculations show, net income for 2014 would only be expected to reach $585,000 – well below Burt's desired profit.

	A	B	C	D	E	F
1		Burt's Construction Company				
2			Actual 2013	2014??		
3		40100 · Construction Income				
4		40100 · Construction Income:40110 · Design Income	1,011,878			
5		40100 · Construction Income:40130 · Labor Income	5,635,423			
6		40100 · Construction Income:40140 · Materials Income	3,225,563			
7		40100 · Construction Income:40150 · Subcontracted Labor Income	2,017,473			
8		40100 · Construction Income:40199 · Less Discounts given	(1,451)			
9		40500 · Reimbursement Income:40520 · Permit Reimbursement Income	36,713			
10		40500 · Reimbursement Income:40530 · Reimbursed Freight & Delivery	26,882			
11			11,952,479	13,000,000		100.0%
12						
13		50100 · Cost of Goods Sold	(1,006,290)	(1,328,538)		
14		54000 · Job Expenses:54200 · Equipment Rental	(9,000)	(11,882)		
15		54000 · Job Expenses:54300 · Job Materials	(2,696,701)	(3,560,277)		
16		54000 · Job Expenses:54400 · Permits and Licenses	(15,750)	(20,794)		
17		54000 · Job Expenses:54520 · Freight & Delivery	(21,825)	(28,814)		
18		54000 · Job Expenses:54500 · Subcontractors	(1,721,429)	(2,272,688)		
19		54000 · Job Expenses:54599 · Less Discounts Taken	6,054	7,993		
20			(5,464,940)	7,215,000		55.5%
21						
22		Gross Margin	6,487,539	5,785,000		44.5%
23						
24		60100 · Automobile:60110 · Fuel	(45,212)			
25		60100 · Automobile:60120 · Insurance	(85,507)			
26		60100 · Automobile:60130 · Repairs and Maintenance	(72,180)			
27		60600 · Bank Service Charges	(3,750)			
28		62100 · Insurance:62110 · Disability Insurance	(70,350)			
29		62100 · Insurance:62120 · Liability Insurance	(176,579)			
30		62100 · Insurance:62130 · Work Comp	(373,283)			
31		62400 · Interest Expense:62420 · Loan Interest	(58,892)			
32		62700 · Payroll Expenses:62710 · Gross Wages	(4,049,550)			
33		62700 · Payroll Expenses:62720 · Payroll Taxes	(429,660)			
34		62700 · Payroll Expenses:62730 · FUTA Expense	(9,660)			
35		62700 · Payroll Expenses:62740 · SUTA Expense	(67,350)			
36		63100 · Rent Expense	(382,320)			
37		63600 · Professional Fees:63610 · Accounting	(72,000)			
38		64200 · Repairs:64220 · Computer Repairs	-			
39		64200 · Repairs:64230 · Equipment Repairs	(40,500)			
40		64800 · Tools and Machinery	(60,320)			
41		65100 · Utilities:65110 · Gas and Electric	(31,244)			
42		65100 · Utilities:65120 · Telephone	(25,235)			
43		65100 · Utilities:65130 · Water	(7,920)			
44		69000 · Miscellaneous	(1,650)			
45		70100 · Other Income	3,098			
46		70200 · Interest Income	6,875			
47		Total Fixed Costs	(6,053,190)	5,200,000		
48						
49						
50	TOTAL		434,349	585,000		
51						

At this point, you need to convince Burt of the importance of pricing his products and services at the desired profit margin in an effort to target the desired results. To convey this point, you will tell Burt the following laughable story about the Florida boys who started a business in Gainesville, Florida selling onions. It goes like this:

These two Florida boys were running up to Georgia and buying Vidalia onions at 4 for $1.00 which they then took back to Gainesville and sold for a quarter a piece on the

streets. The business was an instant success and soon those boys found themselves selling from a road side stand, to a small store, to a much bigger store. The customers kept coming and the business kept getting bigger. Soon they had customers lined up around the block to buy those onions, which they kept buying 4 for a dollar and selling for 25 cents apiece.

After six months, one Florida boy turned to the other and said – "you know, business is great! But I don't think we're making any money – what do you think we should do?" The other Florida boy thought real hard and then blurted – "I think we need a bigger truck."

OK, it's an old exaggerated story, but there is a lesson to be learned here. If you don't price your products to make a profit, you will never make a profit. And, *if you don't price your products to make your desired profit, you will never make your desired profits*. In our example above, Burt should consider setting his margin pricing to target a profit margin of 47.7%, instead of the current profit margin of 44.5% to ensure a chance of achieving his desired goals. Without this measure, Burt has absolutely no chance of reaching his goals, unless his revenue estimate is wildly under-stated.

To be sure, if Burt's costs go up or down, his prices will need to be adjusted accordingly to provide the desired profit margin. But when you think about it, this approach is one in which Burt sells his goods and services to his customers at the lowest price point possible that covers his fixed costs, variable costs, and desired profit – and not a penny more. It seems reasonable that every company in the world strive for this goal - right?

Here's a simplified way to look at this - suppose your business was to purchase candy bars for resell. Your only options are to sell the candy bars for:

A. *Below cost.*
B. *At cost.*
C. *At cost plus your desired profit.*
D. *At cost plus an egregiously high profit.*
E. *At cost plus some random profit that may or may not be sufficient.*

I can't see how any reasonable person could select any option other then C – yet I see many companies sell their products based on all of these scenarios because they don't take time to calculate their desired profit margin, and then monitor that amount throughout the year.

You can download this Profit margin template at **www.CarltonCollins.com/profitmargin.xlxs**.

Data Analysis Tools

Preparing Data for Data Analysis

Before you start to analyze data using Excel's various data commands such as **Sort**, **Autofilter**, **Subtotal**, **Grouping**, **Consolidate**, or **PivotTable**, you should first inspect your data to determine if it is in *Analysis-Ready* condition. In general, this means that the data must meet the following criteria:

a. **Contiguous Data** – The data should contain no blank rows or blank columns. For example, the screen below shows blank rows (with solid lines). These rows should first be removed before proceeding with the creation of a PivotTable.

b. **Single Row Data** – Some accounting systems produce data that spans two or more rows per transaction. If this is the case, your will need to clean that data so that all related information for a single transaction or data is contained on a single row. For example, the following data contains multiple rows of data related to a single sales order. In this case, the user must move and paste the data to fall on a single row. This is an example of data that requires a great deal of clean up.

c. **Column Headers** - <u>The data should contain a unique header atop each column</u>. For example, the following screen contains two columns labeled **Date**, while columns D and E contain no heading. These are both cases of data that should be cleaned before creating a PivotTable.

<u>If you attempt to analyze data that does not contain a column heading atop all columns, you will sometimes receive an error message, such as the example shown below.</u>
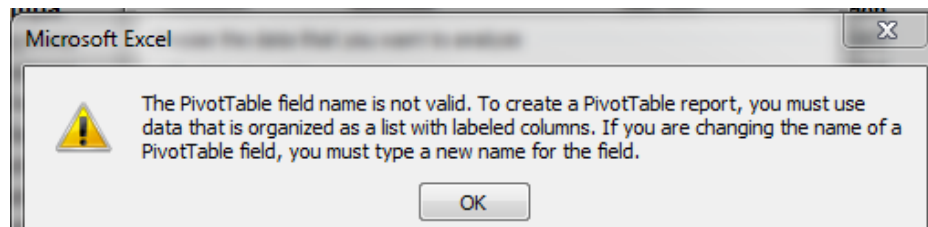
<u>If you have data with the same column heading used more than once, Excel will sometimes alter the column headings, for example when you create a PivotTable, so all headings will be unique.</u>

d. **Row Descriptions** – <u>Generally, your data should repeat row descriptions for each row</u>. For example, the screen below shows that the state and city descriptions are not repeated for each row in columns A & B.

	A	B	C	D	E	F	G	H
3	Carlton's Rental Properties							
4	2012 Analysis							
5								
6	State	City	Type	Manager	Revenue	Expenses	Profit	Vacancy Rate
7	Florida	Daytona	Duplex	Steve	75,254	58,698	16,556	25.5%
8			Duplex	Steve	77,184	87,218	(10,034)	56.4%
9			Duplex	Steve	77,184	68,694	8,490	25.5%
10			Duplex	Steve	76,219	60,213	16,006	54.4%
11			Townhome	Steve	52,140	41,191	10,949	35.6%
12			Townhome	Steve	52,800	59,664	(6,864)	25.5%
13			Townhome	Steve	52,140	41,191	10,949	27.6%
14			Triplex	Ginger	110,772	94,156	16,616	39.8%
15			Triplex	Ginger	121,198	112,714	8,484	45.0%
16			Triplex	Ginger	121,198	112,714	8,484	23.3%
17		Tampa	Apartment	Ginger	128,563	119,564	8,999	39.8%
18			Apartment	Ginger	217,504	184,878	32,626	53.3%
19			Duplex	Steve	79,114	64,873	14,240	25.5%

A solutio for quickly filling in the missing row descriptions is presented later in these materials.

e. **Transposing Headers and Rows** – In some cases, data may need to be transposed because many of Excel's Data tools use the column headings, not the row headings to crunch the data. To do this, copy the data, then select **Paste Special, Transpose, OK** to flip the data around.

f. **Clean Data** – The data must be clean of empty text cells containing spaces, special characters, extra spaces within data, trailing spaces, trailing zeros, leading zeros, etc.

Data Analysis Tools

Excel provides specialized tools for analyzing data and generating financial reports, yet most CPAs are unaware of these tools or haven't tried using them before. Specifically useful are the **Subtotaling**, **Grand Totaling**, **Filtering**, **Consolidating**, **Grouping & Outlining**, **Drilling**, **OLAP Data Cubes**, **PivotTables**, **Sparklines**, **Data Bar Reporting**, **Conditional Formatting**, **Charting**, **Foot Notes and End Notes, Formula Auditing Tools, Error Checking, Functions,** and **Data Analysis Tools**.

The concepts discussed are intended to directly aide the CPA in summarizing, slicing, dicing and analyzing data, and generating related financial reports.

2013 Data Ribbon:
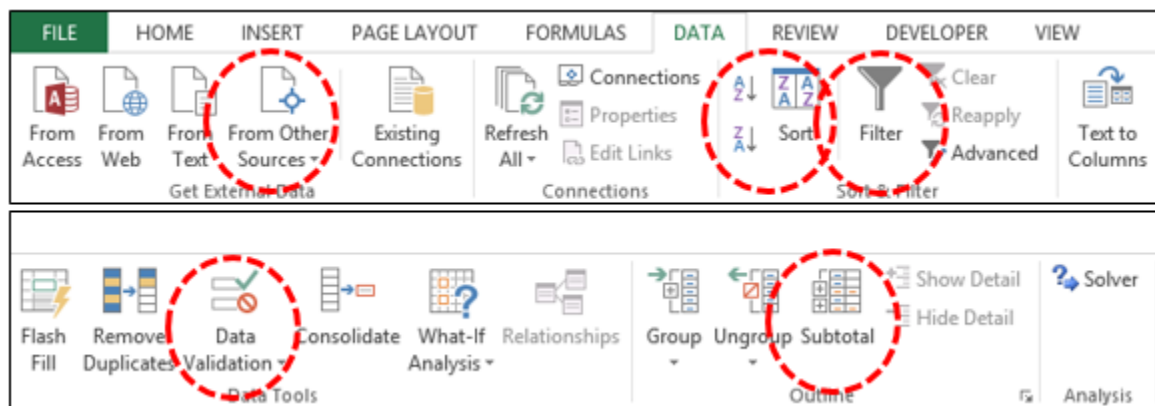
2013 Insert Ribbon:
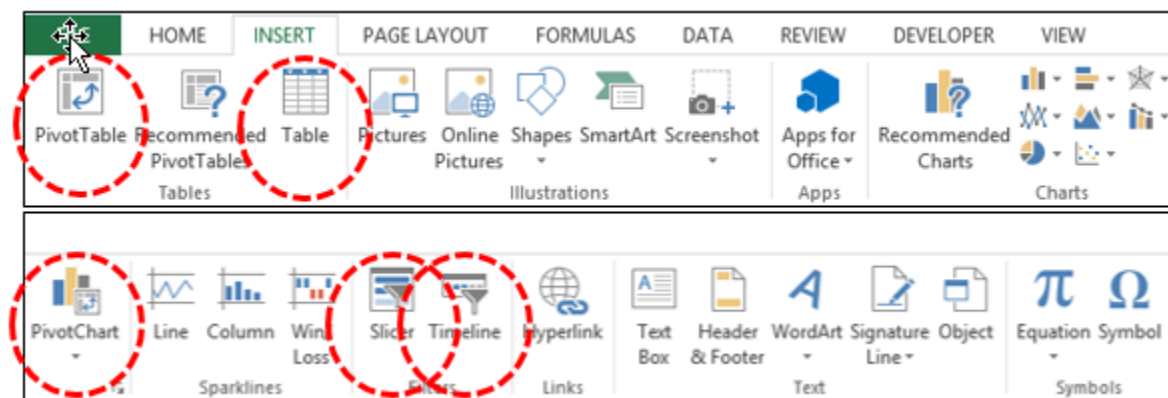
Data Sort

You would think that every Excel user would already know all about sorting data in Excel, but I am frequently surprised to find that many users have missed a few key points related to using this tool. I don't mean to belittle you are talk beneath you, but humor me a copy of paragraphs and let's make sure you are fully up to speed on the following key sorting points:

1. **Contiguous Data** - The "A to Z" sorting tool can sort a large matrix of data without having to highlight the area as long as the data is contiguous; that is to say that your data should contain no blank columns, no blank rows, and the columns must all be labeled with a column heading. When data is contiguous, all you need to do is place your cursor in a single cell in a given column and click the **Sort A to Z** or **Sort Z to A** buttons, and Excel will automatically select the entire matrix for sorting. Surprisingly many users waste a great deal of time highlighting sort ranges prior to sorting, but this step is often unnecessary.

2. **A to Z Button** - Simply place the cursor in the desired column for sorting, and press the A to Z or Z to A button as the case may be. Excel will automatically sort all continuous columns that have headings and all contiguous rows from the top row under the heading labels down to the last row in the selected column that contains data. *(Note - If you accidently select 2 cells instead of just one, your results will not be correct.)*

3. **Sort by 64 Columns -** The "Sort" tool was enhanced beginning in Excel 2007 as it now provides the ability to sort by up to 64 columns, instead of just 3 columns. Presented below is a dialog box which shows this expanded functionality.
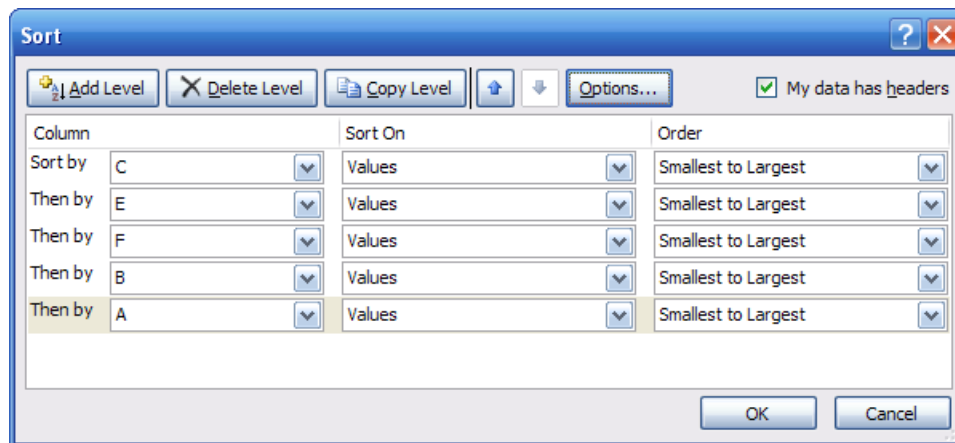
4. **Sort Left to Right** – Excel has always provided the ability to sort left to right. To do so, select the **Sort Options** box in the **Sort** dialog box and click the check box labeled **Sort Left to Right** as pictured below.
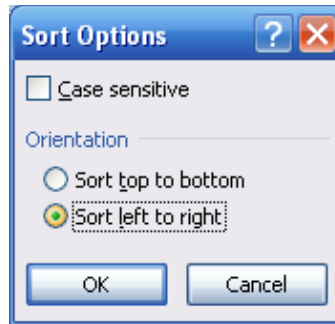
5. **Sort by Color** – beginning with Excel 2007, you can also sort by font color or by cell color, or both. This is handy in many ways. Sometimes CPAs use color to tag or mark certain cells - and later find it useful to be able to sort by those markings. In other situations CPAs use conditional formatting to apply color to cells using a wide variety of rules; and thereafter they can sort the data based on the resulting conditional colors. The two sort-by-color options are pictured below.
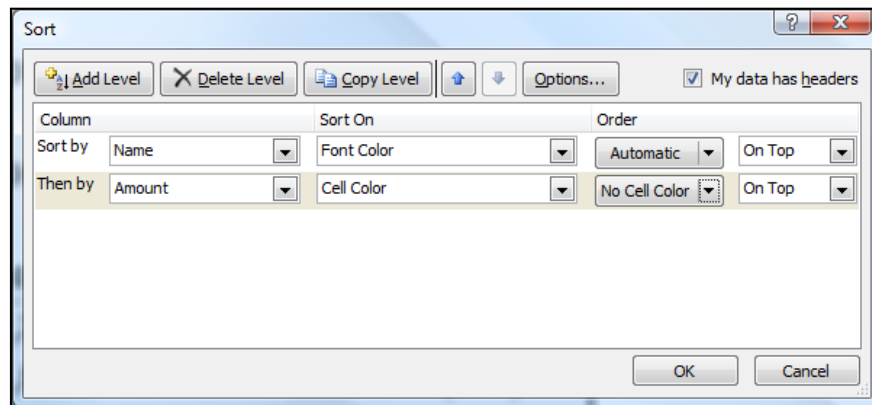
To be fair, it was sort of possible to sort by color in Excel 2003. To accomplish this task, you needed to use the **CELL** function in order to identify information about a given cell such as the cell color or font color. Thereafter, the results of that function could be used to sort rows – which effectively means that you can sort by color in Excel 2003 – but it takes a bit more effort.

6. **Sort By Custom List** – Another sorting capability in Excel is the ability to sort by **Custom List**. For example, assume a CPA firm has ten partners, and the Managing partner prefers to be shown at the top of the list, and the remaining Partners based on seniority. In this case, you could create a Custom List in the Excel Options dialog box listing the partners in the desired order, and then sort future reports based on that order.
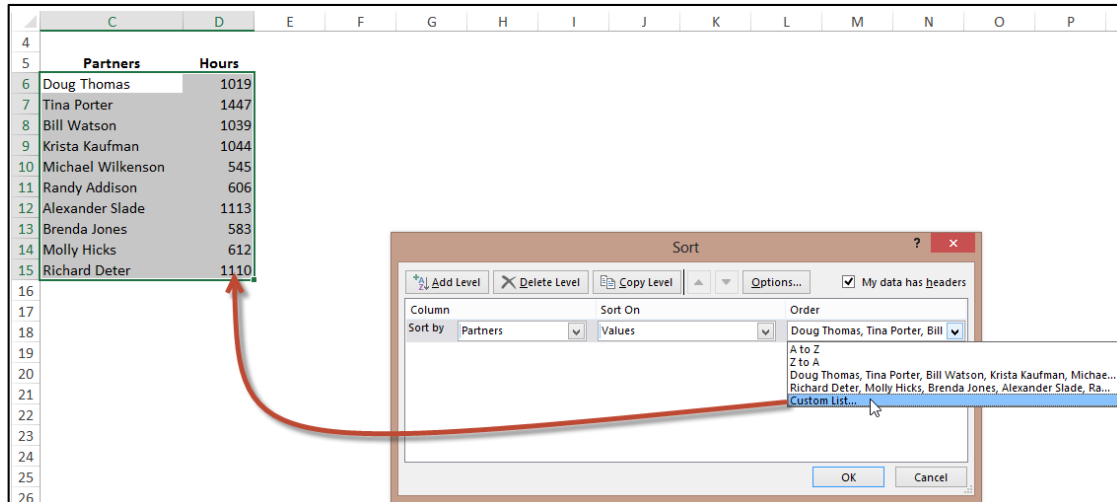
To access the Custom List settings:

1. In Excel 2013 & 2010, select **File, Options, Advanced**, and scroll to the bottom, and then select **Edit Custom List**.

2. In Excel 2007, select **File, Options**, select **Edit Custom List** option a few inches down from the top.

3. In Excel 2003, select **Tools, Options**, and click the **Custom Lists** tab.

Filtering Data

AutoFilter allows you to view a subset of your data and when you are done, you can clear the filters to once again redisplay all of your data. To use this tool, start with any list of data and turn on the AutoFilter tool. Then position your cursor in the column you want to filter and use the drop down arrows to apply your filters as suggested in the screen below.

	A	B	C	D	E	F	G	H	I
1				Carlton's Rental Properties					
2				2014 Analysis					
4	Manage	State	City	Type	Revenue	Expense	Profit	Vacancy Rate	Police Visits
5	Billy	Sort A to Z		Apartment	47,520	45,619	1,901	24.7%	6
6	Billy	Sort Z to A		Triplex	91,463	72,256	19,207	35.6%	8
7	Billy	Sort by Color		Apartment	356,040	259,909	96,131	25.5%	2
8	Billy	Clear Filter From "City"		Triplex	154,276	143,477	10,799	65.0%	9
9	Billy	Filter by Color		Apartment	113,924	93,417	20,506	25.5%	6
10	Billy	Text Filters		Triplex	94,936	77,848	17,089	31.5%	9
11	Billy	Search		Apartment	90,305	70,438	19,867	25.5%	6
12	Billy	(Select All)		Triplex	394,276	366,677	27,599	15.4%	0
13	Billy	Atlanta		Apartment	116,122	84,769	31,353	13.4%	3
		Brewton							
14	Billy	Dallas		Apartment	92,621	82,433	10,188	18.7%	3
15	Billy	Daytona		Triplex	69,466	66,687	2,779	54.4%	9
		Dothan							
16	Billy	Fort Worth		Apartment	261,005	221,854	39,151	23.3%	6
17	Billy	Houston		Triplex	57,024	54,743	2,281	56.4%	8
		Macon							
18	Ginge	Mobile		Triplex	181,988	205,646	(23,658)	43.2%	2
19	Ginge			Triplex	121,198	112,714	8,484	15.4%	4
20	Ginge	OK	Cancel	Apartment	432,900	367,965	64,935	24.7%	2
21	Ginge			Apartment	96,768	70,641	26,127	31.8%	2

Once the filters are applied, you will see a subset of your data. For example, the screen presented below shows filtered data for only Macon and Savannah properties.

	A	B	C	D	E	F	G	H	I
1				Carlton's Rental Properties					
2				2014 Analysis					
4	Manage	State	City	Type	Revenue	Expense	Profit	Vacancy Rate	Police Visits
25	Ginger	Georgia	Macon	Apartment	128,563	119,564	8,999	39.8%	8
26	Ginger	Georgia	Macon	Apartment	128,563	119,564	8,999	23.3%	1
27	Ginger	Georgia	Savannah	Apartment	76,032	75,272	760	65.0%	0
64	Steve	Georgia	Macon	Townhome	52,800	46,992	5,808	18.7%	9
65	Steve	Georgia	Macon	Duplex	76,219	60,213	16,006	26.5%	7
66	Steve	Georgia	Macon	Duplex	75,254	58,698	16,556	35.6%	5
67	Steve	Georgia	Macon	Apartment	296,700	216,591	80,109	23.3%	1
118	Jim	Georgia	Macon	Triplex	82,427	62,444	19,983	53.3%	1
121	Jim	Georgia	Macon	Duplex	90,981	57,088	33,892	27.6%	0
125	Jim	Alabama	Macon	Townhome	60,720	52,504	8,216	25.5%	8
126	Jim	Alabama	Macon	Townhome	59,961	36,248	23,713	35.6%	5

As filters are applied, a small funnel icon appears in the drop down arrow button to indicate that a filter has been applied to that particular column.

Key Points Concerning the AutoFilter Command:

1. **Contiguous Data** – The AutoFilter tools works best when you are working with data that is contiguous. In other words, your data should contain no blank columns, no blank rows, and the columns must all be labeled.

2. **Column Headings** –Your columns need unique column headings in and single row, and if the column headings are not in row 1, then the row above the column headings should be blank so Excel will auto detect the correct range.

3. **Filter by Multiple Columns** - You can filter by more than one column.

4. **Filters are Additive** - Each additional filter is based on the current filter and further reduces the subset of data.

5. **Removing Filters** – In all editions of Excel, a fast way to remove multiple filters is to turn **AutoFilter** off and then turn **AutoFilter** back on. In Excel 2007 and later editions, you can also click the **Clear** button in the **Sort & Filter Group** as pictured below.
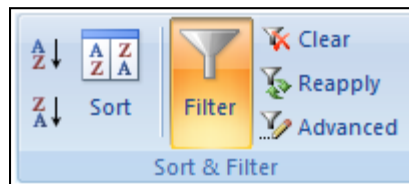
6. **Filter by Color** – You can filter based on colors. For example, you can filter by cell color or by a list of numbers, you can filter by icon or by a custom filter.
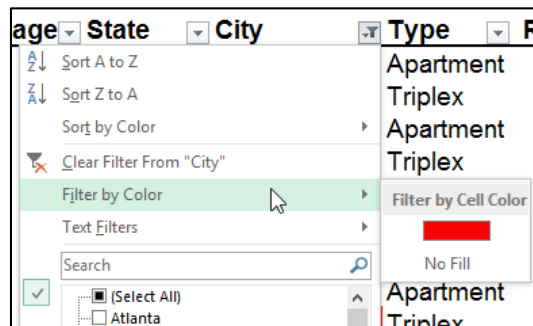
Note that the Color Filter is mutually exclusive as you cannot also filter by value or text when filter by color is applied, and vice versa.

7. **Filters Enabled -** A drop-down arrow ⏷ means that filtering is enabled but not applied.

8. **Filter Applied -** A Filter button ⏷ means that a filter is applied.

9. **Filter Spanning** - The commands under the **All Dates** in the **Date Filters** menu, such as January or Quarter 2 filter by the period no matter what the year. This can be useful, for example, to compare sales by a period across several years.
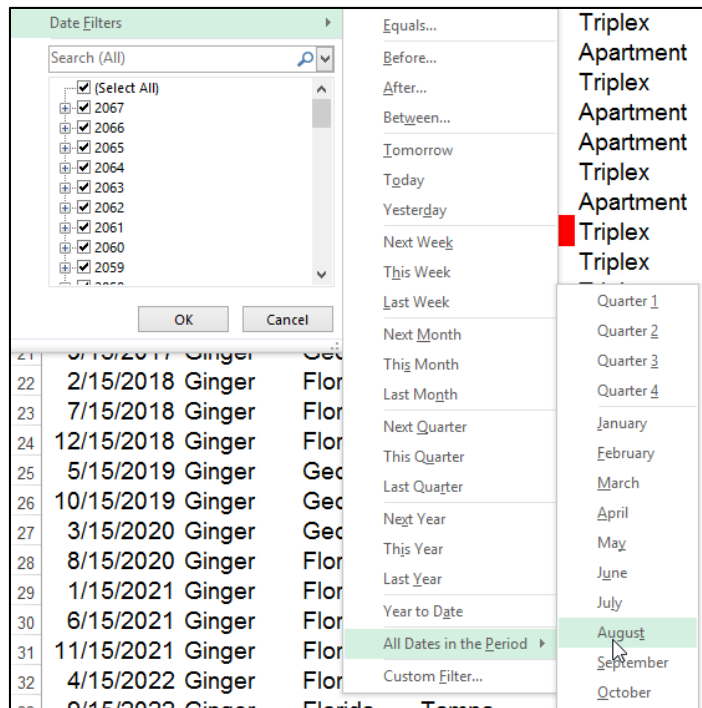
10. **This Year vs. Year-to-Date** - **This Year** and **Year-to-Date** are different in the way that future dates are handled. **This Year** filtering can return dates in the future for the current year, whereas **Year-to-Date** only returns dates up to and including the current date based on the computer's time clock.

11. **Filtering Dates** - All date filters are based on the Gregorian calendar as decreed by Pope Gregory XIII, after whom the calendar was named, on 24 February 1582. The Gregorian calendar modifies the Julian calendar's regular four-year cycle of leap years as follows: Every year that is exactly divisible by four is a leap year, except for years that are exactly divisible by 100; the centurial years that are exactly divisible by 400 are still leap years. For example, the year 1900 is not a leap year; the year 2000 is a leap year.

12. **Filtering By Days of Week -** If you want to filter by days of the week, simply format the cells to show the day of the week, or insert a new column and use the **WEEKDAY** function to calculate the week day, and then apply filters using this new column.

13. **Top & Bottom Filtering** - On the **Data** tab, in the **Sort & Filter** group, click **Filter**. Point to **Number Filters** and then select **Top 10**. To filter by number, click **Items**. To filter by percentage, click **Percent**. Note - Top and bottom values are based on the original range of cells or table column and not the filtered subset of data.
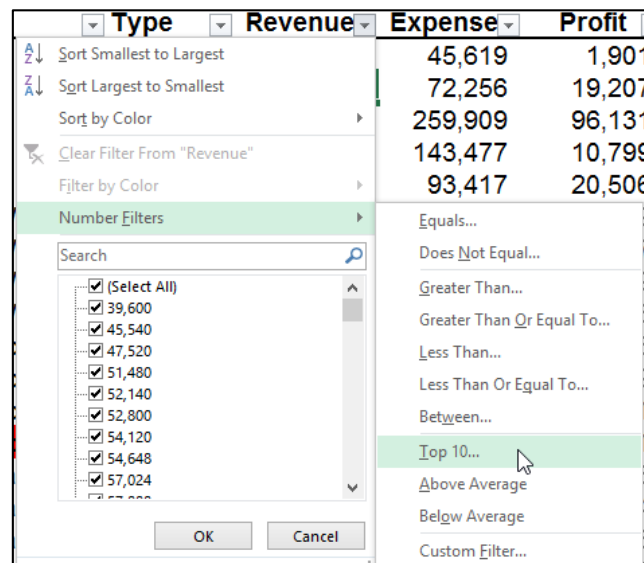
14. **Above & Below Average Filtering** - On the **Data** tab, in the **Sort & Filter** group, click **Filter**. Select **Number Filters, Above/Below Average**. Note – These values are based on the original range of cells or table column and not the filtered subset of data.

15. **Filtering Out Blanks** - To filter out blanks, in the **AutoFilter** menu at the bottom of the list of values, de-select the check box labeled **Blanks**.

16. **Filtering By Color** - Select **Filter by Color**, and then depending on the type of format, select **Filter by Cell Color**, **Filter by Font Color**, or **Filter by Cell Icon**. Note that these filter options only show up when there are actual cell colors, font colors or icons included in the data range.

