

Chapter 2

Introduction to Excel and Basic Charts

Key Concepts

Area charts, Bar and Column charts, Bubble charts, Filtering, Formatting, Line charts, Pie charts, Pivot Tables, Sorting, Radar charts.

Discussion

In this chapter the key concepts are all about commands in Excel. The first step is to load the **Data Analysis Toolpak**. The standard data structure used throughout this book consists of rows of observations and columns of variables. Some of the basic functionality will be introduced to familiarize you in navigating through Excel spreadsheets.

In this chapter the emphasis is on the basic Excel procedures to allow you to successfully analyze and chart your data. These basic procedures will form the framework for future chapters that have more complicated Excel functionalities. The instructions are provided in a detailed step-by-step process so make sure you do not skip steps. One of the most common frustrations is Excel refusing to compute or complete your graph and usually it is because a vital step has been ignored by the user.

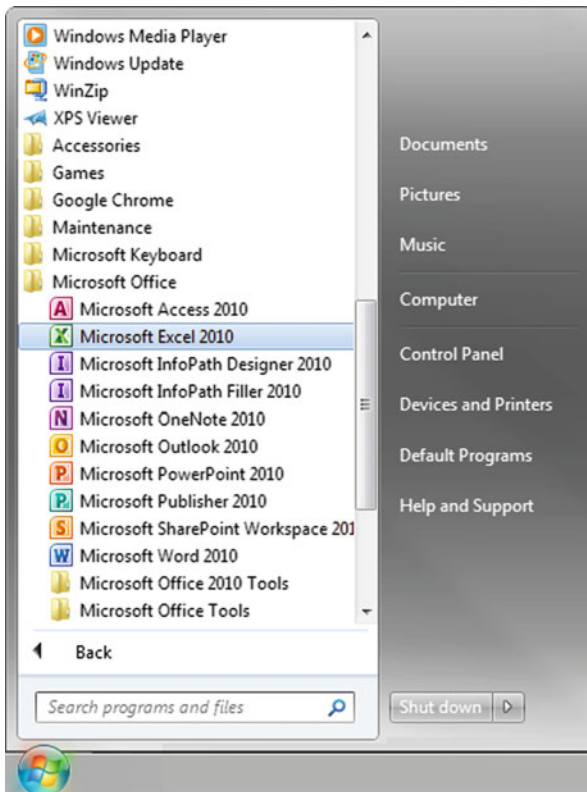
There are many versions of Excel for various types of computers under various operating systems. This book has been compiled using Excel 2010 running under the Microsoft® Windows operating system. However the instructions and flow remain very similar regardless of the Excel version you may be using.

These Excel functions and charts will provide a useful companion to your business applications in the workplace or to your business statistics textbook applications in the classroom.

Basic Concepts

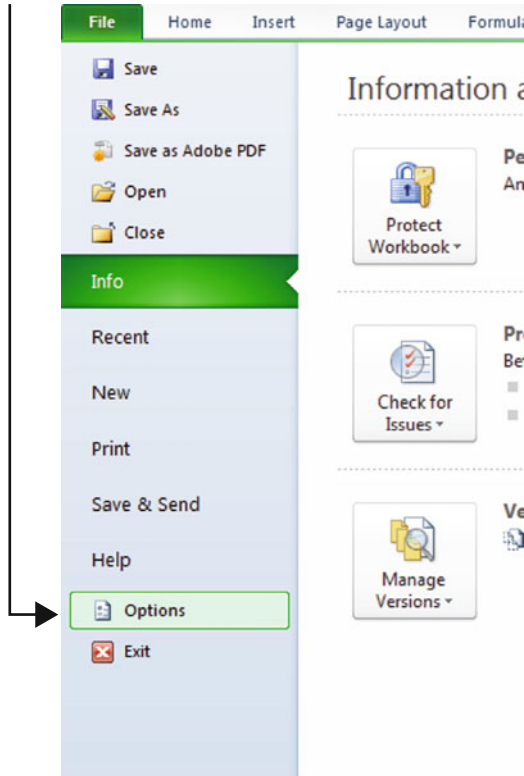
Start Up

- Click on the **Start button** in the lower left corner of your Windows desktop. The Windows Start menu will open
- Click on **All Programs** and the Programs menu will appear to the right of the Windows Start menu
- Open the Microsoft Office folder and select **Microsoft Excel 2010** (or whatever version you are using)



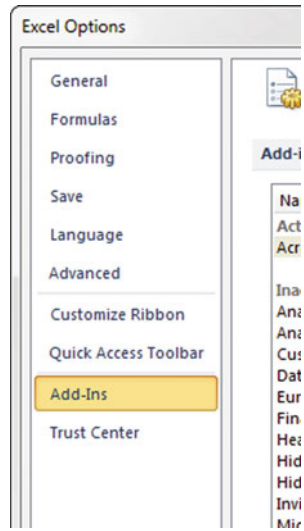
Adding Data Analysis Toolpak

- Click the **File** tab on the upper left hand of the Excel window
- Select **Options** near the bottom of the command menu

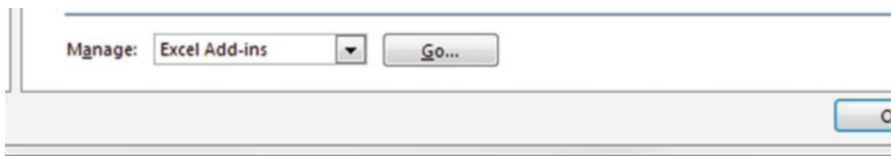


- Select **Add-Ins** on the left hand side

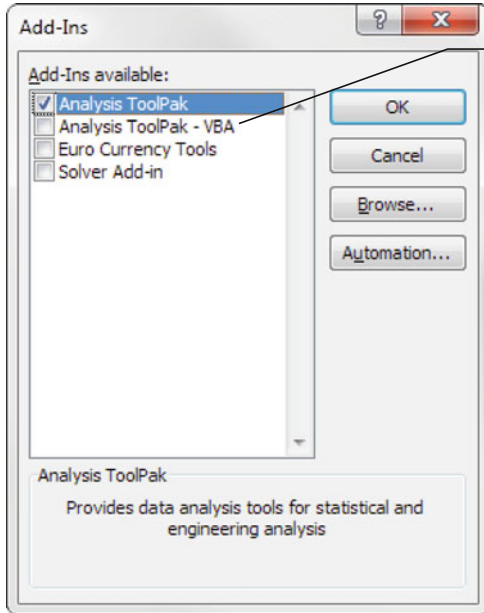
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- Select **Excel Add-ins**, under “Manage:”



- Click **Go...**
- Check **Analysis ToolPak**



Note: Even though there are two (2) **Analysis ToolPaks**, you only need to select the first one. You will not need to install the **Analysis ToolPak - VBA** because that ToolPak uses a programming language called Visual Basic, which will not be covered in this book.

➤ Click **OK**

Once the Analysis ToolPak is installed, it will launch automatically upon opening Excel

◆ Sometimes the Add-in may seem to vanish. This tool is available to you to re-load as necessary each time you launch Excel.

Excel Elements

Element	Purpose
Title bar	Displays the name of the application and the current Excel document
Menu bar	Contains Excel menus with commands for Excel tasks
Toolbar	Contains buttons that allow one click access to Excel commands and features
Formula bar	Displays the formula or value entered into the currently selected cell
Worksheet	Displays the contents of a chart or Excel spreadsheet results
Cells	Stores individual text or numeric entries
Column headings	Organizes cells into lettered columns
Row headings	Organizes cells into numeric rows
Scroll bar	Used to view cell entries that lie outside the main Excel window
Name box	Displays the names or references of the currently selected object or cell
Task pane	Displays commonly used commands
Sheet tabs	Click to display individual worksheets

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Entering Formulas

- Click inside the formula bar
- Type in an “=” sign and type in your formula or click on the *fx* symbol to choose from the drop down menu
 - ◊ To make the formula easier to use make sure you input the cell location where your variable is located not the actual value of the variable.

