Spreadsheet Concepts: Creating Charts in Microsoft Excel

Objectives:

Upon successful completion of Lab 6, you will be able to

- Create a simple chart on a separate chart sheet and embed it in the worksheet
- Create a pie chart using one series of data
- Understand the difference between plotting series by rows and by columns
- Identify and format chart elements including series, legend, titles, and chart area
- Add and delete a series from a chart
- Understand the linked relationship between the data and the chart
- Understand that some chart types are more appropriate for some types of data

Resources required:

- A computer running Microsoft Excel 2010 for Windows or Microsoft Excel 2008 for Mac

Starter files:

- None

Prerequisite skills:

- General keyboarding skills
- Comfortable editing an Excel worksheet or another electronic spreadsheet application
- Ability to find files using Windows File Explorer, Mac Finder or a file search feature
- Ability to open and save a file in a Windows or Mac application

NRC's Top Ten Skills, Concepts, and Capabilities:

- Skills
    Use a spreadsheet to model a simple process—household budget expenses
    - Create simple charts including line, bar, column, and pie
    - Identify and format chart elements
- Concepts
    Modeling and abstraction
- Capabilities
    Engage in sustained reasoning
    Think abstractly about Information Technology—building generic electronic spreadsheet concepts
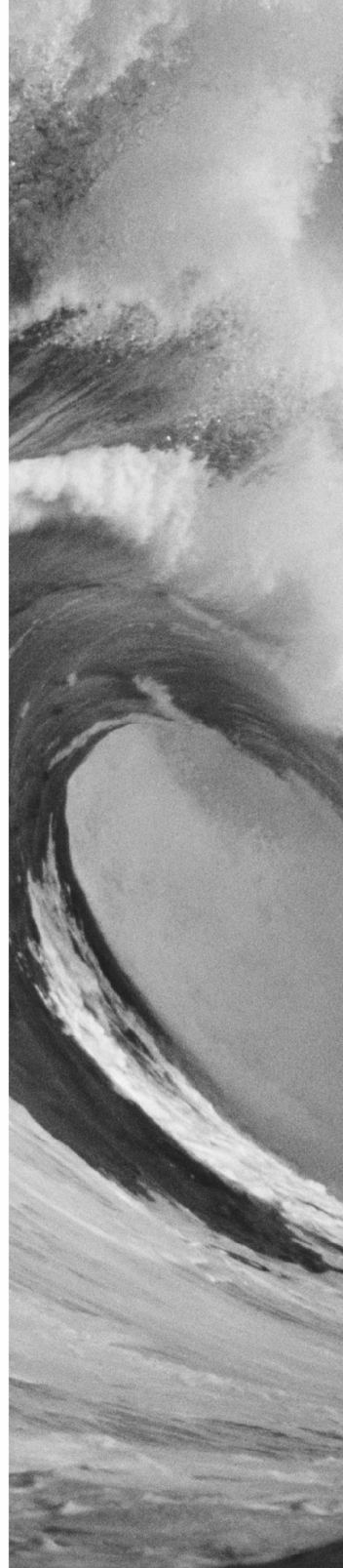
	A	B	C	D	E
1	Stock Performance				
2	Highest Trading price/share				
3					
4		April	May	June	
5	Resort Hotels	35.5	37.9	42.6	
6	Sporty Autos	54	53.5	56	
7	Toys for You	21	17	14	
8	Furniture Manufacturir	29	31	32	
9					

Figure 6.1 *Excel chart data.*

Lab Lesson

Frequently we find ourselves using data in some sort of table form and would like to "see" how the data changes overall. In this case, a chart can make all the difference in how the data is presented. There is a wide variety of charts available and some are more suited to different types of data than others, but they all add a terrific visual effect to any presentation material!

Creating a Simple Column Chart

In order to create a chart, we must start with an active sheet containing data.

► **Open a new workbook, activate the first sheet and enter the data shown in Figure 6.1. Formatting such as bold and alignment is not important.**

► **Save the file as stock.xlsx.**

Remember to save your file periodically as you work through this lab. When you save a file, all sheets, including the chart sheet, will be saved in the Excel workbook file.

For our first chart, we will create a column chart, which will be placed on a separate worksheet in the workbook.

► **Select the range A4:D8 by dragging through it to select it. It saves time if you include a row of titles and a column of titles when selecting the range for charting before selecting the chart type.**

► **In Windows, click the Insert menu option to display the Charts options in the ribbon as shown in Figure 6.2a In Mac OS X, click the Charts tab to display the Charts gallery as shown in Figure 6.2b.**

There is a wide variety of chart types to choose from. As we will see, once we have defined all of the appropriate ranges and titles, changing the chart type is as easy as selecting a new type from this screen. For now, let's create a basic column chart. The major chart types appear in the Ribbon toolbar.
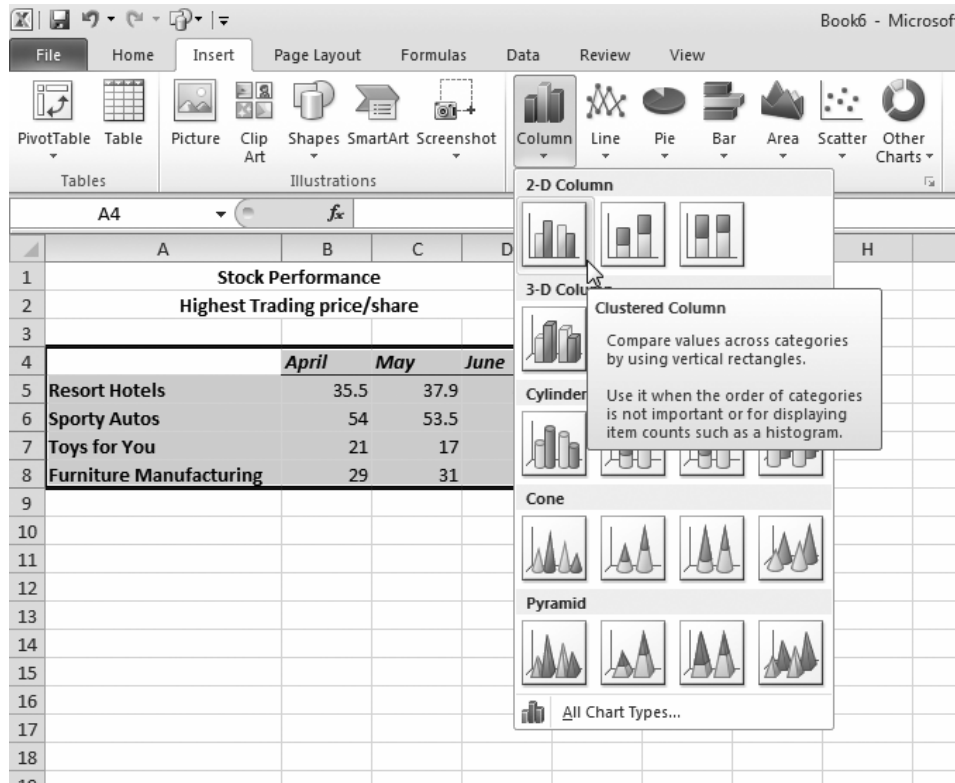
Figure 6.2a   *Windows Excel 2007 Column chart gallery.*

Let's create a 2-D Column chart.

> ► In Windows, click the Column button as shown in Figure 6.2a.
> ► Click the 2-D Clustered Column button as shown in Figures 6.2a and 6.2b.

The chart will be created and placed in the worksheet as shown in Figure 6.3.

You can move and size the chart.

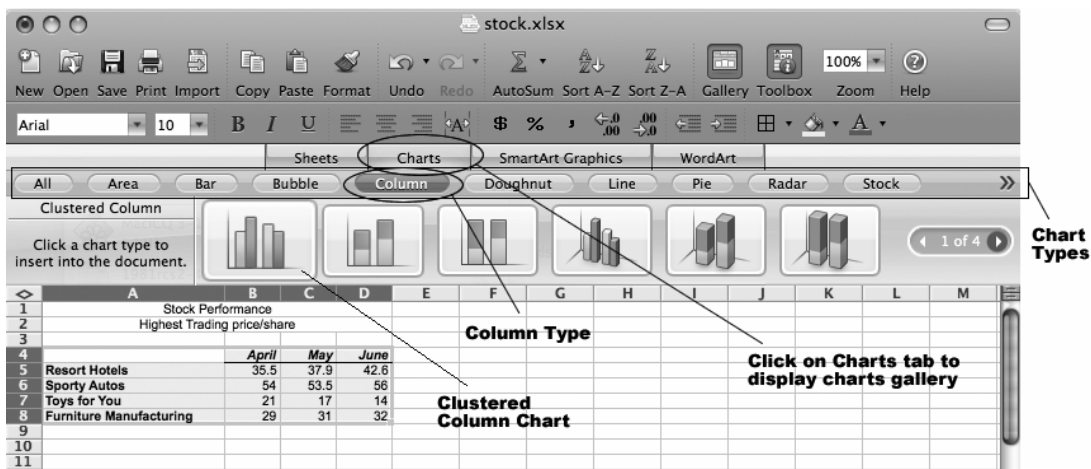> ► Position the mouse pointer in an empty part of the chart and drag the chart to a location where it is not covering the data.

Figure 6.2b   *Mac Excel 2008 Column chart gallery.*
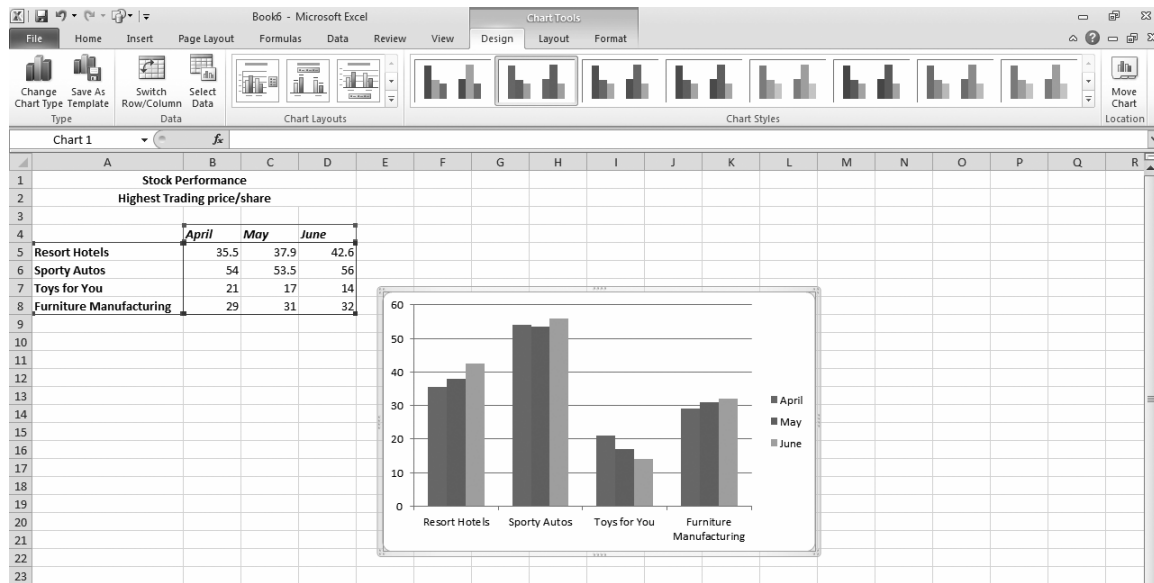
Figure 6.3 *Excel 2-D Chart embedded in the worksheet.*

► Position the mouse pointer on the sizing handles (indicated by three dots) on the chart edges or corners until it changes to a double arrow.