17. **Filter by Selection** - To filter by text, number, date, time, or color for selected cell(s), select the cells to be used as a filter basis and then right-click that selection, and from the popup menu select **Filter, Filter by Selected Cell's Value,** (or **Filter by Selected Cell's Color**, **Filter by Selected Cell's Font Color**, or **Filter by Selected Cell's Icon**).
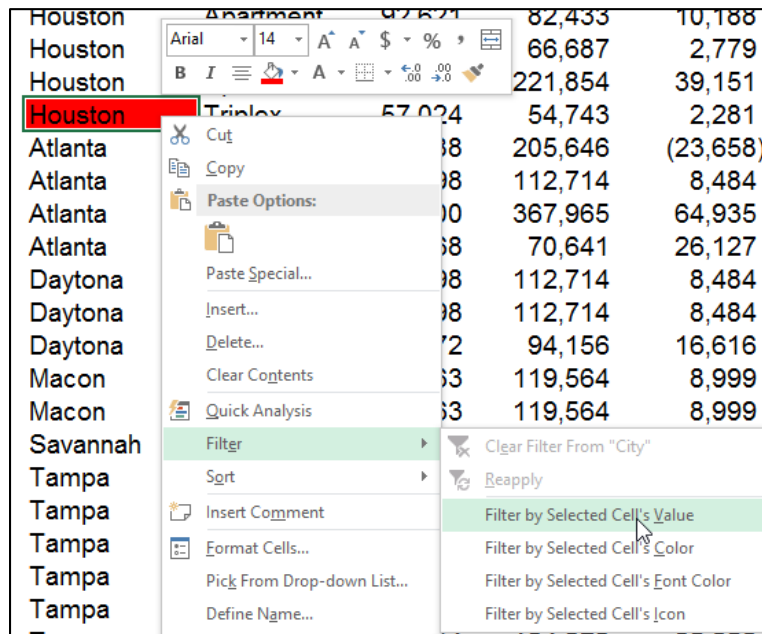
18. **Refreshing Filters** - To reapply a filter after the data changes, click a cell in the range or table, and then on the **Data** tab, in the **Sort & Filter** group, click **Reapply**.

Data Form

Excel's Data Form tool provides a data input window which makes Excel look and behave more like a database, such as Microsoft Access. (Note that in Excel 2013, 2010 and 2007, the Form tool button has not been included on the Ribbon, so to use it you will first need to add the Form tool button to the Quick Access Toolbar.)

A data form provides a convenient means to enter or display one complete row of information in a range or table without scrolling horizontally. Some people, especially those who are used to using databases, find that using a data form can make data entry easier than moving from column to column when you have more columns of data than can be viewed on the screen.

Key Points using Data Form:

1. You cannot print data from a data form.

2. Because a data form is a modal dialog box, you cannot use either the Excel Print command or Print button until you close the data form.

3. You might consider using the Windows Print Screen key to make an image of the form, and then paste it into Microsoft Word for printing.

Data Subtotals

Excel's **Subtotal** command automatically calculates and inserts subtotals and grand totals in your list or table. Once inserted, Excel recalculates subtotal and grand totals as you enter and edit the detail data. The Subtotal command also outlines the list so that you can display and hide the detail rows for each subtotal. Examples of the **Subtotal** dialog box and a resulting subtotaled table are shown below.
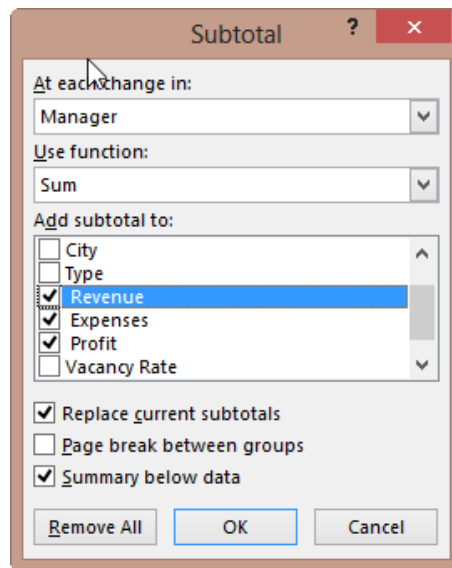
To display subtotals and grand totals at the top instead of the bottom, deselect the checkbox labeled **Summary below data**.

		Manager	State	City	Type	Revenue	Expenses	Profit
	4	Manager	State	City	Type	Revenue	Expenses	Profit
−	5	Grand Total				22,836,355	17,733,341	5,103,014
−	6	Billy Total				1,938,977	1,640,126	298,851
	7	Billy	Texas	Dallas	Apartment	47,520	45,619	1,901
	8	Billy	Texas	Dallas	Triplex	91,463	72,256	19,207
	9	Billy	Texas	Dallas	Apartment	356,040	259,909	96,131

Key points to Consider When Using Subtotaling are as follows:

1. **Contiguous Data** – The Subtotal tools works best when you are working with data that is contiguous. In other words, your data should contain no blank columns, no blank rows, and the columns must all be labeled.

2. **Sort Before You Subtotal** - You must sort the data by the column you wish to subtotal by, else you will receive erroneous results.

3. **Other Mathematical Applications** - The Subtotal tool not only calculates subtotals, but it can also calculate minimums, maximums, averages, standard deviations, and other functions.
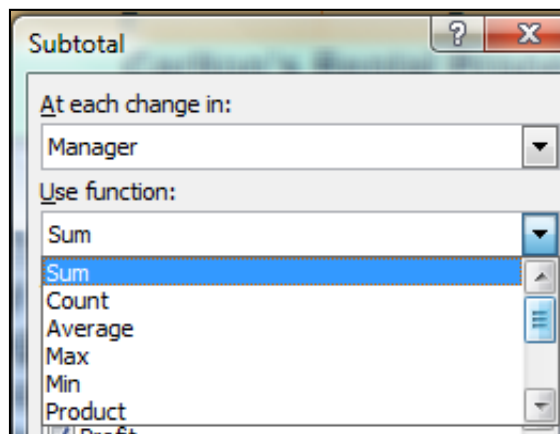
4. **Subtotals in 2013, 2010 & 2007 Tables** – Excel 2007 added a new **Table** tool which enables **Subtotals** a little differently; the Subtotal tool appears at the bottom of each column in each **Table**, as shown in the screen below.

5. **Automatic Outlining** – The **Subtotal** tool automatically inserts **Outlines**, which allows you to collapse or expand your data.

6. **Copying Outline Data** - Some CPAs also like to copy and paste collapsed subtotal data to another location, but they find this process copies and pastes all of the data – not just the summary data they desire. In this situation, there are two ways to achieve a clean copy and paste without grabbing all the hidden data as follows:

    a. **CTRL key** – Hold the **Control Key** down while you individually click to select individual rows; this action will enable you to copy and paste selected data. However, this approach can sometimes be problematic because if you miss-click, you have to start over.

    b. **Select Visible Cells** – A better approach is to use the **Select Visible Cells** tool. This tool will select on the data you can see, after which the copy and paste routine will yield the desired results. This option is better because it is faster and less error prone.
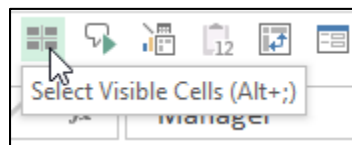
    c. **Go To** – You can also select visible cells using **Go To**. To do this**,** press **F5** to launch the **Go To** tool and then click **Special**. In the **Go To Special** dialog box, select the radio button labeled **Select Visible cells** and press **OK**.
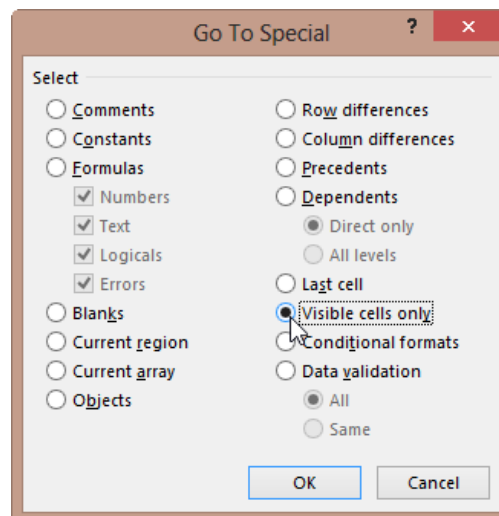
    d. **ALT + ;** - The **Alt + ;** key combination is the shortcut to using the Select Visible Cells Tool.

Data Validation

Data Validation can be used to limit the data that can be entered into a cell. For example, you might want the user to enter only values between 1% and 99%. You might also use this tool to enable data input to a drop down list which offers two advantages in that it can be faster and more accurate. To create a dropdown list, enter a list into sequentially cells in Excel. Next, from the **Data** tab select **Data Validation**, **Data Validation** (yes, again), then in the dialog box (as shown below) select **List** from the **Allow** dropdown box and then indicate the data range for your list in the **Source** box.
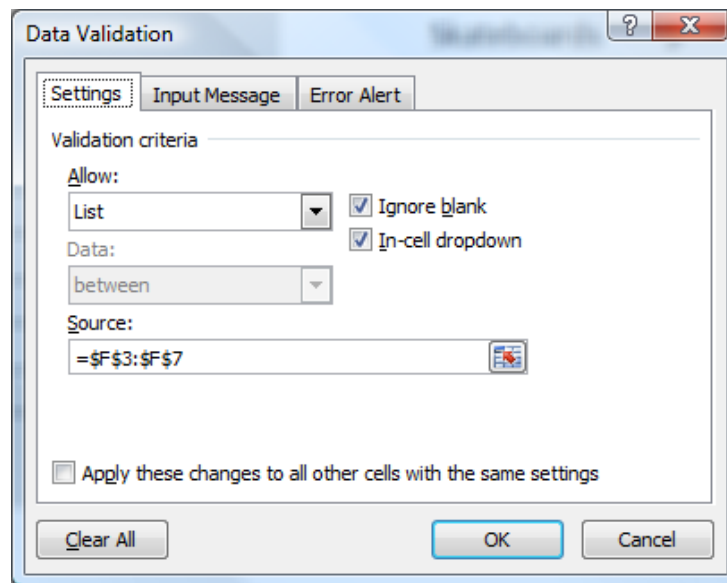
After making all the necessary selections in the validation list dialog box, your worksheet will produce a cell containing a drop down list (shown in cell A10 below) that behaves as shown.

You can also provide messages to define what input you expect for the cell, and instructions to help users correct any errors. For example, on a worksheet, you can set up a cell to allow only

account numbers that are exactly three characters long. When users select the cell, you can show them a message such as this one:
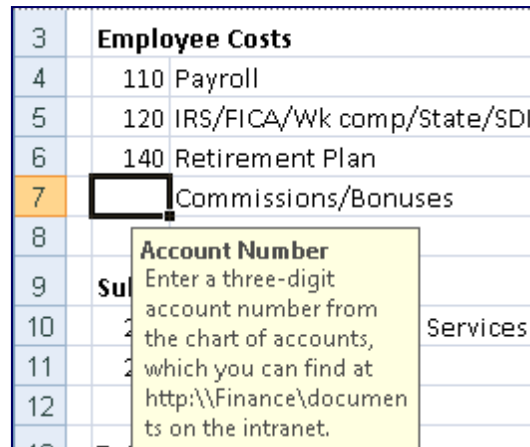
If users ignore this message and type invalid data in the cell, such as a two-digit or five-digit number, you can display an actual error message. In a more advanced scenario, you might use data validation to calculate the maximum allowed value in a cell based on a value elsewhere in the workbook. In the following example, the user has typed $4,000 in cell E7, which exceeds the maximum limit specified for commissions and bonuses.
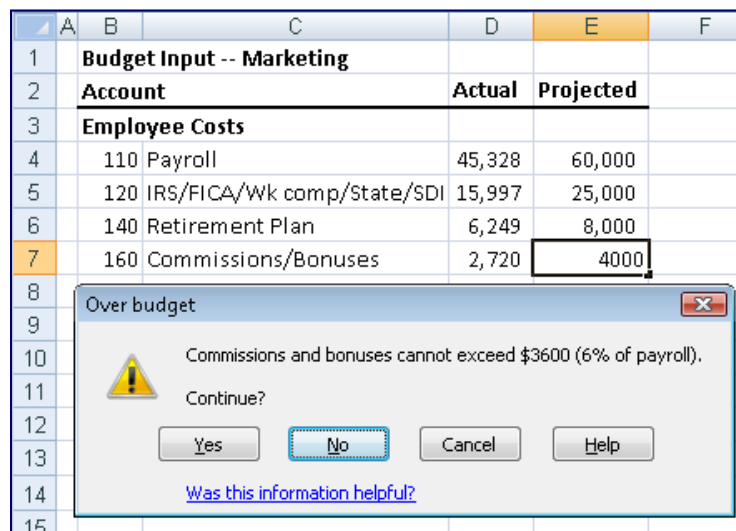
If the payroll budget were to increase or decrease, the allowed maximum in E7 would automatically increase or decrease with it.

Data Table ("What-if Analysis")

Data tables are part of the collection of what-if analysis commands, which include:

1. Data Tables
2. Goal Seek
3. Scenarios

The **Data Table** command enables the process of changing values in cells to see how those changes will affect the outcome. For example, you can use a data table to vary the interest rate and term length used in a loan to determine possible monthly payment amounts.

There are two types of **Data Tables – One Way** and **Two Way**. A data table cannot accommodate more than two variables. If you want to analyze more than two variables, you should use scenarios. Although it is limited to only one or two criterion (one for the row input cell and one for the column input cell), each criterion can include as many different variable values as you want. (In contrast, a **Scenario** can have a maximum of 32 different criterion, but you can create as many **Scenarios** as you want.)

Loan Analysis Example

In this exercise, we start by creating a simple Payment function to calculate the payment amount of a loan given a loan amount, interest rate and number of periods.

The next step is to create a **Two-Way Data Table** displaying the resulting payment amount given a variety of lengths of the loan. This process is started by creating a list of the alternative loan amounts, as shown below in **B8, B9, B10**, etc. Cell **C7** must reference the results you want to be displayed in the table.

C7	▼		f_x =C4		
	A	B	C	D	
1	Loan Amount		300,000		
2	Interest rate		6%	Per Year	
3	Number of Periods		30	Years	
4	Payment Amount		$1,798.65		
5					
6					
7			$ 1,799		
8		1			
9		2			
10		3			
11		4			
12		5			
13		6			
14		7			

Next, highlight the data table range and use the **Data Table** command on the **Data** tab (as shown below) to generate the desired table.

Data Table ? ✕

Row input cell: [ ]

Column input cell: C3

OK   Cancel
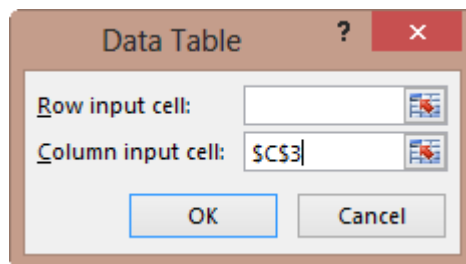
This process will generate the following table:

	A	B	C	D	
1	Loan Amount		300,000		
2	Interest rate		6%	Per Year	
3	Number of Periods		30	Years	
4	Payment Amount		$1,798.65		
5					
6					
7			$ 1,799		
8		1	$ 25,820		
9		2	$ 13,296		
10		3	$ 9,127		
11		4	$ 7,046		
12		5	$ 5,800		
13		6	$ 4,972		

This table tells us that the same loan amount will require a monthly payment of $4,972 to pay the loan off in just 6 years, or a monthly payment of $5,800 to repay the loan in just 5 years.

The next step in this exercise is to generate a line chart based on the data table we just created. This line chart will provide some interesting observations regarding the benefits and detriments of paying off loans over longer periods.
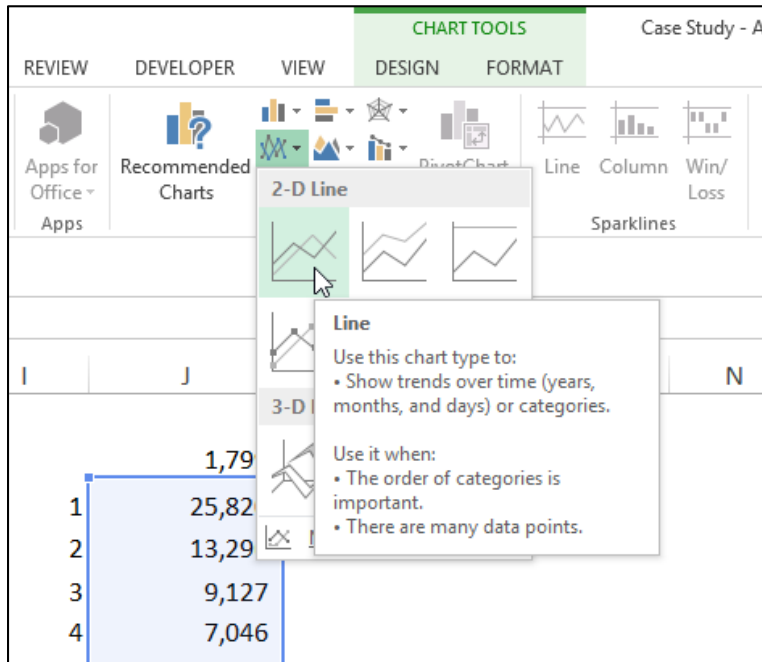
The resulting chart is shown as follows:
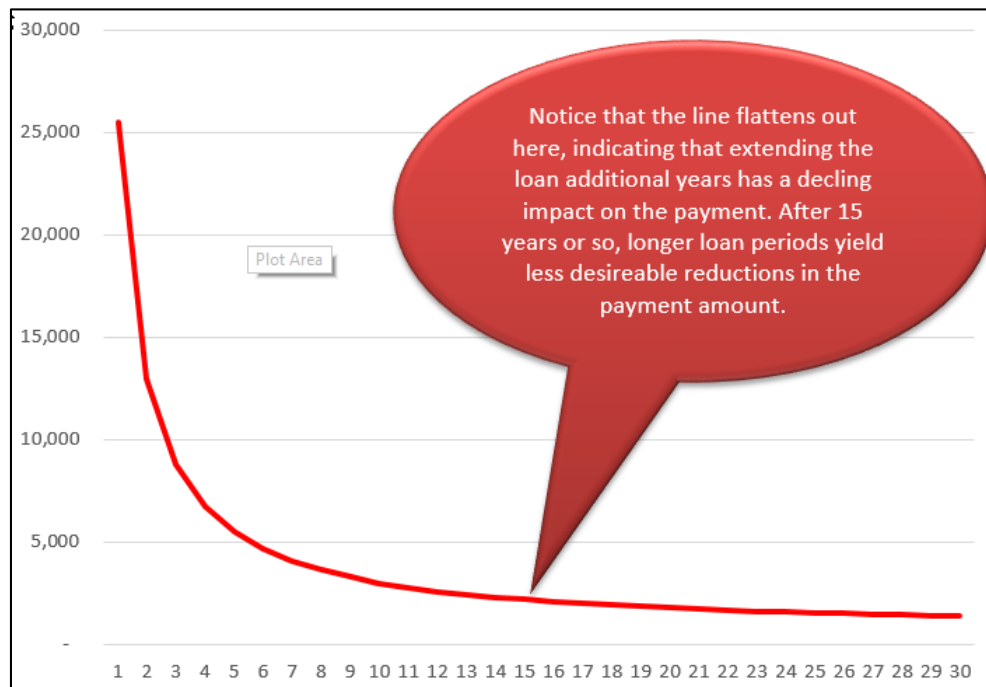
Based on this, no one should ever obtain a fair market loan for more than 15 years, the reduction in payments simply aren't worth the additional length of the loan. This same basic behavior is seen whether the interest rate is 1% or 100%, or whether the loan amount is $1,000 or $10,000,000. The only time you might be justified in obtaining a loan longer than 15 years might be when you are extended a favorable interest rate (perhaps from a rich uncle), better than a fair market interest rate.

Goal Seek

If you know the result that you want from a formula, but are not sure what input values are needed to produce your desired results, use **Goal Seek**. For example, suppose that you have decided to purchase a house, but you don't know how much house you can afford. In this case, know how the interest rate (3.75%) and how long you want to take to pay off the loan (15 years), and the amount you can afford to pay each month ($2,800). In this case, you can use **Goal Seek** to work backwards to figure out how much house you can afford. Start by calculating the monthly payment based on any random home loan amount as pictured below.

	A	B	C	D	E
1	Loan Amount	300,000			
2	Interest Rate	3.75%	Percent		
3	Duration of Loan	15	Years		
4					
5	Monthly Payment	2,181.67			

Next, from the **Data** tab, select **What-If Analysis, Goal Seek**. Fill in the parameters to set the payment amount to $2800 by adjusting the Loan Amount, as shown, and then click OK.

	A	B	C	Goal Seek
1	Loan Amount	385,027		Set cell: B5
2	Interest Rate	3.75%	Percent	To value: 2800
3	Duration of Loan	15	Years	By changing cell: B1
4				OK Cancel
5	Monthly Payment	2,800.00		
6				

The result is that a person with $2,800 available to make monthly payments can afford to purchase a home costing up to $385,027 (assuming a 15 year loan and 3.75% interest rate) – as pictured above. (Keep in mind that anyone actually following this scenario would need to consider that homes also come with other monthly obligations including real estate taxes, insurance maintenance, etc.)

Data - Text to Columns

CPAs sometimes receive data from their clients or IT departments that is in text form. When this happens, Excel can split the contents of one or more cells in a column and distribute those contents as individual parts across other cells in adjacent columns. For example, the worksheet below contains a column of full names and amounts that you want to split into separate columns. The **Text to Columns** wizard parses the data automatically into separate cells. To use this tool, select the cell, range or entire column that contains the text values that you want to split.

Notes:

1. A range that you want to split can include any number of rows, but it can include no more than one column.

2. You also should make sure there are enough blank columns to the right of the selected column to prevent overwriting existing data in those adjacent columns.

Flash Fill

Of all the Office 2013 applications, Excel is the beneficiary of the most impressive enhancements. Excel's new **Flash Fill** watches you work and applies logic to help you complete your tasks. The example pictured below contains a list of 44 first and last names in Column A, which I want to separate into Columns B and C. As I start typing the first name of the second record in Column B; Excel's **Flash Fill** guesses what I'm trying to do and offers to fill in the remaining 42 first names *(as shown in grey text).*

	A	B	C	D	E	F
1	**President**					
2	George Washington	George				
3	John Adams	John				
4	Thomas Jefferson	Thomas				
5	James Madison	James				
6	James Monroe	James				
7	John Quincy Adams	John				
8	Andrew Jackson	Andrew				
9	Martin Van Buren	Martin				
10	William Henry Harrison	William				
11	John Tyler	John				
12	James Polk	James				
13	Zachary Taylor	Zachary				
14	Millard Fillmore	Millard				
15	Franklin Pierce	Franklin				
16	James Buchanan	James				
17	Abraham Lincoln	Abraham				

After typing in the letter "J" on row 3, Flash Fill guesses that you want to split the remaining names as well, and offers to do this for you.
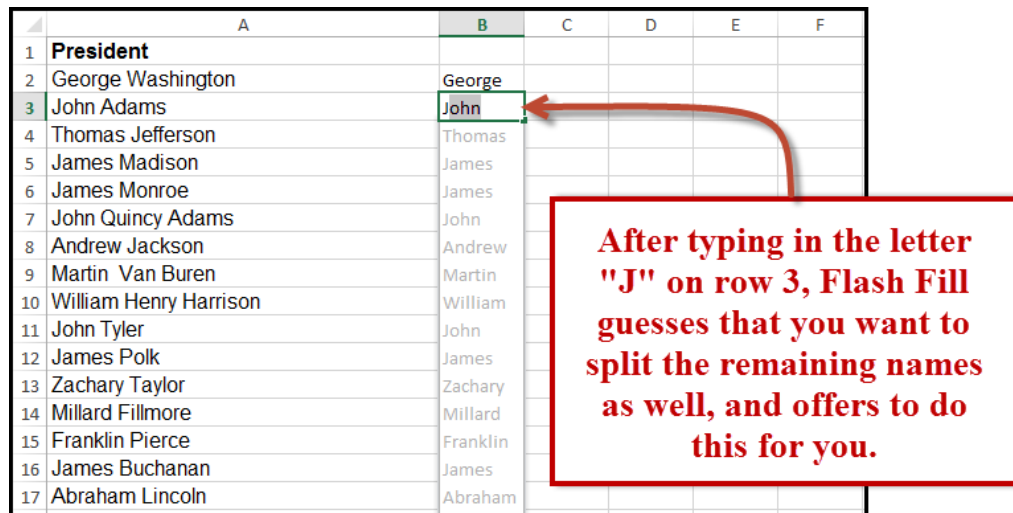
Data Grouping & Outlining

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

	Account	Category	Description	1/31/2011	2/28/2011	3/31/2011
1			**Income Statement by Month**			
3			Report date: 1/1/2011..12/31/2013			
4						
5	**Account**	**Category**	**Description**	1/31/2011	2/28/2011	3/31/2011
10		Sales Total		(2,047,351)	(2,051,709)	(2,051,413)
15		Service Total		(169,638)	(169,904)	(169,001)
16	000-4130-01	Installation	Installation Charges - West	(13,542)	(13,998)	(14,198)
17	000-4130-02	Installation	Installation Charges - Central	(145,906)	(146,071)	(145,481)
18	000-4130-03	Installation	Installation Charges - East	(282,819)	(283,051)	(283,506)
19	000-4130-04	Installation	Installation Charges - Canada	(87,371)	(88,121)	(88,848)
20		Installation Total		(529,637)	(531,240)	(532,034)
25		Repair Total		(91,793)	(95,030)	(95,322)
30		Sales Discounts Total		328,958	327,865	327,018
35		Trade Discounts Total		146,985	148,012	148,057
40		Sales Returns Total		279,301	277,507	275,729
45		COGS Total		282,104	283,035	282,564
55		Variance Total		3,072	5,746	5,766
64		Salaries Total		260,428	258,616	256,952
69		Insurance Total		29,772	29,782	28,301
75		Depreciation Total		28,467	27,174	28,096
78		Repairs Total		13,106	11,521	11,527

PowerView

Excel's new **PowerView** inserts new worksheets connected to your data, and then enables you to create new report types, such as the interactive map chart presented below. The resulting PowerView Map report is zoomable, and filters can be applied to display partial data.

PowerView worksheets can be published as standalone, interactive reports to Microsoft SharePoint's PowerPivot Gallery or other reporting service destinations. Some of the tools provided by PowerView include the ability to create a dashboard containing multiple PowerViews, apply themes and backgrounds, insert pictures and text boxes, insert collapsible and expandable tiles, and add data slicers.

PowerView Learning Points

1. **Included** - PowerView isn't included in Office Home editions. Power View and PowerPivot are only available in the Office Professional Plus and Office 365 Professional Plus editions.
2. **Worksheet** - PowerView is another sheet in the workbook, and acts like a Dashboard.
3. **Fields** – Add data to the PowerView by selecting fields, much like you do for PivotTables.
4. **Play** - You can play charts to see how they change over time.
5. **PowerView uses PowerPivot -** Known to be extremely fast for retrieving and sorting data.
6. **Relationships** – PowerView can integrate multiple data sets via relationships.

Timeline Slicer

CPAs who work with PivotTables will likely appreciate Excel's new **Timeline Slicer** which helps users *slice and dice* Pivot data that contain dates. As an example, selecting the dates May through October on the Timeline slicer pictured below adjusts the PivotTable to display May thru October data.
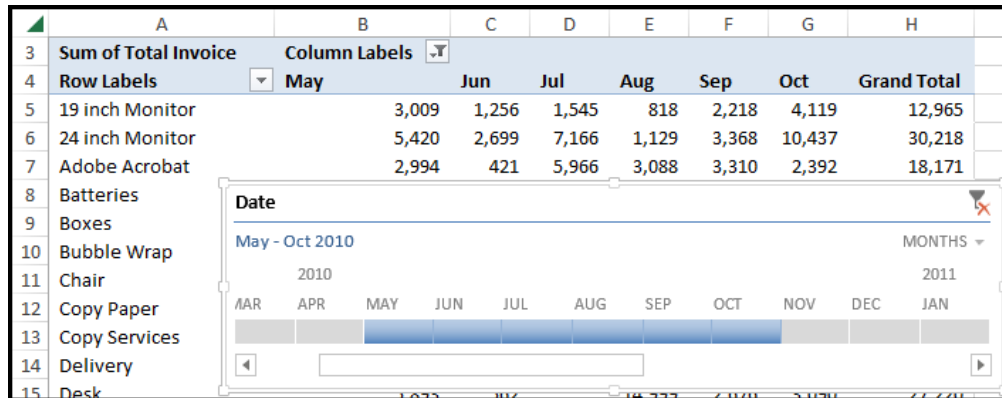
Quick Analysis

Excel's **Quick Analysis** tool also helps you analyze data by offering a variety of formatting, charts, totals, tables and sparkline layouts to instantly summarize large volumes of data *(see screen below)*. When using Quick Analysis to scrutinize text-only data, text specific options for highlighting duplicate or unique text items appear.
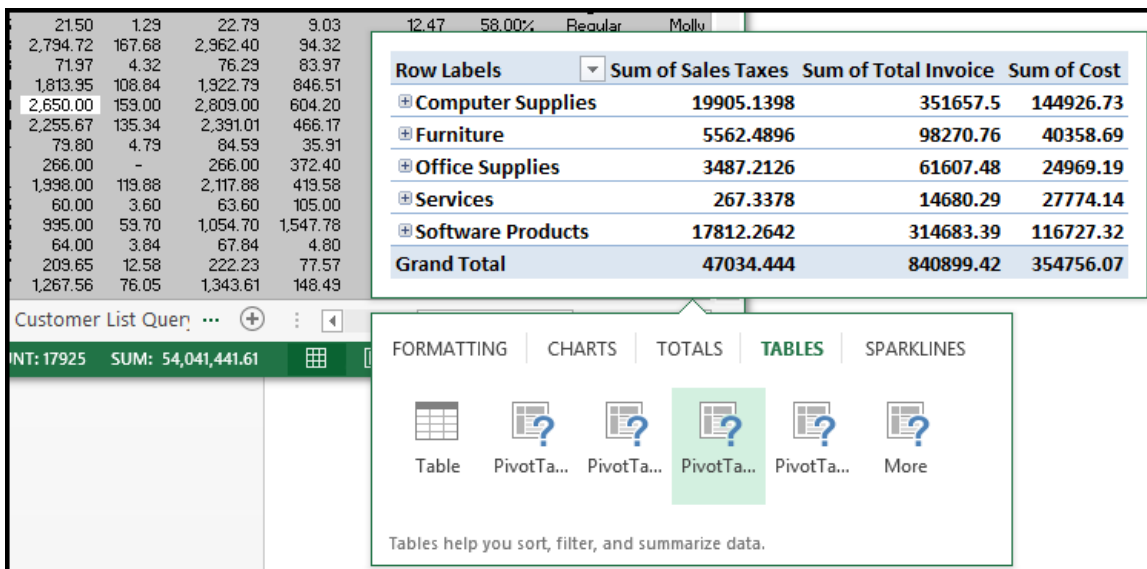
Queries

Excel 2010, 2007 & 2003 include pre-designed "queries" that can import commonly used data such as stock quotes for updating a stock portfolio. All you need is a connection to the internet and of course, some stock ticker symbols. In Excel 2010 or 2007 select **Data, Existing Connections, MSN MoneyCentral Stock Quotes** (or in Excel 2003 select **Data**, **Import External Data**, **Import Data Existing Connections, MSN MoneyCentral Stock Quotes)** and then walk through the web query wizard for importing stock quotes. In just a few seconds, Excel will retrieve Real-Time data for NYSE, NASDAQ & AMEX, and 20 minute delayed stock prices from other exchanges (during the hours when the stock market is open) and display a grid of complete up-to-date stock price information that is synchronized to the stock market's changing stock prices. With each click of the "Refresh" button, the stock price information in Excel is updated - this sure beats picking numbers out of the newspaper.