When you input an Excel function the following symbols can be used:

Operator	Description
+	Addition
–	Subtraction
/	Division
*	Multiplication
^	Exponentiation

Cell References

- For a list of data values, use a colon. If you copy and paste a formula in a row or column, the cell reference in the new formulas will shift along with the cell. In this example we are asking Excel to sum up all of the data from cell A2 to cell A11

Example: SUM(A2:A11)

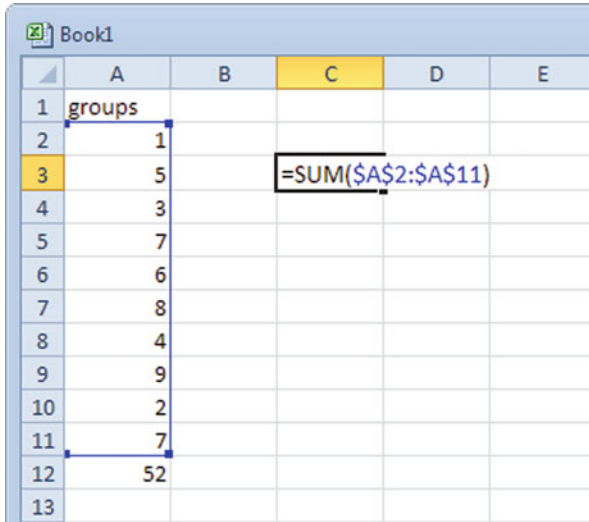
The screenshot shows an Excel spreadsheet with the following data:

	A	B	C
1	groups		
2	1		
3	5		
4	3		
5	7		
6	6		
7	8		
8	4		
9	9		
10	2		
11	7		
12	=SUM(A2:A11)		
13			
14			

A tooltip for the SUM function is visible in cell A13, showing the syntax: SUM(number1, [number2], ...)

- For a fixed reference, use dollar signs. If you copied this formula into other cells, it would still point to cells A2:A11 and would not be shifted to reflect a new cell location. Note Excel will recognize the following formats as being the same: \$A\$2, \$A2, A\$2

Example SUM(\$A\$2:\$A\$11)



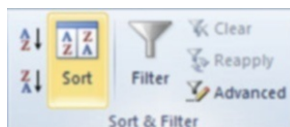
Sorting Data

To sort a column of data:

- Click on the **Data** tab

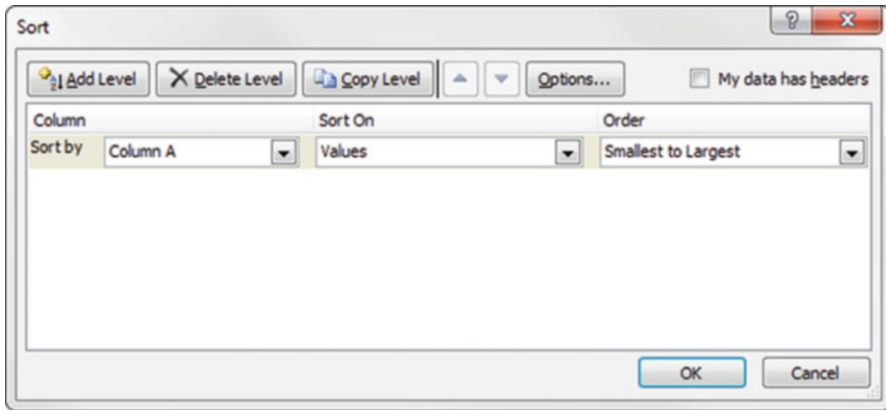


- Highlight the previous data set above or create your own data set
 - ◊ If you want to preserve the original data set/order, you need to copy and paste it in another column; otherwise Excel will replace the unordered column with the ordered data.
- Choose the **Sort** function



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- Select the type of sorting
- You can sort by more than one level



Filtering Data

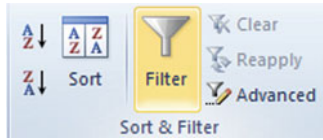
- Highlight the data set above or create your own data set that you want to filter
 - ◊ If you want to preserve the original data set, you need to copy and paste it in another column. Excel will replace the unordered column with the ordered data.

	A	B
1	Count	
2	15	
3	28	
4	54	
5	68	
6	73	
7	82	
8	96	
9		

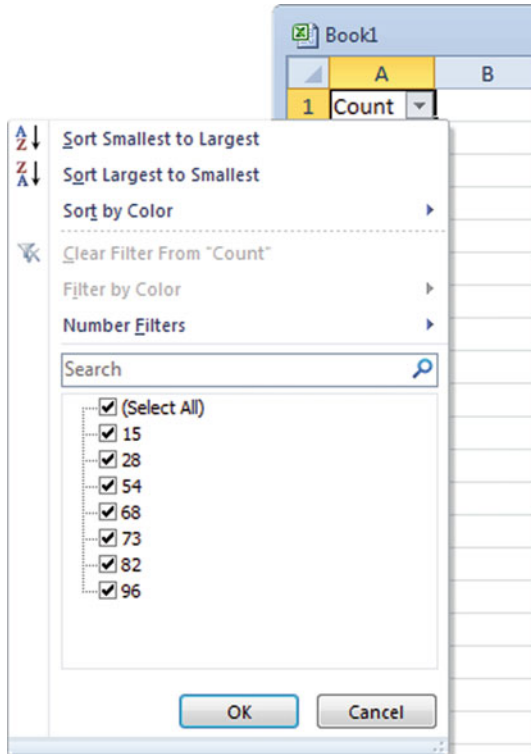
- Select the first row with the data label
- Click on the **Data** tab



- Click on **Filter** function



- Click on the drop down arrow on the first cell



You can apply a sorting function or a filter(s).

Examples

Choose all values greater than 30. Excel will list the values 54, 68, 73, 82, and 96.
Choose all values ≤ 75 and ≥ 25 . Excel will list the values 28, 54, 68, and 73.

Getting Excel Help

- Click on the question mark on the far right of the upper toolbar



- You can type in the concept or the actual question



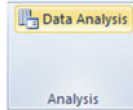
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Statistical Tools

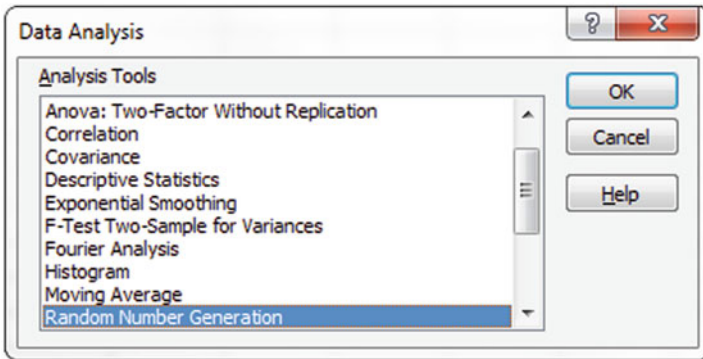
- Click on the **Data** tab



- Click in the **Data Analysis** function

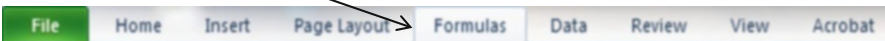


- Highlight the statistical function you need. If the function is not displayed in the list box, click on the vertical scroll bar on the right of the box or scroll to it



