



# Microsoft Excel Green Belt Training

Presented by: Patrick Wilson



# Microsoft Excel

- Tabs, Toolbars, Quick Access Toolbar
- Basic Functions & Formulas
- Tips, Tricks, Shortcuts
- Conditional Formatting
- Text to Columns
- VLOOKUP
- Pivot Tables & Charts



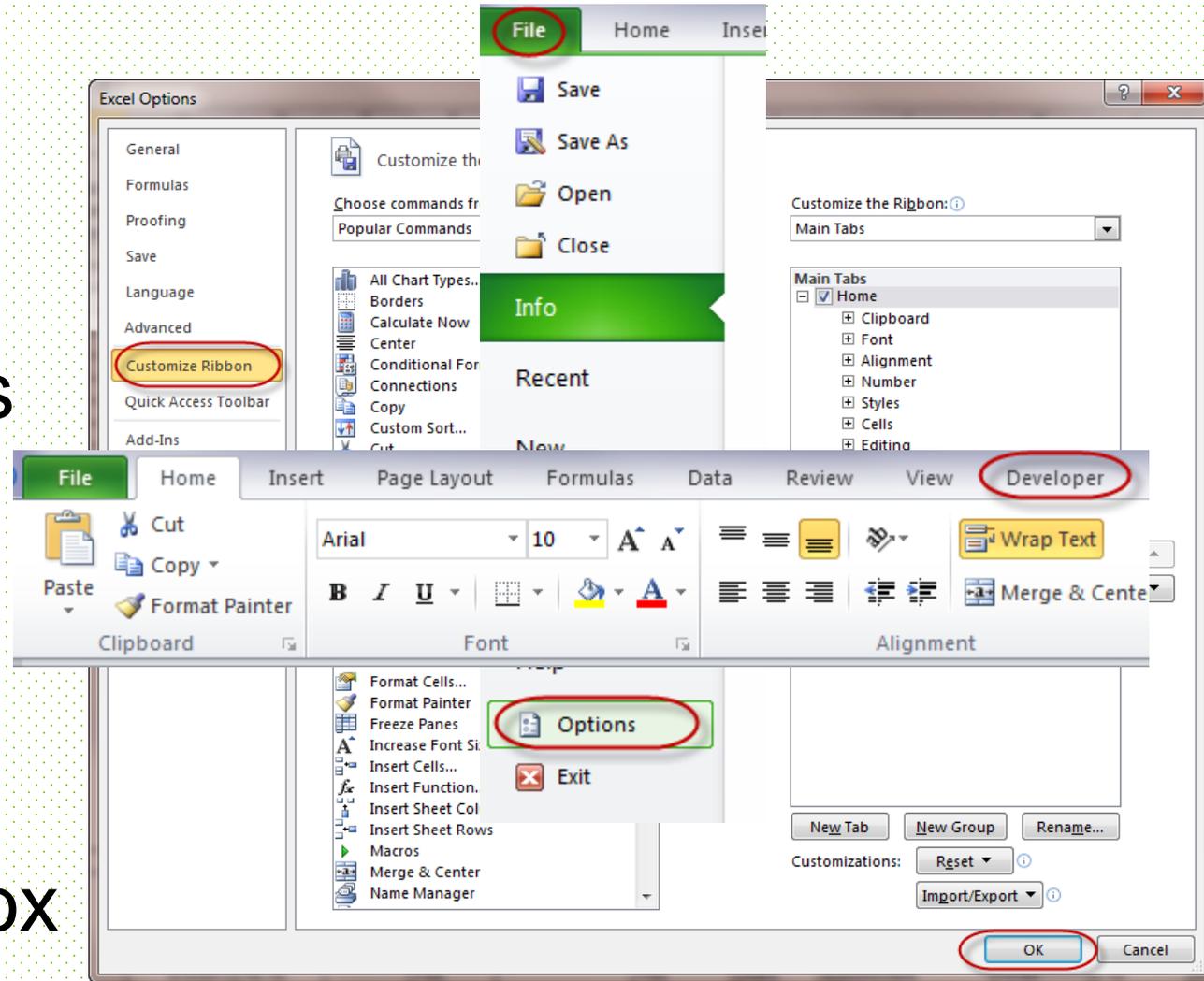
# Microsoft Excel Tabs





# Adding the Developer Tab

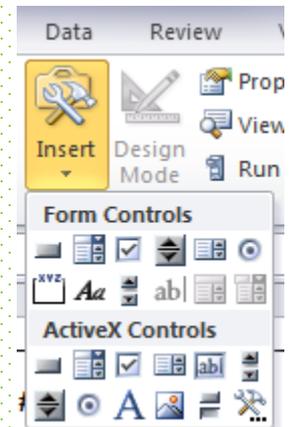
- Click on the File tab
- Click Options
- Choose Customize Ribbon
- Check Developer box
- Click OK