	Last	Previous Close	High	Low	Volume	Change	% Change	52 Wk High	52 Wk Low
Friday, April 24, 2009									
11:34:42 AM									
Stock Quotes Provided by MSN Money									
Click here to visit MSN Money									
Microsoft Corp Chart News	20.29	18.92	20.45	19.5	66,077,415	1.37	7.24%	32.1	14.87
Apple Inc Chart News	124.32	125.4	125.14	123.73	6,275,076	-1.08	-0.86%	192.24	78.2
Coca-Cola Co Chart News	42.87	42.92	43.09	42.71	3,205,193	-0.05	-0.12%	61	37.44
United Parcel Service Inc Chart News	53.48	53.33	54.04	52.53	2,533,150	0.15	0.28%	74.14	37.99
International Business Machines Corp Chart News	100.33	101.42	101.97	100.09	2,665,080	-1.09	-1.07%	130.93	69.5
Wal-Mart Stores Inc Chart News	48.73	48.86	49.56	48.51	8,042,577	-0.13	-0.27%	63.85	46.25

Completing the Stock Portfolio – Next link the grid data to another worksheet, and insert new columns containing the number of shares owned, as wells as an additional column to compute the total value based on shares owned, as shown below.

	Last	Shares Owned	Current Value	Previous Close	High	Low	Volume	Change	% Change
Friday, April 24, 2009									
11:40:17 AM									
Stock Quotes Provided by MSN Money									
Microsoft Corp	20.29	13,500	273,915	18.92	20.45	19.5	66077415	1.37	0.0724
Apple Inc	124.32	2,400	298,368	125.4	125.14	123.73	6275076	-1.08	-0.0086
Coca-Cola Co	42.87	12,000	514,440	42.92	43.09	42.71	3205193	-0.05	-0.0012
United Parcel Service Inc	53.48	1,780	95,194	53.33	54.04	52.53	2533150	0.15	0.0028
International Business Machines	100.33	2,800	280,924	101.42	101.97	100.09	2665080	-1.09	-0.0107
Wal-Mart Stores Inc	48.73	8,300	404,459	48.86	49.56	48.51	8042577	-0.13	-0.0027
			1,867,300						

Refreshing the Stock Prices - Once you have created your portfolio, simply click the Refresh Data button on the "External Data" Toolbar in Excel 2003 or on the "Data Ribbon" in Excel 2010 & 2007 shown below to update the current value of your Portfolio.
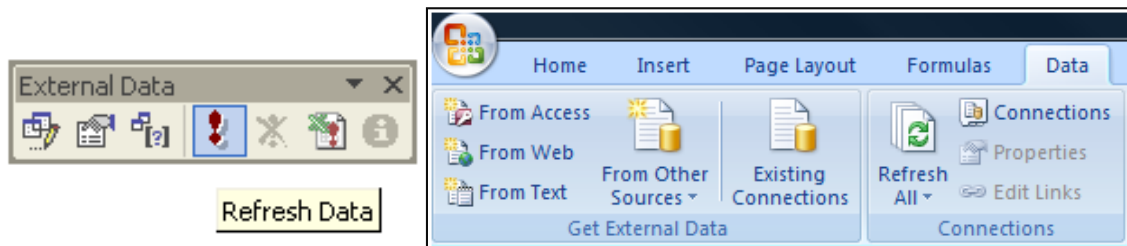
Query Parameters - There are numerous options to help you extract exactly the data you want the way you want it. The "Web Query Parameters Box", "Web Query Options box" and "External Data Properties Box" provide numerous options for controlling your web query.

Excel 2013 Stock Quote Queries

In Excel 2013, for unknown reasons Microsoft has removed the stock quote query option, therefore below are instructions for restoring this option.

1. Launch Notepad (**Start, Programs, Windows Accessories, Notepad**)

2. Enter the following information exactly:
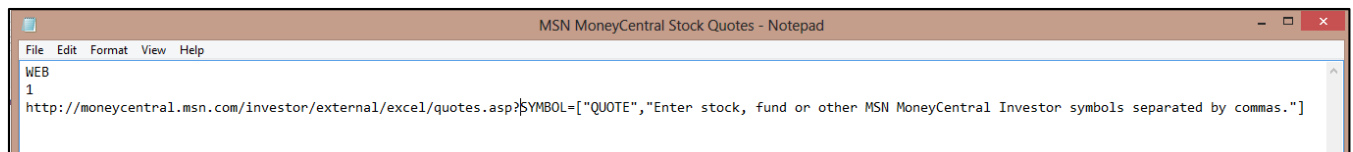
Web
1
http://moneycentral.msn.com/investor/external/excel/quotes.asp?SYMBOL=["QUOTE","Ent er stock, fund or other MSN MoneyCentral Investor symbols separated by commas."]

Or if you prefer, use this to query Yahoo's stock prices:
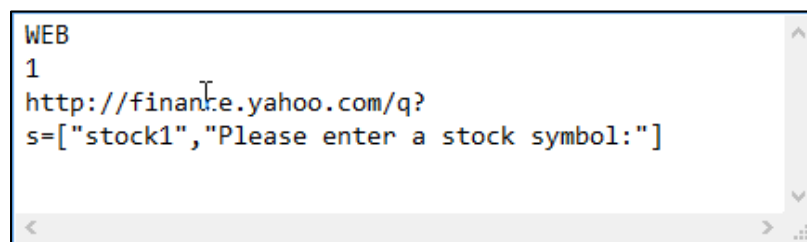
3. Save the file using any name you want, but be sure to include the extension **.igy** as pictured.
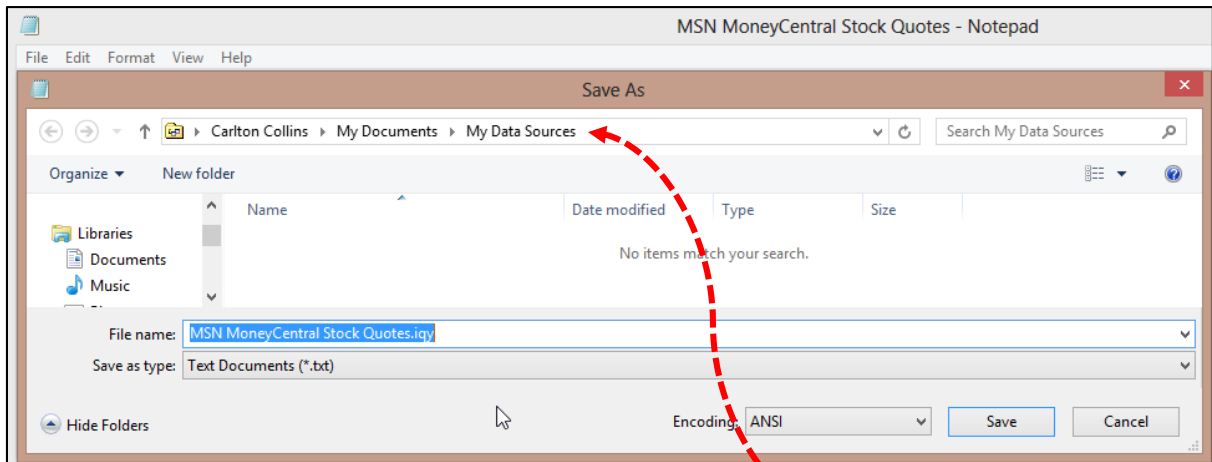
4. Make sure to save this file to the folder labeled **My Data Sources**.

C:\Users\Carlton\Documents\My Data Sources
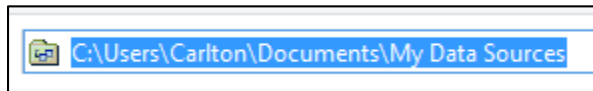
5. Now in Excel, from the **Data** tab select **Existing Queries**, then scroll to and launch the new query you just created – it should work just like it did in Excel 2010, 2007 and 2003.
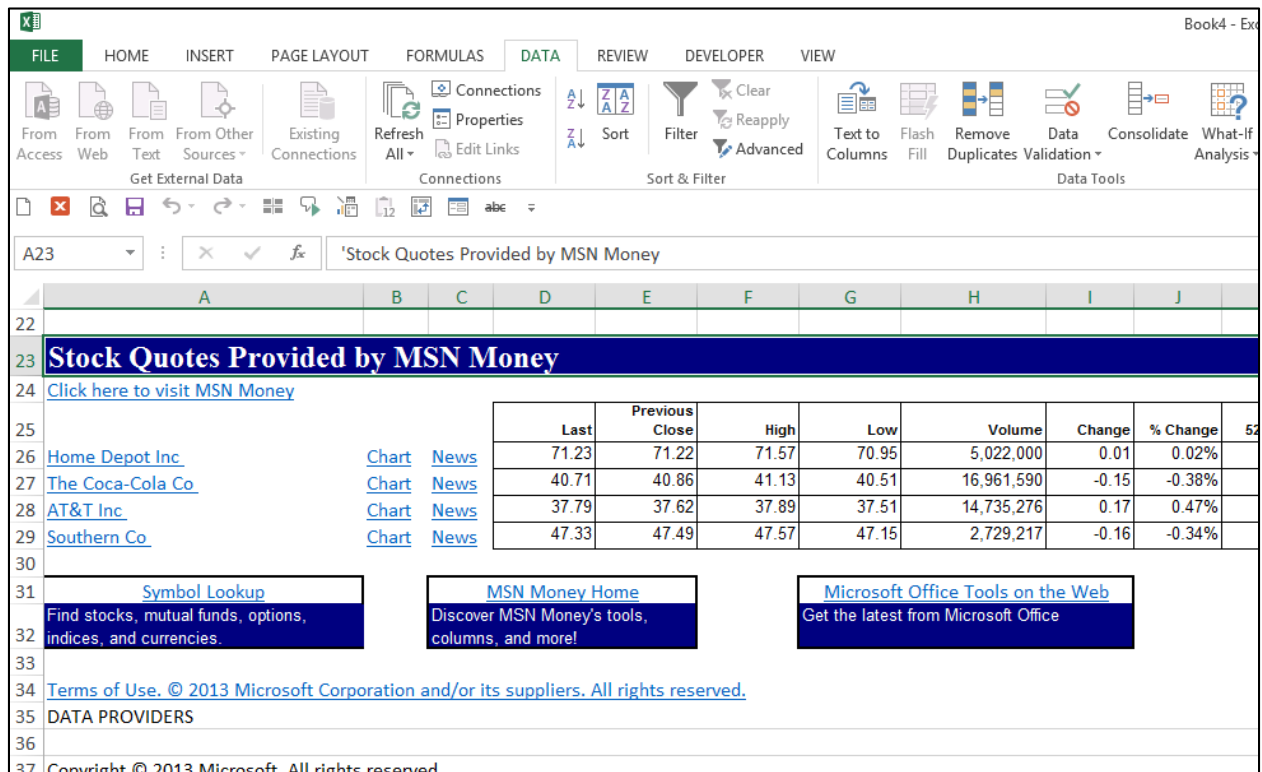
Database Queries

Microsoft Excel can also query and retrieve data you want from an external data source. For example, you can retrieve Microsoft Excel data about a specific product by region. You can create a simple query by using the Query Wizard, or you can create a more complex query by using the advanced features of Microsoft Query.

To use Microsoft Query to retrieve external data, you must:

1. **Have access to an external data source -** If the data is not on your local computer, you may need to see the administrator of the external database for a password, user permission, or other information about how to connect to the database.

2. **Install Microsoft Query -** If Microsoft Query is not available, you might need to install it.

3. **Specify a source to retrieve data from, and then start using Microsoft Query -** For example, if you want to insert database information, display the Database toolbar, click Insert Database, click Get Data, and then click MS Query.

For example, suppose we have some data in our accounting system – Sage MAS 200 ERP that we would like to analyze in Excel. We can use the Database Query Wizard to build a query that will extract the data we need and place it in an Excel spreadsheet, as follows.
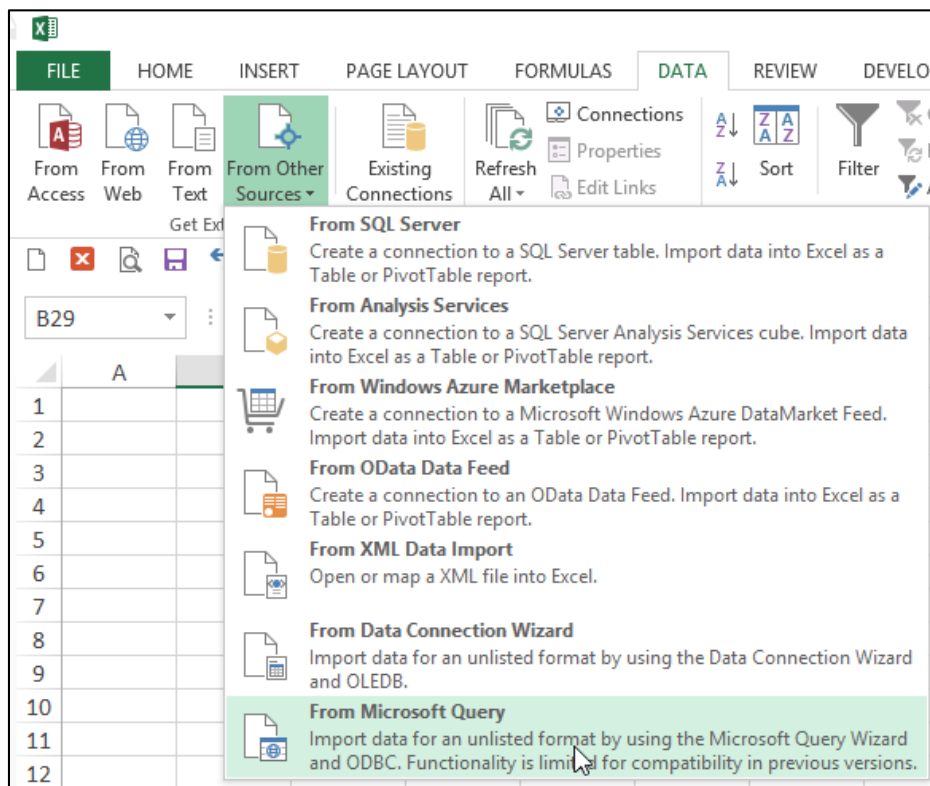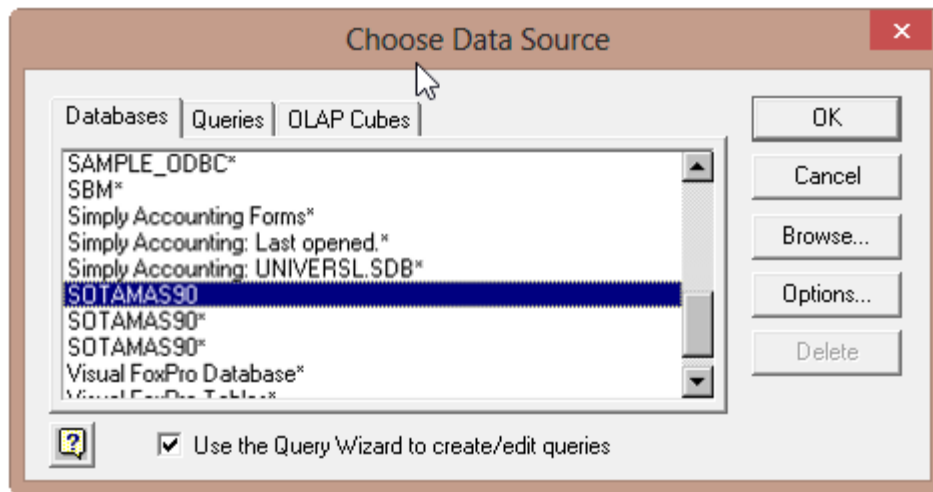
The first step is to select the type of database you want to query and to select the specific database.
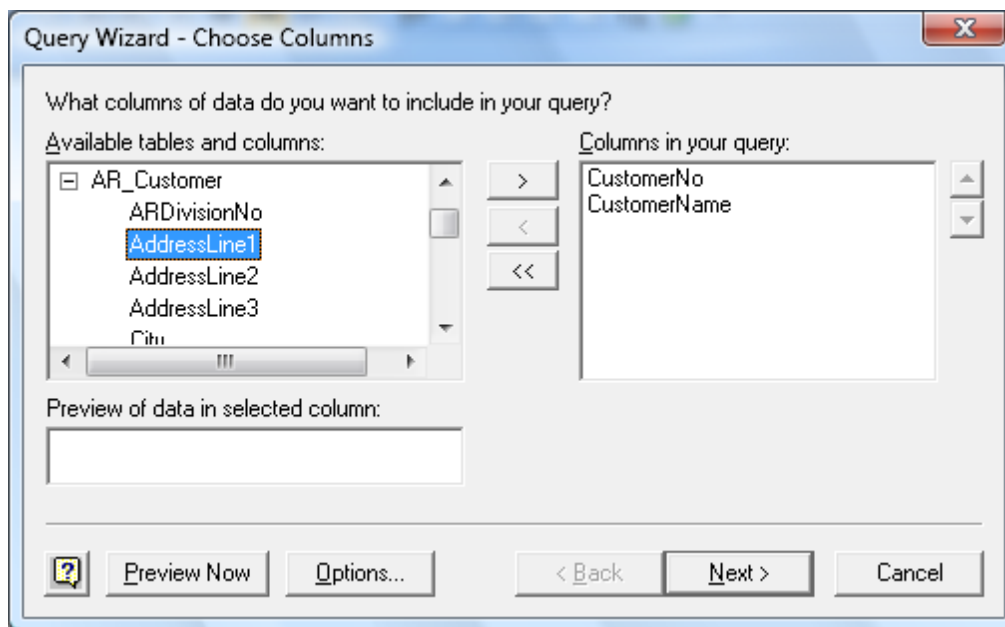
Upon the selection of the desired database a list of tables will be presented. Choose the desired tables, and select the desired data fields to be imported. You will then have the option to filter and sort the data before it is imported. Finally you will be given the option to save the query so you can run it at a later date without having to start from scratch. Excel will then return a table full of the data you requested as shown in the screen below.

	A	B	C	D	E	F	G
1	CustomerNo	CustomerName	State	CurrentBalance	AvgDaysOverDue		
2	ABF	American Business Futures	WI	5732.36	0		
3	AVNET	Avnet Processing Corp	WI	7377.37	52		
4	BRESLIN	Breslin Parts Supply	WI	11828.26	0		
5	HILLSB	Hillsboro Service Center	WI	2902.86	0		
6	RSSUPPL	R & S Supply Corp.	WI	7086.74	0		
7	SHEPARD	Shepard Motorworks	WI	513339.95	0		
8	ALLENAP	Allen's Appliance Repair	CA	645.51	0		
9	AMERCON	American Concrete Service	CA	13743.8	57		
10	ATOZ	A To Z Carpet Supply	CA	8732.4	37		
11	AUTOCR	Autocraft Accessories	CA	23954.02	0		
12	BAYPYRO	Bay Pyrotronics Corp.	CA	16644.94	106		
13	CAPRI	Capri Sailing Ships	CA	56169.33	31		
14	CUSTOM	Custom Craft Products	CA	19446.43	0		
15	GREALAR	Greater Alarm Company	CA	825.5	0		
16	JELLCO	Jellco Packing	CA	5055.91	0		
17	ORANGE	Orange Door & Window Co.	CA	263.37	0		
18							
19							
20							

Sparklines

Sparklines – Sparklines are small cell-sized charts that you can embed in a worksheet next to data to get a quick visual representation of the data. For example, if you had a worksheet that tracked the performance of several dozen stocks, you could create a Sparkline for each stock that graphed its performance over time, in a very compact way. Here are examples:
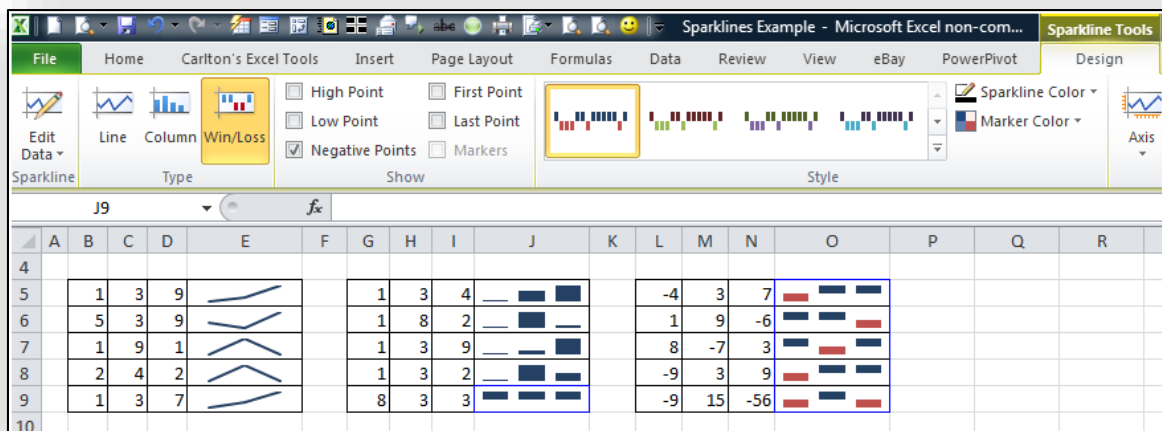
Conditional Formatting

1. **Conditional Formatting Improvements** – Microsoft has improved and added more styles and icons regarding the ability to apply a format to a range of cells, and then have the formatting change according to the value of the cell or formula.

2. **Solid Bars** - Data Bars can be solid now in Excel 2010. Excel 2007 bars offered only a gradient effect, which was visually was confusing to read. Below is a comparison on the Excel 2007 and Excel 2010 Data Bar options.

2007 Gradient   2010 Gradient   2010 Solid

3. **Negative Numbers** - Microsoft corrected a problem which Excel 2007 had when creating Data Bars based on negative numbers, by adding axis support for both positive and

negative values. The screens shots below show Excel 2010's new solution, and how Excel 2007 got confused when applying Data Bars to the exact same data.

| | | Excel 2010's Data Bars | | Excel 2007's Data Bars |

a. **More Data Bar Options** - Notice that Microsoft added more Data Bar options as shown in the comparison below.

Excel 2010's Data Bar Menu   Excel 2007's Data Bar Menu

b. **More Icon Options** - Notice that Microsoft added more Data Bar options as shown in the comparison below.
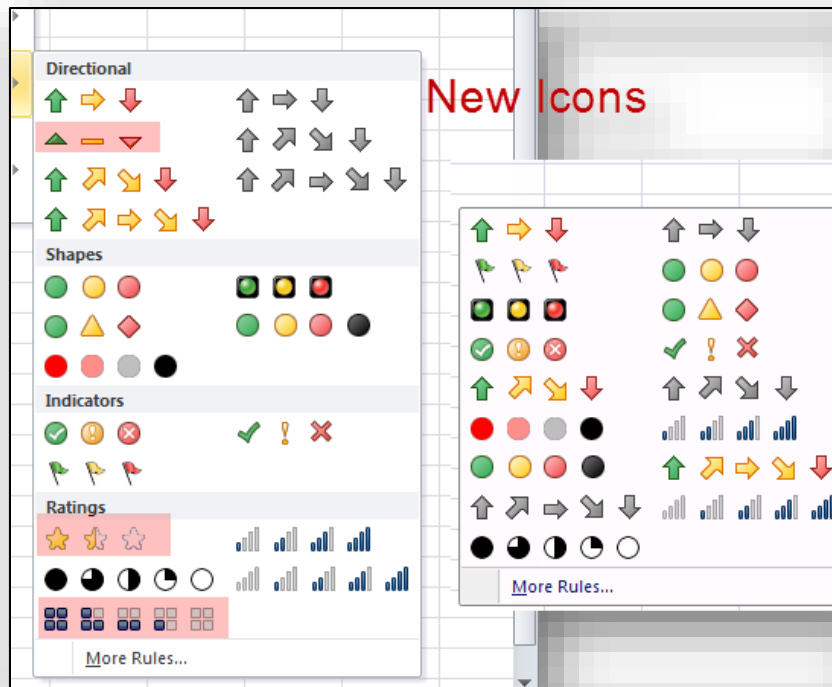
Excel 2010's Icon Menu   Excel 2007's Icon Menu

c. **Arrow Colors** - It is possible to change icons used for KPI i.e. You can have two arrows with different colors that might represent both a negative impact and positive growth, for example.
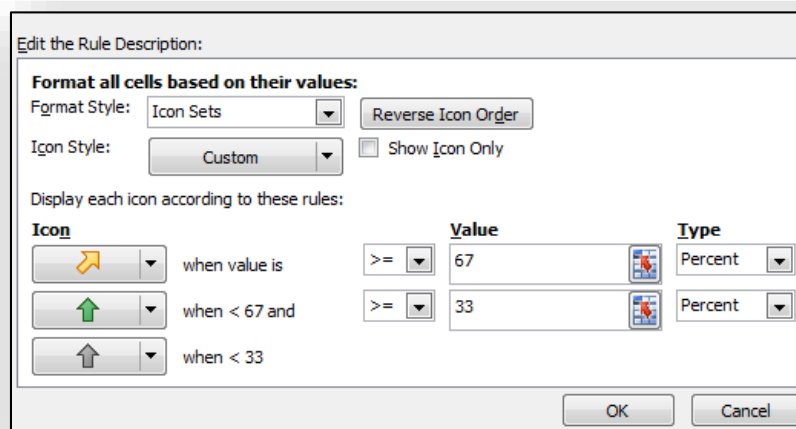
d. **Referring to Data** - You can now refer to data on different worksheets, and even refer to a range outside the Conditional Formatting area. The screen below shows the error

message produced by Excel 2007 when you attempted to reference cells outside the Conditional Formatting area; Excel 2010 now accommodates this situation.
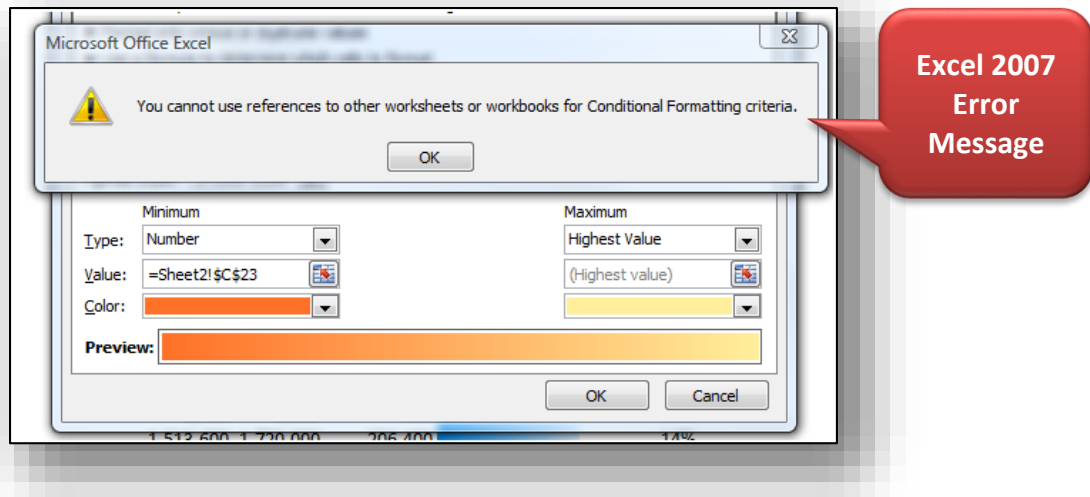
4. **Sort by Color** – Beginning with 2007, Excel provides the ability to sort by font color or by cell color, or both. This is handy in many ways. Sometimes CPAs use color to tag or mark certain cells - and later find it useful to be able to sort by those markings. In other situations CPAs use conditional formatting to apply color to cells using a wide variety of rules. Thereafter Excel can sort the data based on the resulting colors. The sort-by-color options are shown below.
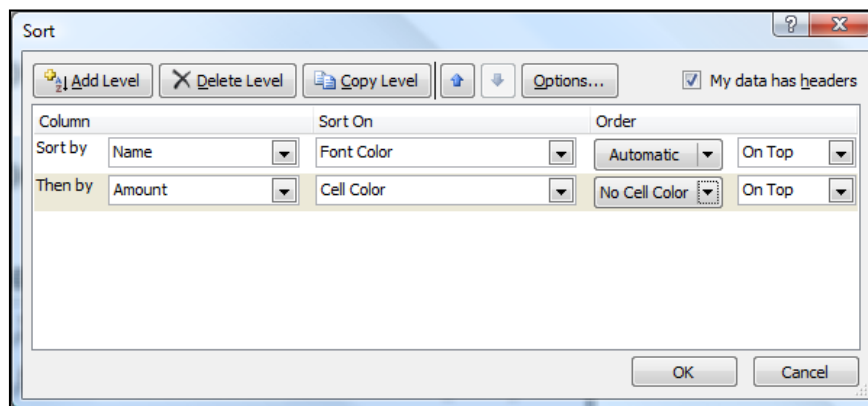
To be accurate, it was possible to sort by color in Excel 2003. To accomplish this task, you needed to use the =CELL function in order to identify information about a given cell such as the cell color or font color. Thereafter, the results of that function could be used to sort rows – which effectively means that you can sort by color in Excel 2003 – but it takes a bit more effort.

Excel Functions

An Excel function is a preset formula that calculates a specific result based on the criteria/variables/arguments you specify. All functions start with the equal sign followed by the function's name and criteria/variables/arguments you specify. As a simple example, the most frequently used function in Excel is the SUM function, which is used to add data.

	A
1	342
2	345
3	654
4	564
5	322
6	=SUM(A1:A5)

There are a total of 455 Excel Functions in Excel 2013; the following table summarizes the number of functions introduced in previous editions of Excel.

New Functions Added to Excel	
Excel 5.0 (1993)	First Functions Appear
Excel 5.0 thru 2001	299
Excel 2002	40
Excel 2003	0
Excel 2007	5
Excel 2010	61
Excel 2013	50
Total	455

Excel Functions are preprogrammed formulas that make the task of writing complex formulas easier. There are a total of 455 functions in Excel. These functions are separated into 14 categories as follows:

Categories & Number Of Functions In Each Category

1. Compatibility ....(38)
2. Cubes .... (7)
3. Databases ....(12)
4. Date and times ....(24)
5. Engineering ....(54)
6. Financials ....(55)
7. Information ....(20)
8. Logical .... (9)
9. Lookup and references ....(19)
10. Math and trigonometry ....(79)
11. Statistical ....(101)
12. Texts ....(30)
13. User defined that are installed with add-ins ....(4)
14. Webs ....(3)

Function Relevance to CPAs

Some Excel functions are more powerful than others and some are more relevant to the CPA than others. For example, most CPAs will find the IF, SUM, COUNT, SUBTOTAL, TEXT, and VLOOKUP are very relevant to the CPA while other engineering and trigonometry functions such as LOG, PI, RADIENS, DELTA, TAN, COMPLEX, and HAX2DEC are typically less relevant to CPAs. It has been my experience that approximately 171 functions are more relevant or important to CPAs; therefore in my opinion, CPAs wishing to increase their command of Excel functions should concentrate on learning these functions primarily. To help you accomplish this goal, presented below is a list of all 455 Excel functions, along with a brief explanation of each function. The 170 functions that I find more relevant are shown in red bold.