► Drag the mouse pointer to enlarge or shrink the chart slightly.

Notice that the columns are grouped by stock and each month value is represented by a different color. Sometimes it's useful to switch the grouping. The current chart is plotted by column (months) such that each column of data is a different color.

Suppose we wish to plot the chart such that each stock is a different color. We can do this by switching the row and column data.

► Click the **Switch Row/Column** button (PC) or Row button (Mac) as shown in Figures 6.4a and 6.4b.

For this data, it makes more sense to plot the months in series as we had originally.

► Click the **Switch Row/Column** button (PC) or **Column** button (Mac) to plot the chart with the months in series.

We can change the colors and styles of the columns using the Chart Styles gallery. Let's select a different style.
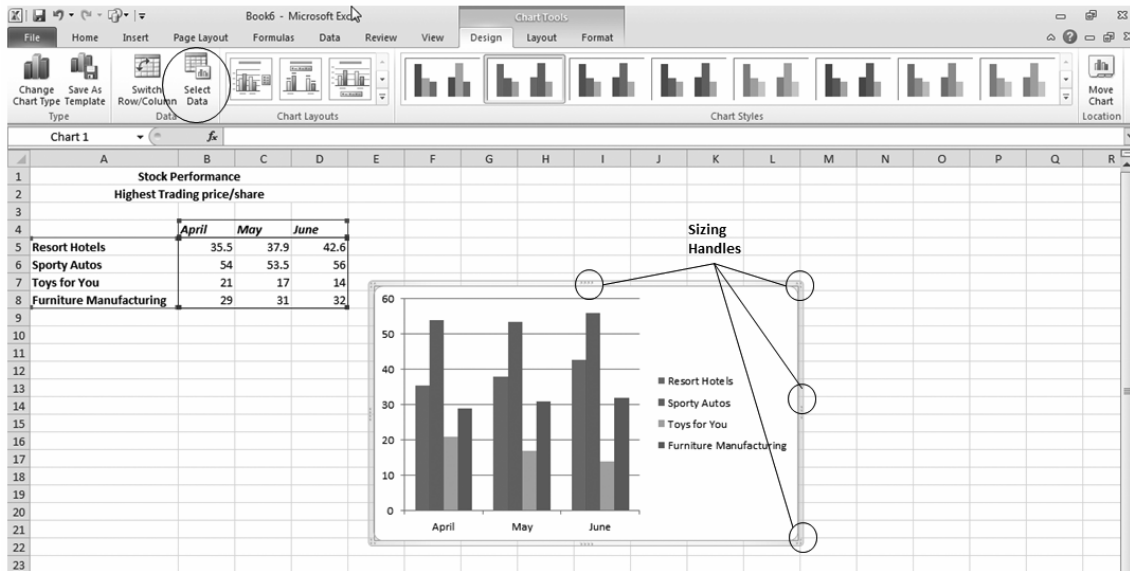
Figure 6.4a   *Windows Excel 2007 Chart after Switch Row/Column.*

► Click the **Scroll up** and **Scroll down** buttons in the Chart Styles as shown in Figures 6.5a and 6.5b.

► Click one of the styles to apply it to the chart as shown in Figures 6.5a and 6.5b.

Let's add some titles and other features to the chart.

In Windows:

► Click the **Layout** tab and click the **Chart Title** button as shown in Figure 6.6a.

► Click the option **Above Chart** as shown in Figure 6.6. The Chart Title will appear and the chart will be resized.

► Drag through the Chart Title and type: Stock Performance. This is shown in Figure 6.6.

In Mac OS X:

► Click the drop-down **Title** on the Formatting Palette to select **Chart Title**.

► In the text box below type: Stock Performance

This is shown in Figure 6.6b.
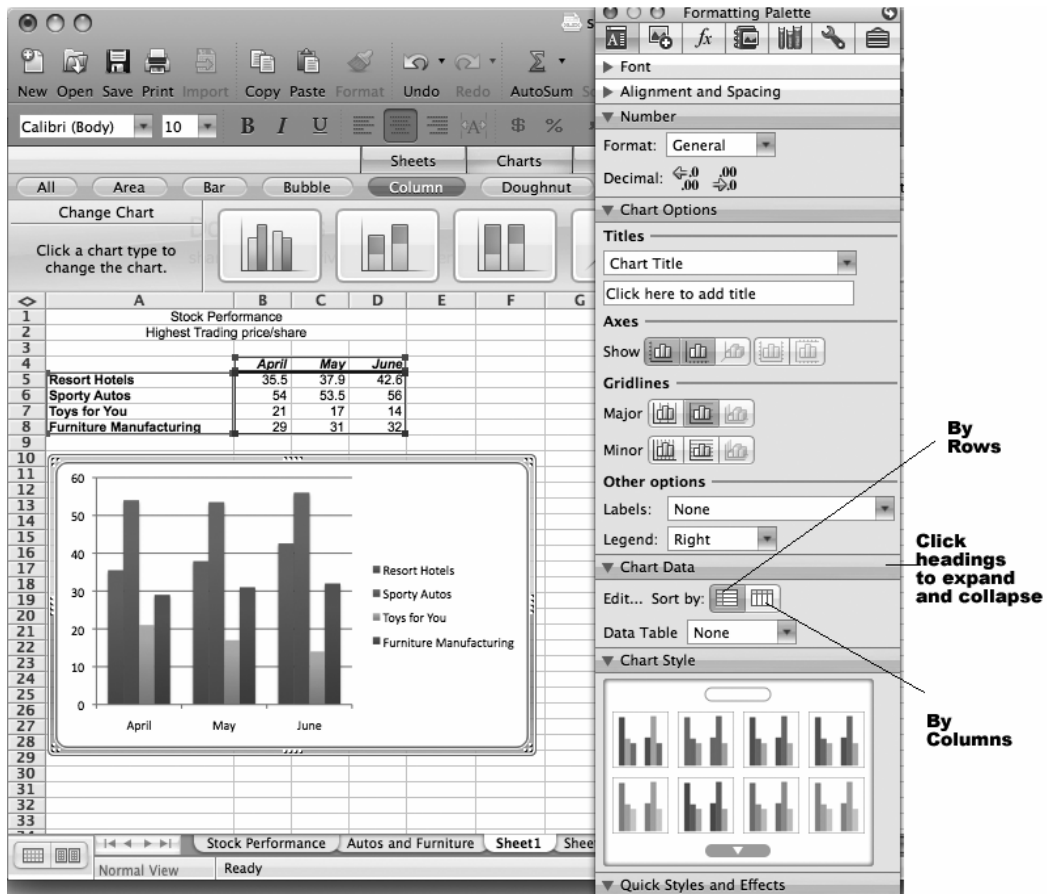
Figure 6.4b *Mac Excel 2008 Chart after Switch Row/Column.*

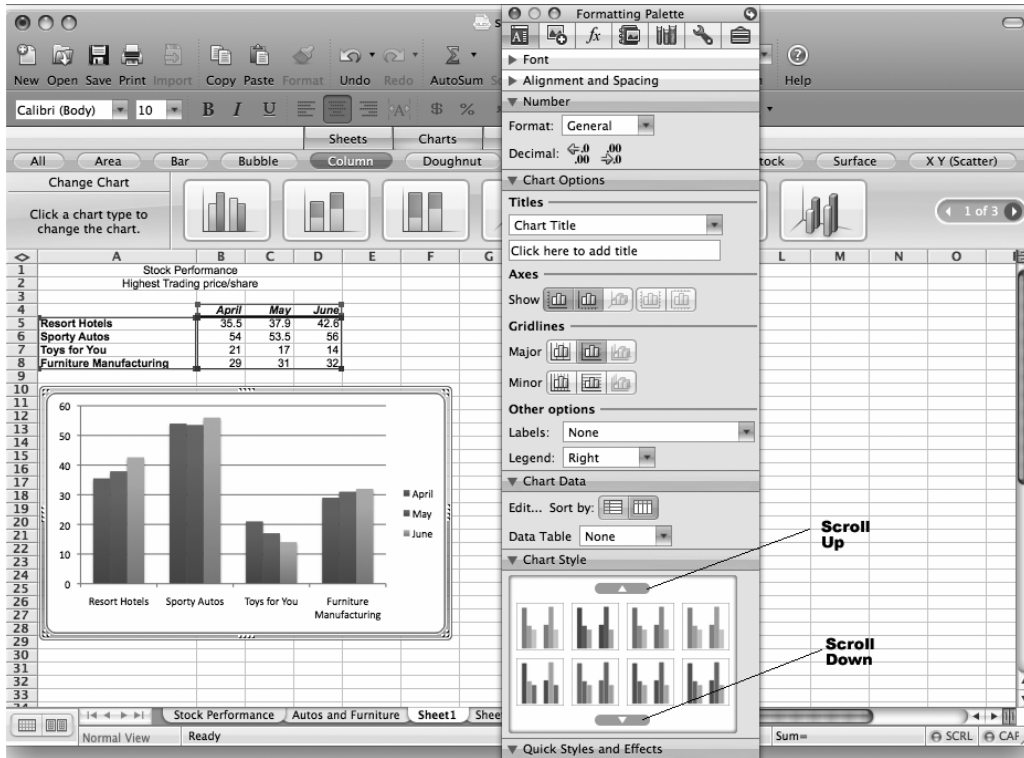**Figure 6.5a** *Windows Excel 2007 Chart and Chart Styles.*

Figure 6.5b   *Mac Excel 2008 Chart and Chart Styles.*
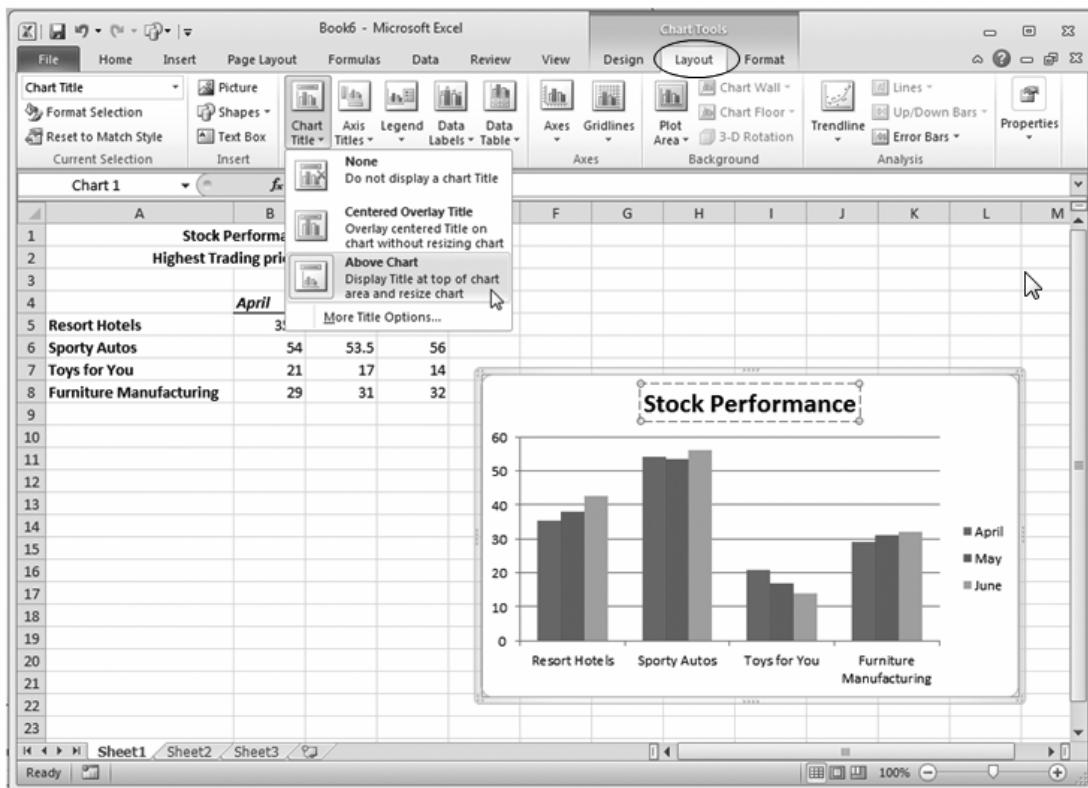