# Developer Tab Items

- The Developer tab is useful for advanced features of Excel 2010 such as creating and recording Macros, or using or editing Visual Basic commands
- It is also necessary if you wish to insert Form Controls or ActiveX Controls into your spreadsheet





# Quick Access Toolbar

- The Quick Access Toolbar is a customizable toolbar that contains a set of commands that are independent of the tab that is currently displayed.
- Used to store shortcuts to frequently used features
  - Save, Undo/Redo, Spelling, Add Comment



# Adding “\$” to a Formula

If a dollar sign precedes a row number, the row number doesn't change when you copy it up or down.  
For example:

- =B3 copies up as: =B2
- =B3 copies down as: =B4
- =B\$3 copies up or down as: =B\$3

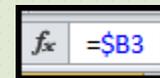
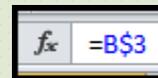
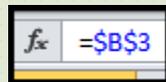
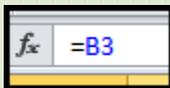
If a dollar sign precedes a column letter, the column letter doesn't change when you copy it right or left.  
For example:

- =B3 copies right as: =C3
- =B3 copies left as =A3
- =\$B3 copies right or left as: =\$B3

If a dollar sign precedes both column letters and row numbers, the formula copies anywhere as a static number.  
For example:

- =\$B\$3 copies anywhere as: =\$B\$3

Hint: If you click on the cell address within the formula bar, the F4 key on the keyboard allows you to “toggle” through the four possibilities





## \$ Exercise

- Add a \$ to the formulas in Line 9 so that you can drag down (or copy) to fill in the remaining portion of the table.
- You want to “anchor” the exchange rates in Colum D
- **Answer:  $B9=D\$3*A9$**



## Sort and Filter

- Found on the HOME page under editing, or on the DATA page under sort and filter
- Sorting and Filtering allow you to manipulate data in a worksheet based on given set of criteria



# Sort and Filter Exercise

- Employee List
- Let's SORT by First Name then by Hire Date
  - Highlight all columns of data (otherwise it will only sort the columns you highlighted)
  - On the Data tab choose SORT
  - Sort by First Name (A to Z)
  - Add Level and sort by Hire Date (oldest to newest)



# Sort and Filter Exercise

- Now add a FILTER to only show the Classified employees who work 4 Hours
  - On the DATA Tab choose FILTER
  - Column H click on the drop down box and select only “Classified”
  - Column F click the drop down box and select only “4”

Sort & Filter



# Conditional Formatting

- Analyzing Data in a Colorful Way
  - On the HOME Tab under Styles
- Formatting that is applied “under some condition”. It allows you to format certain cells when some type of criteria (that you specify) is met.



# Conditional Formatting Exercise

- Highlight the movies with a viewer rating that is above average (light red fill)
  - Highlight column G, select Conditional Formatting, Top/Bottom Rules, Above Avg
- Highlight the movies that were released prior to 1985 (green fill)
  - Highlight column B, select Conditional Formatting, highlight cells rules, less than, 1985, change to green fill

Conditional Formatting



# Transpose

- When you need to flip-flop data and you don't waste time doing it manually.
  - Returns a vertical range of cells as a horizontal range, or vice versa.
- You can use Transpose as a
  - Paste Option for one-time paste
  - Formula for linked cells



# Transpose Exercise 1

- **Transpose Function**
  - Highlight the empty cells B2:K2
  - Enter =TRANSPOSE(A3:A12) in the formula box
  - Then press Ctrl-Shift-Enter to create an array formula
- **Paste Special** (ONLY want to perform a one-time paste)
  - Copy cells A3:A12
  - Right click on cell B13, select “Paste Special”
  - Select the Transpose checkbox and click on the OK button.

Transpose 1



## Transpose Example 2

- Transpose can also be applied to tables
  - Highlight and Copy the entire table (A6:K9)
  - Right click where you want to paste the table and select “Paste Special”
  - Select the Transpose checkbox and click on the OK button.
  - You can also use the =TRANSPOSE Formula with tables if you want them to be linked

Transpose 2



# PROPER

- Proper Function
  - One of Excel's text functions
  - Capitalizes the first letter and any other letters that follow a non-letter character in a text string. Converts all other letters in the text string to lowercase letters.
  - Useful with employee lists, expenditures descriptions, etc



# Proper Example 1

- We want to convert the text expenditure description in Column A
  - Insert a new column between A and B
  - In B2, Enter =PROPER(A2)
  - Drag formula down to fill in the remaining cells
  - Copy the new data
  - Paste Special and select “Values”
  - Delete Column A