Compatibility

1	BETADIST	Returns the beta cumulative distribution
2	BETAINV	Returns the inverse of the cumulative distribution for a specified beta distribution
3	BINOMDIST	Returns the individual term binomial distribution probability
4	CHIDIST	Returns the one-tailed probability of the chi-squared distribution
5	CHIINV	Returns the inverse of the one-tailed probability of the chi-squared distribution
6	CHITEST	Returns the test for independence
7	CONFIDENCE	Returns the confidence interval for a population mean
8	COVAR	Returns covariance, the avg of the products of paired deviations

9	CRITBINOM	Returns the smallest value for which the cumulative binomial distribution is less than or equal to a criterion value
10	EXPONDIST	Returns the exponential distribution
11	FDIST	Returns the F probability distribution
12	FINV	Returns the inverse of the F probability distribution
13	FTEST	Returns the result of an F-test
14	GAMMADIST	Returns the gamma distribution
15	GAMMAINV	Returns the inverse of the gamma cumulative distribution
16	HYPGEOMDIST	Returns the hypergeometric distribution
17	LOGINV	Returns the inverse of the lognormal cumulative distribution
18	LOGNORMDIST	Returns the cumulative lognormal distribution
19	MODE	Returns the most common value in a data set
20	NEGBINOMDIST	Returns the negative binomial distribution
21	NORMDIST	Returns the normal cumulative distribution
22	NORMINV	Returns the inverse of the normal cumulative distribution
23	NORMSDIST	Returns the standard normal cumulative distribution
24	NORMSINV	Returns the inverse of the standard normal cumulative distribution
25	**PERCENTILE**	**Returns the k-th percentile of values in a range**
26	**PERCENTRANK**	**Returns the percentage rank of a value in a data set**
27	POISSON	Returns the Poisson distribution
28	QUARTILE	Returns the quartile of a data set
29	**RANK**	**Returns the rank of a number in a list of numbers**
30	STDEV	Estimates standard deviation based on a sample
31	**STDEVP**	**Calculates standard deviation based on the entire population**
32	TDIST	Returns the Student's t-distribution
33	TINV	Returns the inverse of the Student's t-distribution
34	TTEST	Returns the probability associated with a Student's t-test
35	VAR	Estimates variance based on a sample
36	VARP	Calculates variance based on the entire population
37	WEIBULL	Returns the Weibull distribution
38	ZTEST	Returns the one-tailed probability-value of a z-test

Cubes

39	**CUBEKPIMEMBER**	**Returns a key performance indicator (KPI) property and displays the KPI name in the cell. A KPI is a quantifiable measurement, such as monthly gross profit or quarterly employee turnover, that is used to monitor an organization's performance.**
40	CUBEMEMBER	Returns a member or tuple from the cube. Use to validate that the member or tuple exists in the cube.

41	CUBEMEMBERPROPERTY	Returns the value of a member property from the cube. Use to validate that a member name exists within the cube and to return the specified property for this member.
42	CUBERANKEDMEMBER	Returns the nth, or ranked, member in a set. Use to return one or more elements in a set, such as the top 10 sales performers.
43	CUBESET	Defines a calculated set of members or tuples by sending a set expression to the cube on the server, which creates the set, and then returns that set to Microsoft Office Excel.
44	CUBESETCOUNT	Returns the number of items in a set.
45	CUBEVALUE	Returns an aggregated value from the cube.

Databases

46	DAVERAGE	Returns the average of selected database entries
47	DCOUNT	Counts the cells that contain numbers in a database
48	DCOUNTA	Counts nonblank cells in a database
49	DGET	Extracts from a database a single record that matches the specified criteria
50	DMAX	Returns the maximum value from selected database entries
51	DMIN	Returns the minimum value from selected database entries
52	DPRODUCT	Multiplies the values in a particular field of records that match the criteria in a database
53	DSTDEV	Estimates standard deviation based on a sample of the database
54	DSTDEVP	Calculates the standard deviation based on the entire population of selected database entries
55	DSUM	Adds the numbers in the field column of records in the database that match the criteria
56	DVAR	Estimates variance based on a sample of the database
57	DVARP	Calculates variance based on the entire population of selected database entries

Date and Time

58	DATE	Returns the serial number of a particular date
59	DATEVALUE	Converts a date in the form of text to a serial number
60	DAY	Converts a serial number to a day of the month
61	DAYS	Returns the number of days between two dates
62	DAYS360	Calculates the number of days between two dates based on a 360-day year
63	EDATE	Returns the serial number of the date that is the indicated number of months before or after the start date
64	EOMONTH	Returns the serial number of the last day of the month before or after a specified number of months
65	HOUR	Converts a serial number to an hour

66	ISOWEEKNUM	**Returns the number of the ISO week number of the year for a given date**
67	MINUTE	**Converts a serial number to a minute**
68	MONTH	**Converts a serial number to a month**
69	NETWORKDAYS	**Returns the number of whole workdays between two dates**
70	NETWORKDAYS.INTL	Returns the number of whole workdays between two dates using parameters to indicate how many days are weekend days
71	NOW	**Returns the serial number of the current date and time**
72	SECOND	**Converts a serial number to a second**
73	TIME	**Returns the serial number of a particular time**
74	TIMEVALUE	**Converts a time in the form of text to a serial number**
75	TODAY	**Returns the serial number of today's date**
76	WEEKDAY	**Converts a serial number to a day of the week**
77	WEEKNUM	**Converts a serial number to a number representing where the week falls numerically with a year**
78	WORKDAY	**Returns the serial number of the date before or after a specified number of workdays**
79	WORKDAY.INTL	Returns the serial number of the date before or after a specified number of workdays using parameters to indicate which and how many days are weekend days
80	YEAR	**Converts a serial number to a year**
81	YEARFRAC	Returns the year fraction representing the number of whole days between start_date and end_date

Engineering

82	BESSELI	Returns the modified Bessel In(x)
83	BESSELJ	Returns the Bessel Jn(x)
84	BESSELK	Returns the modified Bessel Kn(x)
85	BESSELY	Returns the Bessel Yn(x)
86	BIN2DEC	Converts a binary number to decimal
87	BIN2HEX	Converts a binary number to hexadecimal
88	BIN2OCT	Converts a binary number to octal
89	BITAND	Returns a 'Bitwise And' of two numbers
90	BITLSHIFT	Returns a value number shifted left by shift_amount bits
91	BITOR	Returns a bitwise OR of 2 numbers
92	BITRSHIFT	Returns a value number shifted right by shift_amount bits
93	BITXOR	Returns a bitwise 'Exclusive Or' of two numbers
94	COMPLEX	Converts real and imaginary coefficients into a complex number
95	**CONVERT**	**Converts a number from one measurement system to another**
96	DEC2BIN	Converts a decimal number to binary
97	DEC2HEX	Converts a decimal number to hexadecimal

98	DEC2OCT	Converts a decimal number to octal
99	**DELTA**	**Tests whether two values are equal**
100	ERF	Returns the error
101	ERF.PRECISE	Returns the error
102	ERFC	Returns the complementary error
103	ERFC.PRECISE	Returns the complementary ERF integrated between x and infinity
104	GESTEP	Tests whether a number is greater than a threshold value
105	HEX2BIN	Converts a hexadecimal number to binary
106	HEX2DEC	Converts a hexadecimal number to decimal
107	HEX2OCT	Converts a hexadecimal number to octal
108	IMABS	Returns the absolute value (modulus) of a complex number
109	IMAGINARY	Returns the imaginary coefficient of a complex number
110	IMARGUMENT	Returns the argument theta, an angle expressed in radians
111	IMCONJUGATE	Returns the complex conjugate of a complex number
112	IMCOS	Returns the cosine of a complex number
113	IMCOSH	Returns the hyperbolic cosine of a complex number
114	IMCOT	Returns the cotangent of a complex number
115	IMCSC	Returns the cosecant of a complex number
116	IMCSCH	Returns the hyperbolic cosecant of a complex number
117	IMDIV	Returns the quotient of two complex numbers
118	IMEXP	Returns the exponential of a complex number
119	IMLN	Returns the natural logarithm of a complex number
120	IMLOG10	Returns the base-10 logarithm of a complex number
121	IMLOG2	Returns the base-2 logarithm of a complex number
122	IMPOWER	Returns a complex number raised to an integer power
123	IMPRODUCT	Returns the product of from 2 to 255 complex numbers
124	IMREAL	Returns the real coefficient of a complex number
125	IMSEC	Returns the secant of a complex number
126	IMSECH	Returns the hyperbolic secant of a complex number
127	IMSIN	Returns the sine of a complex number
128	IMSINH	Returns the hyperbolic sine of a complex number
129	IMSQRT	Returns the square root of a complex number
130	IMSUB	Returns the difference between two complex numbers
131	IMSUM	Returns the sum of complex numbers
132	IMTAN	Returns the tangent of a complex number
133	OCT2BIN	Converts an octal number to binary
134	OCT2DEC	Converts an octal number to decimal
135	OCT2HEX	Converts an octal number to hexadecimal

Financial

136	**ACCRINT**	**Returns accrued interest for a security paying periodic interest**
137	**ACCRINTM**	**Returns accrued interest for a security paying interest at maturity**
138	AMORDEGRC	Returns the depreciation for each accounting period by using a depreciation coefficient
139	AMORLINC	Returns the depreciation for each accounting period
140	COUPDAYBS	Returns the number of days from the beginning of the coupon period to the settlement date
141	COUPDAYS	Returns the number of days in the coupon period that contains the settlement date
142	COUPDAYSNC	Returns the number of days from the settlement date to the next coupon date
143	COUPNCD	Returns the next coupon date after the settlement date
144	COUPNUM	Returns the number of coupons payable between the settlement date and maturity date
145	COUPPCD	Returns the previous coupon date before the settlement date
146	CUMIPMT	Returns the cumulative interest paid between two periods
147	CUMPRINC	Returns cumulative principal paid on a loan between two periods
148	DB	Returns the depreciation of an asset for a specified period by using the fixed-declining balance method
149	**DDB**	**Returns the depreciation of an asset for a specified period by using the double-declining balance method or some other method that you specify**
150	DISC	Returns the discount rate for a security
151	DOLLARDE	Converts a dollar price, expressed as a fraction, into a dollar price, expressed as a decimal number
152	DOLLARFR	Converts a dollar price, expressed as a decimal number, into a dollar price, expressed as a fraction
153	DURATION	Returns the annual duration of a security with periodic interest payments
154	**EFFECT**	**Returns the effective annual interest rate**
155	**FV**	**Returns the future value of an investment**
156	FVSCHEDULE	Returns the future value of an initial principal after applying a series of compound interest rates
157	INTRATE	Returns the interest rate for a fully invested security
158	**IPMT**	**Returns interest payment for an investment for a given period**
159	**IRR**	**Returns the internal rate of return for a series of cash flows**
160	**ISPMT**	**Calculates the interest paid during a specific period of an investment**
161	MDURATION	Returns the Macauley modified duration for a security with an assumed par value of $100
162	MIRR	Returns the internal rate of return where positive and negative cash flows are financed at different rates
163	NOMINAL	Returns the annual nominal interest rate

164	NPER	Returns the number of periods for an investment
165	**NPV**	**Returns the net present value of an investment based on a series of periodic cash flows and a discount rate**
166	ODDFPRICE	Returns price per $100 face value of a security with an odd first period
167	ODDFYIELD	Returns the yield of a security with an odd first period
168	ODDLPRICE	Returns the price per $100 face value of a security with an odd last period
169	ODDLYIELD	Returns the yield of a security with an odd last period
170	PDURATION	Returns the number of periods required by an investment to reach a specified value
171	**PMT**	**Returns the periodic payment for an annuity**
172	**PPMT**	**Returns the payment on the principal for an investment for a given period**
173	PRICE	Returns the price per $100 face value of a security that pays periodic interest
174	PRICEDISC	Returns the price per $100 face value of a discounted security
175	PRICEMAT	Returns the price per $100 face value of a security that pays interest at maturity
176	**PV**	**Returns the present value of an investment**
177	**RATE**	**Returns the interest rate per period of an annuity**
178	**RECEIVED**	**Returns the amount received at maturity for a fully invested security**
179	RRI	Returns an equivalent interest rate for the growth of an investment
180	**SLN**	**Returns the straight-line depreciation of an asset for one period**
181	SYD	Returns the sum-of-years' digits depreciation of an asset for a specified period
182	**TBILLEQ**	**Returns the bond-equivalent yield for a Treasury bill**
183	TBILLPRICE	Returns the price per $100 face value for a Treasury bill
184	**TBILLYIELD**	**Returns the yield for a Treasury bill**
185	VDB	Returns the depreciation of an asset for a specified or partial period by using a declining balance method
186	**XIRR**	**Returns the internal rate of return for a schedule of cash flows that is not necessarily periodic**
187	**XNPV**	**Returns the net present value for a schedule of cash flows that is not necessarily periodic**
188	**YIELD**	**Returns the yield on a security that pays periodic interest**
189	YIELDDISC	Returns the annual yield for a discounted security; for example, a Treasury bill
190	YIELDMAT	Returns the annual yield of a security that pays interest at maturity

Informational

191	CELL	Returns information about the formatting, location, or contents of a cell Note This is not available in Excel Web App.
192	ERROR.TYPE	Returns a number corresponding to an error type
193	INFO	Returns information about the current operating environment. Note This is not available in Excel Web App.
194	ISBLANK	Returns TRUE if the value is blank
195	ISERR	Returns TRUE if the value is any error value except #N/A
196	ISERROR	Returns TRUE if the value is any error value
197	ISEVEN	Returns TRUE if the number is even
198	ISFORMULA	Returns TRUE if there is a reference to a cell that contains a formula
199	ISLOGICAL	Returns TRUE if the value is a logical value
200	ISNA	Returns TRUE if the value is the #N/A error value
201	ISNONTEXT	Returns TRUE if the value is not text
202	ISNUMBER	Returns TRUE if the value is a number
203	ISODD	Returns TRUE if the number is odd
204	ISREF	Returns TRUE if the value is a reference
205	ISTEXT	Returns TRUE if the value is text
206	N	Returns a value converted to a number
207	NA	Returns the error value #N/A
208	SHEET	Returns the sheet number of the referenced sheet
209	SHEETS	Returns the number of sheets in a reference
210	TYPE	Returns a number indicating the data type of a value

Logical

211	AND	Returns TRUE if all of its arguments are TRUE
212	FALSE	Returns the logical value FALSE
213	IF	Specifies a logical test to perform
214	IFERROR	Returns a value you specify if a formula evaluates to an error; otherwise, returns the result of the formula
215	IFNA	Returns the value you specify if the expression resolves to #N/A, otherwise returns the result of the expression
216	NOT	Reverses the logic of its argument
217	OR	Returns TRUE if any argument is TRUE
218	TRUE	Returns the logical value TRUE
219	XOR	Returns a logical exclusive OR of all arguments

Lookup and Reference

220	ADDRESS	Returns a reference as text to a single cell in a worksheet
221	AREAS	Returns the number of areas in a reference

222	CHOOSE	Chooses a value from a list of values
223	COLUMN	Returns the column number of a reference
224	COLUMNS	Returns the number of columns in a reference
225	FORMULATEXT	Returns the formula at the given reference as text
226	GETPIVOTDATA	Returns data stored in a PivotTable report
227	HLOOKUP	Looks in the top row of an array and returns the value of the indicated cell
228	HYPERLINK	Creates a shortcut or jump that opens a document stored on a network server, an intranet, or the Internet
229	INDEX	Uses an index to choose a value from a reference or array
230	INDIRECT	Returns a reference indicated by a text value
231	LOOKUP	Looks up values in a vector or array
232	MATCH	Looks up values in a reference or array
233	OFFSET	Returns a reference offset from a given reference
234	ROW	Returns the row number of a reference
235	ROWS	Returns the number of rows in a reference
236	RTD	Retrieves real-time data from a program that supports COM automation (Automation: A way to work with an application's objects from another application or development tool. Formerly called OLE Automation, Automation is an industry standard and a feature of the Component Object Model (COM).)
237	TRANSPOSE	Returns the transpose of an array
238	VLOOKUP	Looks in the first column of an array and moves across the row to return the value of a cell

Math & Trigonometry

239	ABS	Returns the absolute value of a number
240	ACOS	Returns the arccosine of a number
241	ACOSH	Returns the inverse hyperbolic cosine of a number
242	ACOT	Returns the arccotangent of a number
243	ACOTH	Returns the hyperbolic arccotangent of a number
244	AGGREGATE	Returns an aggregate in a list or database
245	ARABIC	Converts a Roman number to Arabic, as a number
246	ASIN	Returns the arcsine of a number
247	ASINH	Returns the inverse hyperbolic sine of a number
248	ATAN	Returns the arctangent of a number
249	ATAN2	Returns the arctangent from x- and y-coordinates
250	ATANH	Returns the inverse hyperbolic tangent of a number
251	BASE	Converts a number into a text representation with the given radix (base)

252	CEILING	**Rounds a number to the nearest integer or to the nearest multiple of significance**
253	CEILING.MATH	**Rounds a number up, to the nearest integer or to the nearest multiple of significance**
254	CEILING.PRECISE	Rounds a number the nearest integer or to the nearest multiple of significance. Regardless of the sign of the number, the number is rounded up.
255	COMBIN	Returns the number of combinations for a given number of objects
256	COMBINA	Returns the number of combinations with repetitions for a given number of items
257	COS	Returns the cosine of a number
258	COSH	Returns the hyperbolic cosine of a number
259	COT	Returns the cotangent of an angle
260	COTH	Returns the hyperbolic cotangent of a number
261	CSC	Returns the cosecant of an angle
262	CSCH	Returns the hyperbolic cosecant of an angle
263	DECIMAL	**Converts a text representation of a number in a given base into a decimal number**
264	DEGREES	Converts radians to degrees
265	EVEN	**Rounds a number up to the nearest even integer**
266	EXP	Returns e raised to the power of a given number
267	FACT	Returns the factorial of a number
268	FACTDOUBLE	Returns the double factorial of a number
269	FLOOR	Rounds a number down, toward zero
270	FLOOR.MATH	**Rounds a number down, to the nearest integer or to the nearest multiple of significance**
271	FLOOR.PRECISE	Rounds a number down to the nearest integer or to the nearest multiple of significance. Regardless of the sign of the number, the number is rounded down.
272	GCD	Returns the greatest common divisor
273	INT	**Rounds a number down to the nearest integer**
274	ISO.CEILING	Returns a number that is rounded up to the nearest integer or to the nearest multiple of significance
275	LCM	Returns the least common multiple
276	LN	Returns the natural logarithm of a number
277	LOG	Returns the logarithm of a number to a specified base
278	LOG10	Returns the base-10 logarithm of a number
279	MDETERM	Returns the matrix determinant of an array
280	MINVERSE	Returns the matrix inverse of an array
281	MMULT	Returns the matrix product of two arrays
282	MOD	Returns the remainder from division
283	MROUND	Returns a number rounded to the desired multiple

284	MULTINOMIAL	Returns the multinomial of a set of numbers
285	MUNIT	Returns the unit matrix or the specified dimension
286	**ODD**	**Rounds a number up to the nearest odd integer**
287	PI	Returns the value of pi
288	POWER	Returns the result of a number raised to a power
289	**PRODUCT**	**Multiplies its arguments**
290	**QUOTIENT**	**Returns the integer portion of a division**
291	RADIANS	Converts degrees to radians
292	**RAND**	**Returns a random number between 0 and 1**
293	**RANDBETWEEN**	**Returns a random number between the numbers you specify**
294	ROMAN	Converts an Arabic numeral to Roman, as text
295	**ROUND**	**Rounds a number to a specified number of digits**
296	**ROUNDDOWN**	**Rounds a number down, toward zero**
297	**ROUNDUP**	**Rounds a number up, away from zero**
298	SEC	Returns the secant of an angle
299	SECH	Returns the hyperbolic secant of an angle
300	SERIESSUM	Returns the sum of a power series based on the formula
301	**SIGN**	**Returns the sign of a number**
302	SIN	Returns the sine of the given angle
303	SINH	Returns the hyperbolic sine of a number
304	SQRT	Returns a positive square root
305	SQRTPI	Returns the square root of (number * pi)
306	**SUBTOTAL**	**Returns a subtotal in a list or database**
307	**SUM**	**Adds its arguments**
308	**SUMIF**	**Adds the cells specified by a given criteria**
309	**SUMIFS**	**Adds the cells in a range that meet multiple criteria**
310	**SUMPRODUCT**	**Returns the sum of the products of corresponding array components**
311	SUMSQ	Returns the sum of the squares of the arguments
312	SUMX2MY2	Returns the sum of the difference of squares of corresponding values in two arrays
313	SUMX2PY2	Returns the sum of the sum of squares of corresponding values in two arrays
314	SUMXMY2	Returns the sum of squares of differences of corresponding values in two arrays
315	TAN	Returns the tangent of a number
316	TANH	Returns the hyperbolic tangent of a number
317	TRUNC	Truncates a number to an integer

Statistical

318	AVEDEV	Returns the average of the absolute deviations of data points from their mean
319	**AVERAGE**	**Returns the average of its arguments**
320	AVERAGEA	Returns the average of its arguments, including numbers, text, and logical values
321	**AVERAGEIF**	**Returns the average (arithmetic mean) of all the cells in a range that meet a given criteria**
322	**AVERAGEIFS**	**Returns the average (arithmetic mean) of all cells that meet multiple criteria**
323	BETA.DIST	Returns the beta cumulative distribution
324	BETA.INV	Returns the inverse of the cumulative distribution for a specified beta distribution
325	BINOM.DIST	Returns the individual term binomial distribution probability
326	BINOM.DIST.RANGE	Returns the probability of a trial result using a binomial distribution
327	BINOM.INV	Returns the smallest value for which the cumulative binomial distribution is less than or equal to a criterion value
328	CHISQ.DIST	Returns the cumulative beta probability density
329	CHISQ.DIST.RT	Returns the one-tailed probability of the chi-squared distribution
330	CHISQ.INV	Returns the cumulative beta probability density
331	CHISQ.INV.RT	Returns the inverse of the one-tailed probability of the chi-squared distribution
332	CHISQ.TEST	Returns the test for independence
333	CONFIDENCE.NORM	Returns the confidence interval for a population mean
334	CONFIDENCE.T	Returns the confidence interval for a population mean, using a Student's t distribution
335	CORREL	Returns the correlation coefficient between two data sets
336	**COUNT**	**Counts how many numbers are in the list of arguments**
337	**COUNTA**	**Counts how many values are in the list of arguments**
338	**COUNTBLANK**	**Counts the number of blank cells within a range**
339	**COUNTIF**	**Counts the number of cells within a range that meet the given criteria**
340	**COUNTIFS**	**Counts the number of cells within a range that meet multiple criteria**
341	COVARIANCE.P	Returns covariance, the average of the products of paired deviations
342	COVARIANCE.S	Returns the sample covariance, the average of the products deviations for each data point pair in two data sets
343	DEVSQ	Returns the sum of squares of deviations
344	EXPON.DIST	Returns the exponential distribution
345	F.DIST	Returns the F probability distribution
346	F.DIST.RT	Returns the F probability distribution
347	F.INV	Returns the inverse of the F probability distribution

348	F.INV.RT	Returns the inverse of the F probability distribution
349	F.TEST	Returns the result of an F-test
350	FISHER	Returns the Fisher transformation
351	FISHERINV	Returns the inverse of the Fisher transformation
352	**FORECAST**	**Returns a value along a linear trend**
353	FREQUENCY	Returns a frequency distribution as a vertical array
354	GAMMA	Returns the Gamma value
355	GAMMA.DIST	Returns the gamma distribution
356	GAMMA.INV	Returns the inverse of the gamma cumulative distribution
357	GAMMALN	Returns the natural logarithm of the gamma, Γ(x)
358	GAMMALN.PRECISE	Returns the natural logarithm of the gamma, Γ(x)
359	GAUSS	Returns 0.5 less than the standard normal cumulative distribution
360	GEOMEAN	Returns the geometric mean
361	**GROWTH**	**Returns values along an exponential trend**
362	HARMEAN	Returns the harmonic mean
363	HYPGEOM.DIST	Returns the hypergeometric distribution
364	**INTERCEPT**	**Returns the intercept of the linear regression line**
365	**KURT**	**Returns the kurtosis of a data set**
366	**LARGE**	**Returns the k-th largest value in a data set**
367	**LINEST**	**Returns the parameters of a linear trend**
368	**LOGEST**	**Returns the parameters of an exponential trend**
369	LOGNORM.DIST	Returns the cumulative lognormal distribution
370	LOGNORM.INV	Returns the inverse of the lognormal cumulative distribution
371	**MAX**	**Returns the maximum value in a list of arguments**
372	**MAXA**	**Returns the maximum value in a list of arguments, including numbers, text, and logical values**
373	MEDIAN	Returns the median of the given numbers
374	**MIN**	**Returns the minimum value in a list of arguments**
375	**MINA**	**Returns the smallest value in a list of arguments, including numbers, text, and logical values**
376	MODE.MULT	Returns a vertical array of the most frequently occurring, or repetitive values in an array or range of data
377	MODE.SNGL	Returns the most common value in a data set
378	NEGBINOM.DIST	Returns the negative binomial distribution
379	NORM.DIST	Returns the normal cumulative distribution
380	NORM.INV	Returns the inverse of the normal cumulative distribution
381	NORM.S.DIST	Returns the standard normal cumulative distribution
382	NORM.S.INV	Returns the inverse of the standard normal cumulative distribution
383	**PEARSON**	**Returns the Pearson product moment correlation coefficient**
384	PERCENTILE.EXC	Returns the k-th percentile of values in a range, where k is in the range 0..1, exclusive

385	PERCENTILE.INC	Returns the k-th percentile of values in a range
386	PERCENTRANK.EXC	Returns the rank of a value in a data set as a percentage (0..1, exclusive) of the data set
387	PERCENTRANK.INC	Returns the percentage rank of a value in a data set
388	PERMUT	Returns the number of permutations for a given number of objects
389	PERMUTATIONA	Returns the number of permutations for a given number of objects (with repetitions) that can be selected from the total objects
390	PHI	Returns the value of the density for a standard normal distribution
391	POISSON.DIST	Returns the Poisson distribution
392	PROB	Returns the probability that values in a range are between two limits
393	QUARTILE.EXC	Returns the quartile of the data set, based on percentile values from 0..1, exclusive
394	QUARTILE.INC	Returns the quartile of a data set
395	RANK.AVG	Returns the rank of a number in a list of numbers
396	RANK.EQ	Returns the rank of a number in a list of numbers
397	**RSQ**	**Returns the square of the Pearson product moment correlation coefficient**
398	**SKEW**	**Returns the skewness of a distribution**
399	**SKEW.P**	**Returns the skewness of a distribution based on a population: a characterization of the degree of asymmetry of a distribution around its mean**
400	**SLOPE**	**Returns the slope of the linear regression line**
401	**SMALL**	**Returns the k-th smallest value in a data set**
402	STANDARDIZE	Returns a normalized value
403	STDEV.P	Calculates standard deviation based on the entire population
404	STDEV.S	Estimates standard deviation based on a sample
405	STDEVA	Estimates standard deviation based on a sample, including numbers, text, and logical values
406	STDEVPA	Calculates standard deviation based on the entire population, including numbers, text, and logical values
407	STEYX	Returns the standard error of the predicted y-value for each x in the regression
408	T.DIST	Returns the Percentage Points (probability) for the Student t-distribution
409	T.DIST.2T	Returns the Percentage Points (probability) for the Student t-distribution
410	T.DIST.RT	Returns the Student's t-distribution
411	T.INV	Returns the t-value of the Student's t-distribution as a of the probability and the degrees of freedom
412	T.INV.2T	Returns the inverse of the Student's t-distribution
413	T.TEST	Returns the probability associated with a Student's t-test
414	**TREND**	**Returns values along a linear trend**

415	TRIMMEAN	Returns the mean of the interior of a data set
416	VAR.P	Calculates variance based on the entire population
417	VAR.S	Estimates variance based on a sample
418	VARA	Estimates variance based on a sample, including numbers, text, and logical values
419	VARPA	Calculates variance based on the entire population, including numbers, text, and logical values
420	WEIBULL.DIST	Returns the Weibull distribution
421	Z.TEST	Returns the one-tailed probability-value of a z-test

Text

422	ASC	Changes full-width (double-byte) English letters or katakana within a character string to half-width (single-byte) characters
423	BAHTTEXT	Converts a number to text, using the ß (baht) currency format
424	**CHAR**	**Returns the character specified by the code number**
425	**CLEAN**	**Removes all nonprintable characters from text**
426	**CODE**	**Returns a numeric code for the first character in a text string**
427	**CONCATENATE**	**Joins several text items into one text item**
428	DBCS	Changes half-width (single-byte) English letters or katakana within a character string to full-width (double-byte) characters
429	**DOLLAR**	**Converts a number to text, using the $ (dollar) currency format**
430	**EXACT**	**Checks to see if two text values are identical**
431	**FIND, FINDBs**	**Finds one text value within another (case-sensitive)**
432	**FIXED**	**Formats a number as text with a fixed number of decimals**
433	**LEFT, LEFTBs**	**Returns the leftmost characters from a text value**
434	**LEN, LENBs**	**Returns the number of characters in a text string**
435	**LOWER**	**Converts text to lowercase**
436	**MID, MIDBs**	**Returns a specific number of characters from a text string starting at the position you specify**
437	NUMBERVALUE	Converts text to number in a locale-independent manner
438	PHONETIC	Extracts the phonetic (furigana) characters from a text string
439	**PROPER**	**Capitalizes the first letter in each word of a text value**
440	**REPLACE, REPLACEBs**	**Replaces characters within text**
441	**REPT**	**Repeats text a given number of times**
442	**RIGHT, RIGHTBs**	**Returns the rightmost characters from a text value**
443	**SEARCH, SEARCHBs**	**Finds one text value within another (not case-sensitive)**
444	**SUBSTITUTE**	**Substitutes new text for old text in a text string**
445	**T**	**Converts its arguments to text**
446	**TEXT**	**Formats a number and converts it to text**
447	**TRIM**	**Removes spaces from text**

448	UNICHAR	Returns the Unicode character that is references by the given numeric value
449	UNICODE	Returns the number (code point) that corresponds to the first character of the text
450	**UPPER**	**Converts text to uppercase**
451	**VALUE**	**Converts a text argument to a number**

User defined that are installed with add-ins

452	CALL	Calls a procedure in a dynamic link library or code resource
453	EUROCONVERT	Converts a number to euros, converts a number from euros to a euro member currency, or converts a number from one euro member currency to another by using the euro as an intermediary (triangulation)
454	REGISTER.ID	Returns the register ID of the specified dynamic link library (DLL) or code resource that has been previously registered
455	SQL.REQUEST	Connects with an external data source and runs a query from a worksheet, then returns the result as an array without the need for macro programming

Web

453	ENCODEURL	Returns a URL-encoded string
454	FILTERXML	Returns specific data from the XML content by using the specified XPath
455	WEBSERVICE	

The 171 Most Relevant and Important Functions to CPAs
(According to Carlton's best guess)

The numbers in parenthesis correspond to the order
in which each function appears on the All Functions worksheet

Open an Excel file Containing Function Examples:
http://www.ASAResearch.com/web/functions.xlsx

The goal of this summary is to help CPAs focus on learning the most relevant and important functions first, without having to waste time wading through all 455 functions. Excel 2013 provides 455 functions, but in most cases only 37.5% of them are relevant and important to CPAs. Consider, how often do you expect to use the CRITBINOMIALDIST function? How often will the IMAGINARY function have relevance to your work? When did any CPA ever calculate depreciation using the SYD method (other than on a CPA example question). The reality is that CPAs don't have to know all of the functions to master Excel, you'll conquer Excel just by learning 37.5% of the included functions.