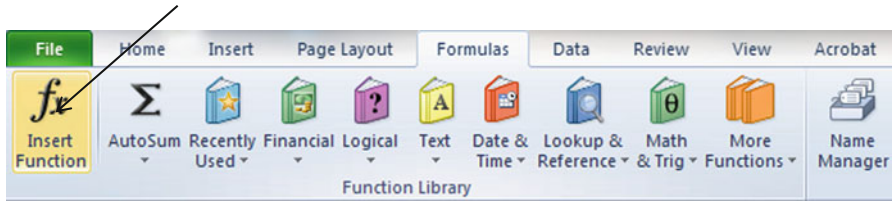
Predefined or Built-In Formulas

- Click on the **Formulas** tab

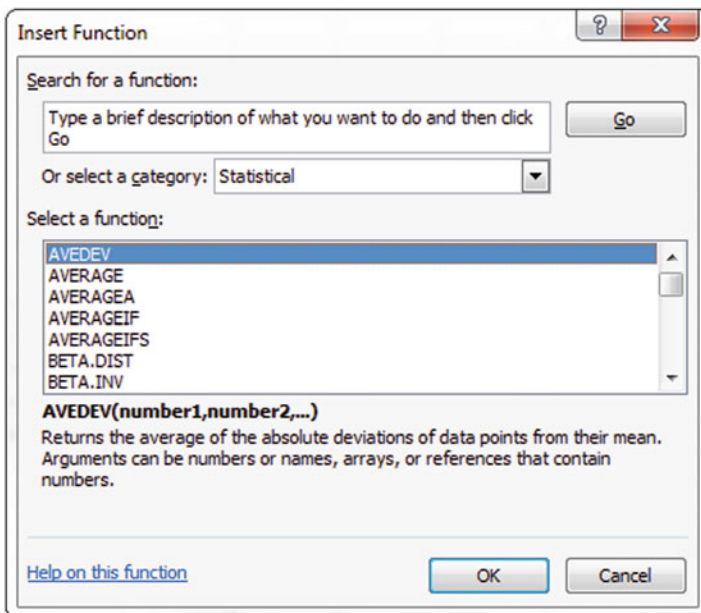


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- Click on the **fx** or **Insert Function** button

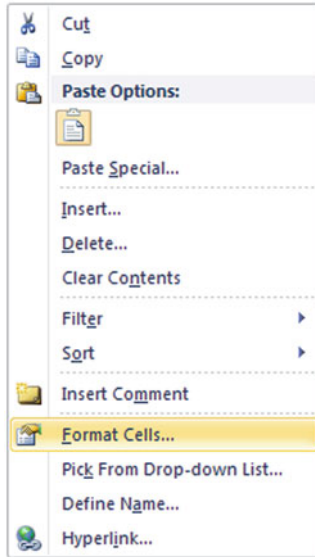


- Click on **Statistical** from the drop down menu to indicate the category
- Highlight the function you want or type in a description of what you want the function to do

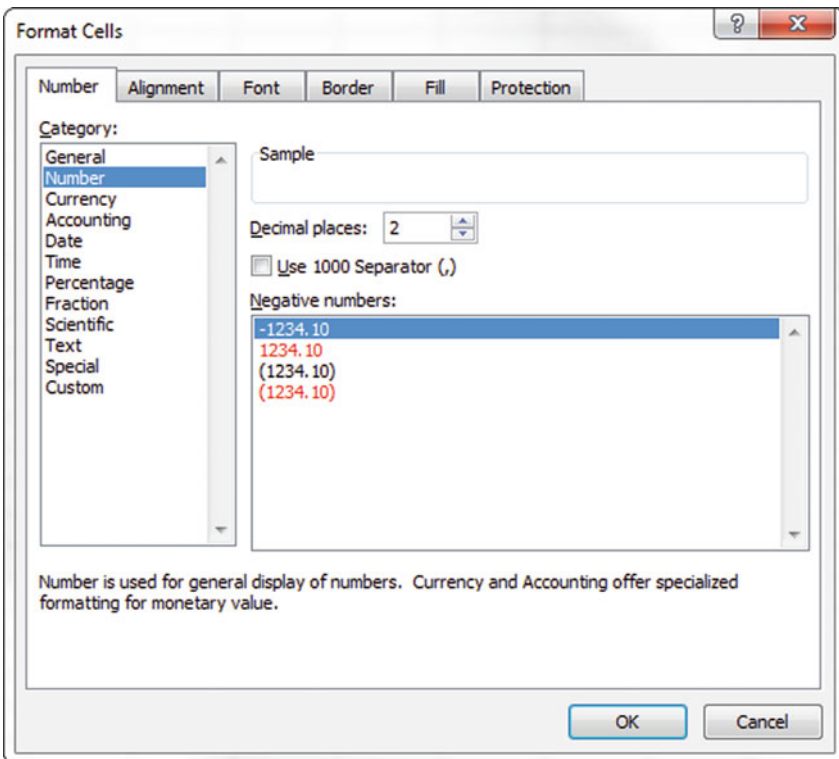


Formatting Data

- Right click on the cells you wish to format
- Select the **Format Cells** option



➤ Select **Number** under Category



➤ Choose the correct number of decimal places, usually 2 is sufficient

Chart Wizard

To access the chart wizard:

- Click on the **Insert** tab



- Select the type of chart you want from the “Charts” section
- You can select any of the following chart types listed. See Fig. 2.1













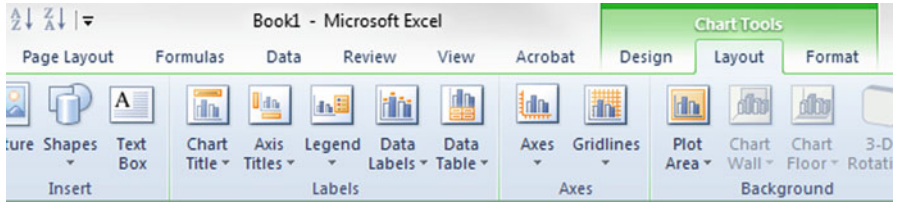
Name	Icon	Description
Column		Shows how data changes over time or between categories. Values are displayed vertically, categories horizontally.
Line		Shows trends in data spaced at equal intervals. Can also be used to compare values between groups.
Pie		Shows the proportional size of items that make up the whole. The chart is limited to one data series.
Bar		Shows how data changes over time or between categories. Values are displayed horizontally, categories vertically.
Area		Displays the magnitude of change over time or between categories. You can also display the sum of group values, showing the relationship of each part to the whole.
Scatter		Displays the relationship between numeric values in several data series. This chart is commonly referred to as a scatter plot.
Other Charts		Displays a sub-set of charts that are less commonly used.
Stock	Stock 	Displays stock market data, including opening, closing, low and high daily values.
Surface	Surface 	Shows the value of a data series in relation to the combination of the values of two other data series.
Doughnut	Doughnut 	Shows the proportional size of items relative to the whole. It can display more than one data series at a time.
Bubble	Bubble 	This is a type of scatterplot but the size of the bubbles is proportional to the value of the third data series.
Radar	Radar 	Shows values from different categories radiating from a center point. Lines connect the values within each data series.

Fig. 2.1 Chart types

Formatting of Graphs

To change graph titles or scales:

- Click on the graph
- Click on the **Layout** tab (not **Page Layout**, it should be bracketed off in green as “Chart Tools”)



- Click on **Chart Title** function or **Data Labels** function or other aspects of the graph you wish to format

Bar and Column Charts

A bar chart or bar graph is a chart with rectangular bars with lengths proportional to the values that they represent. The bars can be plotted vertically or horizontally. A vertical bar chart is sometimes called a column chart.

Example Problem

You own a small used car lot and want to do some analysis with car sales and the days of the week that the cars were sold.