Proper 1



## Proper Example 2

- Using the PROPER function, convert the City Departments
- *Bonus Question:* Using a function within Excel, remove the duplicate departments in the table



# Proper Example 2

## Answer

- **Proper**
  - Insert a new column between A and B
  - In B4, Enter =PROPER(A4)
  - Drag formula down to fill in the remaining cells
  - Copy the new data
  - Paste Special and select “Values”
  - Delete Column A
- **Delete Duplicates**
  - Make sure cursor is somewhere on the table
  - On the Data tab, select “Remove Duplicates”

Proper 2



# Text to Columns

- Convert Text to Columns: separate simple cell content into different columns.
  - Depending on the way your data is arranged, you can split the cell content:
    - Specific column break location within your data
    - A space or a character (comma, a period, or a semicolon)



# Text to Columns Example

- We want to separate the Make and Model of the cars (in Column A)
  - First you have to insert a column where you want the data to go (insert a new column between A and B)
  - Highlight the data that you want to split into separate columns
  - On the DATA tab, select “text to columns” – The Convert Text to Column Wizard will appear
  - Select “Delimited” and then check “space”

Text to Columns



# Tables

- Sometimes it can be tricky when re-organizing adding or deleting data from a table
  - Deleting portions of a table
  - Insert rows into a table
  - Moving tables within a worksheet



# Shortcuts: Moving and Scrolling on Worksheets

- **CTRL End:** moves to the last cell on a worksheet, in the lowest used row of the rightmost used column
- **CTRL Home:** moves to the beginning of a worksheet.
- **CTRL ↓:** moves to the edge of the current data region



## Shortcuts continued

- **CTRL Page Down:** moves to the next sheet in a workbook.
- **ALT Page Down:** Move one screen to the right



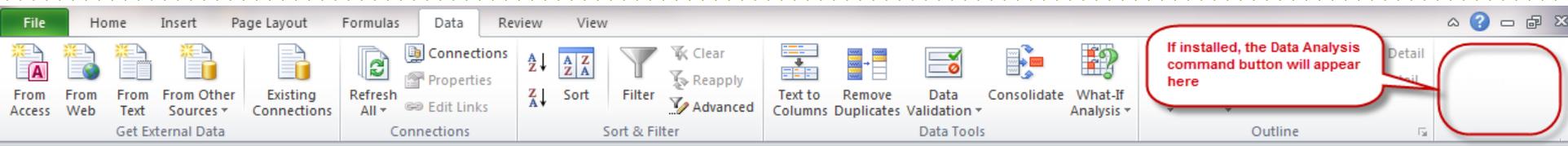
# More Shortcuts

- Shift + spacebar: select entire row.
- Ctrl + spacebar: select entire column.
- Ctrl + Z: undo
- Ctrl C: copy
- Ctrl V: paste
- Ctrl+Shift+\$: applies the currency format



# Data Analysis

- Once installed, this command button will appear on the Data Tab in Excel 2007 – 2013 versions