1.   IF (213) - Specifies a logical test to perform.
2.   SUM (307) - Adds its arguments.
3.   SUBTOTAL (306) - Returns a subtotal in a list or database.
4.   SUMIF (308) - Adds the cells specified by a given criteria.
5.   COUNT (336) - Counts how many numbers are in the list of arguments.
6.   COUNTA (337) - Counts how many values are in the list of arguments.
7.   AVERAGE (319) - Returns the average of its arguments.
8.   COUNTBLANK (338) - Counts the number of blank cells within a range.
9.   COUNTIF (339) - Counts the number of cells within a range that meet the given criteria.
10.   VALUE (451) - Converts a text argument to a number.
11.   TEXT (446) - Formats a number and converts it to text.
12.   VLOOKUP (238) - Looks in the first column of an array and moves across the row to return the value of the indicated cell.
13.   HLOOKUP (227) - Looks in the top row of an array and returns the value of the indicated cell.
14.   TWO WAY LOOKUP – Using both VLOOKUP and HLOOKUP together.
15.   LOOKUP (231) - Looks up values in a vector or array.
16.   MATCH (232) - Looks up values in a reference or array.
17.   TRIM (447) - Removes spaces from text.
18.   PROPER (439) - Capitalizes the first letter in each word of a text value.
19.   LOWER (435) - Converts text to lowercase.
20.   UPPER (450) - Converts text to uppercase.

21.   LEFT, LEFTBs (433) - Returns the leftmost characters from a text value.

22.   RIGHT, RIGHTBs (442) - Returns the rightmost characters from a text value.

23.   MID, MIDBs (436) - Returns a specific number of characters from a text string starting at the position.

24.   FIND, FINDBs (431) - Finds one text value within another (case-sensitive).

25.   SUBSTITUTE (444) - Substitutes new text for old text in a text string.

26.   LEN, LENBs (434) - Returns the number of characters in a text string.

27.   REPLACE, REPLACEBs (440) - Replaces characters within text.

28.   CONCATENATE (427) - Joins several text items into one text item.

29.   CLEAN (425) - Removes all nonprintable characters from text.

30.   NOW (71) - Returns the serial number of the current date and time.

31.   TODAY (75) - Returns the serial number of today's date.

32.   DATE (58) - Returns the serial number of a particular date.

33.   MONTH (68) - Converts a serial number to a month.

34.   DAY (60) - Converts a serial number to a day of the month.

35.   YEAR (80) - Converts a serial number to a year.

36.   WEEKDAY (76) - Converts a serial number to a day of the week.

37.   ROUND (295) - Rounds a number to a specified number of digits.

38.   ROUNDDOWN (296) - Rounds a number down, toward zero.

39.   ROUNDUP (297) - Rounds a number up, away from zero.

40.   MAX (371) - Returns the maximum value in a list of arguments.

41.   DMAX (50) - Returns the maximum value from selected database entries.

42.   MIN (374) - Returns the minimum value in a list of arguments.

43.   DMIN (51) - Returns the minimum value from selected database entries.

44.   MEDIAN - Returns the median of the given numbers.

45.   MODE - Returns the most common value in a data set.

46.   PERCENTILE (25) - Returns the k-th percentile of values in a range.

47.   PERCENTRANK (26) - Returns the percentage rank of a value in a data set.

48.   PMT (171) - Returns the periodic payment for an annuity.

49.   NPV (165) - Returns the net present value of an investment based on a series of periodic cash flows.

50.   DSUM (55) - Adds the numbers in the field column of records in the database that match the criteria.

51.   DCOUNT (47) - Counts the cells that contain numbers in a database.

52.   DCOUNTA (48) - Counts nonblank cells in a database.

53.   AND (211) - Returns TRUE if all of its arguments are TRUE.

54.   OR (217) - Returns TRUE if any argument is TRUE.

55.   CHOOSE (222) - Chooses a value from a list of values.

56.   TIME (73) - Returns the serial number of a particular time.

57.   FV (155) - Returns the future value of an investment.

58.   IRR (159) - Returns the internal rate of return for a series of cash flows.

59.   YIELD (188) - Returns the yield on a security that pays periodic interest.

60.   CELL (191) - Returns information about the formatting, location, or contents of a cell. Note

61.   INFO (193) - Returns information about the current operating environment. Note   This is not avail.

62.   ERROR.TYPE (192) - Returns a number corresponding to an error type.

63.   ISBLANK (194) - Returns TRUE if the value is blank.

64.   ISNA (200) - Returns TRUE if the value is the #N/A error value.

65.   GETPIVOTDATA (226) - Returns data stored in a PivotTable report.

66.   HYPERLINK (228) - Creates a shortcut or jump that opens a document stored on a network server, an in.

67.   TRANSPOSE (237) - Returns the transpose of an array.

68.   ABS (239) - Returns the absolute value of a number.

69.   RAND (292) - Returns a random number between 0 and 1.

70.   RANDBETWEEN (293) - Returns a random number between the numbers you specify.

71.   REPT (441) - Repeats text a given number of times.

72.   SLN (180) - Returns the straight-line depreciation of an asset for one period.

73.   SYD - Returns the sum-of-years' digits depreciation of an asset for a specified period.

74.   DDB (149) - Returns the depreciation of an asset for a specified period by using the double-declining balance method.

75.   DGET (49) - Extracts from a database a single record that matches the specified criteria.

76.   ADDRESS (220) - Returns a reference as text to a single cell in a worksheet.

77.   AGGREGATE (244) - Returns an aggregate in a list or database.

78.   FORECAST (352) - Returns a value along a linear trend.

79.   GROWTH (361) - Returns values along an exponential trend.

80.   LARGE (366) - Returns the k-th largest value in a data set.

81.   NOT (216) - Reverses the logic of its argument.

82.   OFFSET (233) - Returns a reference offset from a given reference.

83.   PEARSON (383) - Returns the Pearson product moment correlation coefficient.

84.   PV (176) - Returns the present value of an investment.

85.   RATE (177) - Returns the interest rate per period of an annuity.

86.   SEARCH, SEARCHBs (443) - Finds one text value within another (not case-sensitive).

87.   SMALL (401) - Returns the k-th smallest value in a data set.

88.   XIRR (186) - Returns the internal rate of return for a schedule of cash flows that is not necessarily.

89.   XOR (219) - Returns a logical exclusive OR of all arguments.

90.   AVERAGEIF (321) - Returns the average (arithmetic mean) of all the cells in a range that meet a give.

91.   AVERAGEIFS (322) - Returns the average (arithmetic mean) of all cells that meet multiple criteria.

92.   COLUMN (223) - Returns the column number of a reference.

93.   COLUMNS (224) - Returns the number of columns in a reference.

94.   CONVERT (95) - Converts a number from one measurement system to another.

95.   COUNTIFS (340) - Counts the number of cells within a range that meet multiple criteria.

96.   DATEVALUE (59) - Converts a date in the form of text to a serial number.

97.   DECIMAL (263) - Converts a text representation of a number in a given base into a decimal number.

98.   DOLLAR (429) - Converts a number to text, using the $ (dollar) currency format.

99.   EXACT (430) - Checks to see if two text values are identical.

100.   FORMULATEXT (225) - Returns the formula at the given reference as text.

101.   HOUR (65) - Converts a serial number to an hour.

102.   INDEX (229) - Uses an index to choose a value from a reference or array.

103.   ISERR (195) - Returns TRUE if the value is any error value except #N/A.

104.   ISERROR (196) - Returns TRUE if the value is any error value.

105.   ISFORMULA (198) - Returns TRUE if there is a reference to a cell that contains a formula.

106.   KURT (365) - Returns the kurtosis of a data set.

107.   MINUTE (67) - Converts a serial number to a minute.

108.   NA (207) - Returns the error value #N/A.

109.   PPMT (172) - Returns the payment on the principal for an investment for a given period.

110.   ROW (234) - Returns the row number of a reference.

111.   ROWS (235) - Returns the number of rows in a reference.

112.   RSQ (397) - Returns the square of the Pearson product moment correlation coefficient.

113.   SHEET (208) - Returns the sheet number of the referenced sheet.

114.   SHEETS (209) - Returns the number of sheets in a reference.

115.   SKEW (398) - Returns the skewness of a distribution.

116.   SKEW.P (399) - Returns the skewness of a distribution based on a population: a characterization of t.

117.   SUMIFS (309) - Adds the cells in a range that meet multiple criteria.

118.   T (445) - Converts its arguments to text.

119.   TYPE (210) - Returns a number indicating the data type of a value.

120.   WEEKNUM (77) - Converts a serial number to a number representing where the week falls numerically with a year.

121.   WORKDAY (78) - Returns the serial number of the date before or after a specified number of workdays.

122.   XNPV (187) - Returns the net present value for a schedule of cash flows that is not necessarily periodic.

123.   EFFECT (154) - Returns the effective annual interest rate.

124.   INT (273) - Rounds a number down to the nearest integer.

125.   INTERCEPT (364) - Returns the intercept of the linear regression line.

126.   RANK (29) - Returns the rank of a number in a list of numbers.

127.   RRI (179) - Returns an equivalent interest rate for the growth of an investment.

128.   SIGN (301) - Returns the sign of a number.

129.   SLOPE (400) - Returns the slope of the linear regression line.

130.   CEILING (252) - Rounds a number to the nearest integer or to the nearest multiple of significance.

131.   CEILING.MATH (253) - Rounds a number up, to the nearest integer or to the nearest multiple of significance.

132.   CHAR (424) - Returns the character specified by the code number.

133.   CODE (426) - Returns a numeric code for the first character in a text string.

134.   DAVERAGE (46) - Returns the average of selected database entries.

135.   DAYS (61) - Returns the number of days between two dates.

136.   FALSE (212) - Returns the logical value FALSE.

137.   FIXED (432) - Formats a number as text with a fixed number of decimals.

138.   FLOOR.MATH (270) - Rounds a number down, to the nearest integer or to the nearest multiple of significance .

139.   IFERROR (214) - Returns a value you specify if a formula evaluates to an error; otherwise, returns t.

140.   IFNA (215) - Returns the value you specify if the expression resolves to #N/A, otherwise returns the.

141.   INDIRECT (230) - Returns a reference indicated by a text value.

142.   IPMT (158) - Returns the interest payment for an investment for a given period.

143.   ISNONTEXT (201) - Returns TRUE if the value is not text.

144.   ISNUMBER (202) - Returns TRUE if the value is a number.

145.   MAXA (372) - Returns the maximum value in a list of arguments, including numbers, text, and logical .

146.   MINA (375) - Returns the smallest value in a list of arguments, including numbers, text, and logical.

147.   N (206) - Returns a value converted to a number.

148.   NETWORKDAYS (69) - Returns the number of whole workdays between two dates.

149.   RECEIVED (178) - Returns the amount received at maturity for a fully invested security.

150. SECOND (72) - Converts a serial number to a second.
151. SUMPRODUCT (310) - Returns the sum of the products of corresponding array components.
152. TREND (414) - Returns values along a linear trend.
153. TRUE (218) - Returns the logical value TRUE.
154. ACCRINT (136) - Returns the accrued interest for a security that pays periodic interest.
155. ACCRINTM (137) - Returns the accrued interest for a security that pays interest at maturity.
156. ISPMT (160) - Calculates the interest paid during a specific period of an investment.
157. ISTEXT (205) - Returns TRUE if the value is text.
158. LINEST (367) - Returns the parameters of a linear trend.
159. CUBEKPIMEMBER (39) - Returns a key performance indicator (KPI) property and displays the KPI name in.
160. DELTA (99) - Tests whether two values are equal.
161. EVEN (265) - Rounds a number up to the nearest even integer.
162. ISEVEN (197) - Returns TRUE if the number is even.
163. ISODD (203) - Returns TRUE if the number is odd.
164. ISOWEEKNUM (66) - Returns the number of the ISO week number of the year for a given date.
165. LOGEST (368) - Returns the parameters of an exponential trend.
166. ODD (286) - Rounds a number up to the nearest odd integer.
167. PRODUCT (289) - Multiplies its arguments.
168. QUOTIENT (290) - Returns the integer portion of a division.
169. STDEVP (31) - Calculates standard deviation based on the entire population.
170. TBILLEQ (182) - Returns the bond-equivalent yield for a Treasury bill.
171. TBILLYIELD (184) - Returns the yield for a Treasury bill.
172. TIMEVALUE (74) - Converts a time in the form of text to a serial number.

Macros

Macros offer a powerful and flexible way to extend the features of Excel. They allow the automation of repetitive tasks such as printing, formatting, configuring, or otherwise manipulating data in Excel. In its' simplest form, a macro is a recording of your keystrokes. While macros represent one of the stronger features found in Excel, they are rather easy to create and use. There are six major points that I like to make about macros as follows.

Six Major Points for Creating Macros

1. **Record, Use Excel, Stop Recording** – To create a macro, simply turn on the macro recorder, use Excel as you normally do, then turn off the recorder. Presto – you have created a macro. While the process is simple from the user's point of view, underneath the covers Excel creates a Visual Basic subroutine using sophisticated Visual Basic programming commands.

2. **Macro Location** – Macros can be stored in either of two locations, as follows:

    a. The workbook you are using, or
    b. Your Personal Macro Workbook (which by default is hidden from view)

    If your macro applies to all workbooks, then store it in the Personal Macro Workbook so it will always be available in all of your Excel workbooks; otherwise store it in your current workbook. A macro stored in your current workbook will be embedded and included in the workbook, even if you e-mail the workbook to another user.

3. **Assign your Macro to an Icon, Text or a Button** – To make it easy to run your macro, you should assign it to a toolbar icon so it will always be available no matter which workbooks you have open. If the macro applies only to your current workbook, then assign it to Text or a macro Button so it will be quickly available in your current workbook.

4. **Absolute versus Relative Macros** – An "Absolute" macro will always affect the same cells each time whereas a "Relative" macro will affect those cells relative to where your cursor is positioned when you invoke the macro. It is crucial that you understand the difference.

5. **Editing Macros** – Once created, you can view and/or edit your macro using the View Macros option. This will open the macro subroutine in a Visual basic programming window and provide you with a plethora of VB tools.

6. **Advanced Visual Basic Programming** – For the truly ambitious CPA, in the Visual Basic Programming window, you have the necessary tools you need to build very sophisticated macros with dialog boxes, drop down menu options, check boxes, radio buttons – the whole works. I invite you to knock yourself out. To see all of this power, turn on the "Developer Tab" in "Excel Options" (see below).

Presented below are more detailed comments and step-by-step instructions for creating and invoking macros, followed by some example macros.

Steps for Creating A Macro

1. **Launch Macro Recorder** - Select **Record Macros** on the **View** tab, or in the **Code Group** on the **Developer** Tab.

   A. **Macro Name** - Enter a name for the macro In the **Macro Name** box.

      a. The first character of the macro name must be a letter.
      b. Subsequent characters can be letters, numbers, or underscore characters.
      c. Spaces cannot be used in a macro name (an underscore character is often used as a word separator.
      d. If you use a macro name that is also a cell reference, you may get an error message that the macro name is not valid.

   B. **Shortcut** – (This is optional) Assign a CTRL key combination (such as CTRL+A to run the macro by typing any lowercase letter or uppercase letter that you want to use in the Shortcut key box.

      a. The shortcut key will override any equivalent default Excel shortcut key while the workbook that contains the macro is open.

   C. **Macro Location** - In the **Store Macro In** dropdown box, select the workbook where you want to store the macro.

      a. If you want a macro to be available in all Excel workbooks, select **Personal Macro Workbook**. When you select Personal Macro Workbook, Excel creates a hidden personal macro workbook (Personal.xlsb) if it does not already exist, and saves the macro in this workbook.

         i. In Windows Vista, this workbook is saved in the C:\Users\username\AppData\Local\Microsoft\Excel\XLStart folder.
         ii. In Microsoft Windows XP, this workbook is saved in the C:\Documents andSettings\user name\Application Data\Microsoft\Excel\XLStart folder.
         iii. Workbooks in the XLStart folder are opened automatically whenever Excel starts.
      b. **Note** - If you want the macro in the personal macro workbook to be run automatically in another workbook, you must also save that workbook in the XLStart folder so that both workbooks are opened when Excel starts.

D. **Macro Description** - In the **Description** box, type a description of the macro.

E. **Start Recording -** Click **OK** to start recording.

F. **Start Typing -** Perform the actions that you want to record. New in Excel 2010, macros can now record the manipulation of objects, such as inserting or moving a text box.

G. **Stop Recording** – When you are done click "Stop Recording" in the "Code Group" On the "Developer Tab". You can also click **Stop Recording** on the left side of the status bar.

H. **Assign the Macro to an Object, Graphic in the Worksheet** – Insert an object (like a Star shape or text box) or graphic image (like a picture) in your worksheet, then right-click on that object or graphic image and select **Assign Macro** from the popup menu. In the **Macro Name** box, select the macro that you want to assign to that object or graphic image and click **OK**.

2. **Menu Navigation Not Recorded –** Keep in mind that when you record a macro, the macro recorder records all the steps required to complete the actions that you want your macro to perform. Navigation on the Ribbon is not included in the recorded steps, only the commands that are executed are recorded in the macro.

3. **Turn On The Developer Tab –** By default, the Developer tab is turned off, but you can turn it on in Excel 2010 by clicking the **File** tab select **Options, Customize the Ribbon,** and check the checkbox next to **Developer Tab.** In Excel 2007, click the Microsoft Office Start Button in Excel 2007, select **Excel Options, and under** the **Popular** category, **Top options for working with Excel**, select the **Show Developer tab in the Ribbon** check box, and then click **OK**.
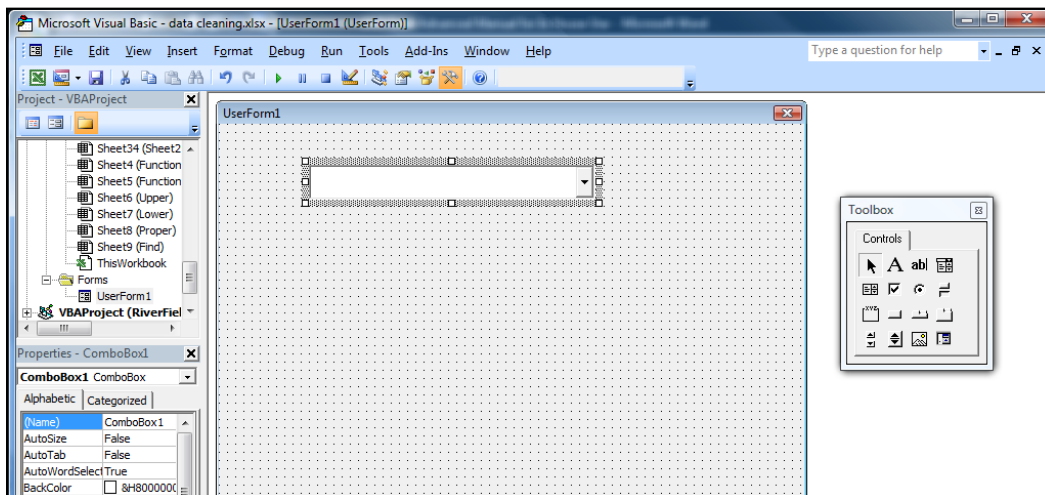
4. **Enable Macros –** If the macro functions are disabled, you can enable them by selecting **Macro Security** in the **Code** group on the **Developer** tab as shown below.
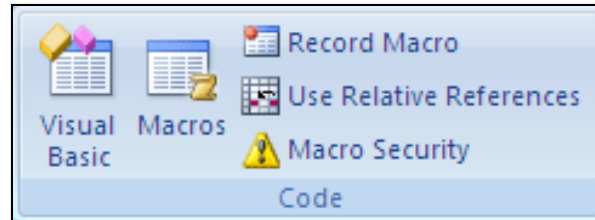
Under Macro Settings, click **Enable All Macros** (*this is not recommended by Microsoft because potentially dangerous code can then run without your approval*), and then click **OK**.

5. **Example Macros**

    A. **Headers and Footers Macro –** Start recording a new macro called **Insert_Headers**. Select all of the worksheets, then from the **Page Layout** tab, double click the Page Setup dialog box button to display the Page Setup dialog box. Continue to customize the header and footers to include page numbers, date and time stamps, file locations, tab names, etc. Assign the macro to an Icon on your toolbar or Quick Access Bar for quick and easy access. Thereafter, inserting headers and footers in your worksheets will be a breeze.

    B. **Print Macros –** Do you have a workbook containing multiple reports that you frequently print? If so, insert macro buttons to print each individual report, a group of reports, and even multiple reports, and in the future reporting will be a snap.

    C. **Delete Data Macro –** Do you have a frequently used template that contains a lot of variables? If so, create a macro that visits each cell and erases that data, resetting the worksheet for use in a new set of criteria. Assign the macro to a macro button and you will never again have old assumptions mixed in with your newer template.

    D. **Macro Case Study – Carlton's Copy Shop** – See the following chapter for a detailed case study for using macros.

Copy Shop Sales Order Macro Case Study

As an accounting software installer, I've learned from experience that most businesses can pick blindly from among the top accounting systems in the world and pretty much get the job done. From one business to the next, accounts payable needs, payroll needs, trial balance needs, reporting needs, and even inventory needs are similar and well covered by today's top accounting systems. However, there is one area which differs dramatically - and that area is in the sales order. It turns out that each company sells differing kinds of products and services with options so varied, that few accounting systems are prepared to handle those needs. In this situation, I make a bold claim that an Excel template can be easily used to fill in the missing gaps and supplement any accounting software system to provide excellent order taking capabilities.

In this case study, let us assume that we are working with a small copy shop – a small family owned company with about $300,000 in revenue. In this case they have determined that QuickBooks meets all of there needs, except for order taking. Therefore our goal will be to build a Sales Order system using Excel in only a few minutes. Listed below are the key elements that you will learn in this case study:

1. Neat and Organized Worksheet Design

2. =NOW()

3. Data Validation Lists

4. =VLOOKUP

5. Creating Macro Buttons

6. Creating Macros

    a. Simple Print macro

    b. Simple erase and increment invoice number macro

    c. More complicated posting macro

7. Relative versus Absolute Macros

8. Named Cells

9. Worksheet Protection

10. Adding Logic to the Product Configurator

11. Combining Macros

12. Locating the database on another sheet

Think about a copy shop for a minute, what is so difficult about taking an order in a copy shop? It is the options. How many copies would you like? Do you want that printed on front and back? Stapled or Bound? What kind of binding? What size paper? What color paper? What pound paper? Do you want regular or fast delivery? These are all standard questions asked by a copy shop, yet QuickBooks, nor any high end accounting system is able to take such an order. Even the million dollar solutions aren't equipped to take such an order. These companies must instead resort to purchasing a software application called a "product configurator", solutions which can costs $75,000 to $750,000 or more. To make matters more difficult, there are often rules associated with various options – for example, when ordering a car, if you order the sun roof option, you can not also order the T-Top option. Product configurators must account for and accommoate these types of situations.

1. Let us begin by simply labeling our sales order form. As you can see in the screen to the right, we've added some labels and highlighted some data input fields with yellow background and gridline borders.

(For purposes of this case study, we will only build in options for color and size, but once you get the hang of it, adding in additional options for paper weight, binding, duplex printing, etc is a rather simple matter.)

2. **=NOW()** – Next we type in the Excel Function =NOW(). This will cause Excel to display the computer's date and time each time an order is produced. You can see the =NOW() function in the formula bar and the results displayed in cell B2 below.

3. **Calculations for Base Rate** – Next we add simple calculations to multiply the total number of pages to be copied by the total number of copies and the base rate per copy. To make it easier to visualize, I have added some customer data. (The formula contained in cell B11 is displayed in the formula bar.)

4. **Color Options** – Next I created a table of the color options along with a sur-charge rate per page for each color. Notice that there is a "zero" sur-charge when selecting white paper. Make sure to sort your table in descending order because we plan to refer to that table via a Lookup function – and as we all know, lookup functions do not work properly unless the table array is sorted in descending order. To make the table of options more readable, I applied gridlines and a greenish background.

5. **Data List Validation** – Now this is where the excitement begins. Next I create a data validation list in cell B13 using column one of my options table. To do this, select B13, and choose Data validation from the Data Ribbon. Next select List and use the Cell Chooser to highlight the options in column one of your color options table.
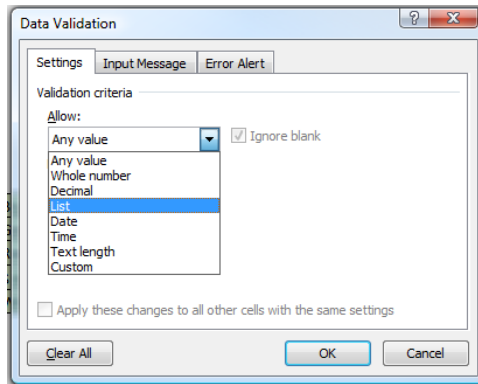
6. **=VLOOKUP** – Next I inserted a =VLOOKUP function in cell B14 to return the Sur-Charge rate based on the Color Selected.

Notice that when you select different colors in cell B13, the rate in Cell B14 changes according to the Color Option table.

7. **Size Options -** Repeat steps 4,5 & 6 above to also create Size Options.

8. **Invoice Total** – From here it is an easy step to add calculations to total the invoice. Of course your complete invoice would also include sales tax calculations as well. Our example is kept as simple as possible to make sure that the key points come across as easy as possible. Here's what we have so far:

9. **Macro Buttons** – To make the Sales Order form easier to use, next we will add three macro buttons. We start this process by creating a single text box, and use the Drawing Tools to make it look fancy. Here are steps:
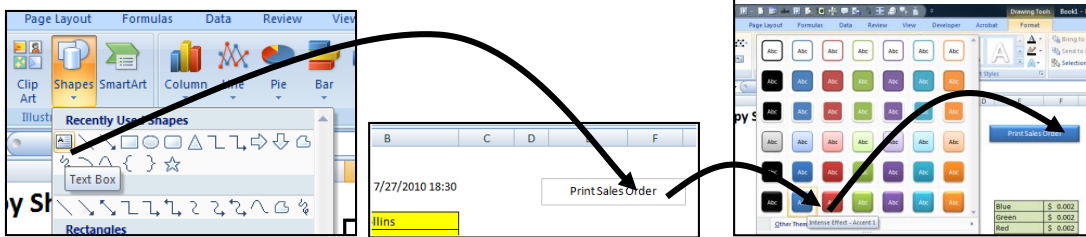
10. **Create the Print Macro** – Next create a print macro by selecting "Macro, Record Macro" from the "View Ribbon" *(make sure that no spaces are used in your macro name and save the macro to "This Workbook)*. Set the "Print Area" appropriately to display your Sales Order Form. Next simply highlight your Sales Order Form and print three copies, then stop recording your macro by selecting "Macro, Stop Recording" from the "View Ribbon". Once completed assign the Macro to the Print Sales Order Button by right mouse clicking and selecting "Assign Macro". The right click menu and the Assign Macro Dialog box are shown in the two screens below.
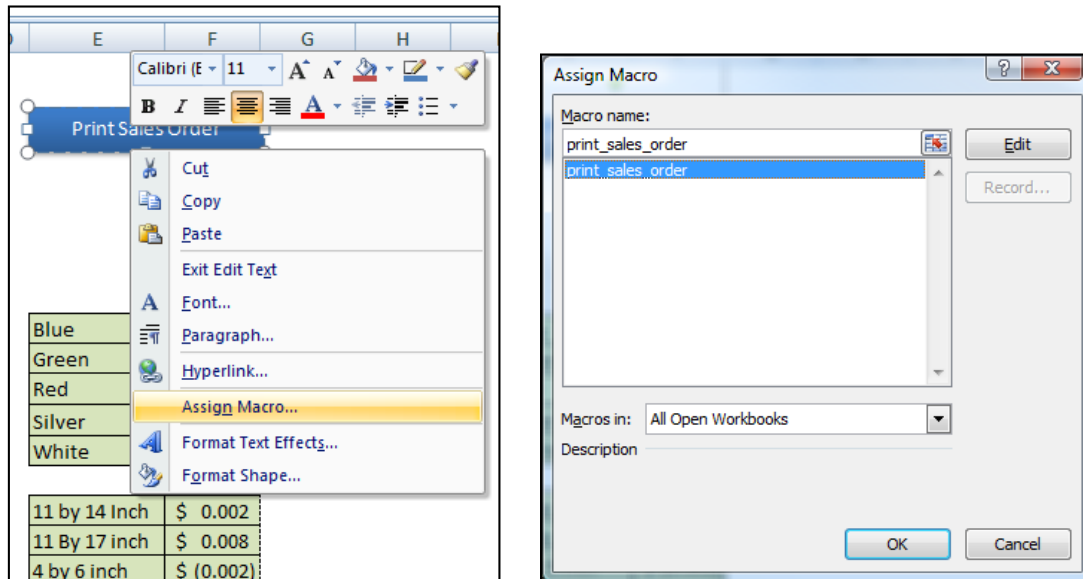
You want to print three copies of the Sales Order as follows: One for your customer's records; One for your product people to follow when making the copies, and one for bookkeeper to use when entering the invoice amount into QuickBooks.

11. **Additional Macro Buttons** – Next right click on the edge of the existing macro button twice, and choose "Copy"; then click away from the button and Paste twice. This will create two exact copies of your macro button. (You must right click twice on the edge of the button to display the second menu of options.)
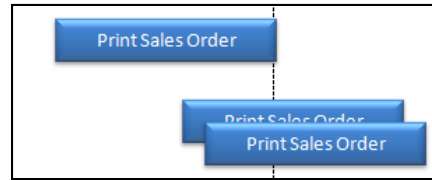
Next select the "Select Objects" menu option from the "Home" Ribbon's "Find and Select" menu in the "Edit" Group. Then lasso the three buttons and from the "Drawing Tools", use the Alignment tools to left justify and Distribute Vertically the three buttons.
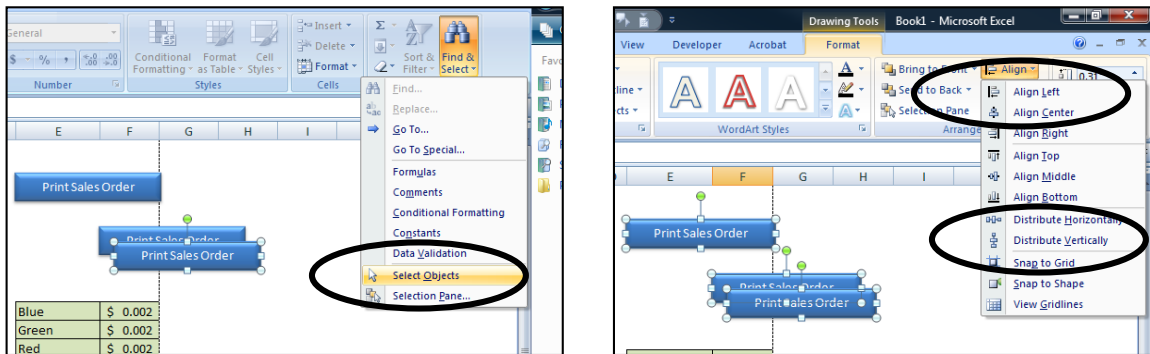
The results will appear as follows:
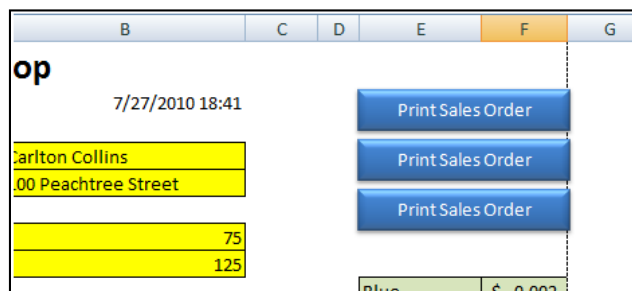
Press escape to deselect the "Object Pointer" tool, and return your cursor to normal.