- Enter the text and numbers in columns A and B

	A	B	C
1	Days of the week	# of Cars Sold	
2	Mon	10	
3	Tues	22	
4	Wed	40	
5	Thurs	12	
6	Fri	5	
7	Sat	45	
8	Sun	42	
9			

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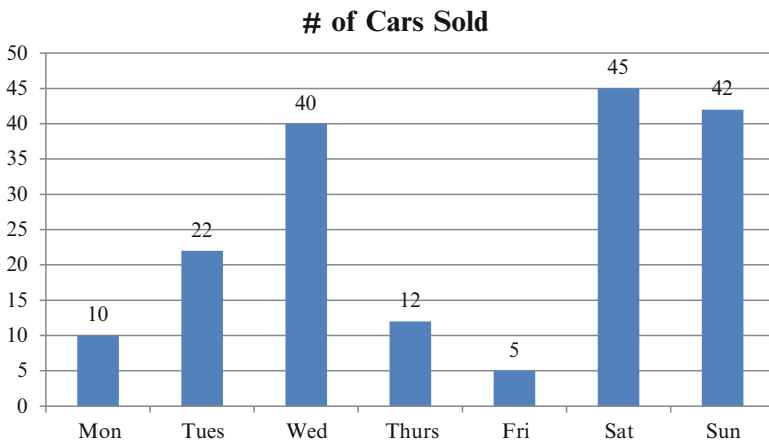
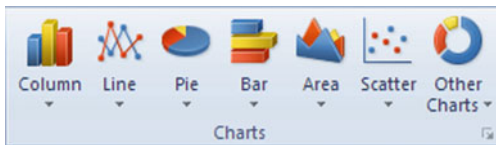
- Highlight the 2 columns of data

	A	B	C
1	Days of the week	# of Cars Sold	
2	Mon	10	
3	Tues	22	
4	Wed	40	
5	Thurs	12	
6	Fri	5	
7	Sat	45	
8	Sun	42	
9			

- Select the **Insert** tab

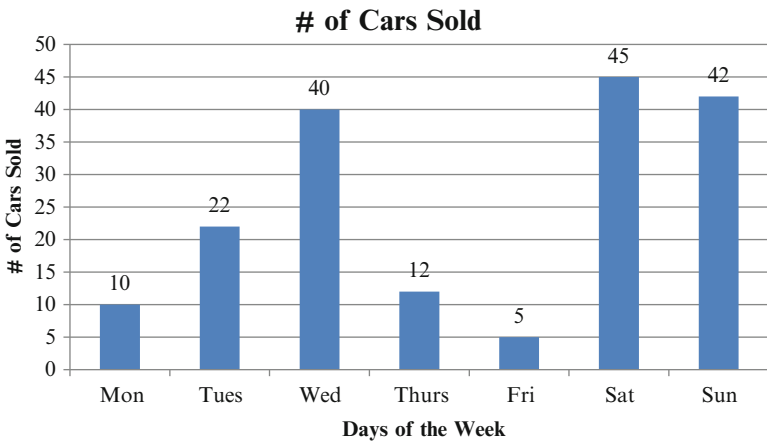
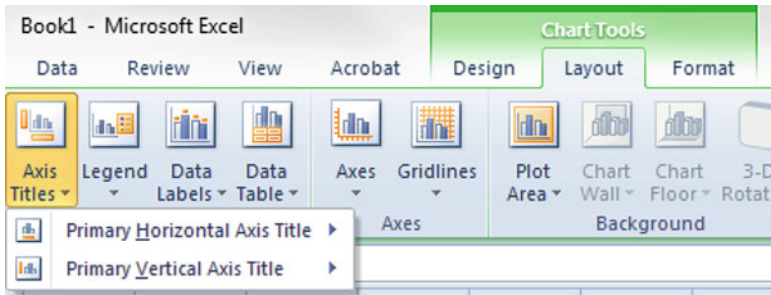


- Select the **Column** chart function



- Click anywhere on the chart
- Click the **Layout** tab, under Chart Tools
- Click the **Data Labels** function to add data labels

- Click the **Axis Titles** function to add the appropriate vertical and horizontal labels



Pie Charts

In the pie chart the sum of the percentages on the chart should add to 100 % if you have used all of the input data correctly. In this example the input data is given as percent of total sales. In the next chapter you will learn how to calculate the percentages from the raw data.

Example Problem

As the store manager you wish to complete some sales analysis on each of the departments in your store. The sales data is “% of total sales” by “department.”

- Enter the text and numbers in columns A and B

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- ◇ Excel will assume the first column is labels so be careful how you enter the data.

	A	B	C
1	Department	% of Total Sales	
2	Home	15%	
3	Bed & Bath	5%	
4	Women's	45%	
5	Men's	2%	
6	Children's	5%	
7	Shoes	20%	
8	Beauty	3%	
9	Jewelry & Accessories	5%	
10			

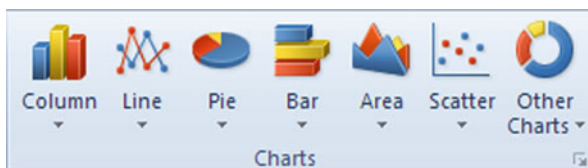
- Highlight the 2 columns of data

	A	B	C
1	Department	% of Total Sales	
2	Home	15%	
3	Bed & Bath	5%	
4	Women's	45%	
5	Men's	2%	
6	Children's	5%	
7	Shoes	20%	
8	Beauty	3%	
9	Jewelry & Accessories	5%	
10			

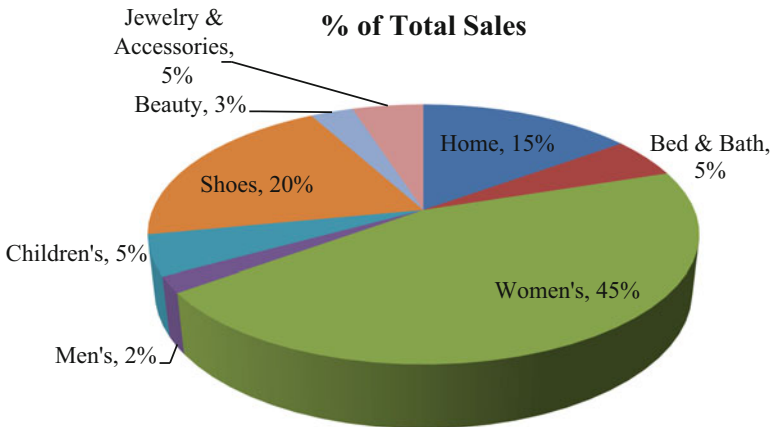
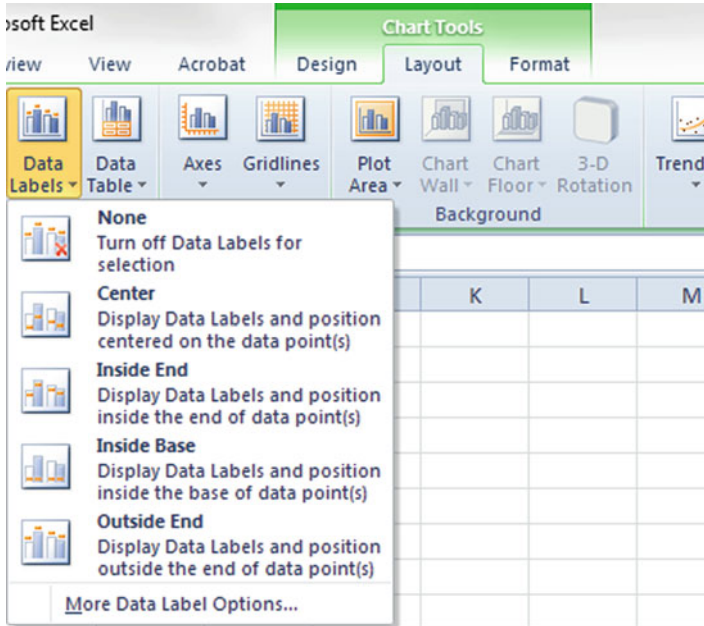
- Select the **Insert** tab



- Select the **Pie** chart function



- Choose type of pie chart you want
- Click anywhere on the chart
- Click the **Layout** tab, under Chart Tools
- Click the **Data Labels** function, to add data labels



- ◇ Remember if you want percentages on the chart you need to format the data cells as percentage. You can select the output as percentages by checking that box.