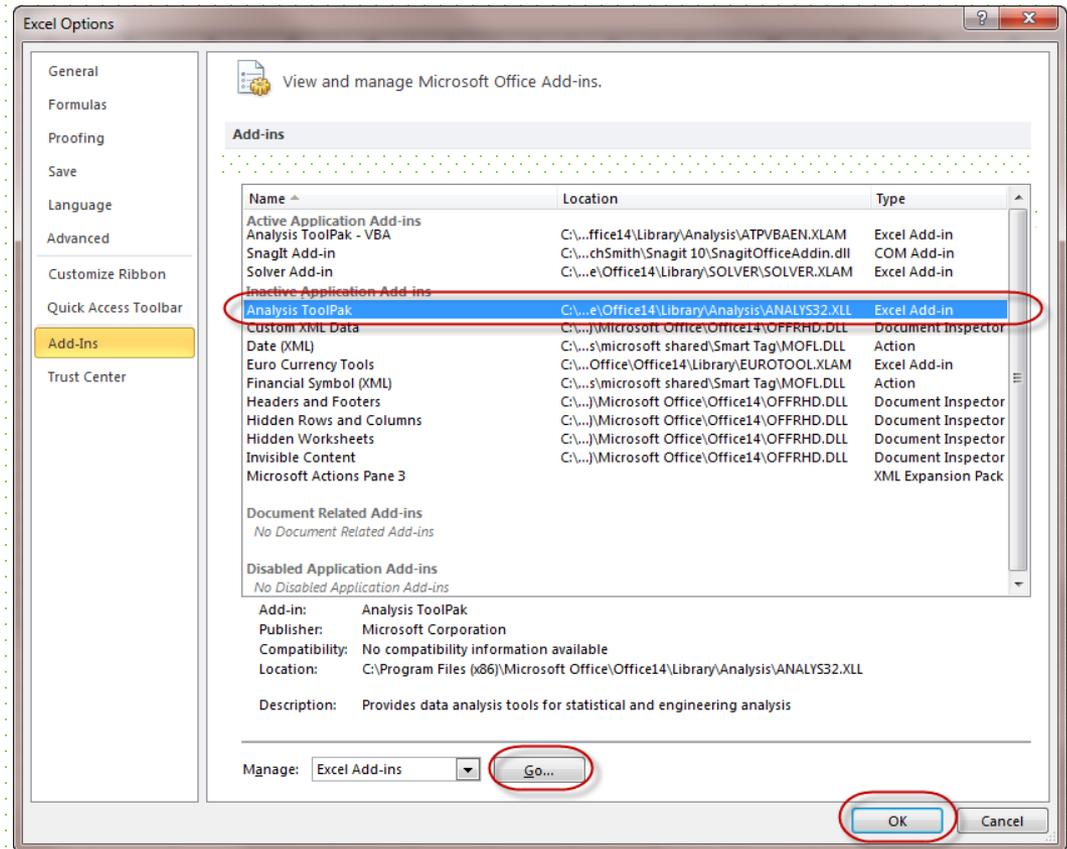


- If it does not appear, install the Data Analysis Toolpak as described in the following steps



# Adding the Data Analysis ToolPak

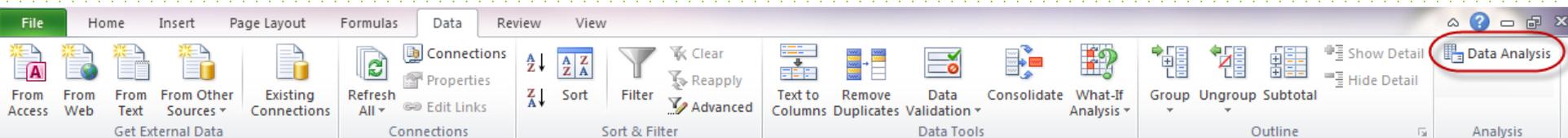
- Click on the File tab, choose Options, and click on Add-Ins
- Select Analysis ToolPak
- Click on Go
- Click OK to close the window





# Adding the Data Analysis ToolPak

- Once installed, the Data Analysis command appears here on the Ribbon under a new Analysis group



- Select the Descriptive Statistics worksheet tab at the bottom of the page, and then click on Data Analysis to see an example of how this works – columns E and F show the results of the Descriptive Statistics of the Sample Data in column C

Descriptive Statistics



# Using Data Analysis for Descriptive Statistics

- To try this yourself, click on the worksheet tab named **Descriptive Statistics 2**, and click on cell **E1**
- On the **Data** tab, click on **Data Analysis**
- Select **Descriptive Statistics**, click **OK**
- Select the Input Range: **C2:C16**
- Select cell **E1** as your Output Range
- Be sure to check **Summary Statistics**
- Click **OK**

Sample Data
17
19
18
17
19
17
18
18
18
18
18
18
17
17
16
19

Descriptive Statistics 2



# Using Data Analysis for Descriptive Statistics

- Your data should appear like this:
- But what does it mean?

Column1	
Mean	17.73333
Standard Error	0.228174
Median	18
Mode	18
Standard Deviation	0.883715
Sample Variance	0.780952
Kurtosis	-0.48529
Skewness	-0.11571
Range	3
Minimum	16
Maximum	19
Sum	266
Count	15

Descriptive Statistics 2



# Data Analysis: Descriptive Statistics Definitions

Excel Descriptive Statistics Definitions:	
Mean:	The average of a set of data points
Standard Error:	The estimate of how well the standard mean approximates the population mean
Median:	The number in the middle of a set of numbers
Mode:	The most common number in a list of data
Standard Deviation:	The measure of the average deviation from the mean
Sample Variance:	The square of the Standard Deviation
Kurtosis:	The sharpness of the peak of data distribution (negative values flatter, positive values sharper)
Skewness:	Refers to a lack of symmetry of the curve of data (negative skewness left of center, positive skewness right of center)
Range:	The difference between the largest and smallest data point values
Minimum:	The lowest value in a set of data
Maximum:	The highest value in a set of data
Sum:	The total of all values in a set of data
Count:	The number of values in a set of data



# SUBTOTAL

- SUBTOTAL Function
  - Returns a subtotal in a list or database
  - Unlike SUM, AVERAGE, COUNT etc. which do one thing and only one thing, ***SUBTOTAL is versatile.***
  - You give SUBTOTAL two things – type of subtotal and the range of cells
    - =SUBTOTAL (TYPE OF TOTAL, RANGE OF CELLS)