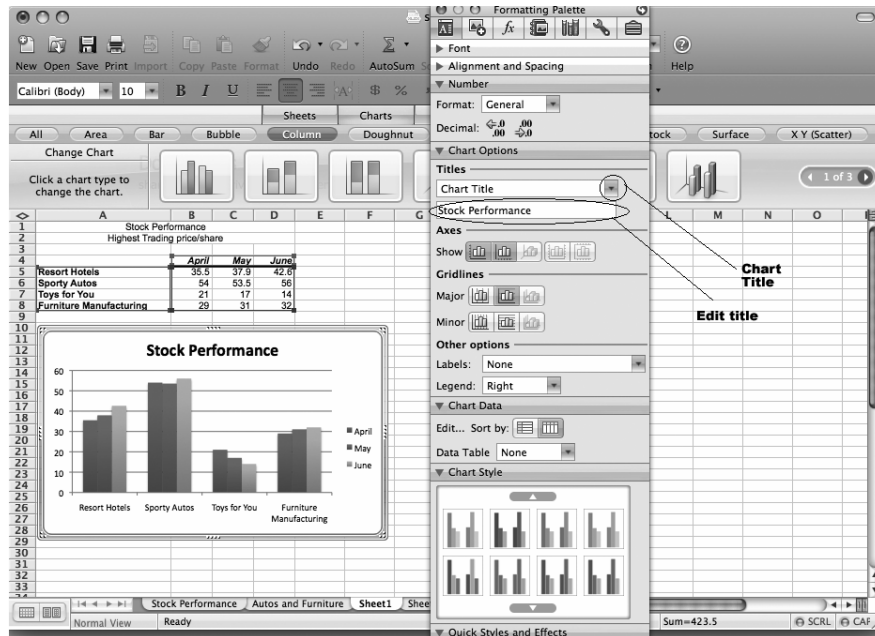**Figure 6.6a**   *Windows Excel 2007 Layout options with Chart Title selection.*

Figure 6.6b *Mac Excel 2008 Layout options with Chart Title selection.*

Let's add a title at the bottom of the chart to identify the names as stocks.

In Windows:

> ► Click the **Axis Titles** button as shown in Figure 6.7a.
> ► Click the option, **Primary Horizontal Axis Title**.
> ► Click the option **Title Below Axis** as shown in Figure 6.7a.

The x-axis Chart Title will appear and the chart will be resized.

> ► Drag through the x-axis title and type: Stock. This is shown in Figure 6.7a.

In Mac OS X:

> ► Click the drop-down **Title** on the Formatting Palette to select **Horizontal (Category) Axis**.
> ► In the text box below type: Stock

This is shown in Figure 6.7b.

Let's reposition the legend, moving it to the bottom, below the chart.

> ► In Windows, click the **Legend** button, and click the option **Show Legend at Bottom** as shown in Figure 6.8a.
> ► In Mac OS X, click the **Legend position drop-down** and select the option **Bottom** as shown in Figure 6.8b.
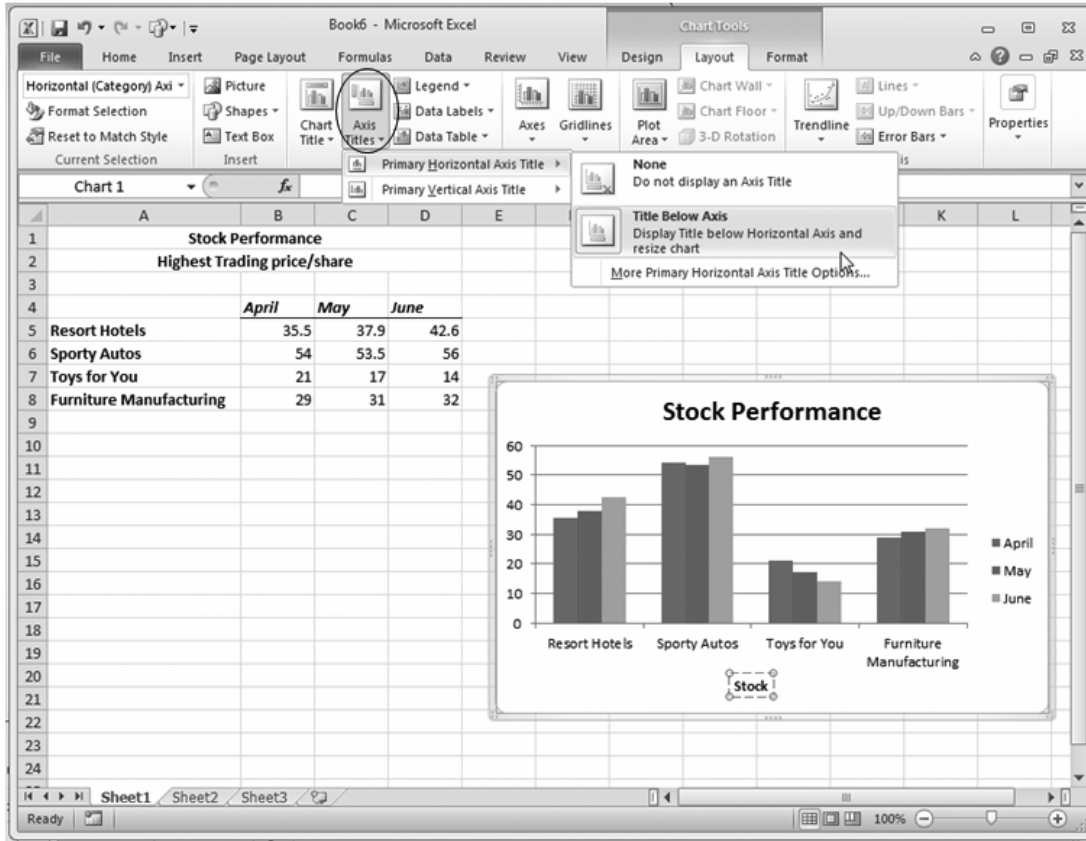
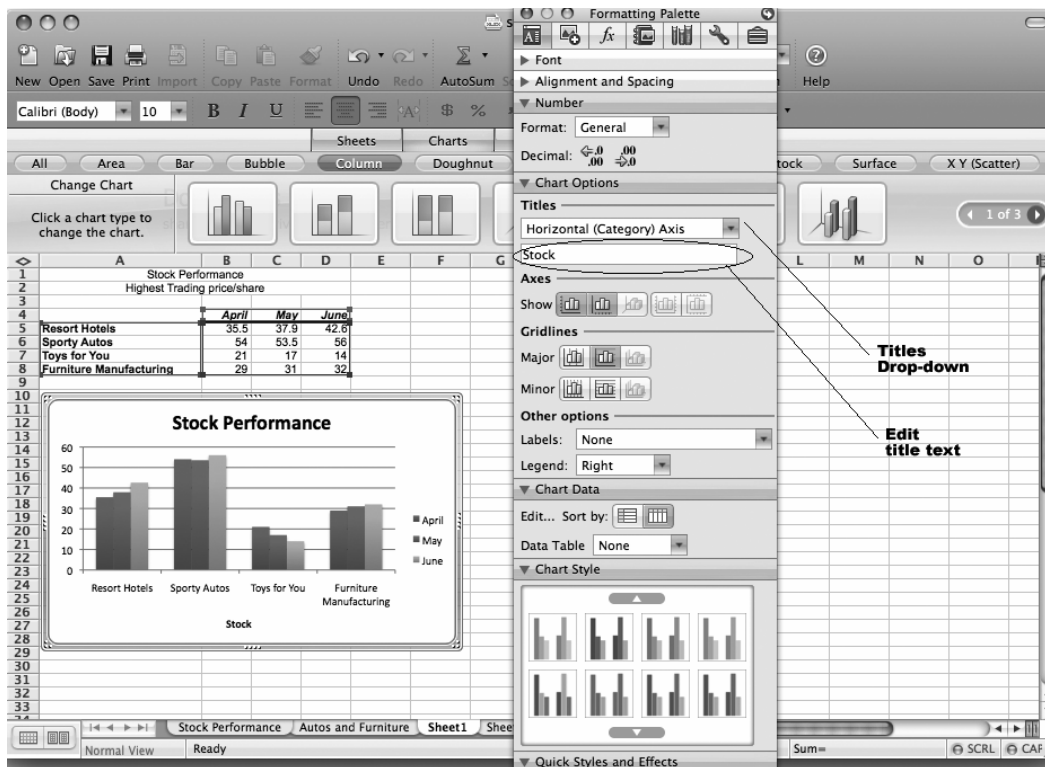**Figure 6.7a** *Windows Excel 2007 Chart with horizontal axis title.*

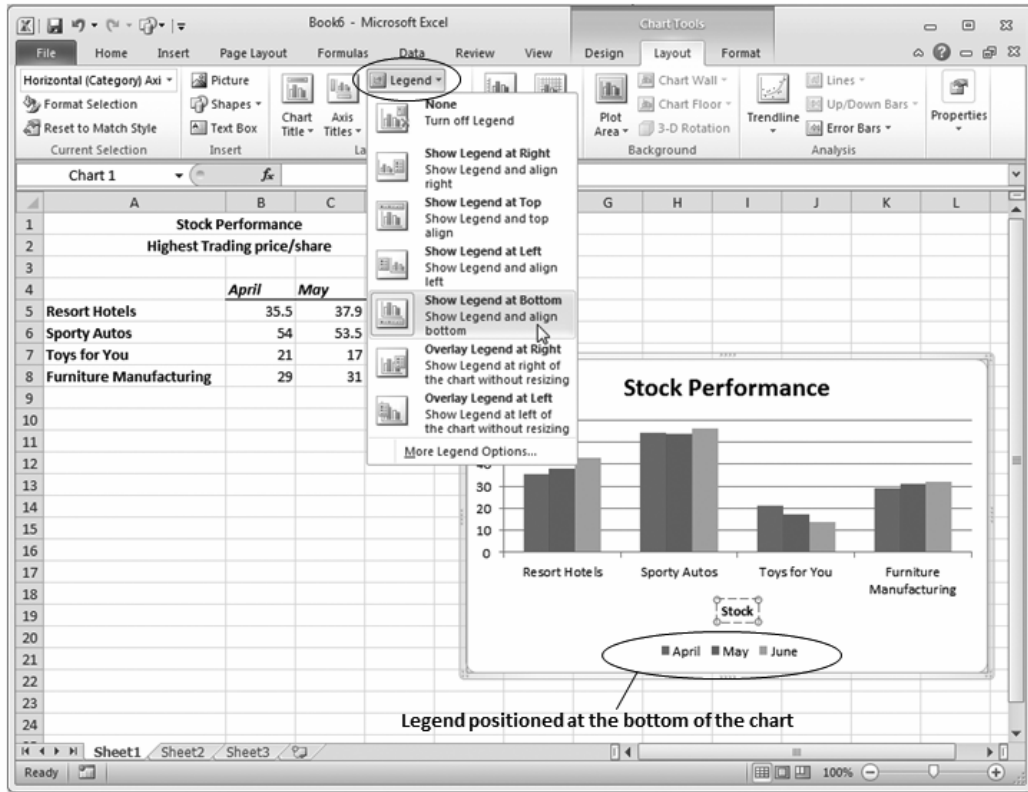**Figure 6.7b** *Mac Excel 2008 Chart with horizontal axis title.*

