BEGINNING EXCEL

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CONTENTS

CHAPTER 1 - FUNDAMENTAL SKILLS

Microsoft® Excel® is a tool that can be used in virtually all careers and is valuable in both professional and personal settings. Whether you need to keep track of medications in inventory for a hospital or create a financial plan for your retirement, Excel enables you to do these activities efficiently and accurately. This chapter introduces the fundamental skills necessary to get you started in using Excel. You will find that just a few skills can make you very productive in a short period of time.

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CHAPTER 2 - MATHEMATICAL COMPUTATIONS

Perhaps the most valuable feature of Excel is its ability to produce mathematical outputs using the data in a workbook. This chapter reviews several mathematical outputs that you can produce in Excel through the construction of formulas and functions. The chapter begins with the construction of formulas for basic and complex mathematical computations. The second section reviews statistical functions, such as SUM, AVERAGE, MIN, and MAX, which can be applied to a range of cells. The last section of the chapter addresses functions used to calculate mortgage and lease payments as well as the valuation of investments. This chapter also shows how you can use data from multiple worksheets to construct formulas and functions. These skills will be demonstrated in the context of a personal cash budget, which is a vital tool for managing your money for long-term financial security. The personal budget objective will also provide you with several opportunities to demonstrate Excel's what-if scenario capabilities, which highlight how formulas and functions automatically produce new outputs when one or more inputs are changed.

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CHAPTER 3 - FORMULAS, FUNCTIONS, LOGICAL AND LOOKUP FUNCTIONS

Excel workbooks are designed to allow you to create useful and complex calculations. In addition to doing arithmetic, you can use Excel to look up data, and to display results based on logical conditions. We will also look at ways to highlight specific results. These skills will be demonstrated in the context of a typical gradebook spreadsheet that contains the results for an imaginary Excel class.

In this chapter, we will:

- Use the **Quick Analysis Tool** to find the Total Points for all students and Points Possible.

- Write a division formula to find the Percentage for each student, using an absolute reference to the Total Points Possible.

- Write an **IF Function** to determine Pass/Fail – passing is 70% or higher.

- Write a **VLOOKUP** to determine the Letter Grade using the Letter Grades scale.

- Use the **TODAY** function to insert the current date.

- Review common **Error Messages** using Smart Lookup to get definitions of some of the terms in your spreadsheet.

- Apply **Data Bars** to the Total Points values.

- Apply **Conditional Formatting** to the Percentage, Pass/Fail, and Letter Grade columns.

- **Printing Review –** Change to Landscape, Scale to Fit Columns on One Page and Set Print Area.

Figure 3-1 shows the completed workbook that will be demonstrated in this chapter. Notice the techniques used in columns O and R that highlight the results of your calculations. Notice, also that there are more numbers on this version of the file than you will see in your original data file. These are all completed using Excel calculations.