12. **Post Sales Order Macro Button** – Next I created a macro to post the sales order information to a database. This is complicated and I will demonstrate several teaching points in class to help you fully understand the process of writing a combination relative and absolute Here are the steps:

    a. Relabel the second Macro Button to Read "Post Sales Order". This will require you to first right mouse click on the button and select the text, or if you prefer, remove the macro before continuing.

    b. Highlight cells B2 thru B21 and label that range "salesorderdata" using the Name Box.

    c. Go to Cell H1 and enter the phrase "Database" in cell H1.

d. Label cell H1 "database" using the Name Box.

e. Copy the labels in cells A2 thru A21 and Paste Transpose them to cell H2.

f. Start recording a macro named "postsalesorder".

g. Click the "Use Relative References" option from the Macros Group on the View Ribbon.

h. Press the F5 key to launch the GoTo Dialog Box.

i. Select the range "salesorderdata" by double clicking on the word "salesorderdata".

j. With your cursor hovering above the selected range, right mouse click and choose "Copy".

k. Press the F5 key to launch the GoTo Dialog Box.

l. Select the range "database" by double clicking on the word "database".

m. Press the End key, followed by the Down Arrow. (You will now be on the last row.)

n. Press the Down Arrow. (You will now be on a blank row underneath the last row.)

o. With your cursor hovering above the selected range, right mouse click and choose "Paste Special".

p. In the paste Special Dialog Box, check Values and Check Transpose, and click OK.

q. Place your cursor on cell A1.

r. Stop recording the macro by selecting "Macro, Stop Recording" from the "View Ribbon.

s. Assign the newly recorded macro to the Post Sales order macro Button.

t. Select Column H and format it to display Time and Date.

u. Adjust the width of your database columns to your preference.

13. **New Sales Order Macro Button** – Finally, edit the Third macro Button to Read "New sales Order" and create a macro that selects the yellow background data cells and deletes the contents. (Make sure to toggle the "Use Relative References" option off because this macro needs to be an absolute macro.) (Also make sure to select Cell B4, then hold the CTRL key down while you also select the other yellow back ground cells). Before you Stop Recording this macro, click on cell B4 so your cursor will be in the correct place to start recording a new sales order.
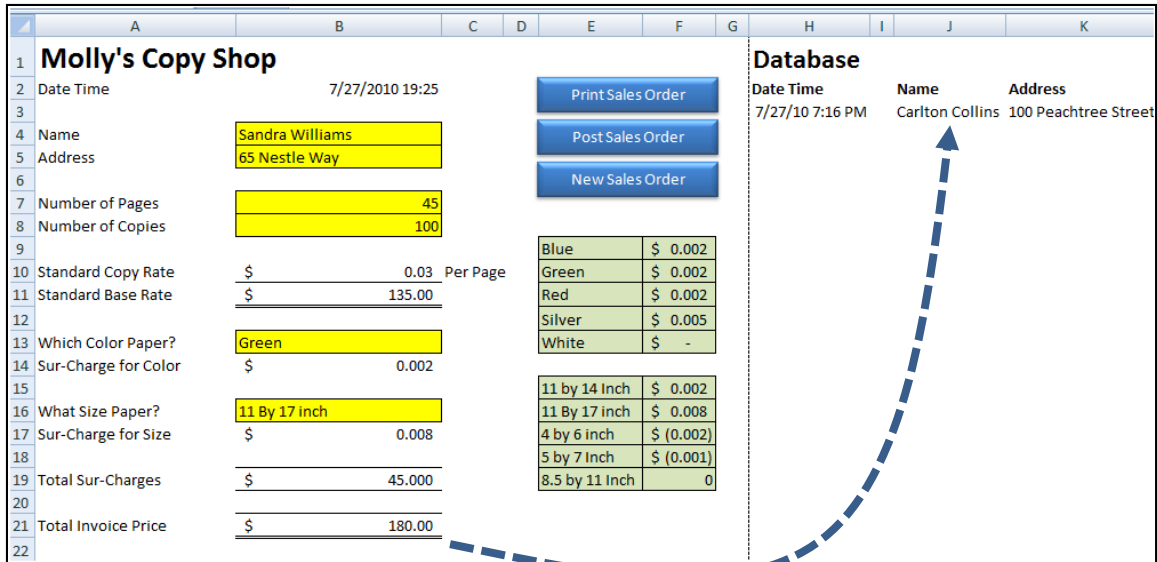
14. **Testing** – Test your three macros by filling in new sales order information, then click the three macro buttons in sequence to print, post and delete your data.

15. **Unlock Data Input Cells** – Next, select the cells containing the yellow background and also select the database columns (Hold the CTRL key down to make multiple selections. Then format the those cells to unlock them by right mouse clicking atop your selection and selecting "Format Cells, and unchecking the Locked Box on the protection tab – as shown below:
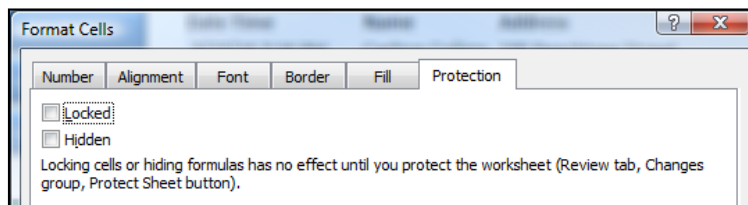
16. **Protect Your Worksheet** - Finally turn on worksheet protection by selecting "Protect Sheet" from the Review ribbon. Enter a password and repeat the password. This will prevent you or others from making accidental changes to the formulas and data contained in your template.

17. **Keep in Mind** – This case study covered the basics, but you could enhance this template a number of ways. Here are a few example hints:

    a. Combine the three macro buttons into one button that performs all tasks – printing, posting, and deleting.

    b. You might also add a grid for matrix pricing – pricing for volume below 1,000, 5,000, and 10,000 total pages copied.

c. You might add an invoice number to the top of the page. Each time you post, your macro might also create a temporary formula in an empty cell that refers to the invoice number and adds one, then copies pastes that result atop the invoice number cell using the paste value command. Make sure the macro then deletes the formula in the temporary cell.

d. You could easily add more options to your order form.

e. Notice that we also included an option to decrease our price if a smaller paper size is selected.

f. The sales order form could be dressed up to look far more professional. Colors, grids, logos, etc. could all be added to make the sales order form match the accounting system, for example.

g. You could copy the worksheet and edit a second order for to be used in different situations. For example, Worksheet A might contain an order form that charges regular rates when a regular customer enters the store, and Worksheet B could charge higher rates when a lawyer enters the store – and so on.

h. The resulting database will continue to compile each sales order as posted, adding new orders to the bottom of the database area each time you post.

i. The bookkeeper need only record the date, customer name, address, and total amount due in QuickBooks. The printed Sales Order copies on file will serve as supporting documentation.

j. You can download a copy of this example template from **www.CarltonCollins.com** – click the Excel Link.

Gantt Charts

Let's start by tricking Excel into creating a Gantt Chart. Of course Excel does not do Gantt charts, so we will apply clever tricks to achieve the desired affects. It's really not that hard and it works just as well in Excel 2013, 2010, 2007 and 2003. Start by preparing a simple list of tasks including start dates, duration of each task, and end dates (formulas in Excel can calculate the end dates). An example is shown below:

	A	B	C	D
1	Trick Excel into Creating a Gantt Chart			
2				
3				
4	Tasks	Start Date	Duration (Days)	End Date
5	Land Preparation	9/4/2008	8	9/12/2008
6	Foundation	9/12/2008	4	9/16/2008
7	Framing	9/16/2008	5	9/21/2008
8	Doors and Windows	9/19/2008	4	9/23/2008
9	Plumbing	9/23/2008	2	9/25/2008
10	Electrical	9/23/2008	3	9/26/2008
11	Sheet Rock	9/26/2008	12	10/8/2008
12	Finish Work	10/8/2008	7	10/15/2008
13	Painting	10/10/2008	9	10/19/2008

1. Start by creating a stacked bar chart
2. Remove the Data Series by right mouse clicking and choosing Select Data Source
3. Add a new Data Source Named Starting Date, and point to the range of start dates for the values
4. Add another new data source named Duration (Days), and point to the range of duration days for the values
5. Add Category Axis Labels and point to the Task names in Column A
6. Remove legend by selecting legend and pressing the Delete key
7. Click on the beginning series and set the Fill and Borders to None
8. Right mouse click on the task labels, choose format Axis, and check the Categories in Reverse Order box (if needed)
9. In two blank cells, write a formula referencing the start and end dates, convert these dates to numbers with formatting
10. Use the resulting numbers to set the scale of the Gantt Chart (perhaps use a slightly larger range of dates)
11. Right mouse click on the date range, set the minimum and maximums to fixed using the numbers acquired in the above step
12. Format the date range to show a short date
13. Format the remaining data bars to display a 3-D bevel
14. For added touch, search Google images for a nice picture of a house, save it to your hard drive.
15. Set the background plot area to picture, and wash out the picture enough so that the chart is still readable.
16. Add a title or text boxes as needed to complete the description of the Gantt Chart

The resulting Gantt chart is shown below. At this point, changing any of the start dates or duration dates will automatically update the Gantt chart.
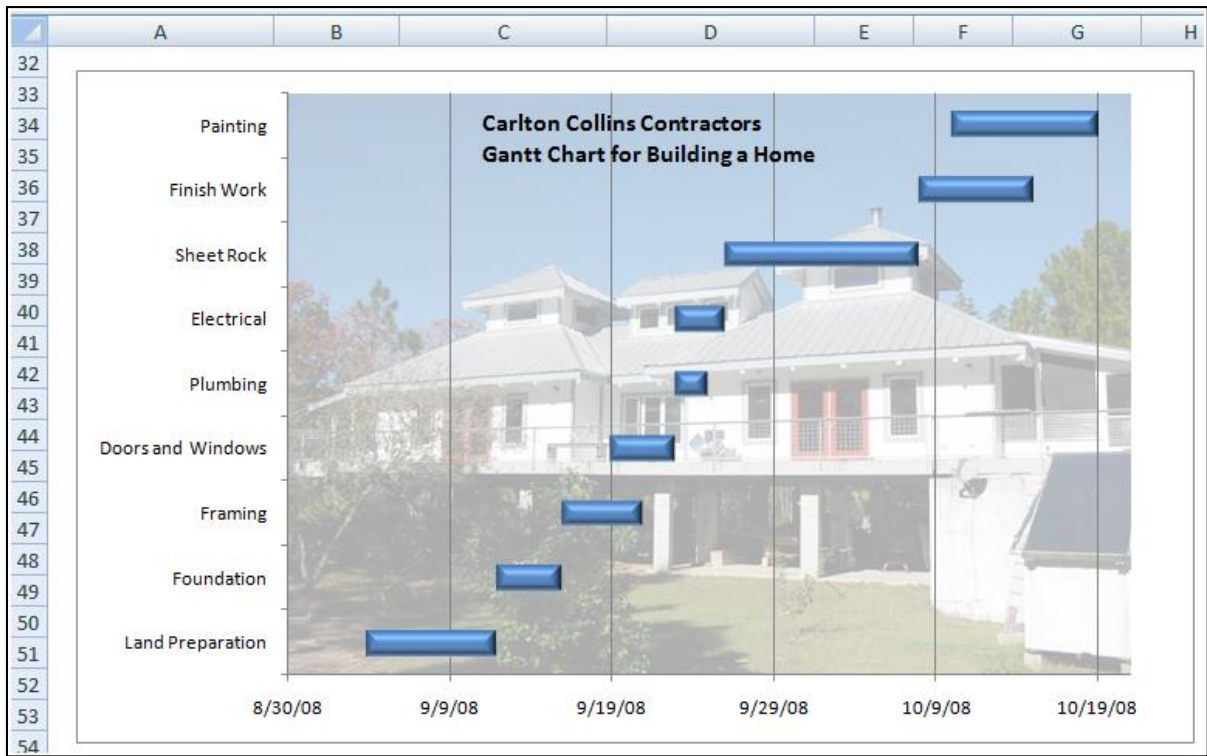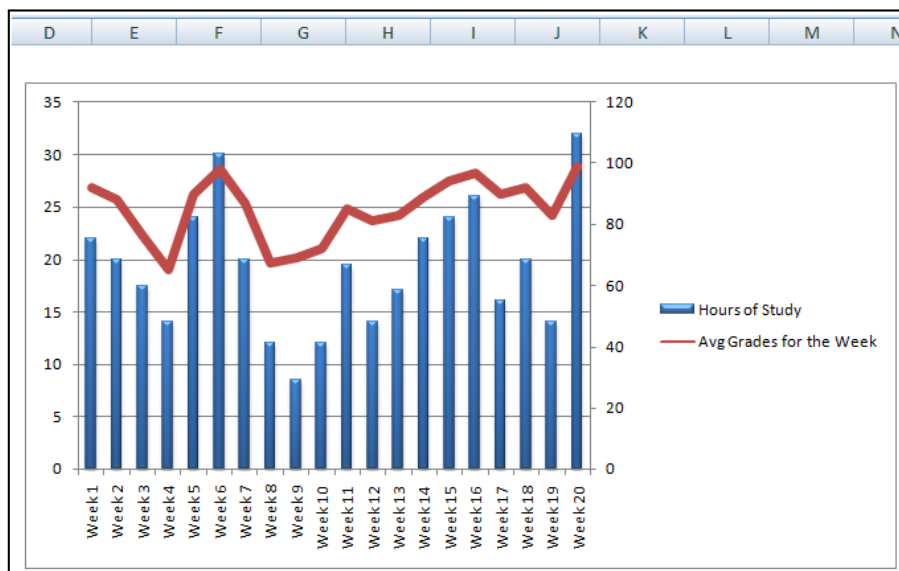
Combination Charts

A combination chart is used to show one chart on top of another chart, using the same scale by percentage. This allows the reader to better study the data to determine whether relationships, if any, exist between the two sets of data. For example, consider the simple study hours and resulting grade information shown to the right for a new college student – we will call him Austin. We have compiled a worksheet showing the number of hours in which Austin studied each week, and the average scores he achieved on his homework, quizzes, test and exams.

1. Start by creating a line chart from your entire data range
2. Rescale the top line by right clicking and change the series option to use a secondary axis
3. Note the ranges on each side of the chart
4. Next right mouse click one of the lines and choose Change Series Chart type, and choose a column chart format
5. Now apply a chart format and study your date for any useful relationships

	A	B	C
1	**Combination Charts**		
2			
3	**Week**	**Hours of Study**	**Avg Grades for the Week**
4	Week 1	22	92
5	Week 2	20	88
6	Week 3	17.5	76
7	Week 4	14	65
8	Week 5	24	90
9	Week 6	30	98
10	Week 7	20	87
11	Week 8	12	67
12	Week 9	8.5	69
13	Week 10	12	72
14	Week 11	19.5	85
15	Week 12	14	81
16	Week 13	17	83
17	Week 14	22	89
18	Week 15	24	94
19	Week 16	26	97
20	Week 17	16	90
21	Week 18	20	92
22	Week 19	14	83
23	Week 20	32	99

As we can see by the resulting combination chart, approximately 26 hours of study are required each week in order to achieve an average grade of 90 or above, and approximately 20 to 22 hours of study are required each week to achieve a B average above 80. In our next case study we might want to analyze whether the amount of money his parents send to him each week affects the number of hours of study he puts forth each week.

Organization Charts

Next we will create an organizational chart using the SmartArt capabilities in Excel 2013, 2010, and 2007. Excel 2003 offers a similar tool, but it is not as pretty. Start by choosing SmartArt and point to the desired chart format.
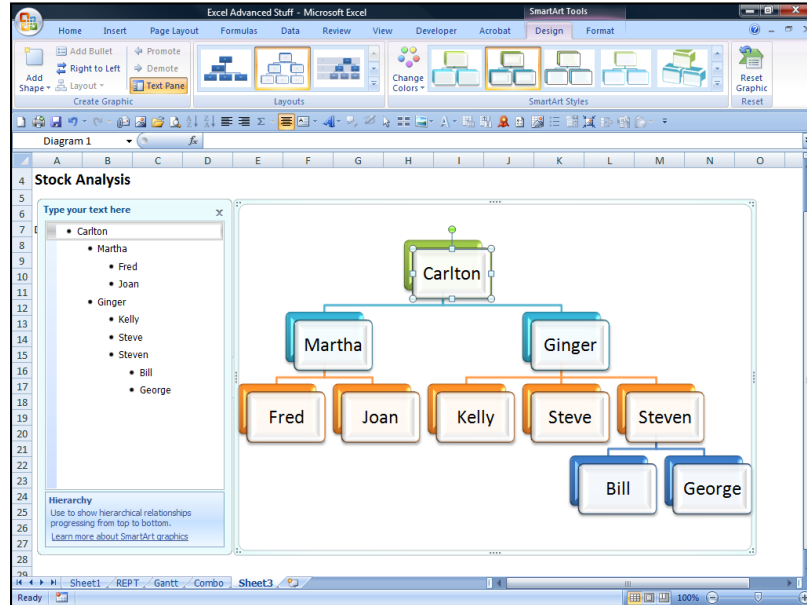
What's New in Microsoft Office 2013?

This course covers 8 hours of the very best and most essential Excel 2013 functionality that CPAs should be using in the performance of their jobs. This course is best suited for moderate level Excel users who know how to use the basic functionality of Excel, but have seldom explored the more powerful features and capabilities that Excel has to offer, including the following new features found in Excel 2013.

1. **Quick Analysis** - helps you analyze data more quickly by offering data layouts.
2. **Flash Fill** - watches you work and applies logic to help you complete your tasks.
3. **PowerView** - enables you to create new report types, such as the interactive map charts.
4. **Timeline Slicer** - helps you slice and dice Pivot data containing dates.
5. **Create Relationships tool** – enables you to build PivotTables from multiple data sources.
6. **Drill Up and Cross Drill** - Drill upward and cross drill to related tables.
7. **Improved Edit Mode** - edit mode, Excel no longer displays an apostrophe.
8. **Excel Instances** - Excel now opens each workbook in a separate instance.
9. **New PivotTable Tools** - decouple PivotCharts so they stand alone.
10. **Fifty New Functions** – Bring the total number of functions to 450. [1]
11. **Recommended Pivot Tables & Charts** – To help you work quicker and easier.
12. **New Chart Controls** - Excel pops up new chart controls.
13. **Get A Link** – Send Excel workbooks links instead of workbooks via email.
14. **Publish Excel Data to Social Media** – Embed Workbooks directly in Facebook.
15. **Review Tools** - new inquire Add-in reviews design, function and data dependencies.
16. **Excel Compare tool** - similar to Word's Compare tool.
17. **Touch-Screen Enabled** – Makes excel accessible on touch-screen mobile devices.
18. **Windows 8 Style Tiles** – For easy launching and navigation.
19. **Cloud-Enabled** – Save Excel workbooks directly to your free cloud data storage SkyDrive.
20. **Office 2013 Web Apps** – a free version of Excel 2013 is available via the cloud.
21. **Subscription Pricing** – enables you to install Excel on five devices, and run Excel from the cloud.

These concepts are described in greater depth below.

New Global Features in Office 2013

Many CPAs worry that Office's new touch-screen functionality means the product's new ribbons that will be time-consuming to learn, but this is not the case. Office 2013's ribbons work and look almost exactly like Office 2010's ribbons, and transitioning to the new product involves only a minor learning curve. While the new touch-screen controls provide new ways to launch and use the applications on touch-screen devices, the 2010-style ribbon along with a standard keyboard and mouse remains to be the primary means for operating the product. On mobile devices, the ribbons offer the same menu options, but they are redesigned to better fit smaller hand-held devices. Most of Office's new touch controls work similar to mouse-clicks, but new gestures have been added. For example, you can navigate Excel workbooks or multiple pages in

Word by swiping your finger across the screen. You can also pinch and spread to shrink or enlarge your spreadsheets, documents or presentations. A new **Touch Mode** button inserts more space around the Ribbon's icons so operating the touch controls on smaller devices is a little easier.

Office's new square, color-coded tiles *(see figure)* are used to launch applications on your tablet, smartphone, or computers equipped with touch-screen monitors. The tiles can be resized and rearranged to your preference, and the color-coded schemes make it easier to identify and select the correct application. Office's tiles match the Windows 8 tiles which have been praised by some for their simplicity and utility.
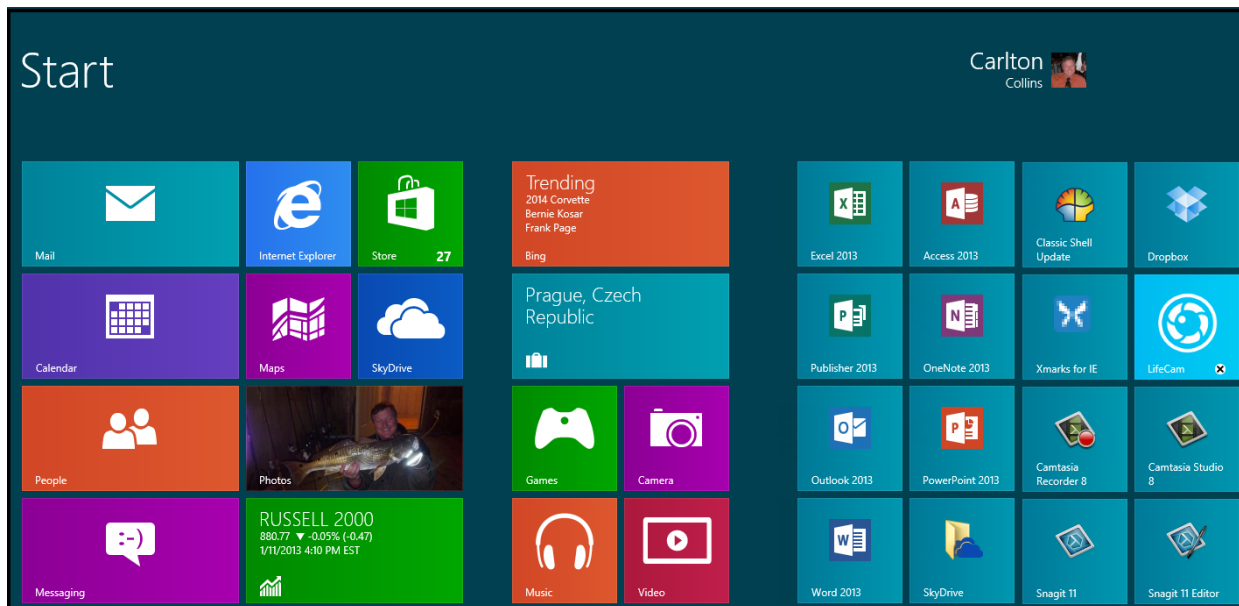
Examples of Office 2013 Quick Launch Tiles in Windows 8

Office binds you to the cloud in many ways. For example, Office automatically connects to your free cloud-based SkyDrive which includes 20 GBs of data storage space, email account, contact management, calendar management, and the following free web apps: 2013 editions of Word, Excel, PowerPoint, and OneNote. These web apps are cloud-based versions of the popular applications (with limited commands and features), accessible from any web browser on a desktop, laptop, tablet or smartphone device.
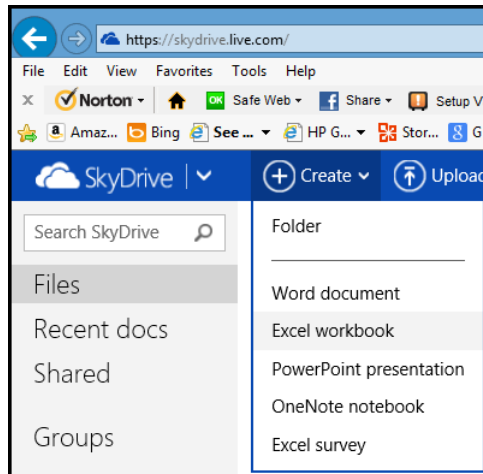
Office 2013's Free Web Apps

Since everyone has access to these free web apps, troublesome file-sharing barriers and file compatibility issues are removed; therefore, CPAs can use Office 2013 with the confidence of knowing that documents and workbooks they produce can be easily viewed and edited by others. *(These web apps are available for free by signing up for a SkyDrive account as described in the October, 2011 JofA article titled A Sky-High Solution - page 78).*

Microsoft offers Office via a subscription plan and many CPAs are finding the rental plan to be a better option than purchasing the product. Pricing options and functionality for selected Office 2013 editions are summarized in the *table* below.

Office Edition	Users/PCs	Price	Included

Purchase Options:

Office Edition	Users/PCs	Price	Included
Office Home & Business	1 user/3 PCs	$279.99	Word, Excel, PowerPoint, OneNote, Outlook
Office Professional	1 user/2 PCs	$499.99	Word, Excel, PowerPoint, OneNote, Outlook, Access, Publisher

Subscription Options:

Office Edition	Users/PCs	Price	Included
Office 365 Professional Plus	1 user/5 PCs	$15/Month	Word, Excel, PowerPoint, OneNote, Outlook, Access, Publisher
Office 365 E3 Plan	1 user/5 PCs	$20/Month	Word, Excel, PowerPoint, OneNote, Outlook, Access, Publisher, Cloud-based email, Web conferencing, Shared calendars, Cloud-based team sites, Office Web Apps

Pricing Options for Selected Editions of Office 2013

Seven advantages for renting rather than purchasing are as follows:

1. **Installs on more PCs** - The subscription plan allows you to install Office professional on five computers or devices, compared to just two or three installations with the purchased product.

2. **Never upgrade again** – Renters will never face an upgrade decision again as future product enhancements are included automatically.

3. **Superior iMap email** - The subscription plan includes a cloud-based email solution using iMap (Internet Message Access Protocol), which is stronger than the traditional Pop3 (Post Office Protocol) email solution. This is because iMap maintains email messages, replies, contacts, tasks and calendars in a central location so you can access them from any of your computers, the web, or mobile devices. In contrast, Pop3 maintains this information on the individual computers, thus accessing this information from multiple computers or devices is more problematic.

4. **Better security** - In the cloud, data is securely encrypted from your computer to the cloud, and your data remains encrypted in the cloud. Your data is also backed up automatically on a continuous basis and is protected by world-class firewalls, anti-virus software, and intrusion monitoring solutions. A significant amount of technology, cost and effort is needed to duplicate this level of security on a local computer or file server.

5. **File Sharing** – The subscription plan includes a cloud-based SkyDrive (starting at 20 GBs), team management tools, and file syncing options to help groups work in collaboration. You can grant permission to others to access your SkyDrive files or folders, even if they don't use Office. In the cloud environment, email attachments are unnecessary because you can send recipients a link instead of attachments; as a result, emails travel faster, deliveries are no longer hung up due to attached file size restrictions, and attachments no longer contribute to oversized inbox data files.

6. **Eliminate upfront capital costs** – For larger companies, the subscription plan eliminates their need to borrow money to purchase product. By opting for the "pay as go" subscription plan, companies can expense the costs as a monthly operating expense;

7. **Eliminate balance sheet liabilities –** For larger companies, FASB 47 requires disclosure of long term obligations, but because Office's subscription plan requires no long-term commitment, these rental obligations need not be included on the balance sheet.
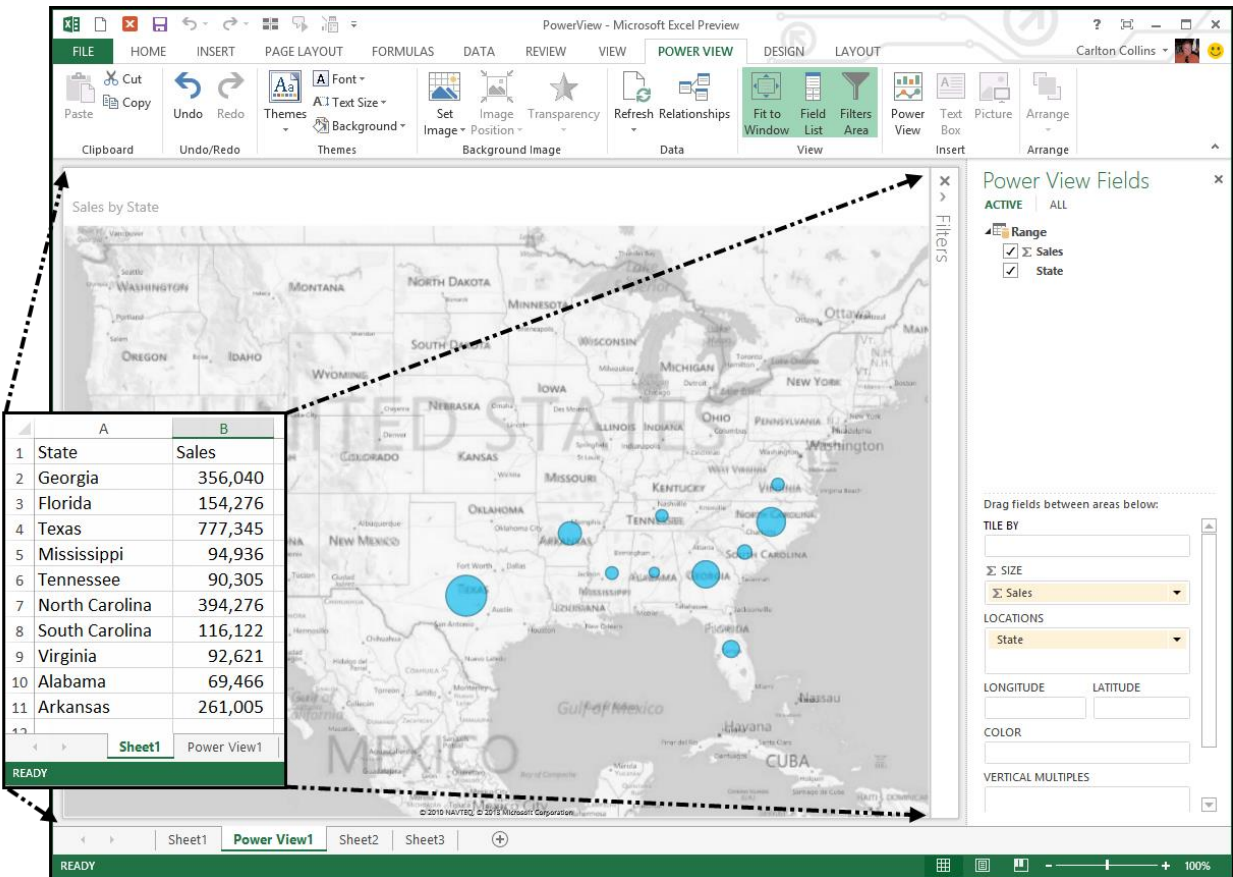
New Features in Excel 2013

Of all the Office 2013 applications, Excel is the beneficiary of the most impressive enhancements. Excel's new **Flash Fill** watches you work and applies logic to help you complete your tasks. The example pictured below *(see figure below)* contains a list of 44 first and last names in Column A, which I want to separate into Columns B and C. As I start typing the first name of the second record in Column B; Excel's **Flash Fill** guesses what I'm trying to do and offers to fill in the remaining 42 first names *(as shown in grey text)*.
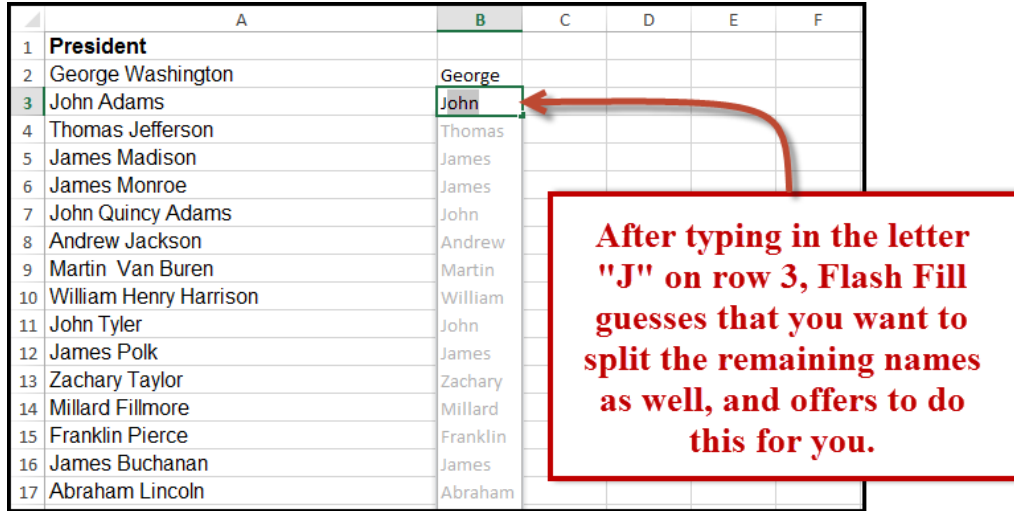
Excel's New Flash Fill Tool

Excel's new **PowerView** inserts new worksheets connected to your data, and then enables you to create new report types, such as the interactive map chart presented in *figure 4*. The resulting PowerView Map report is zoomable, and filters can be applied to display partial data.