Figure 6.8a *Windows Excel 2007 Chart with legend positioned at the bottom.*
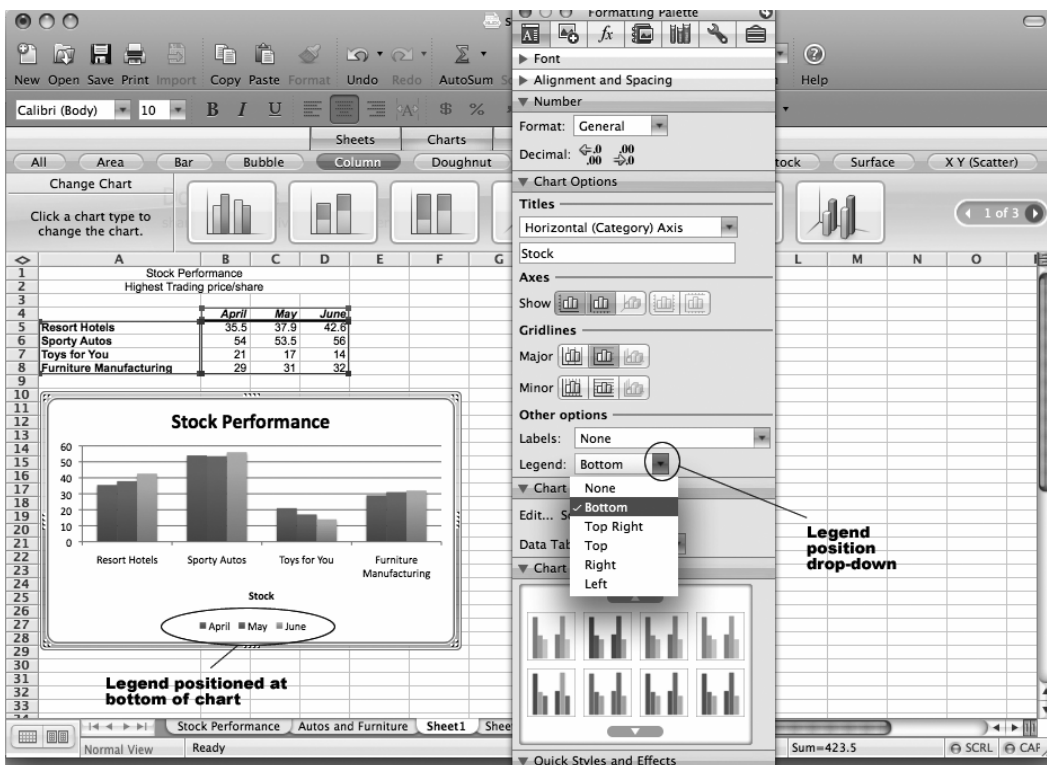

Figure 6.8b *Mac Excel 2008 Chart with legend positioned at the bottom.*

Notice that the legend is now positioned below the chart.

Let's change the location of the chart to place it on its own sheet.

▶ In Windows, click the **Design** tab and click the **Move Chart Location** button as shown in Figure 6.9a.

▶ In Windows, click the menu options **Chart**, **Move Chart** as shown in Figure 6.9b.

The **Chart Location** dialog box will appear as shown in Figures 6.9a and 6.9b.

▶ Click the **New Sheet** button, as shown in Figures 6.9a and 6.9b.

▶ Click the **OK** button.

The chart will appear on a separate sheet in the workbook called Chart1, as shown in Figure 6.10.

Since the chart is stored on a sheet, let's change the name of the sheet to reflect its contents.

▶ Move the mouse pointer to the **Chart1** tab and double-click.

▶ Press the **Delete** key to erase the current name of the sheet.

▶ Type: Stock Performance

▶ Press the **Enter** key to enter the name in the **Chart** tab.

▶ Click once on an empty part of the chart to activate the chart.

There are many parts of a chart. To determine the name of a particular part of the chart, position your mouse pointer on top of the part you wish to identify, and rest the mouse pointer for a moment. The chart item will appear in a pop-up label.
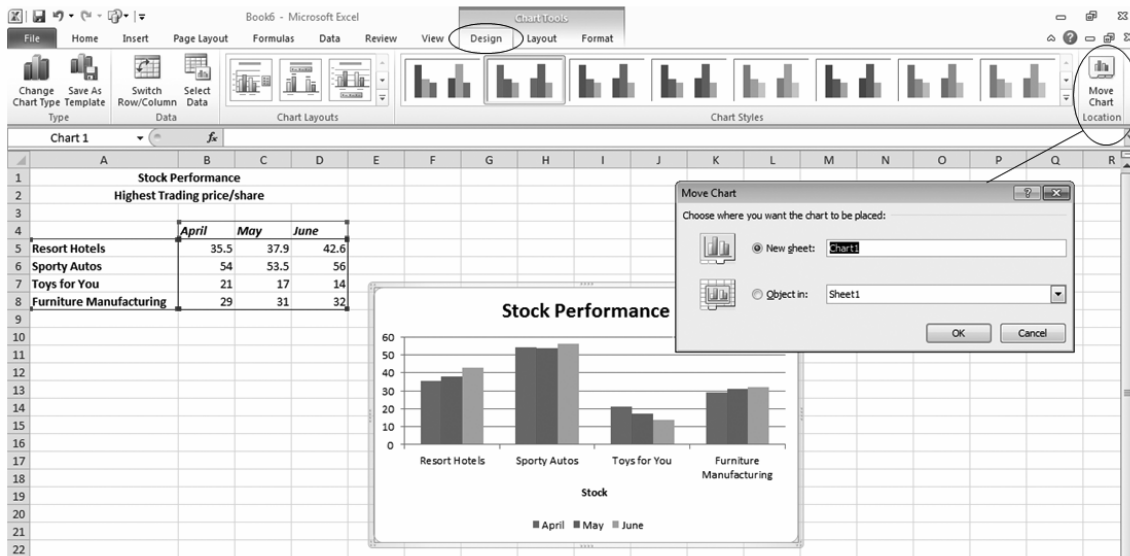

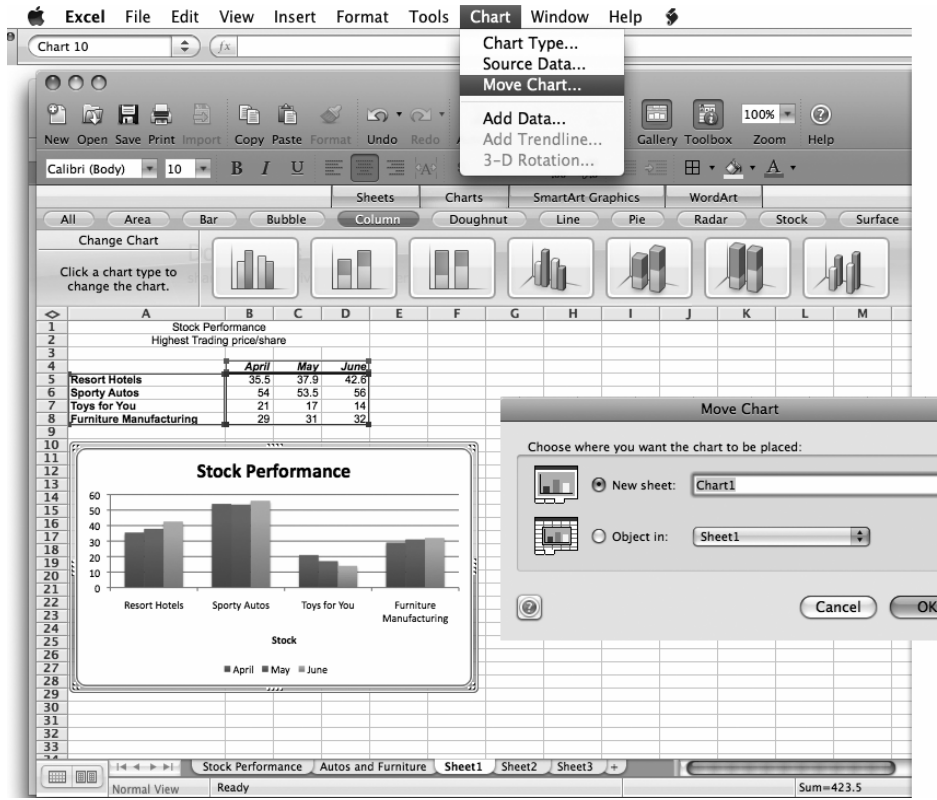**Figure 6.9a**   *Windows Excel 2007 Chart Location button and dialog box.*

Figure 6.9b *Mac Excel 2008 Chart Location button and dialog box.*
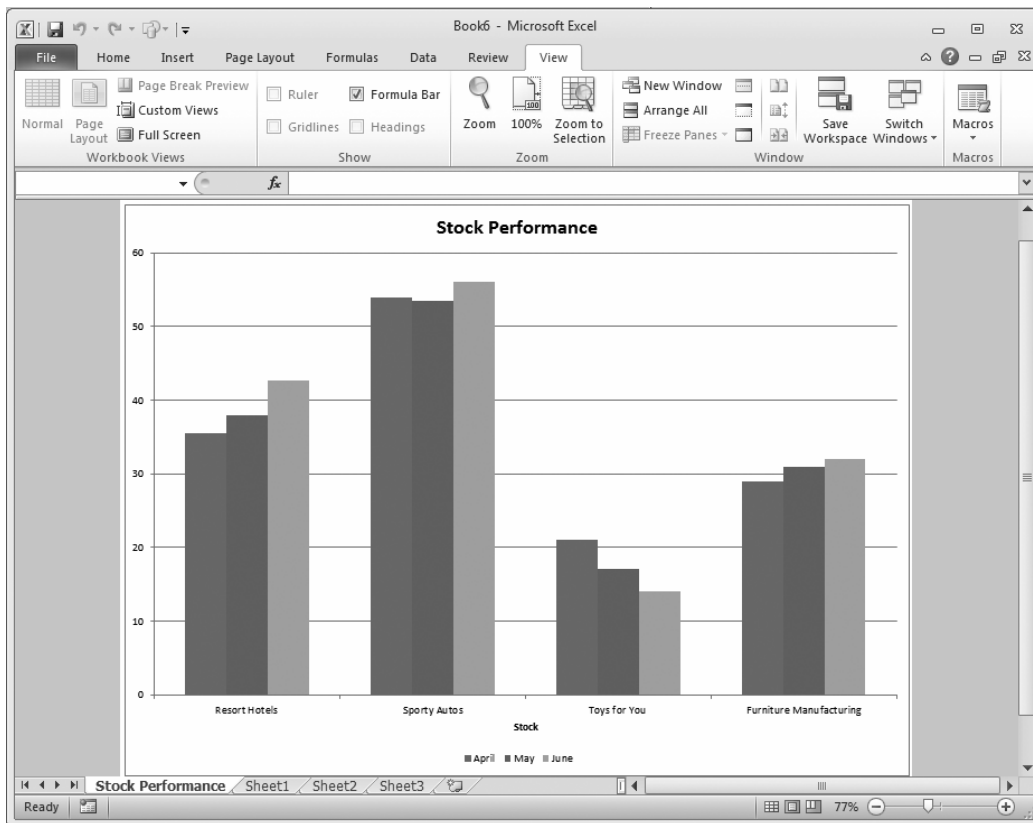

Figure 6.10 *Excel completed column chart.*

Charts are linked to the table of data in the worksheet, by default.