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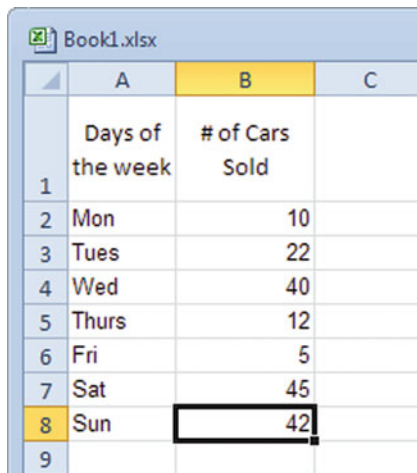
Line Charts and Area Charts

A line chart is a type of chart that displays information as a series of data points connected by straight line segments. An area chart is based on the line chart. The area between the axis and the data line are commonly filled in with colors, textures and hatchings.

Example Problem

You own a small used car lot and want to do some analysis with car sales and the days of the week that the cars were sold.

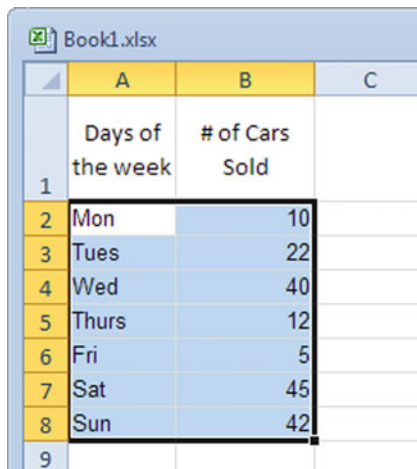
- Enter the text and numbers in columns A and B



The screenshot shows an Excel spreadsheet titled 'Book1.xlsx'. The data is organized in columns A and B. Column A contains the days of the week, and column B contains the number of cars sold. The cell for Sunday (42) is highlighted with a black border.

	A	B	C
1	Days of the week	# of Cars Sold	
2	Mon	10	
3	Tues	22	
4	Wed	40	
5	Thurs	12	
6	Fri	5	
7	Sat	45	
8	Sun	42	
9			

- Highlight the 2 columns of data



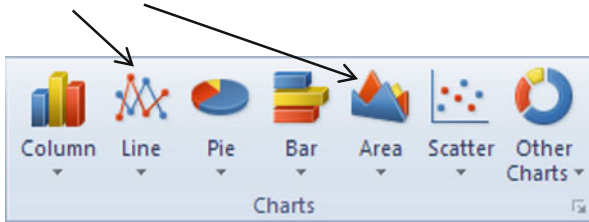
The screenshot shows the same Excel spreadsheet as above, but with columns A and B highlighted in blue, indicating they have been selected.

	A	B	C
1	Days of the week	# of Cars Sold	
2	Mon	10	
3	Tues	22	
4	Wed	40	
5	Thurs	12	
6	Fri	5	
7	Sat	45	
8	Sun	42	
9			

- Select the **Insert** tab

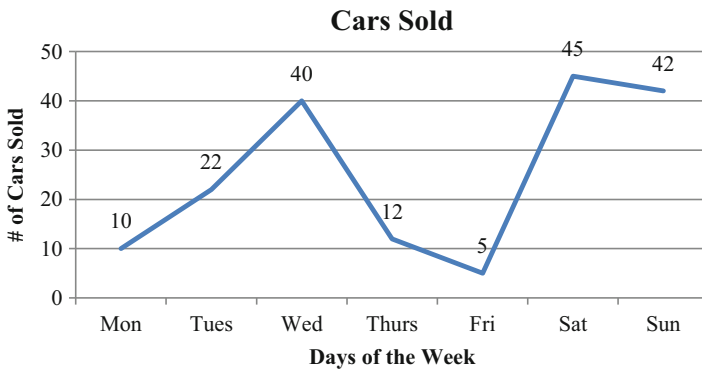


- Select **Line** or **Area** function



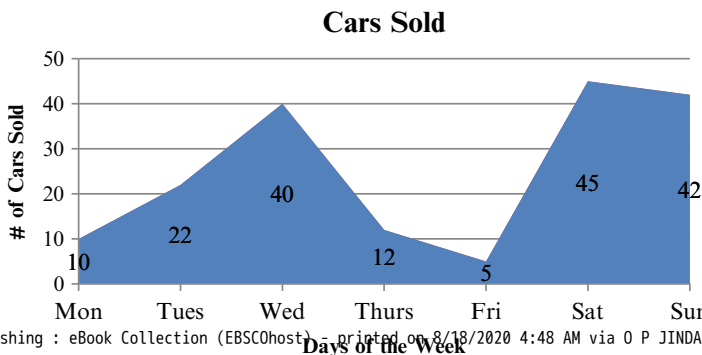
- Select the type of Line or Area chart desired

Line Graph Example



Area Chart Example

The area chart just fills in the area below the line.



Other Charts

Bubble Chart

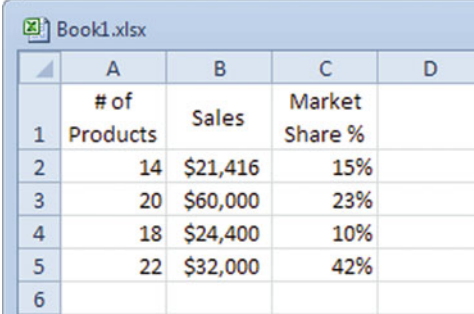
A bubble chart plots 3 dimensional data as a 2 dimensional graph using the size of the bubble to depict the third dimension.

- ◆ You need to have three arrays of data: x, y, size of bubble.

Example Problem

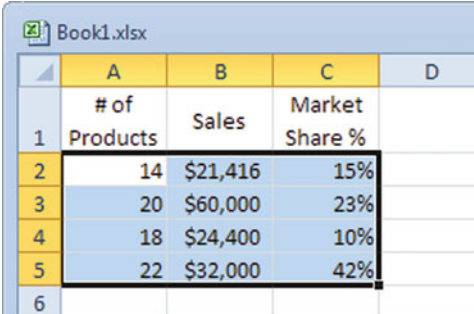
The analysis you wish to complete involves reviewing the product sales and market share by location. The data that is available to you includes the number of different products sold in each of your four geographic areas of operation, the sales generated by those products and the percent of your total market each location represents.

- Enter the text and numbers in columns A, B, and C



	A	B	C	D
1	# of Products	Sales	Market Share %	
2	14	\$21,416	15%	
3	20	\$60,000	23%	
4	18	\$24,400	10%	
5	22	\$32,000	42%	
6				

- Highlight the three columns of data

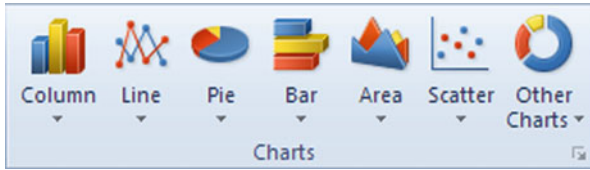


	A	B	C	D
1	# of Products	Sales	Market Share %	
2	14	\$21,416	15%	
3	20	\$60,000	23%	
4	18	\$24,400	10%	
5	22	\$32,000	42%	
6				