Figure 3.1 Completed Gradebook Worksheet

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1								CAS 170 Grades										
2								Thursday, August 25, 2016										
3																		
4	Student Name	CH1	CH2	CH3	Test 1	CH4	CH5	CH6	Test 2	CH7	CH8	CH9	Test 3	Final Exam	Total Points	Percentage	Pass/Fail	Letter Grade
5	Andrews, DeShea	10	10	10	48	10	9	7	50	10	10	10	47		231	59%	Fail	F
6	Coffey, Amber	8	7	8	38	8	7	7	36	8	8	8	39	113	295	76%	Pass	C
7	Denson, Edward	9	8	8	35	6	5	0	30	0	0	0	0	0	101	26%	Fail	F
8	Di, Nina	9	8	9	50	9	8	9	48	8	8	9	45	140	360	92%	Pass	A
9	Gashi, Moesha	10	9	8	49	10	9	10	43	9	9	8	40	129	343	88%	Pass	B
10	Gray, Emanuel	10	5	10	39	10	5	9	41	5	5	9	38	115	301	77%	Pass	C
11	Klein, Tamar	9	10	8	42	9	8	6	33	10	5	0	31	99	270	69%	Fail	D
12	Mansur, Yusuf	10	7	7	48	10	7	8	50	7	7	0	47	150	358	92%	Pass	A
13	Naharro, Claudia	10	10	6	44	10	8	7	46	10	10	9	43	130	343	88%	Pass	B
14	Persson, Thea	6	6	4	26	6	5	4	28	6	6	5	26	78	206	53%	Fail	F
15	Popov, Olga	9	10	8	47	9	7	0	49	10	10	8	46	139	352	90%	Pass	A
16	Prinosil, Jonas	7	5	5	30	7	5	7	31	5	5	6	29	88	230	59%	Fail	F
17	Riley, Jordyn	10	9	9	46	10	6	9	48	9	9	9	45	136	355	91%	Pass	A
18	Smirnov, Yuri	9	9	9	42	9	5	9	44	9	9	8	41	124	327	84%	Pass	B
19	Sokolov, Yegor	10	8	10	48	10	7	10	44	8	8	10	41	130	344	88%	Pass	B
20	Tan, Duong	10	9	8	41	9	9	8	43	9	9	10	40	121	326	84%	Pass	B
21	Taylor, Jaquoya	9	10	9	50	5	10	9	50	10	10	7	50	148	377	97%	Pass	A
22	Trong, Nguyen	9	10	7	44	10	0	7	32	0	0	6	29	101	255	65%	Fail	D
23	Vesely, Katerina	8	6	6	38	8	6	6	40	6	6	0	38	114	282	72%	Pass	C
24	Weller, Elijah	9	10	10	49	8	10	10	49	10	10	8	46	141	370	95%	Pass	A
25	Points Possible	10	10	10	50	10	10	10	50	10	10	10	50	150	390			
26																		
27	Letter Grades																	
28	0%	F																
29	60%	D																
30	70%	C																
31	80%	B																
32	90%	A																

Grades

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CHAPTER 4 - PRESENTING DATA WITH CHARTS

One of the most important things to consider when using charts in Excel is that they are intended to be used for communicating an idea to an audience. Your audience can be reading your charts in a written document or listening to you in a live presentation. In fact, Excel charts are often imported or pasted into Word documents or PowerPoint slides, which serve this very purpose of communicating ideas to an audience. Although there are no rules set in stone for using specific charts for certain data types, some chart types are designed to communicate certain messages better than others. This chapter explores numerous charts that can be used for a variety of purposes. In addition, we will examine formatting charts and using those charts in Word and PowerPoint documents.

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4.1 CHOOSING A CHART TYPE

LEARNING OBJECTIVES

1. Construct a line chart to show a time series trend.
2. Learn how to adjust the Y axis scale.
3. Construct a line chart to present a comparison of two trends.
4. Learn how to use a column chart to show a frequency distribution.
5. Create a separate chart sheet for a chart embedded in a worksheet.
6. Construct a column chart that compares two frequency distributions.
7. Learn how to use a pie chart to show the percent of total for a data set.
8. Construct a stacked column chart to show how a percent of total changes over time.

This section reviews the most commonly used Excel chart types. To demonstrate the variety of chart types available in Excel, it is necessary to use a variety of data sets. This is necessary not only to demonstrate the construction of charts but also to explain how to choose the right type of chart given your data and the idea you intend to communicate.

CHOOSING A CHART TYPE

Before we begin, let's review a few key points you need to consider before creating any chart in Excel.

1. **The first is identifying your idea or message**. It is important to keep in mind that the primary purpose of a chart is to present quantitative information to an audience. Therefore, you must first decide what message or idea you wish to present. This is critical in helping you select specific data from a worksheet that will be used in a chart. Throughout this chapter, we will reinforce the intended message first before creating each chart.
2. **The second key point is selecting the right chart type**. The chart type you select will depend on the data you have and the message you intend to communicate.
3. **The third key point is identifying the values that should appear on the X and Y axes**. One of the ways to identify which values belong on the X and Y axes is to sketch the chart on paper first. If you can visualize what your chart is supposed to look like, you will have an easier time selecting information correctly and using Excel to construct an effective chart that accurately communicates your message. **Table 4.1** "Key Steps Before Constructing an Excel Chart" provides a brief summary of these points.