PowerView Tool Depicting a New Zoomable Map View

PowerView worksheets can be published as standalone, interactive reports to Microsoft SharePoint's PowerPivot Gallery or other reporting service destinations. Some of the tools provided by PowerView include the ability to create a dashboard containing multiple PowerViews, apply themes and backgrounds, insert pictures and text boxes, insert collapsible and expandable tiles, and add data slicers. CPAs who work with PivotTables will likely appreciate Excel's new **Timeline Slicer** which helps users *slice and dice* Pivot data that contain dates. As an example, selecting the dates May through October on the Timeline slicer (pictured) adjusts the PivotTable to display May thru October data.

Excel's New Timeline Slicer provides a
Visual Method of Filtering a PivotTable by Date

As an advanced enhancement, Excel provides the new **Create Relationships** tool for building table relationships in workbooks that contain at least two tables sharing at least one common field name.
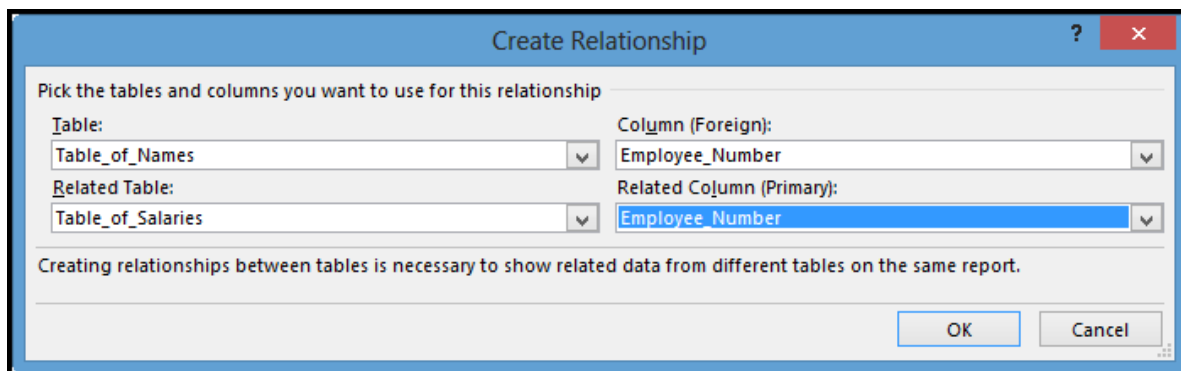
Excel's New Relationship Tool for Pivoting Multiple Sources of Data

Once relationships are established, the **More Tables** option can be used to display additional tables allowing you to add data fields from mutiple tables to PivotTables, as pictured.

Connecting Multiple Sources of Data to a PivotTable

Another PivotTable enhancement involves drillability. Previously, users could only drill down on PivotTable data, but now you can also **Drill Up** and **Cross Drill** to related tables.

Excel offers new tools which can analyze your data and recommend a variety of PivotTable and Chart layouts to best illustrate the data. This new functionality is especially useful to novice users who are less familiar with Excel's functionality, but can also help avid Excel users save time too. Simply place the cursor anywhere in your data area and select **Recommended PivotTables** (or **Recommended Charts**) and in return, Excel offers various PivotTable and Chart options and as pictured in the *figure*.
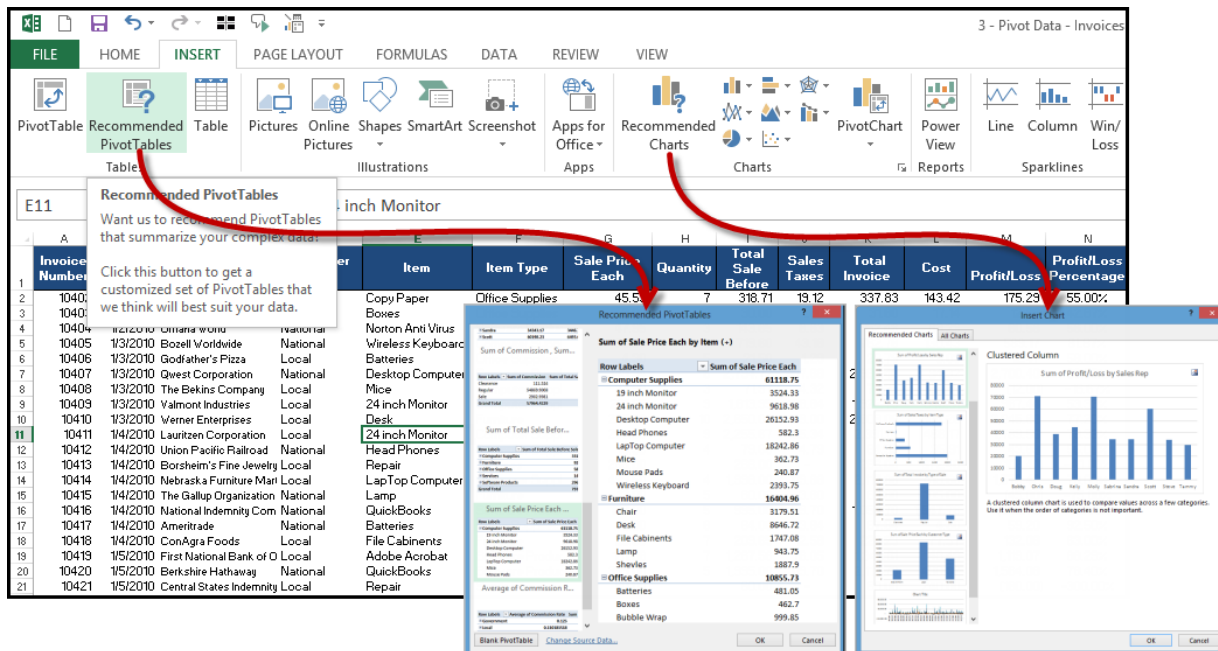
Excel's New Recommend PivotTables and Recommend Charts Tools

Excel's **Quick Analysis** tool also helps you analyze data by offering a variety of formatting, charts, totals, tables and sparkline layouts to instantly summarize large volumes of data *(see figure)*. When using Quick Analysis to scrutinize text-only data, text specific options for highlighting duplicate or unique text items appear.
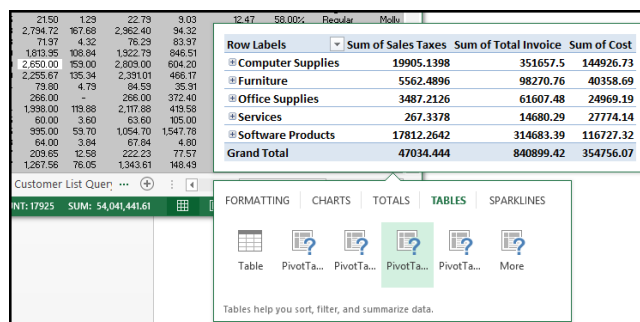
Example of Excel's New Quick Analysis Tool

Microsoft has added 50 new functions to Excel (increasing the total number of functions to 450), and the following 12 new functions in particular will appeal to many CPAs.

1. **ARABIC** – Converts roman numerals to regular numbers, for example V, IX, and XX are converted to 5, 9, and 20.

2. **CEILING.MATH** – This function can be used to round a number up to a specific interval, such as the nearest 99 cents, as demonstrated in *figure 10*.

*Example Use of Excel's New Ceiling.Math Function*

3. **DAYS** – Calculates the number of days between two dates.

4. **FLOOR.MATH** - Rounds numbers down to a specific interval, and also can be used to round negative numbers towards zero, instead of towards a smaller number. For example, -8.5 can be rounded to -8.0 (instead of the -9.0 results delivered by the older **Round** function).

5. **FORMULATEXT** – Displays referenced formulas as text, and can be used to improve formula reading, reviewing and printing.

6. **ISFORMULA** – Returns the value TRUE if the referenced cell contains a formula.

7. **ISOWEEKNUM** – Calculates the week during the year in which a given date falls. As an example, I used this formula to determine that I was born in the 53rd week of 1959.

8. **PDURATION** - Returns the number of periods required by an investment to reach a specified value. For example, you could calculate that $1,000 invested at 6% APR would take 26.89 years to reach a value of $5,000. (This function approach is faster than constructing a 322 row table to figure this out.)

9. **RRI** – This function returns an equivalent interest rate for the growth of an investment. For example, you could calculate that a $1,200 mutual investment that grew to $5,600 in 18 years earned an average return of 8.93%.

10. **SHEET** – Calculates the sheet number of the referenced sheet. For example, you might use this function to determine that your interest rate assumptions are entered on the 46th sheet in your workbook.

11. **SHEETS** – Calculates the total number of sheets in a referenced range.

12. **SKEW.P** – Like the Skew function, SKEW.P calculates the standard deviation of a string of data, but bases its calculation on the entire population instead of a sample of the population. This function could be used to determine whether each line item of a company's historical financial statement data is consistent enough to use as a basis for projecting the following year's budget.

For a complete listing of the 50 new functions in Excel 2013, visit **www.carltoncollins.com/newfun.htm** or scan the tag.
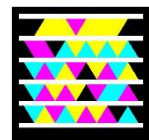
What's New in Microsoft Office 2010?

1. **Office Button Is Replaced With File Tab** – Excel 2007 included the Office Start button, which was not intuitive to anybody, despite what Microsoft said. In Excel 2010, Microsoft Office axed the office Start button in favor of the File tab. **YIPPY!**
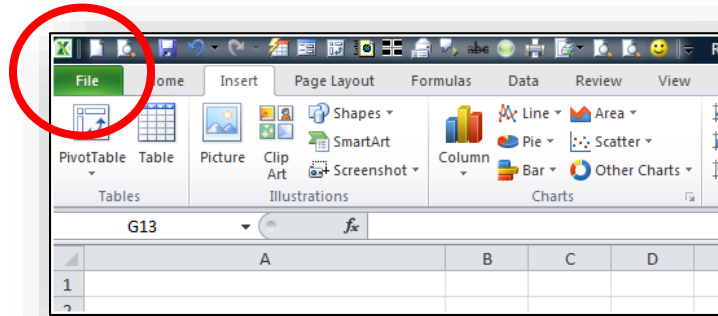
2. **Backstage View –** The file tab provides new look and feel called "Backstage View". This new view represents one of the biggest differences you'll notice in Microsoft Excel 2010. Backstage View is displayed by clicking on Excel's File tab, as in all the other applications that comprise Office 2010. The backstage view in is available in the other Office 2010 applications, and each application uses a different color scheme to differentiate it from the others. In Excel 2010, the color scheme is green.

   In general, Backstage View provides basically the same commands found under the File menu in previous version of Excel such as Save, Save As, Open, Close, Print, etc. What's new is the preview screen and info tabs that accompanying some of these selections. For example, when you select the print option, a preview of the print job is automatically displayed, as shown below.
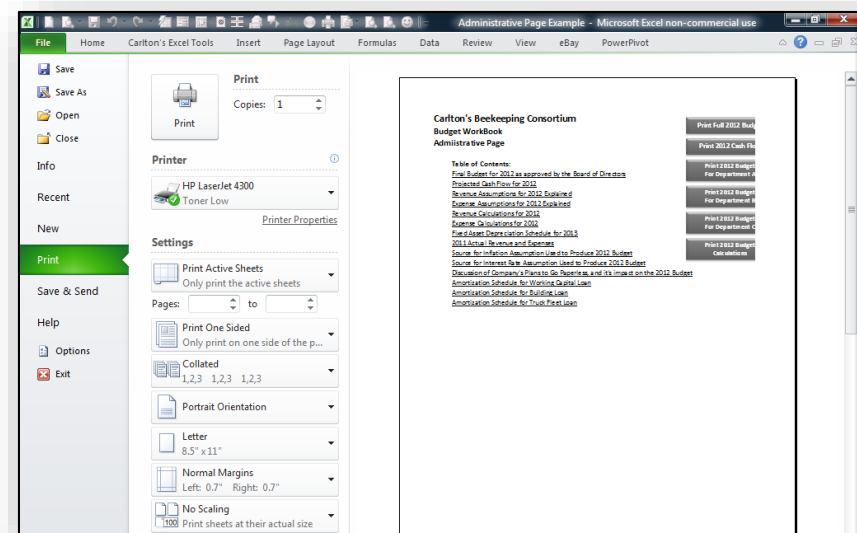
The Print option Backstage View also provides access to various Page and Print settings, such as Duplexing, Orientation, Margins, and Scaling. The save and Send option also has a new look and feel, providing buttons for emailing, publishing, and saving files, as well as options to create PDF or XPS documents.
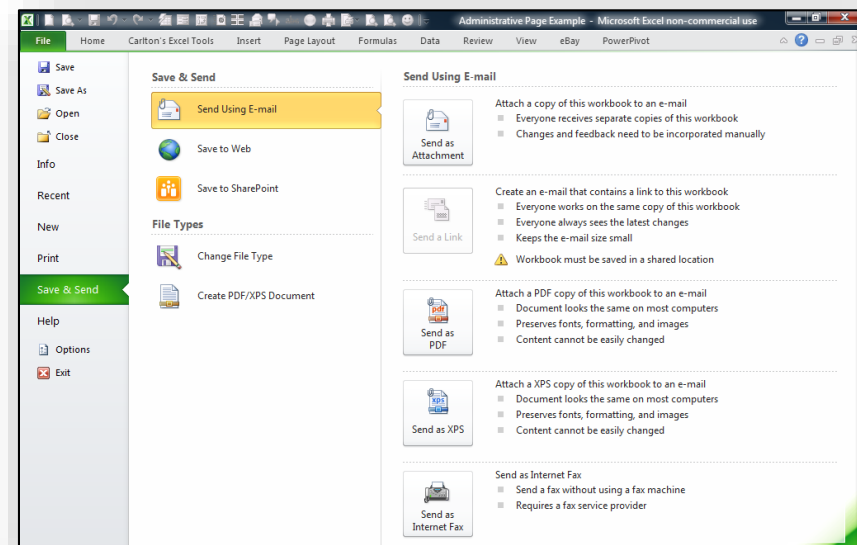
The New option also incorporates a new look and feel with thumbnail previews of templates, and links to downloading more templates from the Web.
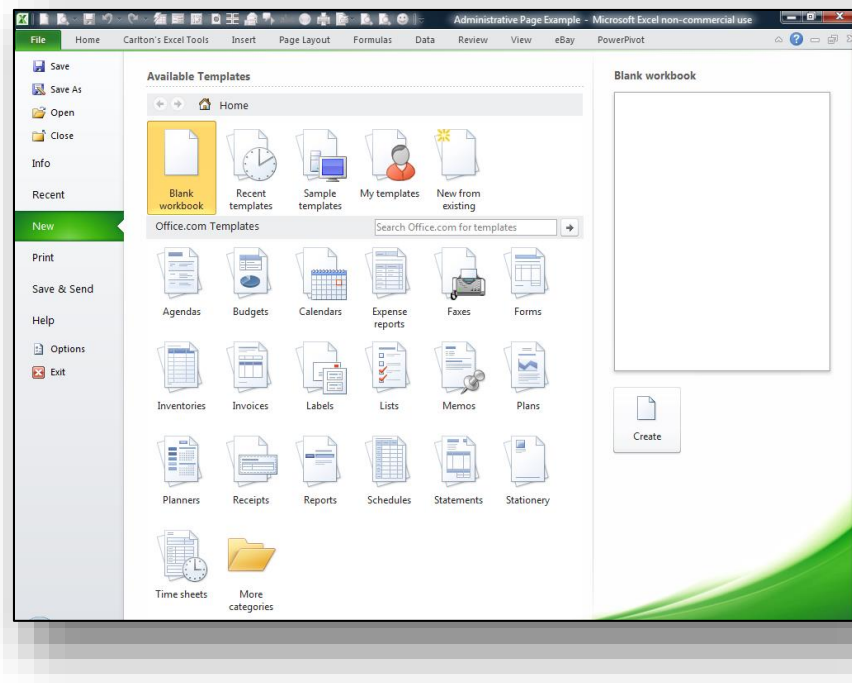
If you want to return to the old Excel 2007 look and feel when you click the File tab (not that you would want to), you can change registry settings, as detailed in this article on Turning Off The Microsoft Office 2010 OutSpace located here:

http://www.off14.com/microsoft-office-2010-outspace/

(They've actually got the name wrong in this article; although the registry key is named "outspace", the display is called Backstage View.)

3. **Double Clicking Fill Handle Uses Connected Columns For Fill Down** – In previous versions of Excel, the double click only worked if data were located in the column immediately to the left or right of the range to be copied, but Excel 2010 will use more distant columns provided they are connected with a common set of column labels.

4. **Custom Lists Obey Character Case Example** – When using the Smart List feature, Excel 2010 obeys the case (proper, lower, and upper) that is used in your starting phrase.

5. **Remove Hyperlinks (Instead Of One Hyperlink at A Time In 2007 And 2003)** – In earlier versions of Excel, you could only remove one hyperlink at a time (the work around is to copy and paste a range containing hyperlinks and paste them as text elsewhere, then copy and paste that result back to your original location. Excel 2010 can remove all hyperlinks from a range in just one step.

6. **Sparklines** – Sparklines are small cell-sized charts that you can embed in a worksheet next to data to get a quick visual representation of the data. For example, if you had a worksheet that

tracked the performance of several dozen stocks, you could create a Sparkline for each stock that graphed its performance over time, in a very compact way. Here are examples:
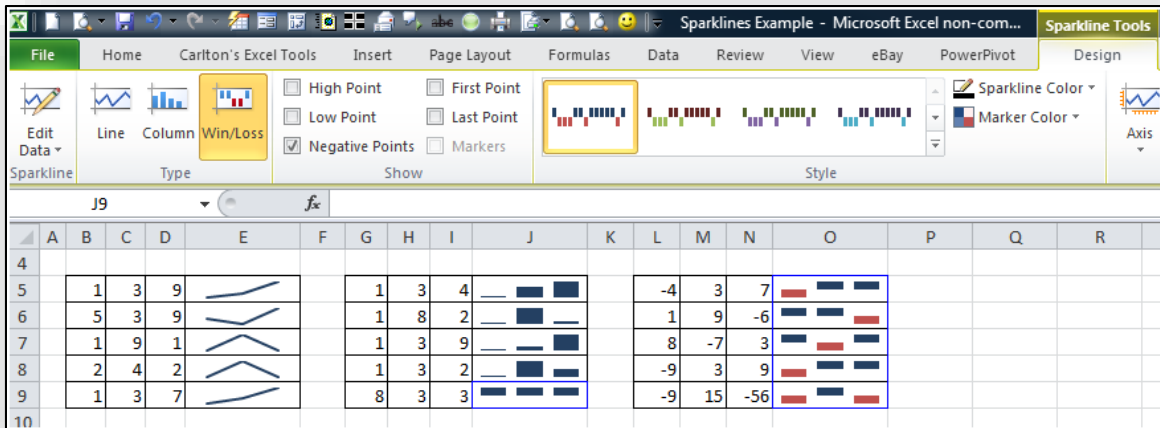
7. **Conditional Formatting Improvements** – Microsoft has improved and added more styles and icons regarding the ability to apply a format to a range of cells, and then have the formatting change according to the value of the cell or formula.

    a. **Solid Bars** - Data Bars can be solid now in Excel 2010. Excel 2007 bars offered only a gradient effect, which was visually was confusing to read. Below is a comparison on the Excel 2007 and Excel 2010 Data Bar options.
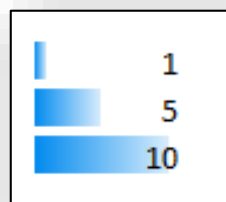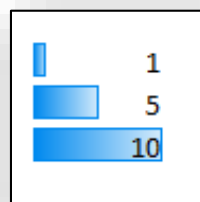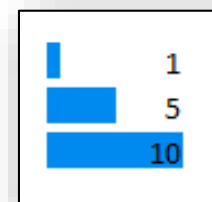
2007 Gradient   2010 Gradient   2010 Solid

    b. **Negative Numbers** - Microsoft also corrected a problem which Excel 2007 had creating when Data Bars based on negative numbers by adding axis support for both positive and negative values. The screens shots below show Excel 2010's new solution, and how Excel 2007 got confused when applying Data Bars to the exact same data.

Budget	Actual	Difference	% Difference	
31,800	38,765	(6,965)		-22%
1,100	940	160		15%
4,200	7,698	(3,498)		-83%
189,200	266,548	(77,348)		-41%
15,000	12,825	2,175		14%
25,400	60,511	(35,111)		-138%
4,600	3,710	890		19%
7,200	654	6,546		91%
49,800	39,501	10,300		21%
107,600	116,970	(9,370)		-9%
15,400	11,849	3,551		23%
700	900	(200)		-29%
241,600	210,103	31,498		13%
43,800	68,618	(24,818)		-57%
27,600	57,897	(30,297)		-110%

Excel 2010's Data Bars   Excel 2007's Data Bars

c. **More Data Bar Options** - Notice that Microsoft added more Data Bar options as shown in the comparison below.
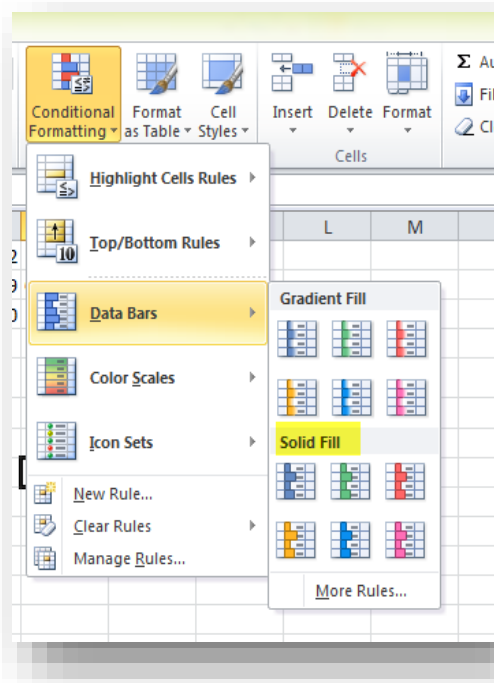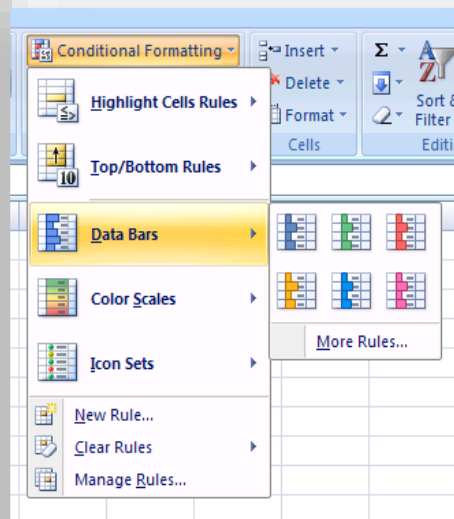
Excel 2010's Data Bar Menu   Excel 2007's Data Bar Menu

d. More Icon Options - Notice that Microsoft added more Data Bar options as shown in the comparison below.
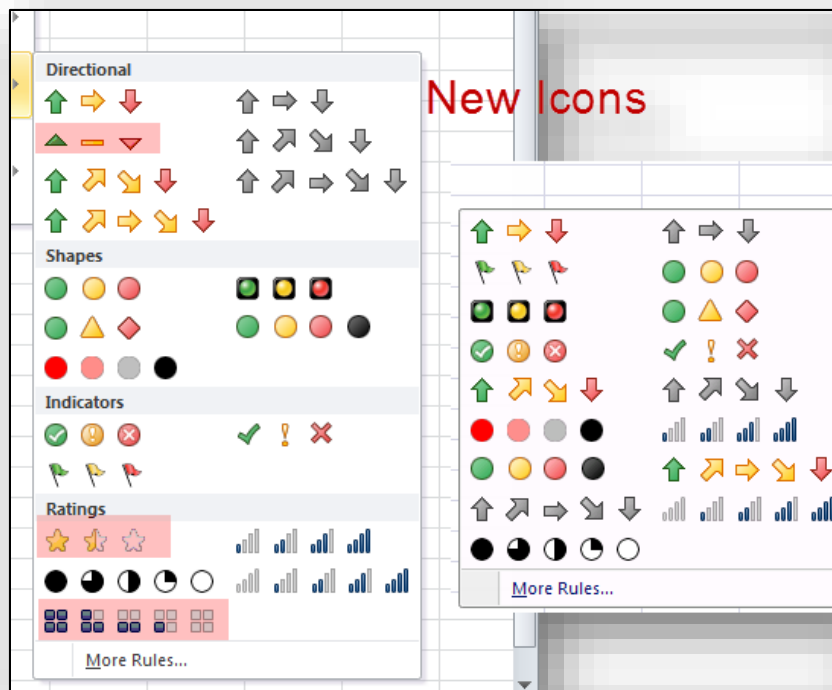
Excel 2010's Icon Menu   Excel 2007's Icon Menu

e. **Arrow Colors** - It is possible to change icons used for KIP i.e. You can have two arrows with different colors of if negative impact and positive growth are good for you.
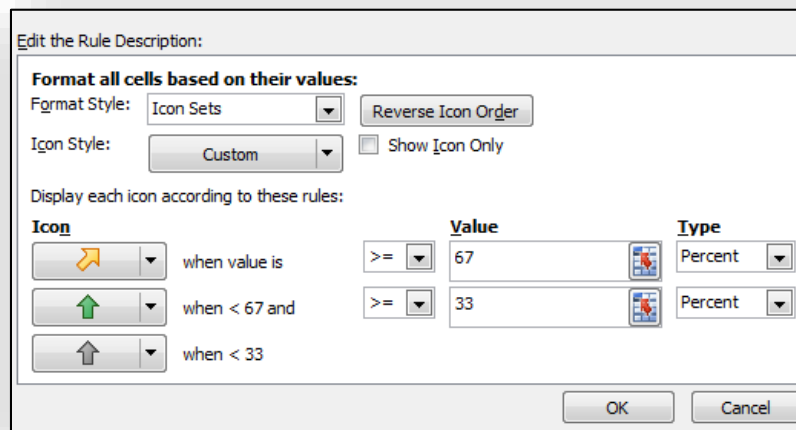
f. **Referring to Data** - You can now refer to data on different worksheets, and even refer to a range outside the Conditional Formatting area. The screen below shows the error message produced by Excel 2007 when you attempted to reference cells outside the Conditional Formatting area; Excel 2010 now accommodates this situation.
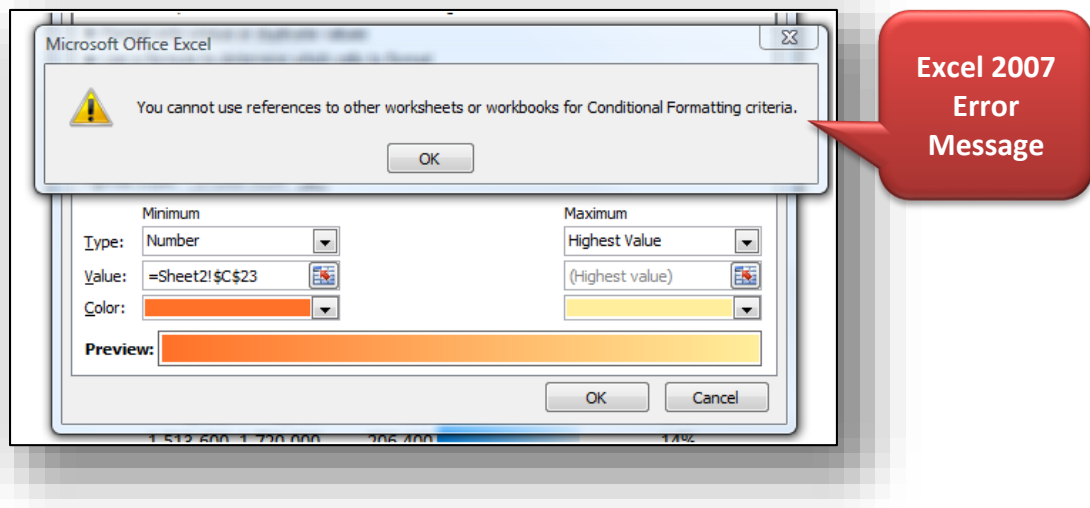
8. **Microsoft Excel Web App's Improved Sharing** – Excel 2010 has new and improved tools for sharing data with other people, including multiple people working on the same document at the same time. Excel Web App extends your Excel experience to the web browser, where you can work with workbooks directly on the site where the workbook is stored. Excel Web App is part of Microsoft Office Web Apps, and is available in Windows Live SkyDrive and in organizations that have configured Office Web Apps on SharePoint 2010. With Excel Web App, you can:

   a. **View** - View a workbook in the browser - When you click on a workbook to open it in Excel Web App, the workbook is displayed in view mode.
   b. **Sort and Filter** - You can sort and filter data in the workbook, expand PivotTables to see relationships and trends in the data, recalculate values, and view different worksheets.
   c. **Browser-Based Editing** - Edit a workbook in the browser - With Excel Web App, all you need to access your workbooks is a browser.
   d. **Share** - Your teammates can work with you, regardless of which version of Excel they have.
   e. **Looks the Same** - Your workbooks look the same in the browser as they do in Excel.
   f. **Excel Tools** - You can edit your worksheets in the browser, using the familiar look and feel of Excel. When you edit in the browser, you can change data, enter or edit formulas, and apply basic formatting within the spreadsheet.
   g. **Simultaneous Access** - You can also work with others on the same workbook at the same time.

Microsoft offers a free solution called Windows Live SkyDrive, which enables everyone in your group to share Word and Excel (and other) documents. This solution also provides users with Word, Excel and PowerPoint applications (with limited functionality) so your group members can work in the same applications.

To use SkyDrive, sign up for a free Windows Live account at **http://explore.live.com/**. Under the **SkyDrive** menu, select **Get started** and follow the instructions for setting up a Windows Live account. Once you have completed the registration process, sign into your Windows Live Sky Drive account and click the **Office** menu option at the top of the screen to view your **SkyDrive** as follows:

Next create a folder and upload (or create) the group's Word and Excel files. Select the folder and click the **Share** menu option as shown to edit permissions and to send links to your group members, which will enable them to access the data files.