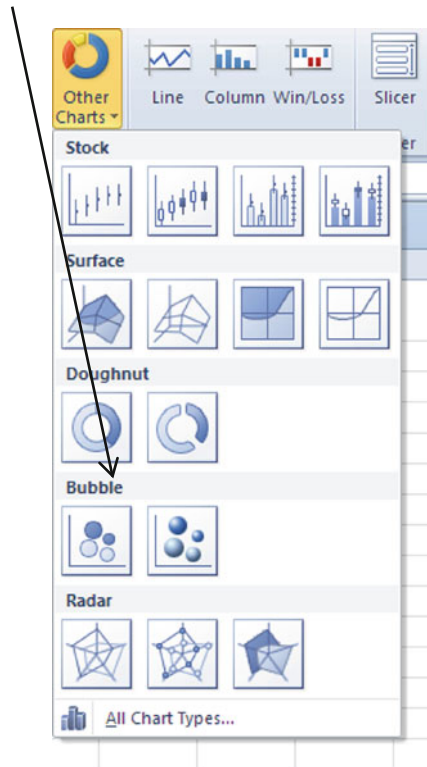
- Select the **Insert** tab



- Select the **Other Charts** chart function

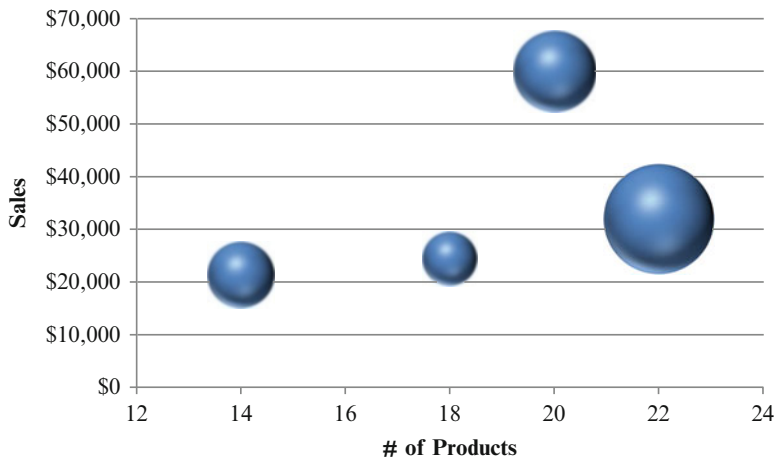
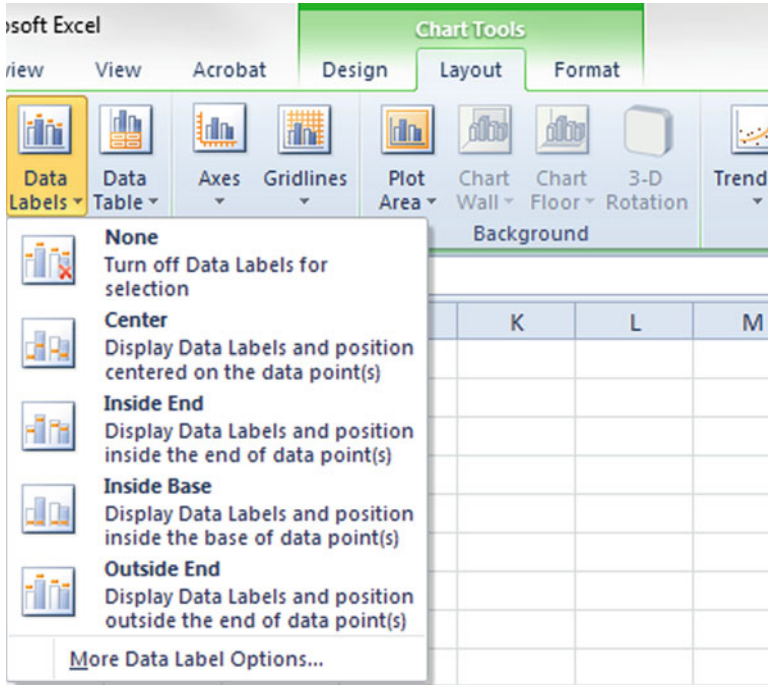


- Choose a **Bubble** chart



- Click anywhere on the chart
- Click the **Layout** tab, under Chart Tools
- Click the **Data Labels** function to add data labels

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The size of the bubbles is in proportion to the percent of the market share that each store holds. The bubble chart is included in this book as an example of the different charts that can be created using Excel; however, this specific chart is difficult to use and may not have many applications.

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Radar Chart

A radar chart plots multivariate data in the form of a two-dimensional chart of three or more quantitative variables represented on axes starting from the same point. It is also known as a spider chart, web chart or star chart. It consists of a sequence of equi-angular spokes, called radii, with each spoke representing one of the variables. The length of a spoke is proportional to the size of the variable for the data point relative to the maximum size of the variable across all data points. A line is drawn connecting the data values for each spoke. This gives the plot a star-like appearance.

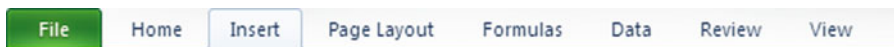
Example Problem

You own a small used car lot and want to do some analysis with car sales and the day of the week that the car was sold.

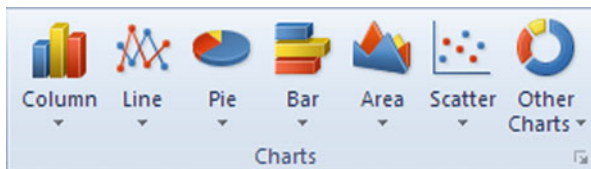
- Enter the text and numbers in columns A and B

	A	B	C
	Days of the week	# of Cars Sold	
1			
2	Mon	10	
3	Tues	22	
4	Wed	40	
5	Thurs	12	
6	Fri	5	
7	Sat	45	
8	Sun	42	
9			

- Select the **Insert** tab

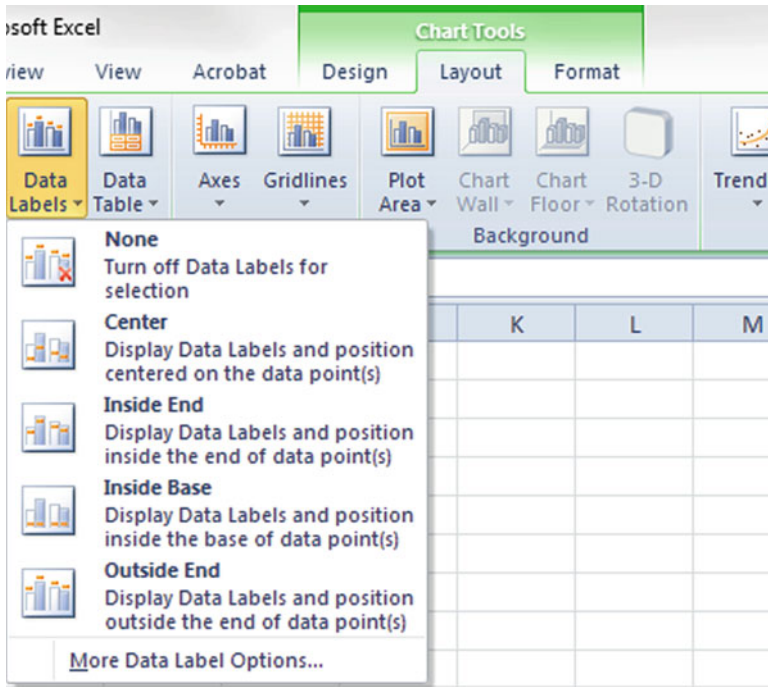


- Select the **Other Charts** chart function

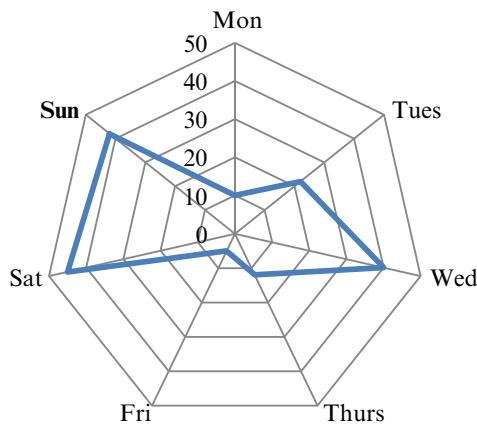


- Choose a **Radar** chart
- Click anywhere on the chart
- Click the **Layout** tab, under Chart Tools
- Click the **Data Labels** function, to add data labels

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of Cars Sold



The intercepts (the point where the blue line intersects the radial black lines) in the radar chart indicate how many cars were sold on that specific day of the week.