Table 4.1 Key Steps before Constructing an Excel Chart

Step	Description
Define your message.	Identify the main idea you are trying to communicate to an audience. If there is no main point or important message that can be revealed by a chart, you might want to question the necessity of creating a chart.
Identify the data you need.	Once you have a clear message, identify the data on a worksheet that you will need to construct a chart. In some cases, you may need to create formulas or consolidate items into broader categories.
Select a chart type.	The type of chart you select will depend on the message you are communicating and the data you are using.
Identify the values for the X and Y axes.	After you have selected a chart type, you may find that drawing a sketch is helpful in identifying which values should be on the X and Y axes. In Excel, the axes are: The "category" axis. Usually the horizontal axis – where the labels are found The "value" axis. Usually the vertical axis – where the numbers are found.

TIME SERIES TREND: LINE CHART 1

The first chart we will demonstrate is a line chart. Figure 4.1 shows part of the data that will be used to create two line charts. This chart will show the trend of the NASDAQ stock index.

Read more: http://www.investopedia.com/terms/n/nasdaq.asp

This chart will be used to communicate a simple message: to show how the index has performed over a two-year period. We can use this chart in a presentation to show whether stock prices have been increasing, decreasing, or remaining constant over the designated period of time.

Integrity Check

Carefully Select Data When Creating a Chart

Just because you have data in a worksheet does not mean it must all be placed onto a chart. When creating a chart, it is common for only specific data points to be used. To determine what data should be used when creating a chart, you must first identify the message or idea that you want to communicate to an audience.
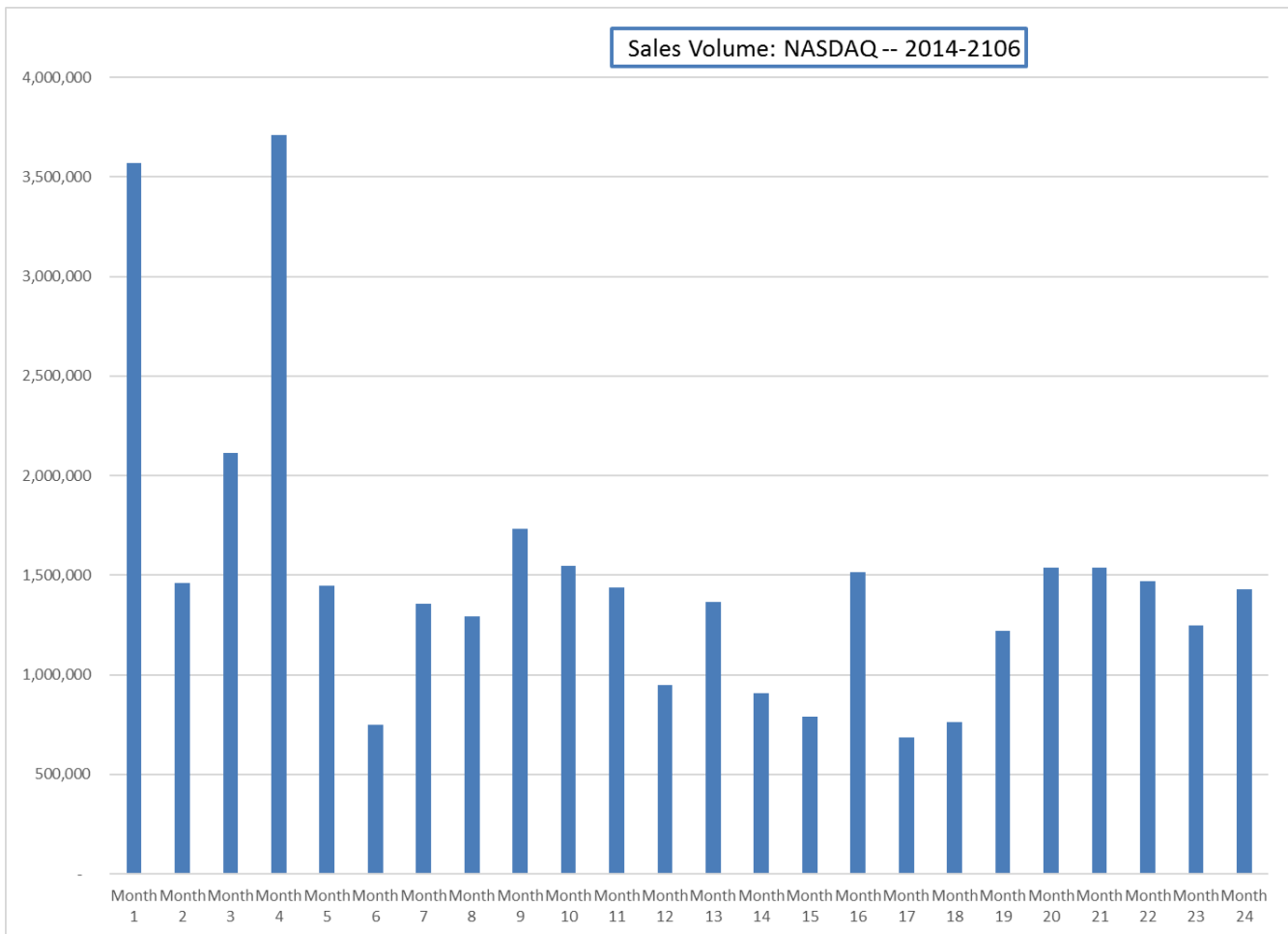
Figure 4.1 Stock Trends