# Subtotal

- Type of Subtotal (or Function Number)
  - There are 11 types of subtotal, each with a designated number 1 -11
    - Average (1), Count (2), ... Sum (9) and so on
- Range of Cells
  - The range that you want to subtotal



# SUBTOTAL

Function_num (includes hidden values)	Function_num (ignores hidden values)	Function
1	101	AVERAGE
2	102	COUNT
3	103	COUNTA
4	104	MAX
5	105	MIN
6	106	PRODUCT
7	107	STDEV
8	108	STDEVP
9	109	SUM
10	110	VAR
11	111	VARP



# SUBTOTAL

- You can use SUBTOTAL to ignore values in hidden rows
  - Often, we use hide rows to remove irrelevant items from view. You can use SUBTOTAL so that values in hidden rows are neglected.



# SUBTOTAL

- `SUBTOTAL(9,A1:A10)` finds the sum of values in cells A1:A10
- `SUBTOTAL(109,A1:A10)` will find sum of values in visible rows only
- See Example (yellow highlighted cells)
  - Add a Filter to not show “seasonal” employees
  - Notice how the Subtotal changes

Subtotal



# SUBTOTAL

- If there are *subtotals* in SUBTOTAL range, they will be neglected

Year	Region	Sales
2007	South	\$ 100
2007	West	150
2007	East	200
<b>2007 Total</b>		<b>450</b>
2008	South	300
2008	West	350
2008	East	400
<b>2008 Total</b>		<b>1,050</b>
2009	South	500
2009	West	550
2009	East	600
<b>2009 Total</b>		<b>1,650</b>
<b>Grand Total</b>		<b>3,150</b>

these SUBTOTALS  
are neglected  
when calculating  
this SUBTOTAL



# SUBTOTAL

## Example 2

- We can create subtotals in a given list
- Highlight the Table and go to Data Tab
- Click on “Subtotals” - This will launch a Subtotal dialog where you can easily specify the type of total grouping you want.
- Example:
  - Highlight Table (A1:I36)
  - On DATA tab select “Subtotal”
  - Sum the Number of employees at each change in Department

Subtotal



# VLOOKUP

- VLOOKUP - looks up the value in the first column of the range or table and returns the corresponding value in a specified table or range column.
- =VLOOKUP (Lookup\_value, Table\_array, Col\_index\_num, Range\_lookup)



# Huh??

- In Simpler terms, there is:
  - an INPUT (something to search for),
  - a TABLE (to Search in)
  - and a RETURNED VALUE (from a specific column that you identify)
  
- Example exercise



# VLOOKUP Exercise

- Using the VLOOKUP function, fill in the Fund Description (In Column B):
  - **=VLOOKUP (A2,'VLOOKUP DATA'!A:B,2, FALSE)**
  - **Lookup\_Value**: the value to be found in the first column of a table
  - **Table\_array**: the table in which the data is retrieved
  - **Col\_index\_num**: The column in the table\_array from which the matching value is returned
  - **Range\_Lookup**: find an exact match, enter “FALSE”



# VLOOKUP Exercise

- Using the VLOOKUP function, fill in the Department Description
- Department Description (In Column D):
  - `=VLOOKUP(C2,'VLOOKUP DATA'!D:E,2,FALSE)`

VLOOKUP



# Pivot Tables

- Great for large lists of data
  - expenditures, inventory, staffing lists
- Provides a quick way to extract specific information from the data
  - Expenditures by fund, staffing by department, vehicle by year, etc



# Pivot Tables

- Creating a Pivot Table:
  - Make sure each column of data has a heading, or a title.
  - Choose “Pivot Table” on the INSERT Tab
  - Highlight the data to be included. You can highlight the entire columns
  - Option to insert the Pivot Table into a new worksheet or existing worksheet

Cut Copy Paste Format Painter Clipboard
Times New Roman 10 A A B I U Font
Wrap Text General Number
Conditional Formatting Format as Table Warning