When sharing files in this manner, to better protect your data, check the checkbox labeled **Require recipients to sign in with Windows Live ID**. This action will require your group members to obtain their own Windows Live accounts and use their passwords in order to access the data files. Otherwise, anyone who receives the link will be able to access the data files.

Notes: The free version of Windows Live Sky Drive is limited to 25 GBs of storage, and individual files are limited to 50 MBs. For a fee, you can increase these capacities. Installing Microsoft's free Silverlight browser add-in will enable drag and drop functionality to and from your SkyDrive. The Windows Live SkyDrive solution was first introduced in August 2007, and is widely used.

9. **Customize the Ribbon Toolbar -** The Ribbon tool bar has been enhanced, and is now highly customizable. For example, you can add your own tabs to the Ribbon (as shown below), you can add your own groups to each tab (also shown below), and you can add any commands or macros to your customized tabs and groups.
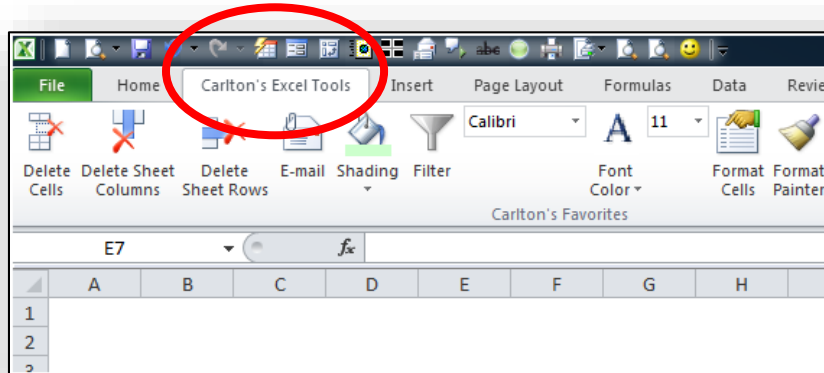
10. **Compatibility of .xlsx -** In Excel 2007, Microsoft introduced a new XML format (.xlsx) which was not compatible with former .xls spreadsheet formats. This problem has been resolved - Excel files created in Excel 2010 may easily be opened in versions of Excel prior to Excel 2007. Now Excel 2010 will save files just as safe as the former Excel 2007, and the spreadsheet size is 75% smaller than the old .XLS version.

11. **Protected Mode -** Excel 2010 includes a Protected View, so you can see the document and make a more informed decision before exposing your computer to possible vulnerabilities. By default, documents that originate from an Internet source are opened in Protected View. When this happens, you see a warning on the Message bar, along with the option to enable editing. You can control which originating sources trigger Protected View. You can also set specific file types to open in Protected View regardless of where they originate. Excel will not allow you to edit the documents unless document editing is enabled. To do this, click the *Enable Editing* option in order to enable document editing as shown in the following screen shot.
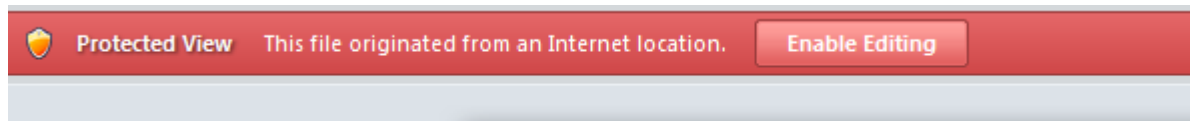
12. **Trusted Documents** - The trusted documents feature is designed to make it easier to open workbooks and other documents that contain active content, such as data connections or macros. Now, after you confirm that active content in a workbook is safe to enable, you don't have to repeat yourself. Excel 2010 remembers the workbooks you trust so that you can avoid being prompted each time you open the workbook.

13. **Slicer -** The Slicer feature provides new slice and dice capabilities within PivotTables – this helps you dynamically segment and filter the data. This feature is located on the *Insert* Tab.
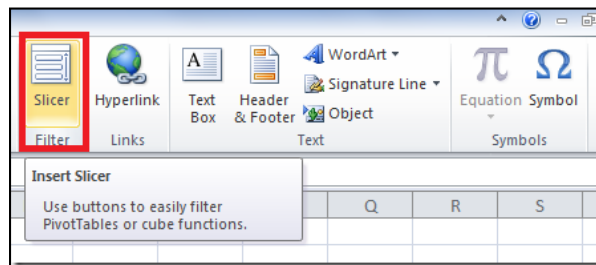
14. **Macro -** Macros in Excel 2010 now support working with shapes, including creating, moving or editing shapes. For example, you could now record a macro that automatically insert s the following SmartArt object.
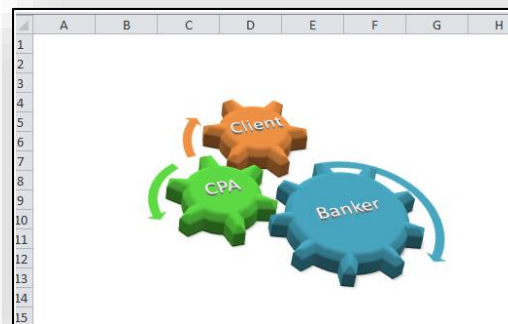
15. **Enhanced Chart Diagram -** In Excel 2010 double clicking a chart element automatically opens the chart's format dialog box.
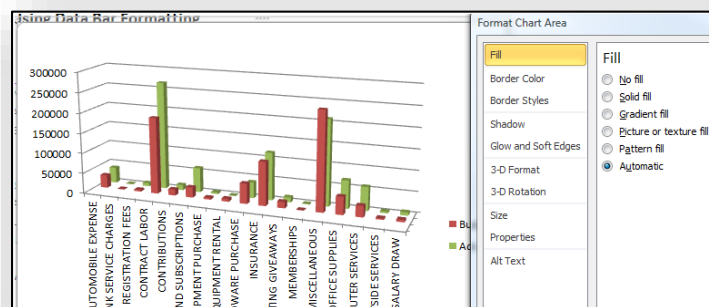
16. **64-bit version of Excel 2010** - Excel 2010 is now available in a 64-bit version, which means that it can take full advantage of your computer's 64-bit motherboard and access more than 4 GBs of RAM. The result is even faster performance.

17. **Microsoft SQL Server PowerPivot for Excel** - Excel 2010 now includes an add-in tool called Microsoft SQL Server PowerPivot which is a Business Intelligence tool that enables you to query multiple SQL Server databases across multiple corporate systems and web data on a real-time basis to produce PivotTables that can be shared via SharePoint. You can try this online at the following Virtual Labs web site:

https://cmg.vlabcenter.com/prepare.aspx?moduleid=ad3bd3e9-8d2b-498d-94fa-e41e1b09730d&ticks=633992819904236083.

Microsoft now offers Project Gemini add-on for Excel 2010 that can handle very large amounts of data -- even worksheets that include hundreds of millions of rows. It will ship as part of SQL Server 2008 R2 in the first half of 2010; a community technology preview will be available in the second half of 2009.

18. **What-If with Write-Back** - PivotTable What-If Analysis is the ability to modify values in PivotTable cells, recalculate the PivotTable with those values and, if the results are satisfactory, publish the changes so that they are reflected in the OLAP data source for other people to see. This feature is also called write back, though it really goes beyond just the ability to write values back to the cube. "What if our sales for New York increased by 10%?" "What if the total number of product orders fell by 25%?" These are examples of questions that PivotTable What-If Analysis is aimed at helping the user answer. Let's take a look at the following scenario:

Sales Quota 2009	Column Labels	
Row Labels	FY 2009	FY 2010 (Expected)
⊟ Stephen Y. Jiang	$10,230,000.00	$4,536,000.00
David R. Campbell	$1,640,000.00	$851,850.00
Garrett R. Vargas	$1,630,000.00	$684,450.00
Jillian Carson	$3,803,000.00	$1,580,850.00
José Edvaldo. Saraiva	$3,157,000.00	$1,418,850.00

Stephen, the sales manager at a small IT company, is trying to figure out what his optimal sales quotas should look like for 2010. Based on a previous analysis and forecasts for next year it seems like 2010 will have a large decrease in sales which would mean his quotas would be reduced by 10% from the 2009 quotas. With the new PivotTable What-If Analysis feature he can now modify the relevant values in his PivotTable report and calculate the PivotTable with the changes to see what the totals would look like without actually modifying the data source. (click to see larger image)
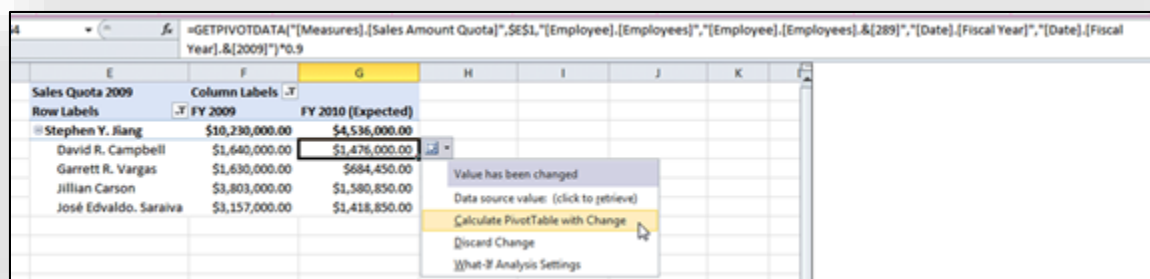
So here is what his PivotTable looks like after calculating with the changes:

If he wants to keep these numbers and share them with other people he can go ahead and publish the changes to the OLAP data source.
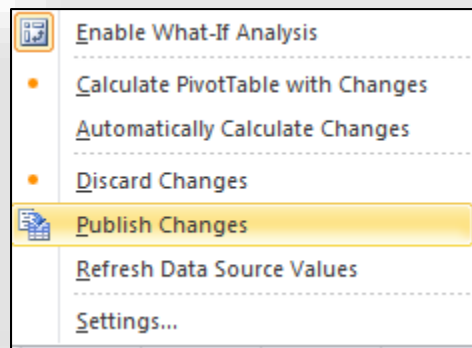
He can also just keep the changes locally without publishing back to the OLAP data source by simply saving the file. When the workbook is loaded again in Excel 2010 all the changes will be reapplied and the PivotTable recalculated. With little knowledge of OLAP data sources the manager was able to change values and recalculate his PivotTables. The changes can be shared across the organization by simply sharing the workbook or publishing the changes back to the OLAP data source.
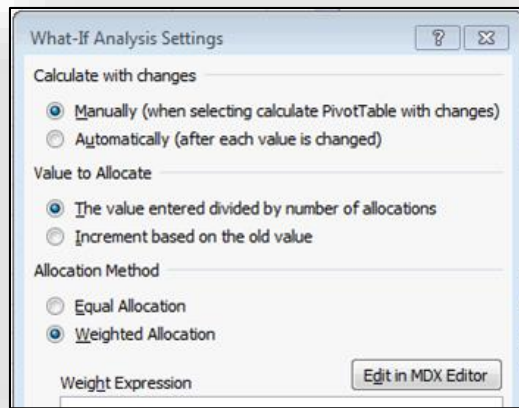
Advanced Options - Advanced options for PivotTable What-If Analysis include being able to change the allocation method, which is the methodology in which the OLAP data source will allocate the newly entered values in the cube. Excel 2010 also gives you the ability to define your own weight allocation definitions from within an MDX editor.

19. **Recover Earlier Versions Of A File In Office 2010** - It is now easier to recover a Microsoft Word 2010, Microsoft Excel 2010, or Microsoft PowerPoint 2010 file if you close your file without saving, or you want to review or return to an earlier version of the file you're already working in.

As with earlier versions of Office, enabling AutoRecover in Word 2010, Excel 2010 or PowerPoint 2010 will save versions while you are working in your file at the interval you select. Now, you can choose to keep the last autosaved version of a file in case you accidentally close that file without saving, so that you can restore it the next time that you open the file. Also, while you are working in your file, you can access a listing of the autosaved files from the Microsoft Office Backstage view.

Note: You must have the "Save AutoRecover information" and "Keep the last autosaved version if I close without saving" enabled for these features to work. (The Recover Unsaved Workbooks option is available from the File tab, under the Recent menu option.
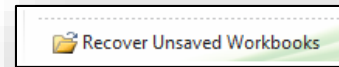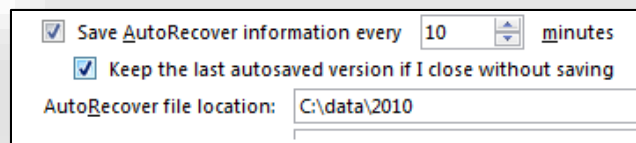
20. **Named Sets -** Named Sets have been added to Microsoft Excel 2010, allows you to create your own named sets. Simply locate the *Fields, Items, & Sets* button under the Ribbon, and it will allow you to define your own Named Sets.

21. **Excel Mobile 2010 for Windows Phone 7 -** If you have Windows Phone 7, you can use Microsoft Office Mobile 2010 to work with your files from anywhere—whether you're at work, at home, or on the go. Excel Mobile 2010 is part of Office Mobile and already on your phone in the Office Hub, so you don't need to download or install anything else to get started.
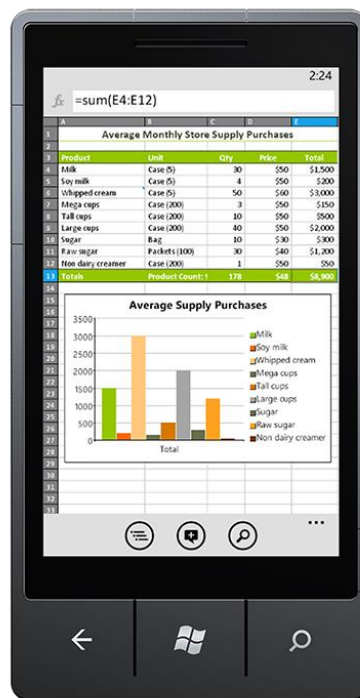
You can use Excel Mobile to view and edit workbooks stored on your phone, sent to you as email attachments, or hosted on a SharePoint 2010 site through SharePoint Workspace Mobile 2010. When you edit a workbook via SharePoint Workspace Mobile, you can save your changes back to the SharePoint site when you're online. You can create, update, and instantly recalculate your spreadsheets using many of the same tools you already know and use in the desktop version of Excel:

a) Use the outline view to switch between worksheets or charts in a workbook.

    b) Sort, filter, and manage your spreadsheets.
    c) Add or edit text and numbers.
    d) Add comments.

22. Improved PivotTables

PivotTables are now easier to use and more responsive. Key improvements include:

a) **Performance** - In Excel 2010, multi-threading helps speed up data retrieval, sorting, and filtering in PivotTables.

b) **PivotTable Labels** - It's now possible to fill down labels in a PivotTable. You can also repeat labels in PivotTables to display item captions of nested fields in all rows and columns. **Watch a video about repeating item labels.**

c) **Enhanced Filtering** - You can use slicers to quickly filter data in a PivotTable with the click of a button and see which filters are applied without having to open additional menus. In addition, the filter interface includes a handy search box that can help you to find what you need among potentially thousands (or even millions) of items in your PivotTables.

d) **Write-back Support -** In Excel 2010, you can change values in the OLAP PivotTable Values area and have them written back to the Analysis Services cube on the OLAP server. You can use the write-back feature in what-if mode and then roll back the changes when you no longer need them, or you can save the changes. You can use the write-back feature with any OLAP provider that supports the UPDATE CUBE statement.

e) **Show Values As feature** - The **Show Values As** feature includes a number of new, automatic calculations, such as **% of Parent Row Total**, **% of Parent Column Total**, **% of Parent Total**, **% Running Total**, **Rank Smallest to Largest**, and **Rank Largest to Smallest**. **Watch a video about changes to the Show Values As feature. Watch a video about changes to the Show Values As feature.**

f) **PivotChart Improvements** - It is now easier to interact with PivotChart reports. Specifically, it's easier to filter data directly in a PivotChart and to reorganize the layout of a PivotChart by adding and removing fields. Similarly, with a single click, you can hide all field buttons on the PivotChart report.

23. Improved Solver Add-In - Excel 2010 includes a new version of the Solver add-in, which you can use to find optimal solutions in what-if analysis. Solver has an improved user interface, a new Evolutionary Solver, based on genetic algorithms, that handles models with any Excel functions, new global optimization options, better linear programming and nonlinear optimization methods, and new Linearity and Feasibility reports. In addition, the Solver add-in is now available in a 64-bit version.

Use Solver to determine the maximum or minimum value of one cell by changing other cells. For example, you can change the amount of your projected advertising budget and see the effect on your projected profit amount.

Example of a Solver problem - In the following example, the level of advertising in each quarter affects the number of units sold, indirectly determining the amount of sales revenue, the associated expenses, and the profit. Solver can change the quarterly budgets for advertising (cells B11:E11), up to a total budget constraint of $40,000 (cell F11), until the value for the total profit reaches the maximum possible amount. The values in the decision variable cells are used to calculate the profit for each quarter, so the values are related to the formula in the target cell F15, =SUM(B15:E15).

1 Decision variable cells

2 Constraint cell

3 Objective cell

After Solver runs, the new values are as follows.

For more solver examples, check out:
http://www.solver.com/excel2010/solverhelp.htm

24. Improved Function Accuracy - Excel 2010 includes more accurate statistical and other functions. Certain existing functions have also been renamed to better describe what they do, as follows:

a) **Accuracy Improvements** - A number of functions have been optimized to improve accuracy. For example, Excel 2010 returns more accurate results for the beta and chi-squared distributions.

b) **More Consistent Functions** - Certain statistical functions have been renamed so that they are more consistent with the function definitions of the scientific community and with other function names in Excel. The new function names also more accurately describe their functionality. Workbooks created in earlier versions of Excel will continue to work despite these name changes, because the original functions still exist in a **Compatibility** category.
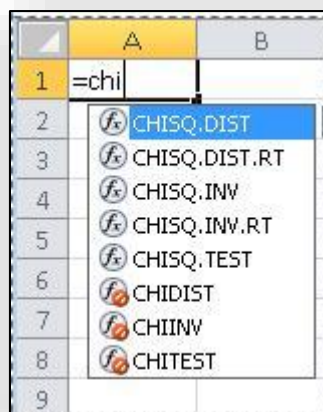
25. Improved Filter Capabilities - In addition to slicers, which are described earlier in this article, Excel 2010 comes with new features that make it easier to sort and filter data, as follows.

a. **New search filter** - When you filter data in Excel tables, PivotTables, and PivotCharts, you can use a new search box, which helps you to find what you need in long lists. For example, to find a specific product in a catalog that stocks over 100,000 items, start by typing your search term, and relevant items instantly appear in the list. You can narrow the results further by deselecting the items you don't want to see.
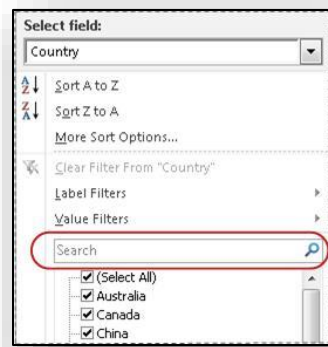
b. **Filter And Sort Regardless Of Location** - In an Excel table, table headers replace regular worksheet headers at the top of columns when you scroll down in a long table. AutoFilter buttons now remain visible along with table headers in your table columns, so you can sort and filter data quickly without having to scroll all the way back up to the top of the table.
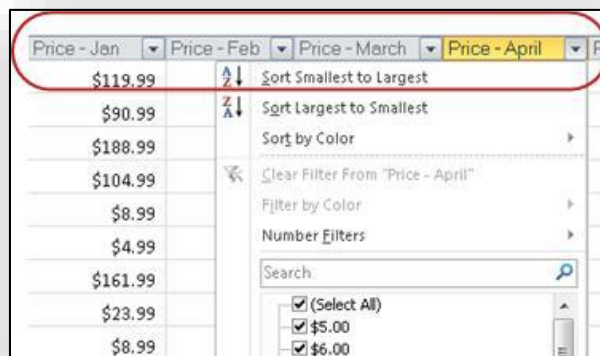
26. **Performance Enhancements -** Performance improvements in Excel 2010 can help you to interact with your data more efficiently. Specific investments include:

a) **General improvements** - Excel 2010 is more responsive when you move and resize charts, work in Page Layout view, and interact with shapes on the worksheet.

b) **Support For Large Data Sets** - Excel 2010 handles workbooks that contain massive amounts of data more efficiently. Specifically, it takes less time to perform activities commonly performed on large data sets, such as filtering and sorting the data, copy and pasting it from one worksheet to another, and using the Fill feature to copy formulas.

c) **Multicore Improvements** - Multithreading improvements in Excel 2010 help to speed up the process of retrieving, sorting, and filtering data in PivotTables and Excel tables. In addition, opening and saving large files is generally faster than before.

d) **Faster Calculation** - To achieve faster calculation performance, Excel 2010 includes support for asynchronous user-defined functions, which can run simultaneously without using multiple Excel calculation threads.

27. **Improved Charting -** It's now easier to work with charts in Excel 2010. Specific improvements include:

a) **New Charting Limits** - In Excel 2010, the limitation on the number of data points that can be created on a chart has been removed. The number of data points is now limited only by available memory.

b) **Quick Access To Formatting Options** - In Excel 2010, you can instantly access formatting options by double-clicking a chart element.

c) **Macro Recording For Chart Elements** - In Office Excel 2007, recording a macro while formatting a chart or other object did not produce any macro code. In Excel 2010, however, you can use the macro recorder to record formatting changes to charts and other objects.

28. **Support for Equations -** You can use the new equation editing tools in Excel 2010 to insert common mathematical equations into your worksheets or to build up your own equations by using a library of math symbols. You can also insert new equations inside of text boxes and other shapes. To get started, on the Insert tab, in the Symbols group, click the arrow next to Equation.
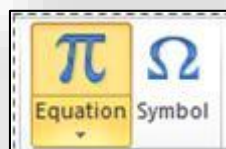
Binomial Theorem

$$(x + a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k}$$

29. **More Themes -** In Excel 2010, there are more themes and styles than ever before. These elements can help you apply professional designs consistently across your workbooks and other Microsoft Office documents. Once you select a theme, Excel 2010 does the design work. Text, charts, graphics, tables, and drawing objects all change to reflect the theme you have selected, so that all elements in your workbook visually complement one another.
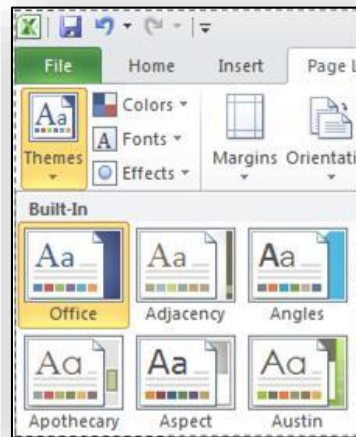
30. **Paste With Live Preview -** The paste with live preview feature enables you to save time when reusing content within Excel 2010 or across other programs. You can use it to preview various paste options, such as Keep Source Column Widths, No Borders, or Keep Source Formatting. The live preview enables you to visually determine how your pasted content will look before you actually paste it in the worksheet. When you move your pointer over Paste Options to preview results, you'll see a menu containing items that change contextually to best fit the content you are reusing. ScreenTips provide additional information to help you make the right decision.
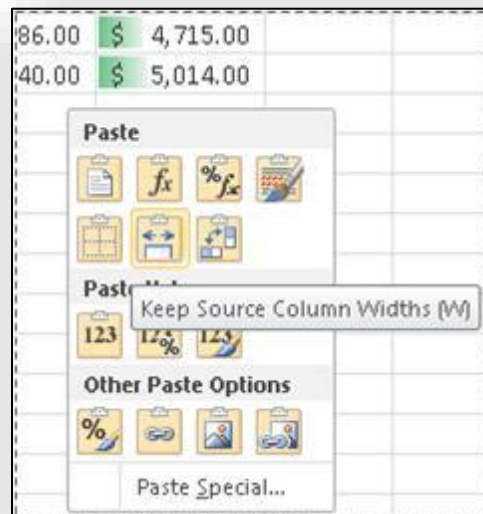
31. **Improved Picture-Editing Tools -** If you use photos, drawings, or SmartArt to communicate visually, you can take advantage of the following features:

a) **Screenshots** - Quickly take a screenshot and add it to your workbook, and then use the tools on the **Picture Tools** tab to edit and improve the screenshot.
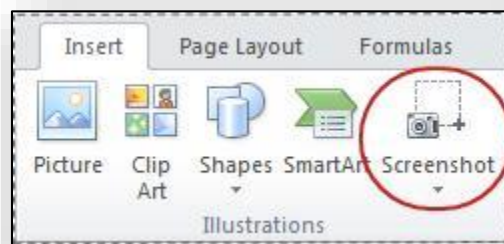
b) **New SmartArt Graphic Layouts** - With new picture layouts, you can tell your story with photographs. For example, use the Captioned Picture layout to show pictures with nice-looking captions underneath.

c) **Picture Corrections** - Fine tune the color of a picture, or adjust its brightness, contrast, or sharpness—all without having to use additional photo-editing software.

d) **New and Improved Artistic Effects** - Apply different artistic effects to your picture to make it look more like a sketch, drawing, or painting. New artistic effects include Pencil Sketch, Line Drawing, Watercolor Sponge, Mosaic Bubbles, Glass, Pastels Smooth, Plastic Wrap, Photocopy, Paint Strokes, and many more.

e) **Better Compression And Cropping** - You now have better control of the image quality and compression tradeoffs, so that you can make the right choice for the medium (print, screen, e-mail) that your workbook will be used for. **Read more about cropping** and **picture compression**.

32. **Accessibility Checker -** The new Accessibility Checker tool in Excel 2010 enables you to find and fix issues that can make it difficult for people with disabilities to read or interact with your workbook. You can open the Accessibility Checker by clicking the File tab, clicking Check for Issues, and then clicking Check Accessibility. Errors and warnings will appear in a task pane. You can then review the issues and see which ones you need to fix. In addition to the Accessibility Checker, you can add alternative text to more objects in your worksheet, including Excel tables and PivotTables. This information is useful to people with visual impairments who may be unable to easily or fully see the object.

33. **Improved Language Tools -** In the Excel Options dialog box, multilingual users can quickly set preferences for editing, display, ScreenTip, and Help languages. And, changing your language settings in Excel automatically changes them across all applicable Microsoft Office 2010 applications. If you don't have the software or keyboard layout installed that you need, you are notified, and links are provided to make it easier to quickly resolve such issues.

34. **Improved Programmability Features -** Improvements for developers include:

a) **Changes to the XLL SDK -** The XLL Software Development Kit (SDK) now supports calling new worksheet functions, developing asynchronous user-defined functions, developing cluster-safe user-defined functions that can be offloaded to a compute cluster, and building 64-bit XLL add-ins.

b) **VBA Improvements** - Excel 2010 has a number of features that will enable you to migrate any remaining Excel 4.0 macros you may have to VBA. Improvements include better performance for print-related methods and chart properties not previously accessible with VBA.

c) **Better User-Interface Extensibility** - If you develop custom workbook solutions, you have more options for programmatically customizing both the ribbon and the new Backstage view. For example, you can programmatically activate tabs on the ribbon, and make custom tabs behave similarly to built-in contextual tabs, where tabs only appear when specific events occur. In addition, you can make custom ribbon groups

grow and shrink as the ribbon is resized and customize context menus with rich controls. You can also add custom UI and other elements to the Backstage view.

d) **Changes to the Open XML SDK** - The Open XML SDK 2.0 now supports schema-level objects, in addition to the part-level support introduced in the Open XML SDK 1.0. This makes it easier to programmatically manipulate workbooks and other documents outside the Office 2010 desktop applications—for example, as part of a server-based solution.

35. Sixty One New Functions in Excel 2010

In Excel 2010, Microsoft added 61 new functions and improved 19 others. This page contains a summary of those new functions and improvements. CPAs will notice that many of these functions are more scientific in nature, or are geared more towards engineers and statisticians. However, there are a handful of new functions that apply to the CPA function - particularly when it comes to data analysis. I've place a ☺ next to those new functions which I consider more useful in standard CPA applications.

Bio for J. Carlton Collins, CPA

ASA Research **Carlton@ASAResearch.com** **770.842.5902**

J. Carlton Collins, CPA is a Certified Public Accountant with experience in technology, tax, auditing, accounting systems, financial reporting, and bond financing. He is an author, lecturer, and technology & accounting systems consultant. He has published books, articles, and web pages and is the author of the monthly technology Q&A column for the **Journal of Accountancy**. As a public speaker, Mr. Collins has delivered more than 2,000 lectures in 44 states and 5 countries addressing more than 500,000 CPAs and business professionals. As a consultant, Mr. Collins has assisted 275+ large and small companies with the selection and implementation of accounting systems. Mr. Collins has a Bachelor's degree in Accounting from the University of Georgia, is a 25+ year member of the American Institute of CPAs and the Georgia Society of CPAs.

Summary of Selected Positions, Awards & Accomplishments:

1. Honored as one of the CPA Industries Top 25 Thought Leaders by **CPA Technology Advisor Magazine**
2. Author of the monthly Technology Q&A column for the Journal of Accountancy.
3. Recipient of the AICPA's Lifetime Technical Contribution to the CPA Profession Award.
4. Chairman of the Southeast Accounting Show - the South's largest CPA event.
5. Recipient of the Tom Radcliff Outstanding Discussion Leader Award.
6. Named "Top Ten CPA Technologists" by Accounting Technologies Magazine (multiple years).
7. Named "Top 100 Most Influential CPAs " by Accounting Technologies Magazine (multiple years).
8. Has personally delivered over 2,000 technology lectures around the world.
9. Recipient of the Outstanding Discussion Leader Award from the Georgia Society of CPAs.
10. Lead author for PPC's Guide to Installing Microcomputer Accounting Systems.
11. Has installed accounting systems for more than 200 companies.
12. Chairperson of the AICPA Technology Conference.
13. Recipient of the ACCPAC Partner of the Year Award.
14. Determined by SAP to be one of the country's "Top Ten Most Influential ERP Systems Consultants".
15. Has delivered keynote and session lectures at dozens of accounting software conferences.
16. Sworn in as a Certified Public Accountant on September 18, 1985.
17. Member of the American Institute of CPAs since 1985.
18. Member of the Georgia Society of CPAs since 1982.

As an auditor, Mr. Collins has audited businesses in the areas of health care, construction, distribution, automobile dealerships, insurance, manufacturing, and general business. Mr. Collins' tax experience includes corporate, individual, partnership, fiduciary, and estate tax planning work. In the area of finance, Mr. Collins has prepared (or assisted in preparing) feasibility studies and financial forecasts for nearly 300 projects seeking more than $3 billion in startup capital. Mr. Collins is familiar with bond issues, Medicare and Medicaid reimbursement, and conventional financing matters. In 1992, Mr. Collins contributed and demonstrated more than 500 pages of suggested design improvements to the Microsoft Excel development team of programmers - and many of those improvements are found in Excel today.

At the University of Georgia, Mr. Collins was elected President of the Phi Eta Sigma Honor Society, was initiated into the BIFTAD Honor Society, served three years in the Judicial Defender/Advocate program, and was a member of Alpha Tau Omega fraternity. At Glynn Academy High School, Mr. Collins was Senior Class President, Class Valedictorian (1 of 6), and received a principle nomination to Annapolis Naval Academy. Mr. Collins has been married for 27 years and has two children. He devotes his leisure time to family, travel, tennis, fishing, snow skiing, and riding motorcycles (both dirt and street). Mr. Collins is president of his homeowners association, participates in the Gwinnett Clean and Beautiful program, and volunteers for Cooperative Ministries food drive.