Before we create the line chart, it is important to identify why it is an appropriate chart type given the message we wish to communicate and the data we have. When presenting the trend for any data over a designated period of time, the most commonly used chart types are the line chart and the column chart. With the column chart, you are limited to a certain number of bars or data points. As you increase the number of bars on a column chart, it becomes increasingly difficult to read. As you scroll through the data on the worksheet shown in **Figure 4.1** you will see that there are 24 points of data used to construct the chart. This is generally too many data points to put on a column chart, which is why we are using a line chart. Our line chart will show the volume of sales for the NASDAQ on the Y axis and the Month number on the X axis. The following steps explain how to construct this chart:

Download Data file: CH4 Data

1. Open data file *CH4 Data* and save a file to your computer as **CH4 Charting**.
2. Navigate to the **Stock Trend** worksheet.
3. Highlight the range **B4:C28** on the Stock Trend worksheet. (Note – you have selected a label in the first row and more labels in column B. Watch where they show up in your completed chart.)
4. Click the Insert tab of the ribbon.
5. Click the **Line** button in the **Charts** group of commands. Click the first option from the list, which is a basic 2D Line Chart (see **Figure 4.2**).
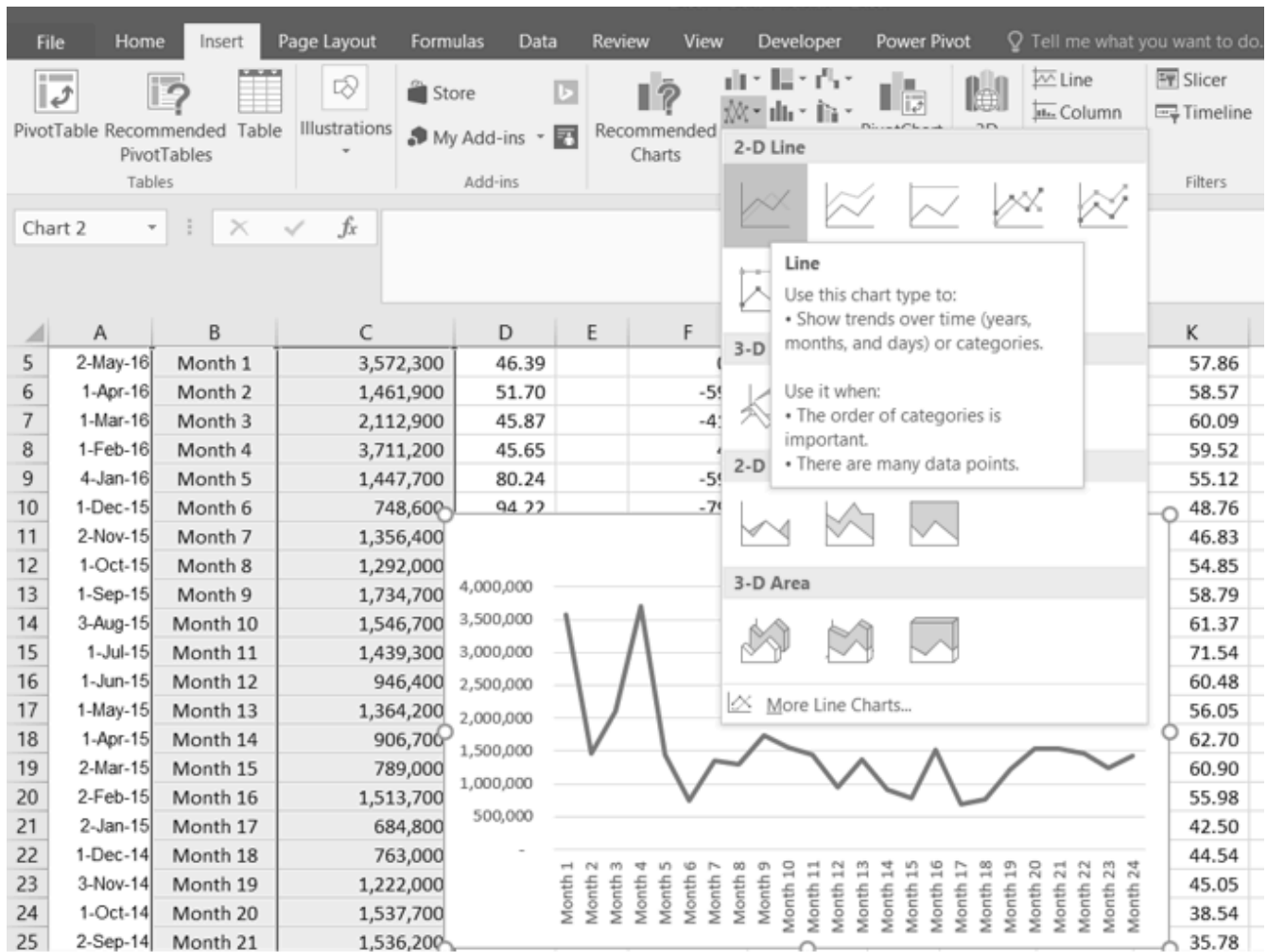
Figure 4.2 Selecting the Basic Line Chart

This adds, or embeds, the line chart to the worksheet, as shown in **Figure 4.3**

Figure 4.3 shows the embedded line chart in the Stock Trend worksheet. Do you see where your labels showed up on the chart?

Why?

Line Chart vs. Column Chart

We can use both a line chart and a column chart to illustrate a trend over time. However, a line chart is far more effective when there are many periods of time being measured. For example, if we are measuring fifty-two weeks, a column chart would require fifty-two bars. A general rule of thumb is to use a column chart when twenty bars or less are required. A column chart becomes difficult to read as the number of bars exceeds twenty.