	A	B	C	D	E	F
1	Fund	Department	Department Description	Object	Object Description	YTD Expense
2	General	21001000	Council	321500	OPER SUPPLIES - MISCELLANEOUS	\$17.97
3	General	21001000	Council	212500	LIFE INSURANCE	\$21.97
4	General	21001000	Council	111105	LONGEVITY	\$50.00
5	General	21001000	Council	443102	POSTMASTER	\$69.50
6	General	21001000	Council	332000	MISC TOOLS & EQUIP	\$125.99
7	General	21001000	Council	311101	CONTRACTED OFFICE VENDOR	\$196.69
8	General	21001000	Council	443101	COUNTY PHONE	\$201.59
9	General	21001000	Council	311102	OFFICE PRINTING	\$285.62
10	General	21001000	Council	311100	OPER SUPPLIES - OFFICE	\$851.91
11	General	21001000	Council	331301	R&M OFFICE EQUIPMENT	\$887.41
12	General	21001000	Council	212900	MEDICARE COSTS	\$1,151.90
13	General	21001000	Council	212200	WORKER'S COMPENSATION	\$2,318.08
14	General	21001000	Council	441500	COMPUTER SERVICES	\$2,603.00
15	General	21001000	Council	111103	RETIREMENT SETTLEMENTS	\$4,056.70
16	General	21001000	Council	441100	PROFESSIONAL SERVICE	\$4,248.00
17	General	21001000	Council	332200	LEGAL MULTI-MEDIA	\$5,707.64
18	General	21001000	Council	445101	LEGALS/PUBLIC NOTICES	\$6,107.85
19	General	21001000	Council	212400	HOSPITALIZATION	\$6,569.96
20	General	21001000	Council	212100	OHIO PUBLIC EMPLOYEES RETIREMT	\$11,280.25
21	General	21001000	Council	111100	SALARIES AND WAGES	\$80,685.41
22	General	21002000	Mayor'S Office	443103	OVERNIGHT CHARGES	\$18.34
23	General	21002000	Mayor'S Office	311102	OFFICE PRINTING	\$35.66
24	General	21002000	Mayor'S Office	448802	AWARD/RETIREMENT TOKENS	\$68.76
25	General	21002000	Mayor'S Office	448100	PERSONAL DEVELOPMENT	\$80.00
26	General	21002000	Mayor'S Office	212500	LIFE INSURANCE	\$88.32
27	General	21002000	Mayor'S Office	448800	MISCELLANEOUS	\$97.04
28	General	21002000	Mayor'S Office	441100	PROFESSIONAL SERVICE	\$137.50
29	General	21002000	Mayor'S Office	443102	POSTMASTER	\$149.29
30	General	21002000	Mayor'S Office	441700	SOFTWARE EXPENSES	\$220.32
31	General	21002000	Mayor'S Office	311101	CONTRACTED OFFICE VENDOR	\$253.17
32	General	21002000	Mayor'S Office	441501	RADIO SERVICES	\$313.00
33	General	21002000	Mayor'S Office	443101	COUNTY PHONE	\$860.61
34	General	21002000	Mayor'S Office	311100	OPER SUPPLIES - OFFICE	\$927.46
35	General	21002000	Mayor'S Office	332200	LEGAL MULTI-MEDIA	\$1,427.43
36	General	21002000	Mayor'S Office	332100	SMALL EQUIPMENT	\$1,535.00
37	General	21002000	Mayor'S Office	212900	MEDICARE COSTS	\$1,568.38
38	General	21002000	Mayor'S Office	448804	DISCRETION ACCOUNT/WEDDING FEE	\$1,947.71
39	General	21002000	Mayor'S Office	212200	WORKER'S COMPENSATION	\$3,041.26
40	General	21002000	Mayor'S Office	441500	COMPUTER SERVICES	\$4,137.00
41	General	21002000	Mayor'S Office	212100	OHIO PUBLIC EMPLOYEES RETIREMT	\$15,481.97
42	General	21002000	Mayor'S Office	212400	HOSPITALIZATION	\$21,553.92
43	General	21002000	Mayor'S Office	111100	SALARIES AND WAGES	\$110,586.30
44	General	21003000	Auditor'S Office	212500	LIFE INSURANCE	\$209.67
45	General	21003000	Auditor'S Office	332000	MISC TOOLS & EQUIP	\$314.38
46	General	21003000	Auditor'S Office	448100	PERSONAL DEVELOPMENT	\$605.00
47	General	21003000	Auditor'S Office	311101	CONTRACTED OFFICE VENDOR	\$672.52
48	General	21003000	Auditor'S Office	331301	R&M OFFICE EQUIPMENT	\$840.83
49	General	21003000	Auditor'S Office	443101	COUNTY PHONE	\$883.73
50	General	21003000	Auditor'S Office	443101	REGISTRATION FEES	\$1,358.00