 ► Click the **Sheet 1** tab and change the figure for Resort Hotels for April, to 100.
 ► Click the **Stock Performance** tab and observe how the chart has changed.
 ► Click the **Sheet1** tab and return the figure for Resort Hotels for April, to 35.5.

When the numbers in the table change, the charts that were created from the data also change.

Changing the Chart Type

Let's change the chart type.

 ► Click the **Stock Performance tab** at the bottom of the Excel window to activate the Chart sheet.
 ► In Windows, click the **Design** tab and click the **Change Chart Type** button to reveal the chart types gallery as shown in Figure 6.11a.
 ► In Mac OS X, notice that the chart types are displayed in the gallery as shown in Figure 6.11b.

Once chart settings have been created, changing the chart type is only a few clicks away. Experiment a little here!

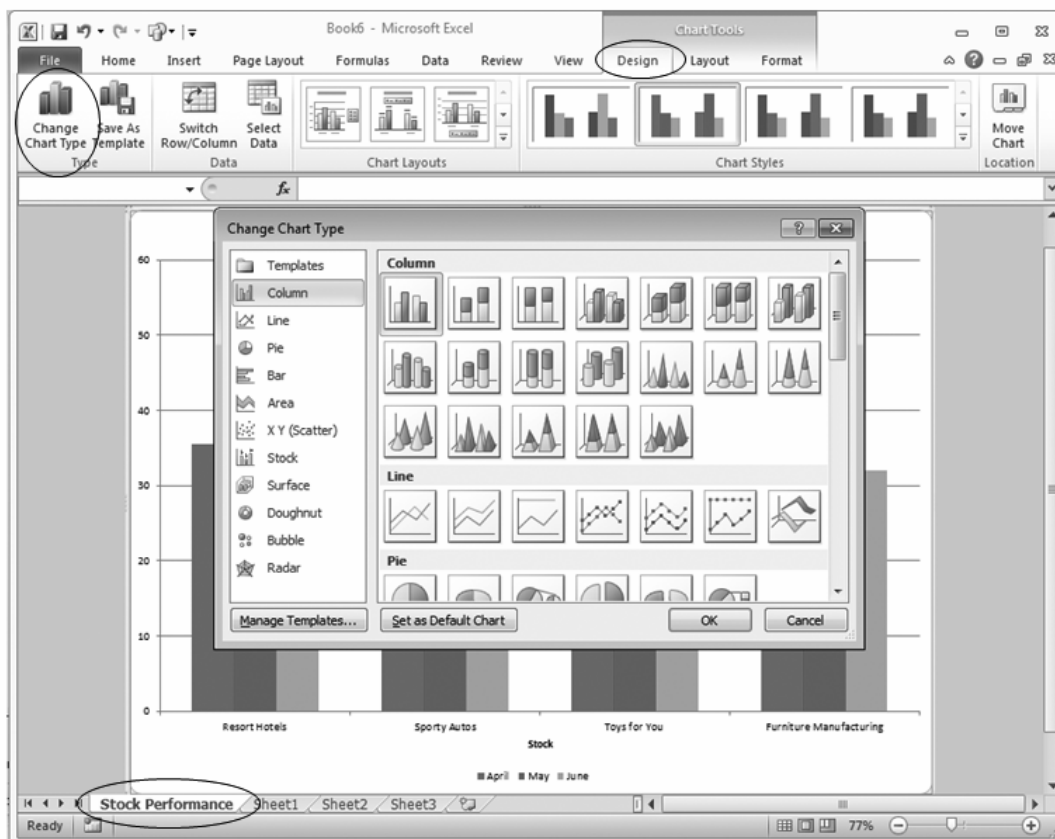 ► Click one of the **Chart Type** buttons and click the **OK** button (PC) to see how the look of your chart changes.

Figure 6.11a *Windows Excel 2007 Change Chart Type gallery.*
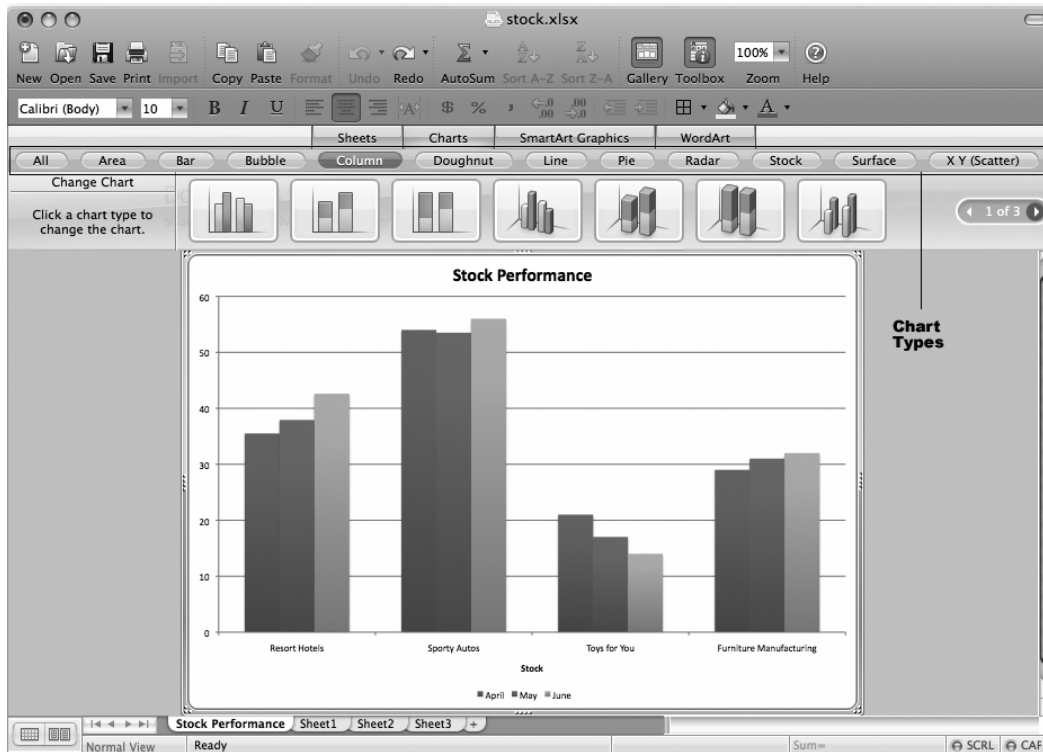
Figure 6.11b *Mac Excel 2008 Chart Type gallery.*

Notice that the same data ranges and chart titles are used when creating different chart types. Also, note that not all chart types are suitable for the current data ranges selected. As we will see later, the pie charts require only one data range.

> ▶ Use the **Change Chart Type** button (PC) or select the **Column Chart** type from the gallery (Mac) to select the chart type as we had displayed originally.

Selecting Nonadjacent Series

Let's create another chart in which we will choose nonadjacent blocks of data. We will still need to specify the block of data that contains the labels.

> ▶ Click on the **Sheet 1** tab to display the values.
> ▶ Select the range A4:D4 by dragging through it.

We have included a blank cell (A4) in this range because Excel expects that the x-axis series will begin with a blank cell. If this cell is not included, then this row will be interpreted as a series and the chart will not look as expected.

> ▶ Press and hold the **Ctrl** key (PC) or **command** key (Mac) while you drag through the range A6:D6. Release the **mouse** button first, and then release the **Ctrl** key (PC) or **command** key (Mac). The selected range is shown in Figure 6.12.
> ▶ Press and hold the **Ctrl** key (PC) or **command** key (Mac) while you drag through the range A8:D8. Release the **mouse** button first, and then release the **Ctrl** key (PC) or **command** key (Mac). The selected range is shown in Figure 6.12.

Figure 6.12   *Excel nonadjacent ranges selected.*

You should notice that three ranges have been selected. Now we are ready to create a chart.

► In Windows, press the **F11 function** key to use the shortcut key combination to create a default chart on a separate sheet.

► In Mac OS X, click the **Clustered Column Chart** type in the gallery and change the location to a new sheet using the menu options **Chart**, **Move Chart**.

Excel created the chart based on the nonadjacent ranges selected. The chart should be displayed on a separate sheet, Chart2.

► Double-click on the **chart sheet** tab and rename it: Autos and Furniture

► Press the **Enter** key to complete the sheet name.

Simple Chart Modifications

Now is a perfect time to discuss some simple chart modifications. Let's make some changes to this new Autos and Furniture chart. First, let's change the type of chart.

► Click an empty area on the chart to select the chart.

Adding Data Labels

Sometimes charts are difficult to read, and it may be important to know the exact value for each data point. Let's add some data labels.

► In Windows, click the **Layout** tab, click the **Data Labels** button, and click the **Outside End** menu option as shown in Figure 6.13a.

► In Mac OS X, click the **Labels drop-down** and select **Value** as indicated in Figure 6.13b.