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PivotTables (Aka Crosstabs)

PivotTables (as they are known in Excel) or crosstabs allow you to show how two different variables are related to each other in a table format.

Example Problem

Your survey company has been asked to collect data on the importance of name brands to consumers with special attention to the age of the respondents. The consumers in your sample indicate their importance rating using a scale from 1 to 5, with 5 being the highest possible score and 1 being the lowest possible score. Input the following sample data you collected:

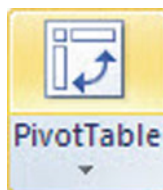
Age	Importance of name brands
18–21	5
18–21	5
18–21	5
18–21	5
18–21	4
18–21	4
18–21	4
18–21	4
18–21	3
18–21	3
18–21	2
18–21	1
22–25	1
22–25	2
22–25	3
22–25	3
22–25	4
22–25	4
22–25	2

To insert a pivot table:

- Click on the **Insert** tab

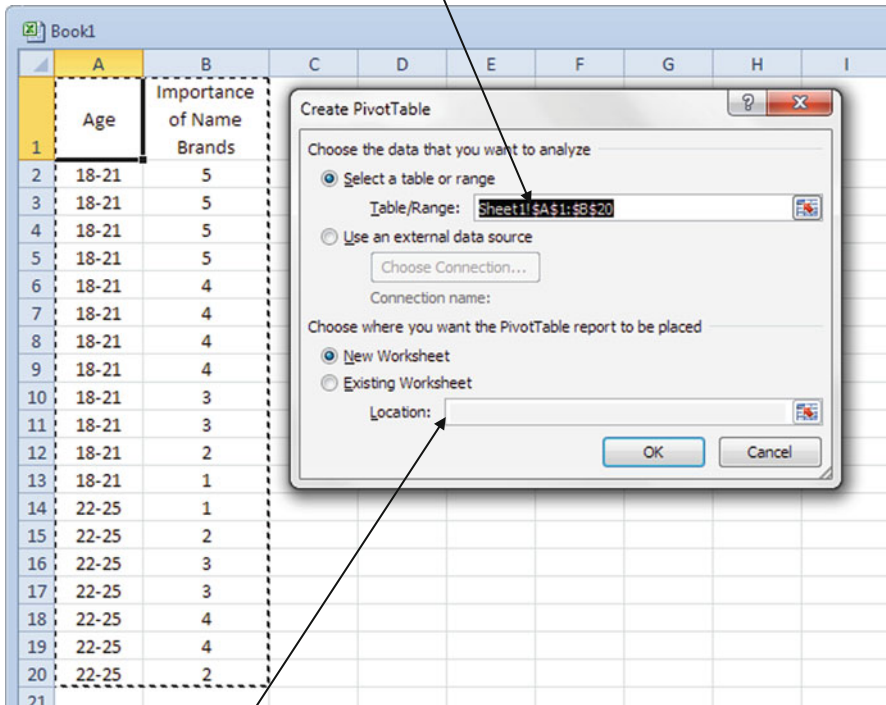


- Select the **PivotTable** function



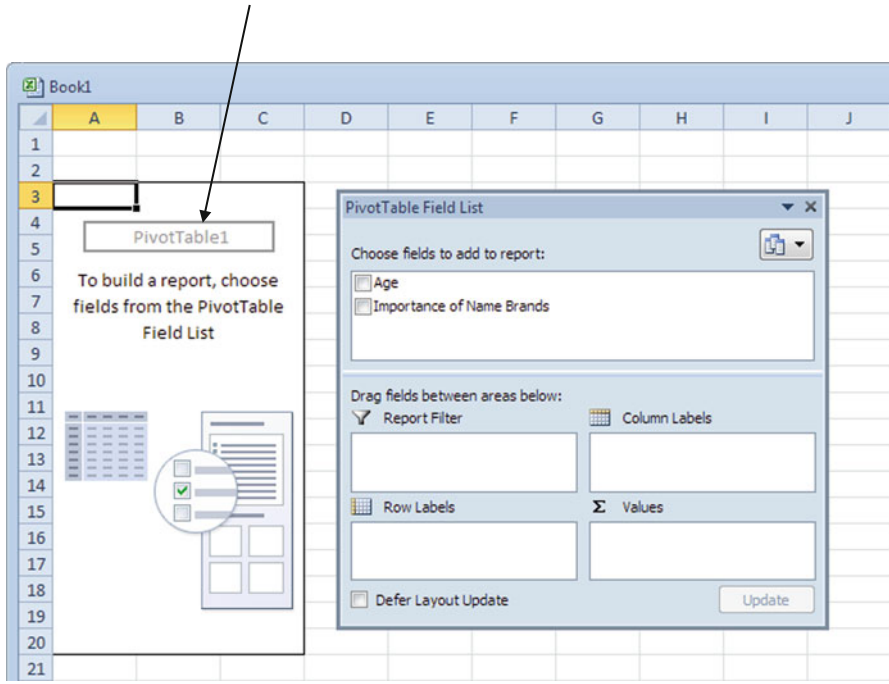
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- Select the appropriate data for **Table/Range**

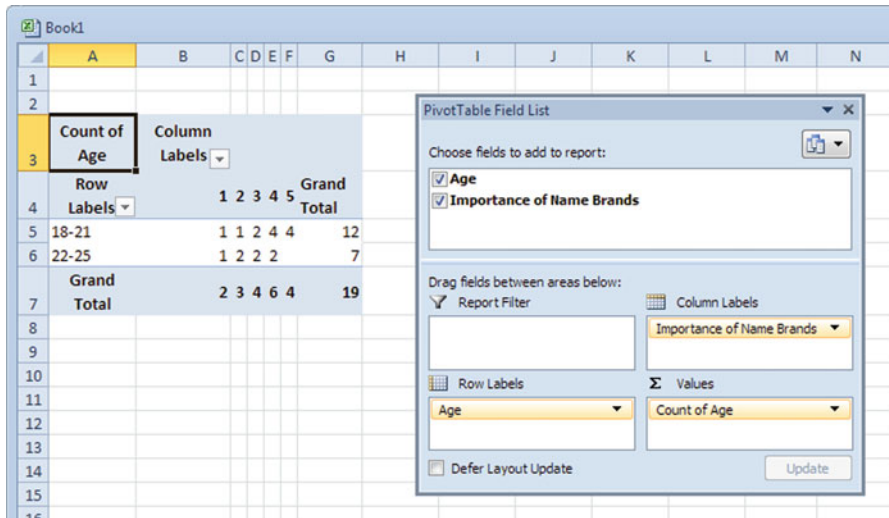


- Choose where you want the PivotTable report to be placed
- Click **OK**
- The PivotTable Field List will appear

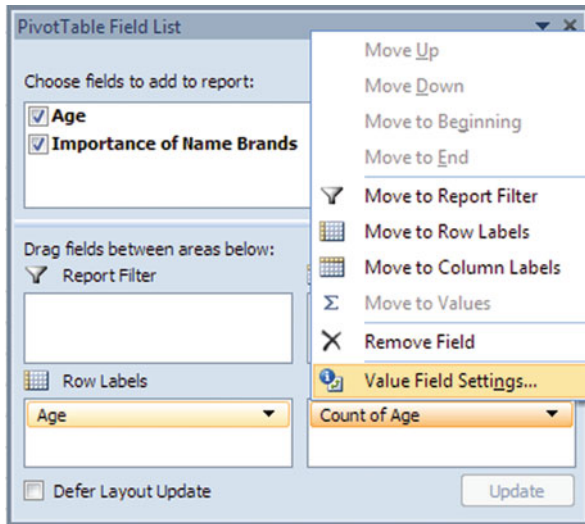
- Click on the **PivotTable1** box



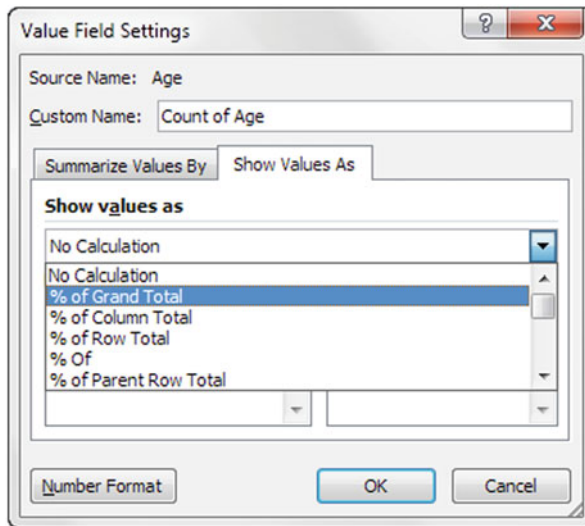
- Set up your table



- Click the **Values Data** or **Value Field Settings** to edit the table with the appropriate data