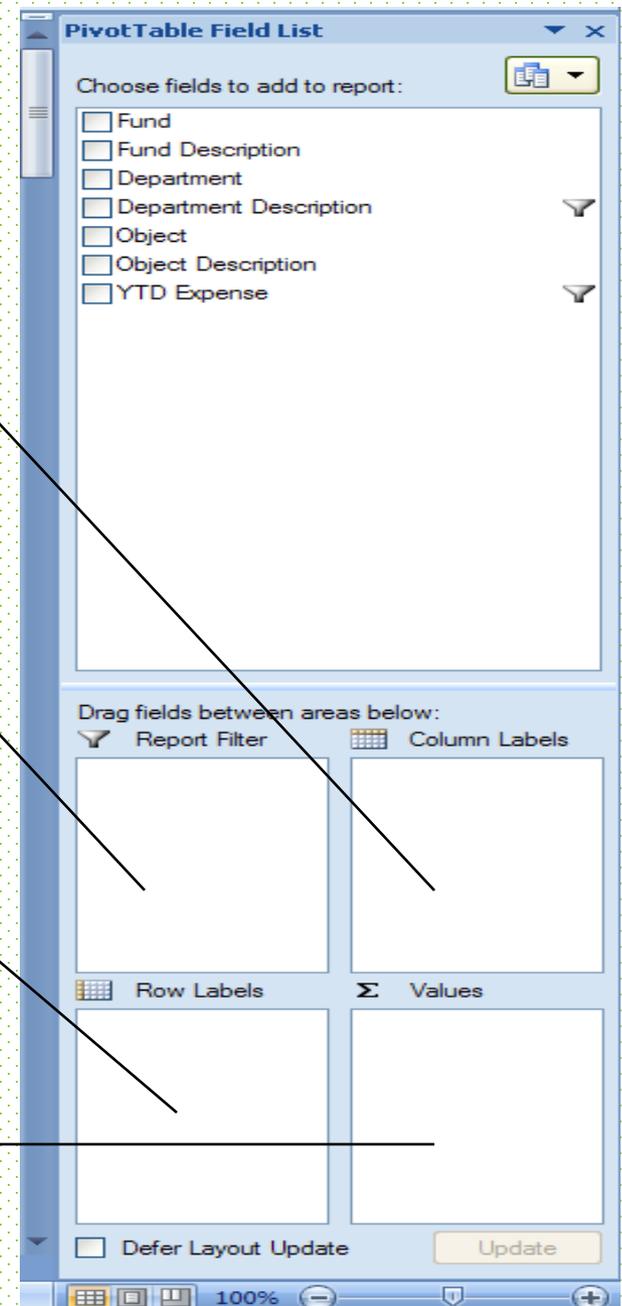
**Column Labels:** Area field shown as column labels at the top of the Pivot Table

- **The Pivot Table Field Report Filter:** Area field is shown above the Pivot Table.  
– will appear once you

**Row Labels:** Area field shown as Row Labels on the Left Side of the Pivot Table

**Values:** Area field shown as summarized numeric values.

ables

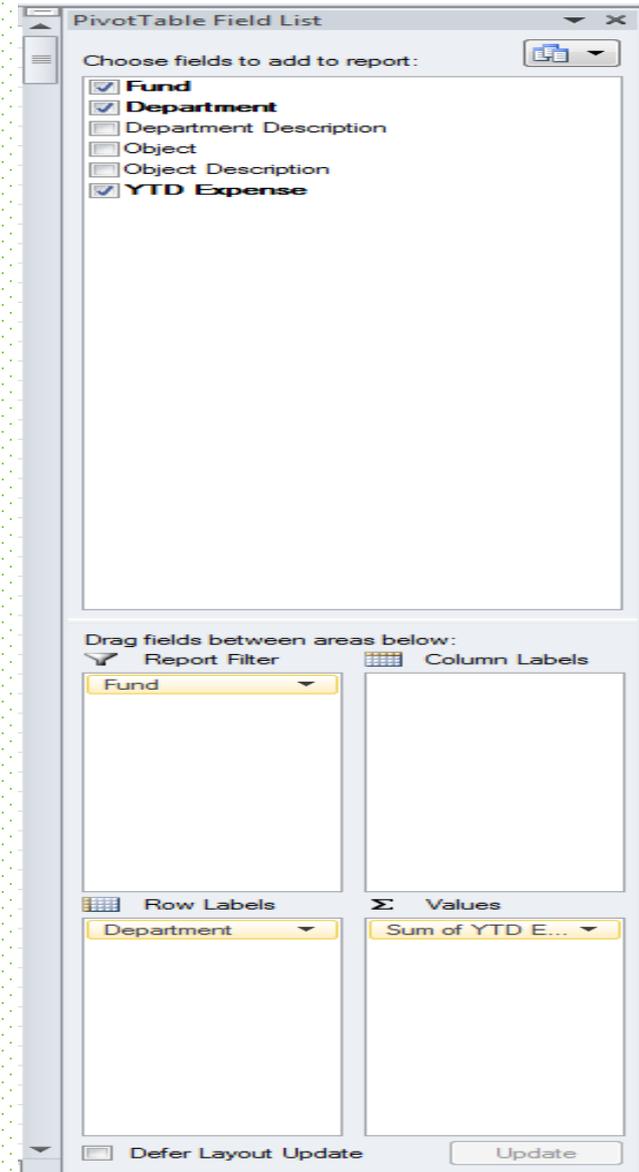




# Pivot Tables

Pivot Table that illustrates YTD Expenses by Department and include only the General Fund.