Data labels will appear above the bars in a column chart, near the points on a line chart, or around the pieces of pie in a pie chart. That is, data labels usually appear close to the plotted points on a chart.
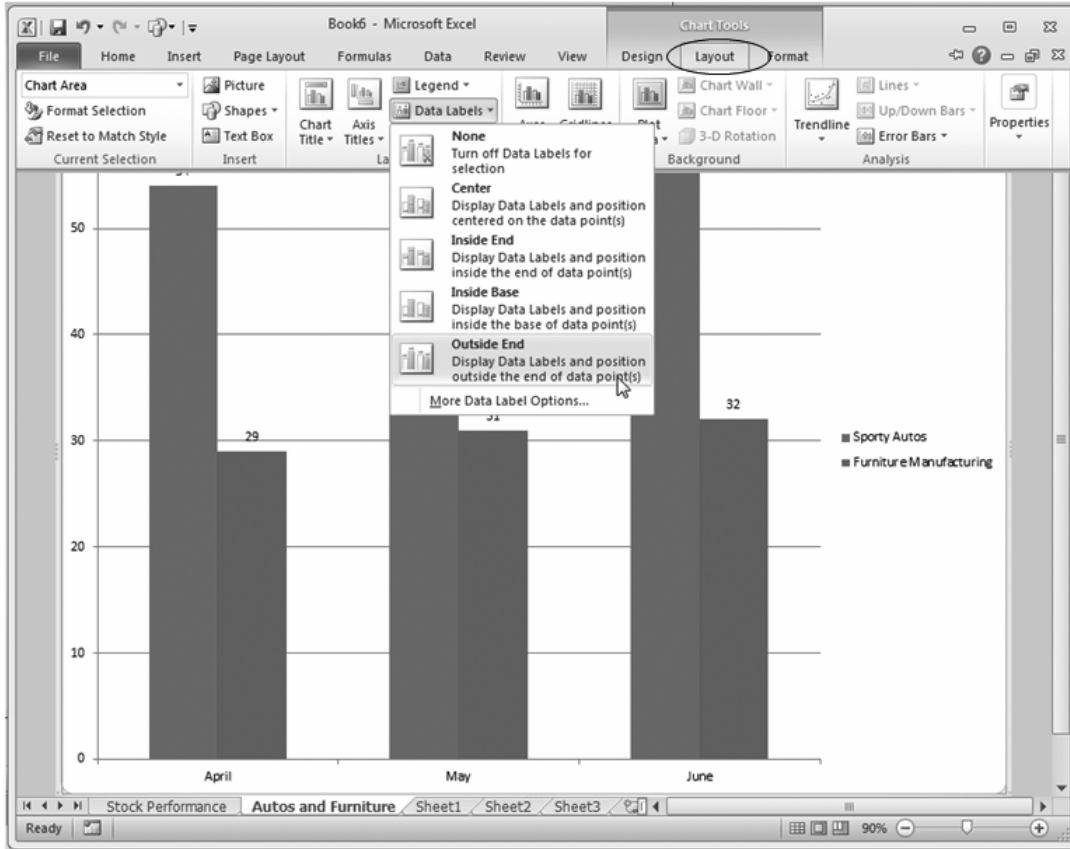
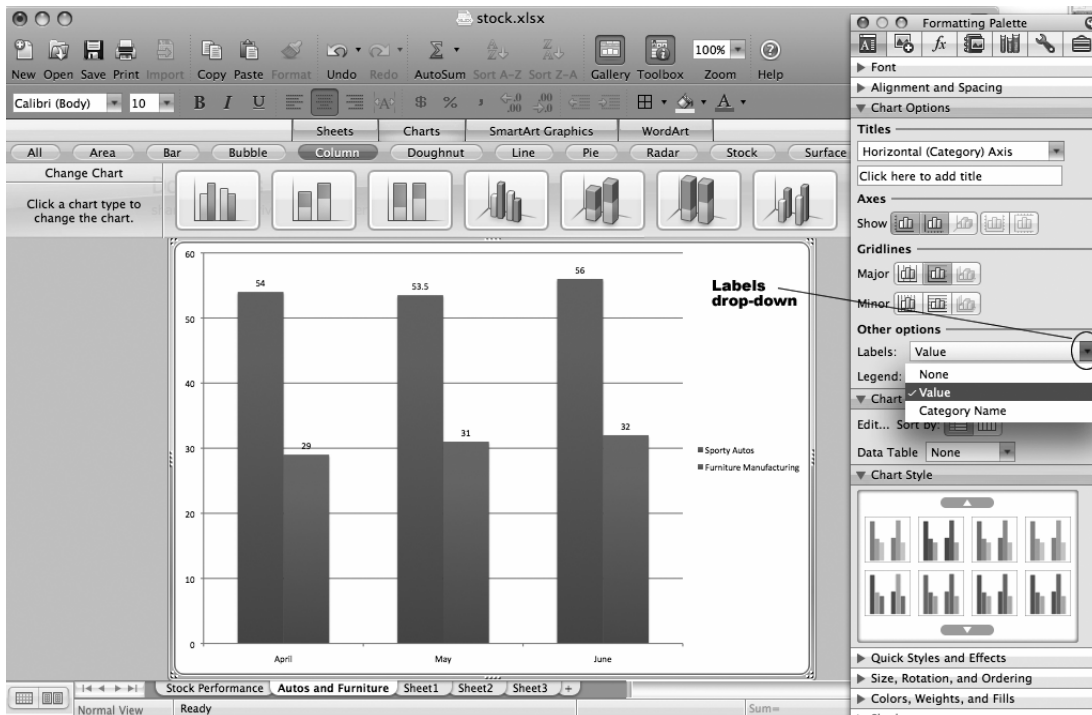**Figure 6.13a** *Windows Excel 2007 Chart Options dialog box showing Data Labels tab.*

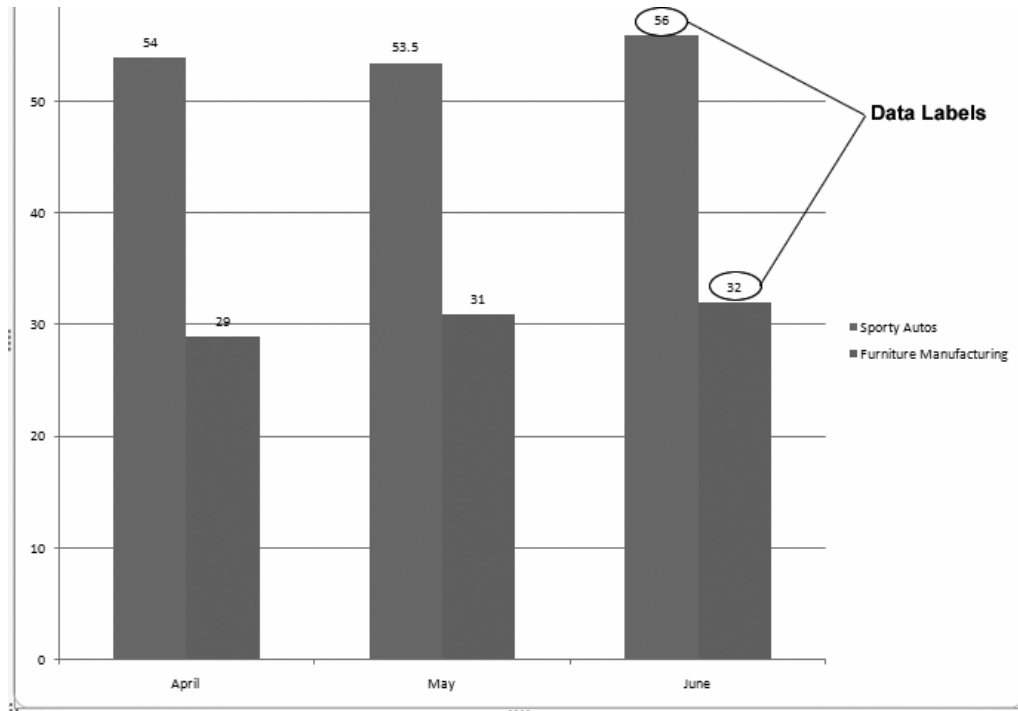**Figure 6.13b** *Mac Excel 2008 Chart Labels Options.*

Figure 6.14   *Excel column chart with data labels.*

In the column chart, we selected the Outside End position for the data labels (PC) and they appear above the columns as shown in Figure 6.14.

Formatting Chart Elements

Although we are focusing on a column chart, the skills outlined here can also be used for any other chart type. Let's look at the various elements in this column chart and use the formatting option to customize the chart. The Design, Layout, and Formatting options will show tools in the Ribbon toolbar that are applicable to the type of chart currently selected.

The chart area is the blank area that surrounds the chart. We can specify the color and other aspects.

> ► Click in the large empty area to activate the Chart Area as shown in Figure 6.15.
> ► In Windows, click the **Format** tab, and click in the **Shape Fill** button as shown in Figure 6.16a.
> ► In Mac OS X, click the heading **Colors**, **Weights and Fills** on the Formatting Palette if it is not already expanded, and click on the **Fill Color** drop-down as shown in Figure 6.16b.
> ► Click a color from the Color Palette to color the entire chart area.

In addition to selecting a simple color, we can also apply a gradient and texture. Let's experiment some more, adding a gradient to the Sporty Autos columns.

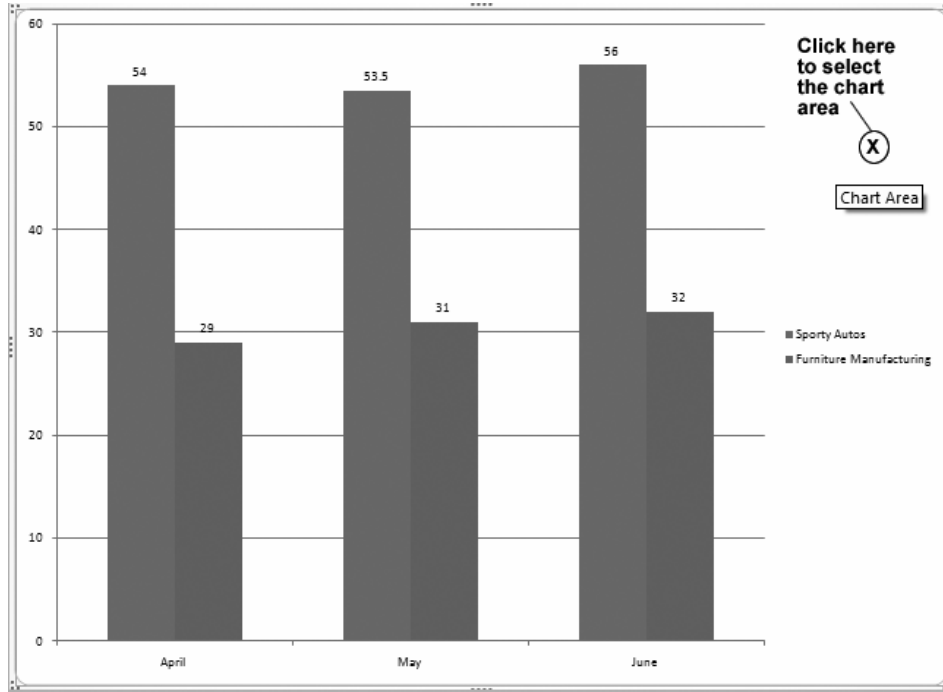> ► Position the mouse pointer on one of the Sporty Autos columns and click to select the series.

Figure 6.15   *Excel Chart selecting Chart Area.*

Notice that handles appear on the corners of each of the columns indicating that the columns are selected.

> ► In Windows, click the **Shape Fill** button as shown in Figure 6.17.
> ► In Windows, click the **Gradient** menu option as shown in Figure 6.17.
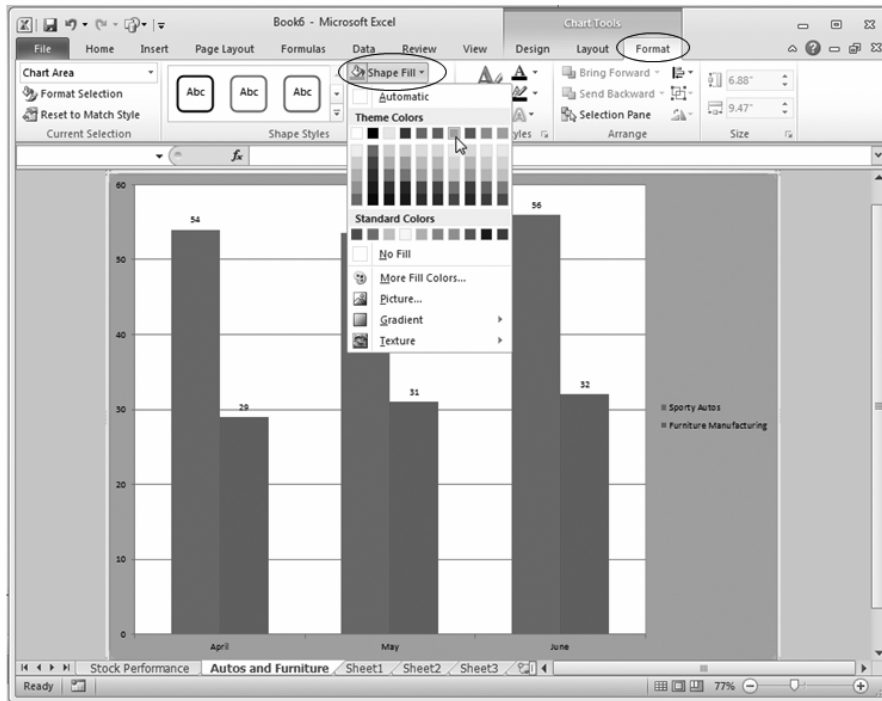> ► Click one of the gradient variations to apply it to the selected series.