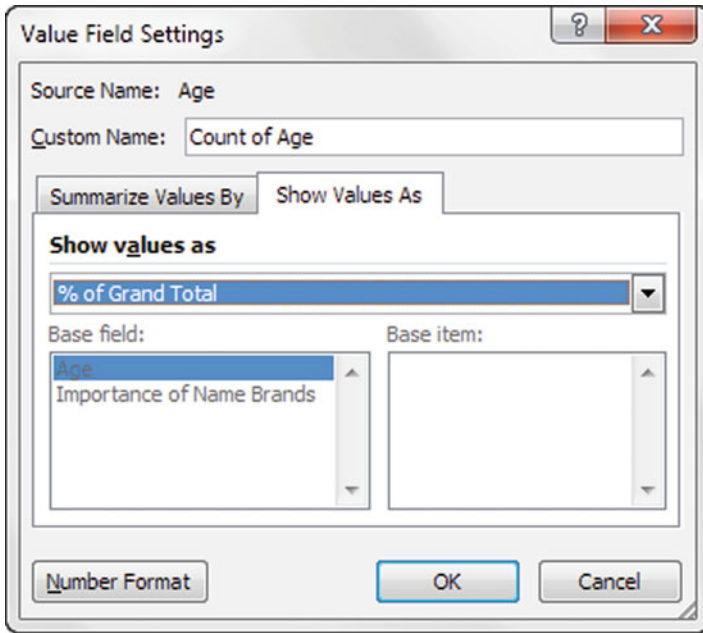


- Click the **Show values as** tab



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- Select the appropriate calculation



- Click **OK**

	A	B	C	D	E	F	G
1							
2							
3	Count of Age	Column Labels					
4	Row Labels	1	2	3	4	5	Grand Total
5	18-21	5.26%	5.26%	10.53%	21.05%	21.05%	63.16%
6	22-25	5.26%	10.53%	10.53%	10.53%	0.00%	36.84%
7	Grand Total	10.53%	15.79%	21.05%	31.58%	21.05%	100.00%
8							

The frequency data for each importance rating value is given within each of the two defined age categories. It seems that the younger age group contains a larger sample, 63 % versus 37 %. The younger age group indicated higher ratings in the 4 and 5 categories of importance. This means younger consumer behaviors may be influenced more by brand names, but we would need much more data to be certain.

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Excel

Common Pitfalls

- ◆ When doing a pivot table, place the variables in the appropriate boxes for Report Filter, Column Labels, Row Labels, and Values. If you just check the variables, they will end up in Row Labels and Values by default.
- ◆ Bubble Charts are difficult to use unless you have 3 interconnected variables. Use caution when deciding to use a bubble chart.
- ◆ Some charts will not display the complete variable labels if the labels are long and exceed a certain character limit. If you want to create a chart that will fit a longer variable label, consider using a Column Chart and sizing the graph so that you can expose more text, or changing the text size.
- ◆ Don't forget to include the "=" sign when you input a formula.
- ◆ Include labels and units for all axes on your charts. By default, Excel will not label your axes.

Final Thoughts and Activities

Practice Problems

1. Prepare a pie chart showing annual sales as a proportion of total sales. There are several options for developing different pie charts from the data.

Region	Annual sales (\$)
North	\$18,000
South	\$52,000
East	\$26,000
West	\$30,000

2. Prepare a bar chart to show the number of mistakes made in a year by employees with different levels of expertise. There are several options for developing different bar charts from the data.

Expertise level	# of mistakes
Novice	36
Apprentice	20
Tradesmen	9
Master tradesman	3

3. Prepare a line chart to show dollars spent on Valentine’s Day flowers over time.

Year	Sale of Valentine’s Day flowers
2011	\$15,730
2010	\$14,160
2009	\$14,750
2008	\$17,200
2007	\$16,890

Discussion Boards

1. Bubble charts and Radar charts are helpful in displaying data. Why are they not more common?
2. Pie charts can be a powerful tool for managers to use on a daily basis but can be easily misused. Explain.

Group Activity

Applied statistical research is an important support activity for the marketing department. There are consulting companies that provide this type of data. What types of statistical analysis do these companies advertise on their websites. What are the challenges in getting managers to accept this data?

Parting Thought

Facts are stubborn things, but statistics are more pliable.

Problem Solutions

1. Prepare a pie chart showing annual sales as a proportion of total sales.

Region	Annual sales (\$)
North	\$18,000
South	\$52,000
East	\$26,000
West	\$30,000

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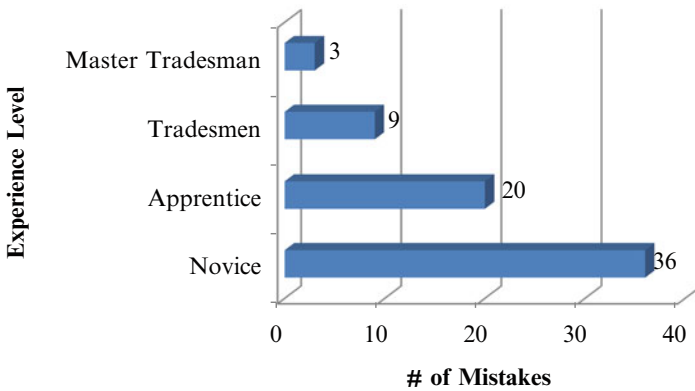
Answer:



2. Prepare a bar chart to show the number of mistakes made in a year by employees with different levels of expertise

Expertise level	# of mistakes
Novice	36
Apprentice	20
Tradesmen	9
Master tradesman	3

Answer:

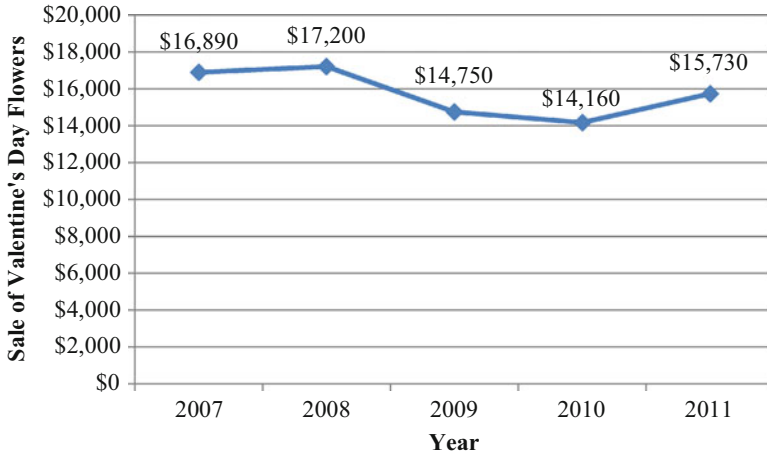


3. Prepare a line chart to show dollars spent on Valentine’s Day flowers over time.

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Answer:



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