Fund	General
<b>Row Labels</b>	<b>Sum of YTD Expense</b>
Auditor's Office	\$444,470
Council	\$127,437
Law Director	\$506,898
Mayor's Office	\$164,528
Service Director	\$110,262
<b>Grand Total</b>	<b>\$1,353,596</b>



## Value Field Settings

Source Name: YTD Expense

Custom Name: Sum of YTD Expense

Summarize Values By

Show Values As

### Summarize value field by

Choose the type of calculation that you want to use to summarize data from the selected field

Sum  
Count  
Average  
Max  
Min  
Product

Number Format

OK

Cancel

PivotTable Field List

Sort: [v]

below:

Column Labels

Values

Defer Layout Update [Update]

100%



# Pivot Tables

- Adding filters to Row Labels, Column Labels, and Values

The screenshot shows an Excel PivotTable with the following data:

Row Labels	Sum of YTD Expense
	956576.7
	5346.25
	444469.7
	232750.16
	2756.42
	16497904.32
	1429372.29
	73922.38
	314983.27
	127437.44
	348
	70894.34
	771297.64
	1614.68
	48815.3
	735691.05
	7186964.31
	3302585.77
	340.62
	923059.38
	36518
	7483.12
	100285
	140430
	13413.81
	23762.29
	506898.14
	1296.56
	164528.44
	2843
	1226002.28
	107547.35

The context menu is open over the Row Labels, showing options like 'Sort A to Z', 'Sort Z to A', 'Clear Filter From "Department Descri..."', 'Label Filters', and 'Value Filters'. A search box is also visible.

The screenshot shows the PivotTable Field List task pane with the following fields selected:

- Department
- Department Description
- Object
- Object Description
- YTD Expense

The 'Report Filter' area is empty. The 'Column Labels' area is empty. The 'Row Labels' area contains 'Department D...' and the 'Values' area contains 'Sum of YTD E...'. The 'Update' button is visible at the bottom right.



# Pivot Table Exercise

- Using the data provided, create a Pivot Table illustrating:
  - The total (the SUM) of Employees by Department
  - Include only the following departments:
    - Auditor's Office, Engineering Office, Health Department, Mayor's Office, Treasurer's Office, and Zoning Department
  - Filter the Table to include only employees who work 260 days per year.



# Pivot Table Exercise: Answer 28.85

Microsoft Excel interface showing a PivotTable exercise. The PivotTable is set up with 'DEPARTMENT' as the Row Labels and 'Sum of EMPLOYEES' as the Values. The Grand Total is 28.85.

DEPARTMENT	Sum of EMPLOYEES
AUDITOR'S OFFICE	3.85
ENGINEERING OFFICE	10
HEALTH DEPARTMENT	12
MAYOR'S OFFICE	1
ZONING DEPARTMENT	2
<b>Grand Total</b>	<b>28.85</b>

The background data table includes columns for JOB DESCRIPTION, DEPARTMENT, PAY RATE, HOURS PER WEEK, DAYS WORKED PER YEAR, and EMPLOYEES. The PivotTable Field List on the right shows the following configuration:

- Report Filter: (None)
- Column Labels: (None)
- Row Labels: DEPARTMENT
- Values: Sum of EMPLOYEES



# Pivot Table Charts

- Simple way to illustrate findings
- Example shows the average hourly rate of public works employees at this city
  - Pivot Table is already created includes:
    - Public Work Departments (filtered)
    - Average Rate of Pay (values summarized by avg)
- We can put this data into a chart



# Pivot Table Chart

- **Make sure your cursor is on the pivot table**
- **Under Pivot Table Tools, select “options”**
- **Select “PivotChart”**

The screenshot shows the Microsoft Excel interface. The 'PivotTable Tools' ribbon is active, with the 'Options' tab selected. The 'PivotChart' button is highlighted, and a tooltip is displayed over it, reading: 'Insert a PivotChart based on the data in this PivotTable.' The background shows a PivotTable with the following data:

Row Labels	Average of PAY RATE
BUILDING MAINTENANCE	\$15.30
PARKS MAINTENANCE	\$18.12
SEWER MAINTENANCE	\$22.11
STORM WATER MAINTENANCE	\$23.34
STREET DEPARTMENT	\$24.19
WATER DISTRIBUTION	\$21.87

Pivot Chart



# Questions





# **Patrick Wilson**

Presenter Phone: (614) 752-7091

E-mail: [pwilson@dps.state.oh.us](mailto:pwilson@dps.state.oh.us)

## **ODPS Process Improvement Team**

1970 West Broad Street

Columbus, Ohio 43223