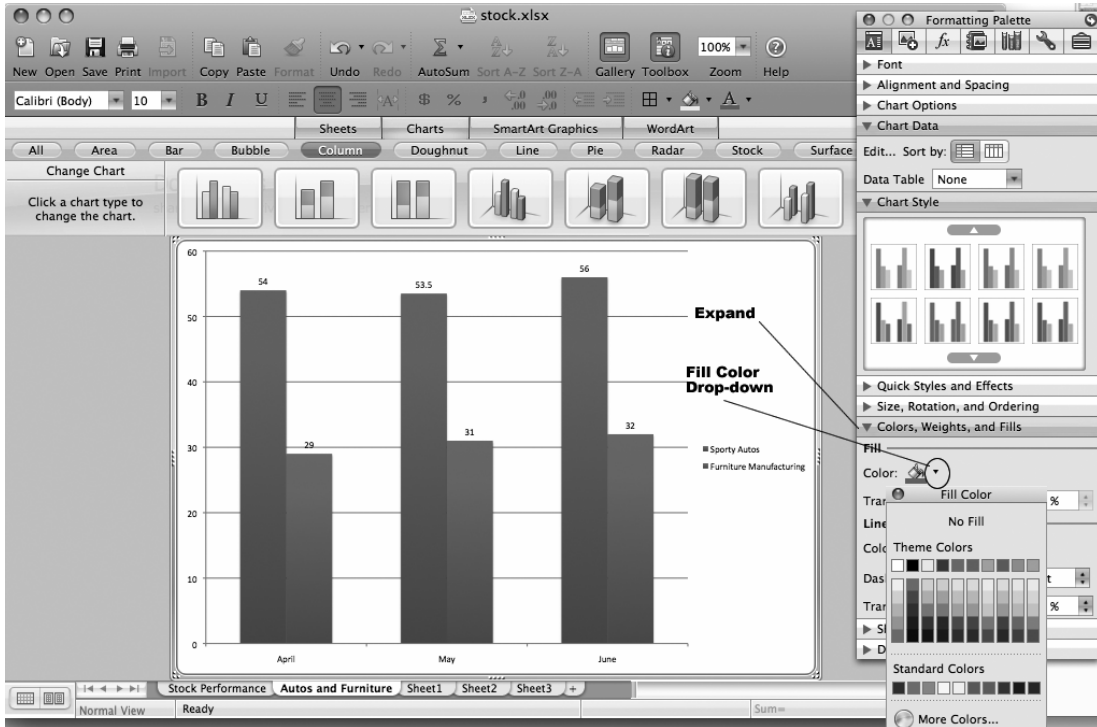**Figure 6.16a**   *Windows Excel 2007 Format Chart Area fill color.*

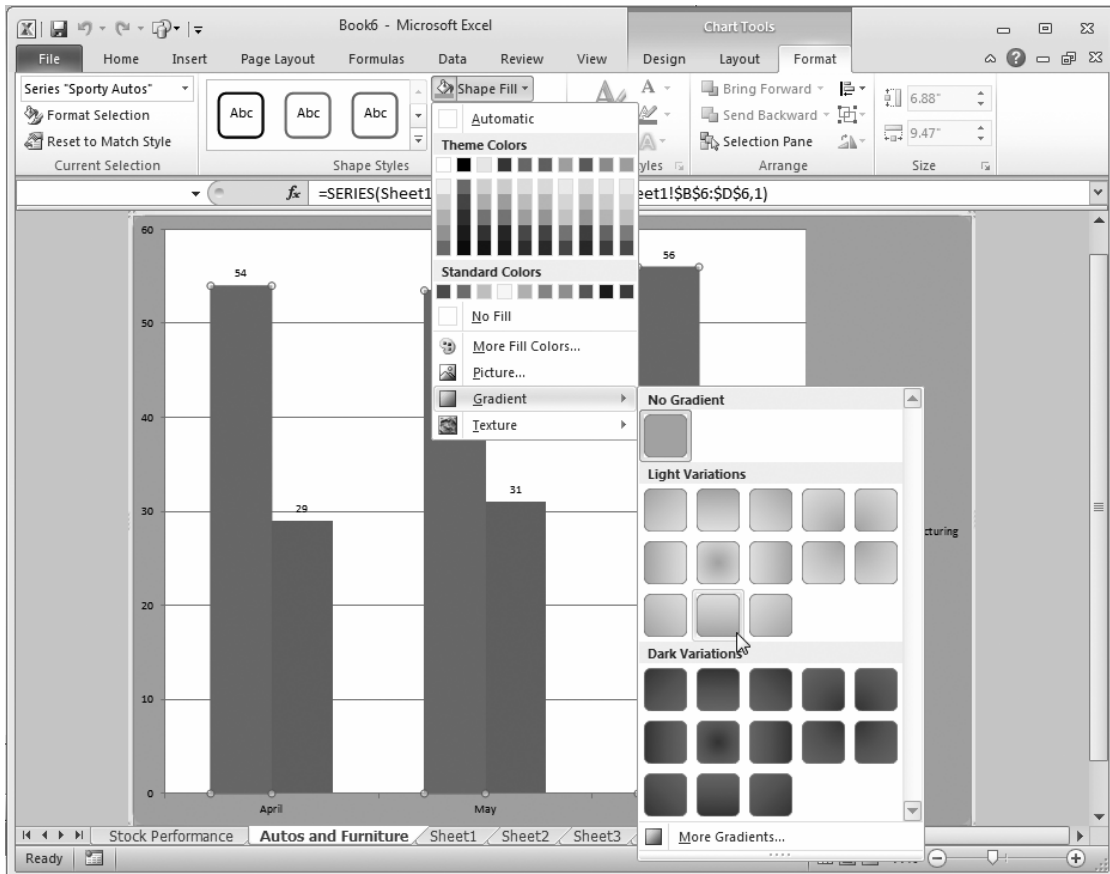**Figure 6.16b**   *Mac Excel 2008 fill color.*

Figure 6.17   *Excel Shape Fill Gradient options.*

Chart Types

Sometimes the most difficult decision is choosing the appropriate chart type for the data. We have focused on a 2D Column chart because our table data lends itself well to this type of chart. Most data can be represented well in a column, bar, line, or area chart. Three-dimensional charts tend to be a bit more difficult to read, but a 3D column or area chart is quite readable. A ribbon chart may be more difficult to read and suitable for impact rather than readability. A pie chart is a special case in which only one series is plotted. The XY chart is suitable for data when there is a dependency such as time versus distance (km/hr, for instance). Radar charts are used in medical applications, and a stock chart type may be suitable for some financial and engineering applications.

Pie Chart

Let's create a pie chart which shows the sales price for each stock for the month of June.

   ► Click the **Sheet1** tab to display the data.
   ► Select the ranges A4:A8 and D4:D8.

Recall that you can drag through the first range, and then press and hold the **Ctrl** key (PC) or **command** key (Mac) while you drag through the second range.

   ► In Windows, click the **Insert** tab and select the **2-D Pie** Chart type as shown in Figure 6.18a.
   ► In Mac OS X, select the **2D Pie Chart type** as shown in Figure 6.18b.

Let's choose a Chart Layout to add appropriate titles and data labels.

   ► Click the **Design** menu option (PC) as shown in Figure 6.19 or click one of the chart styles on the Formatting Palette (Mac).
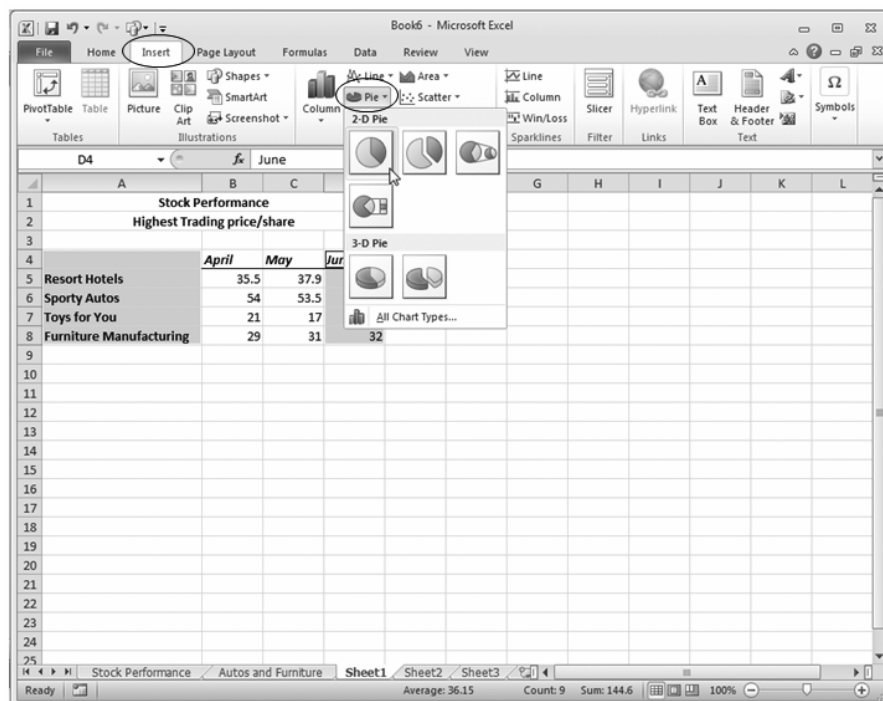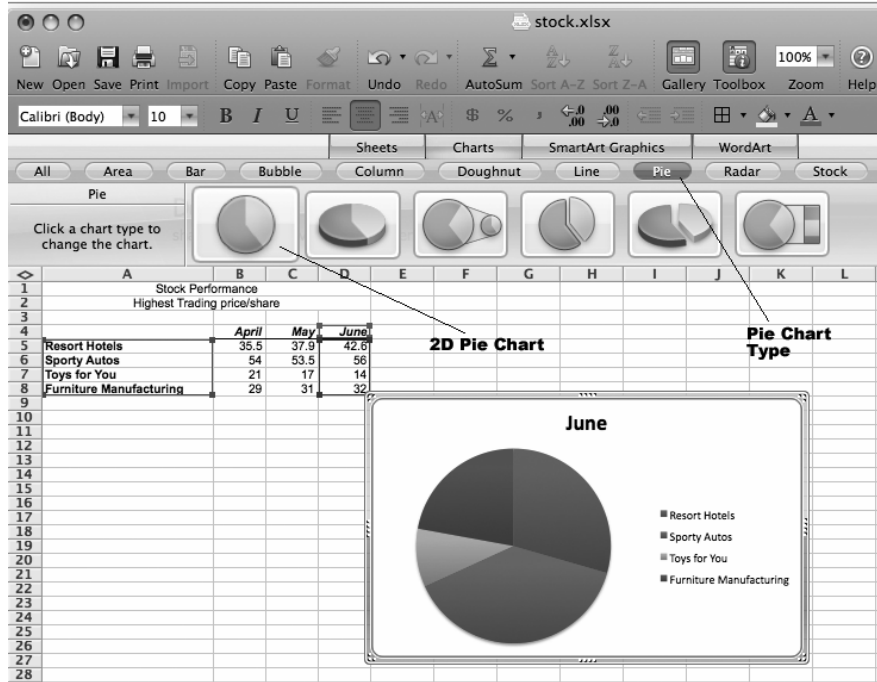

Figure 6.18a   *Windows Excel 2007 Pie Chart type.*

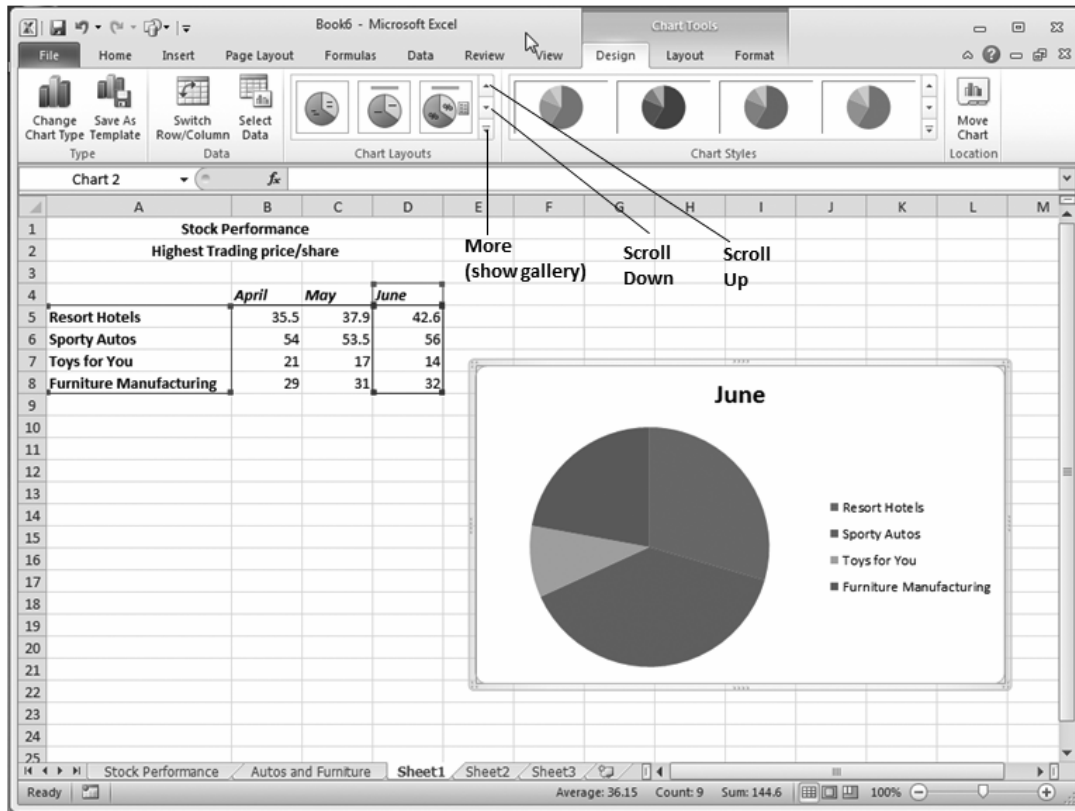**Figure 6.18b**   *Mac Excel 2008 Pie Chart type.*

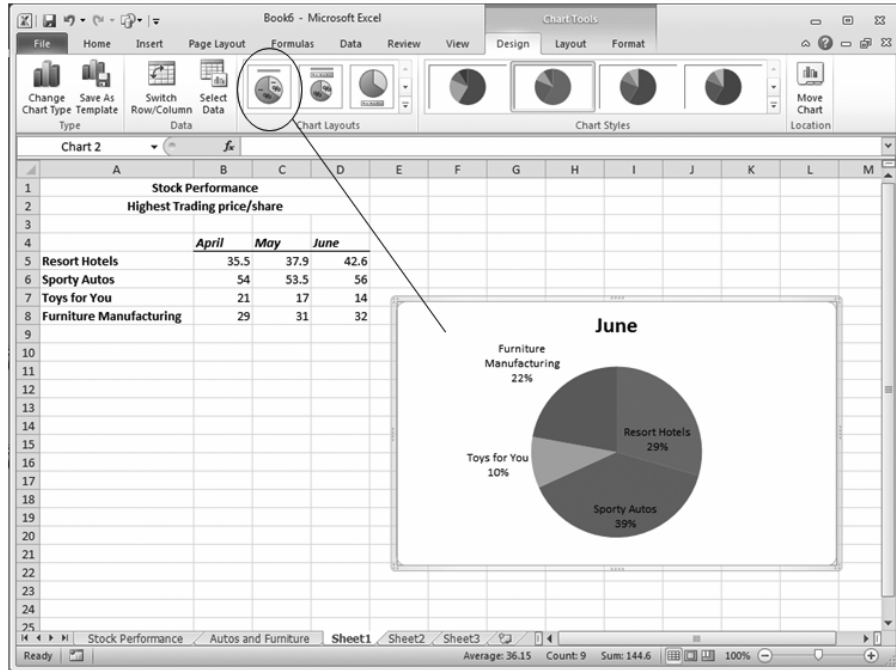**Figure 6.19**   *Excel Chart Layout options.*

Figure 6.20a   *Windows Excel 2007 Pie Chart Layout 1 option.*

You may use the scroll buttons to browse through the available layout selections.

► In Windows, click Layout 1 as shown in Figure 6.20a.
► In Mac OS X, click the drop-down for Labels and select **Category Name and Percent** and click the Legend drop-down and select **None** as shown in Figure 6.20b.

Notice that the legend has disappeared and the pie slices are identified with the stock name and percentage.
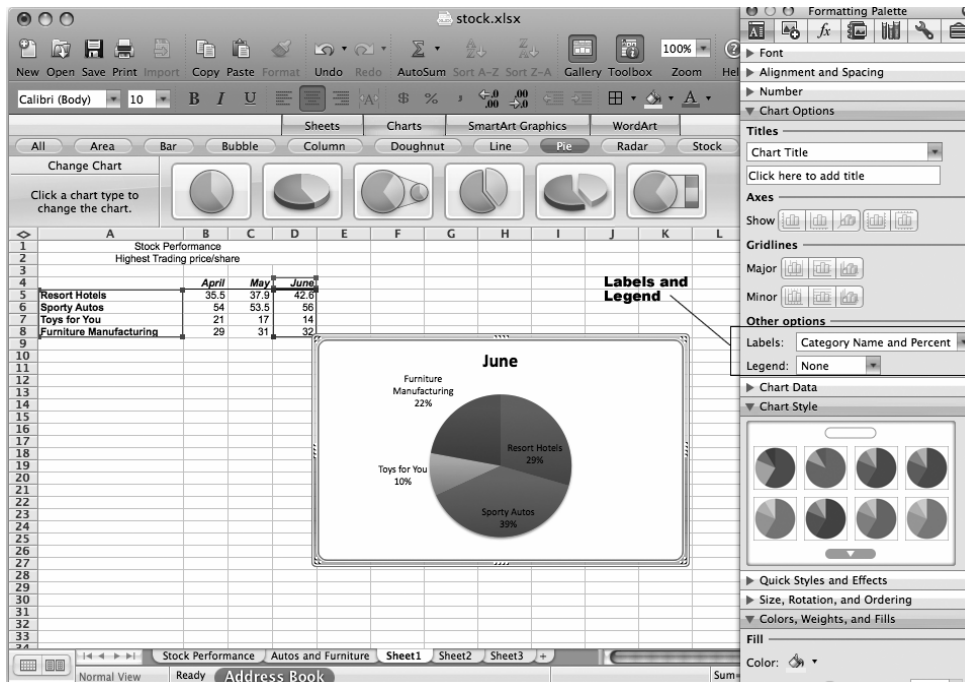

Figure 6.20b   *Mac Excel 2008 Pie Chart Layout options.*

Review

This has been a busy lab! We have covered the following topics:

- Create a column chart on a separate worksheet
    Format chart elements including a series and chart area
    Plot the series by rows and by columns
- Add and modify chart options including series, legend, titles, and chart area
- Add and delete a series from a chart
- Understand that when the data in the worksheet changes, the corresponding charts also change
- Create a pie chart using one series of data
- Understand that some types of charts are more appropriate for some types of data

Exercises

Use the stock.xlsx Sheet1 data and try to recreate the following charts. Don't try to copy them exactly, but try to replicate the general look.

1. Line Chart. *Hint:* Switch Row/Column (PC) or choose column or row (Mac) in order to plot the stocks as lines.
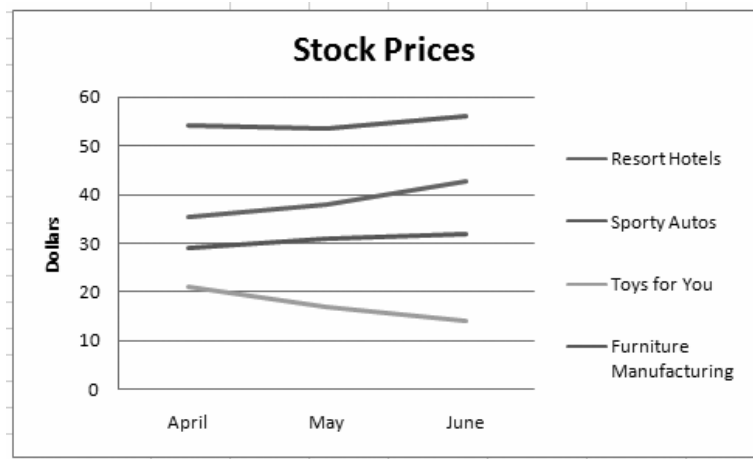

Figure 6.21   *Line Chart.*

2. Pie Chart. *Hint:* Select the cells containing the stock names and April values. Use the Layout options to add the percentages (PC) or select Labels (Mac).
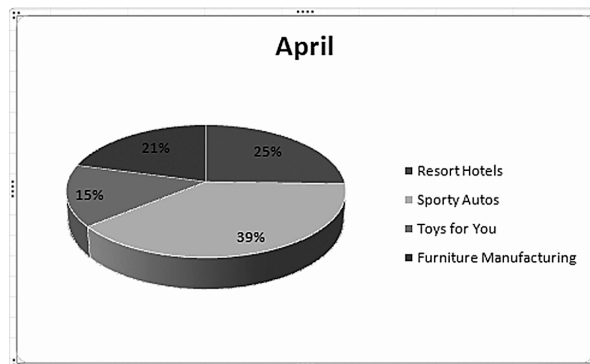

Figure 6.22   *Pie Chart.*

3. 3D Column Chart. *Hint:* Use the Layout options to add the data labels (PC) or select Labels (Mac).
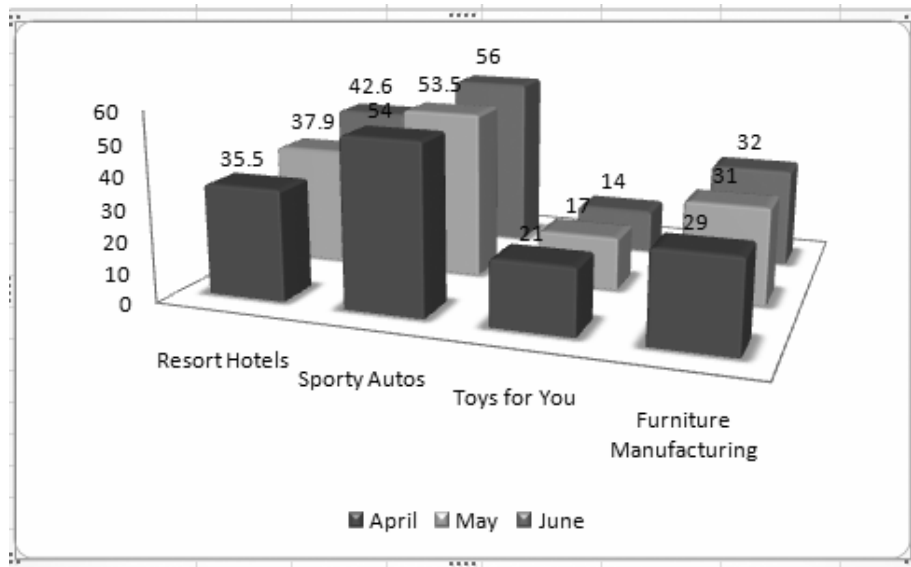

Figure 6.23 *3D Column Chart.*