Notice that additional tabs, or contextual tabs, are added to the ribbon. We will demonstrate the commands in these tabs throughout this chapter. These tabs appear only when the chart is activated.
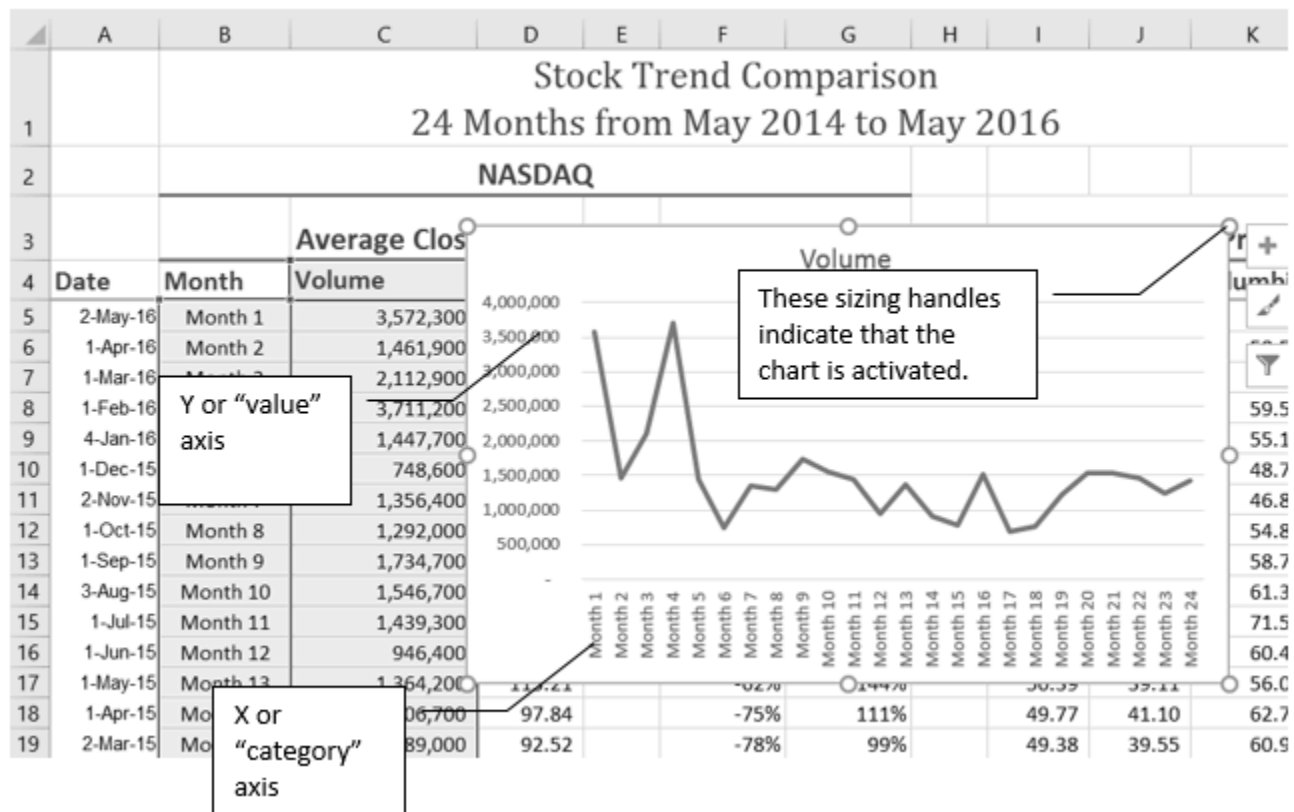

Figure 4.3 Embedded Line Chart in the Stock Trend Worksheet

As shown in **Figure 4.3**, the embedded chart is not placed in an ideal location on the worksheet since it is covering several cell locations that contain data. The following steps demonstrate common adjustments that are made when working with embedded charts:

1. **Moving a chart**: Click and drag the upper left corner of the chart to the center of cell B30.

2. **Resizing a chart**: Place the mouse pointer over the right upper corner sizing handle, hold down the ALT key on your keyboard, and click and drag the chart so it "snaps" to the right side of Column I.

3. Repeat step 2 to resize the chart so the top "snaps" to the top of Row 30, the bottom "snaps" to

Note: Excel 2010 uses three contextual tabs for charts. Later versions use only two. Each has all the same tools. They are just organized a little differently.

the bottom of Row 45, and the left side "snaps" to the left side of Column B. Make sure the right side of the chart snaps to the line between column I and J.

4. **Adjusting the chart title**: Click the chart title once. Then click in front of the first letter. You should see a blinking cursor in front of the letter. This allows you to modify the title of the chart.

5. Type the following in front of the first letter in the chart title: **May 2014-2016 Trend for NASDAQ Sales**.

6. Click anywhere outside of the chart to deactivate it.

7. Save your work.

Figure 4.4 shows the line chart after it is moved and resized. You can also see that the title of the chart has been edited to read **May 2014-2016 Trend for NASDAQ Sales Volume**. Notice that the sizing handles do not appear around the perimeter of the chart. This is because the chart has been deactivated. To activate the chart, click anywhere inside the chart perimeter.

Note: Keep an eye on your pointer. It will change into ⊹ when you are in the right place to move your chart.

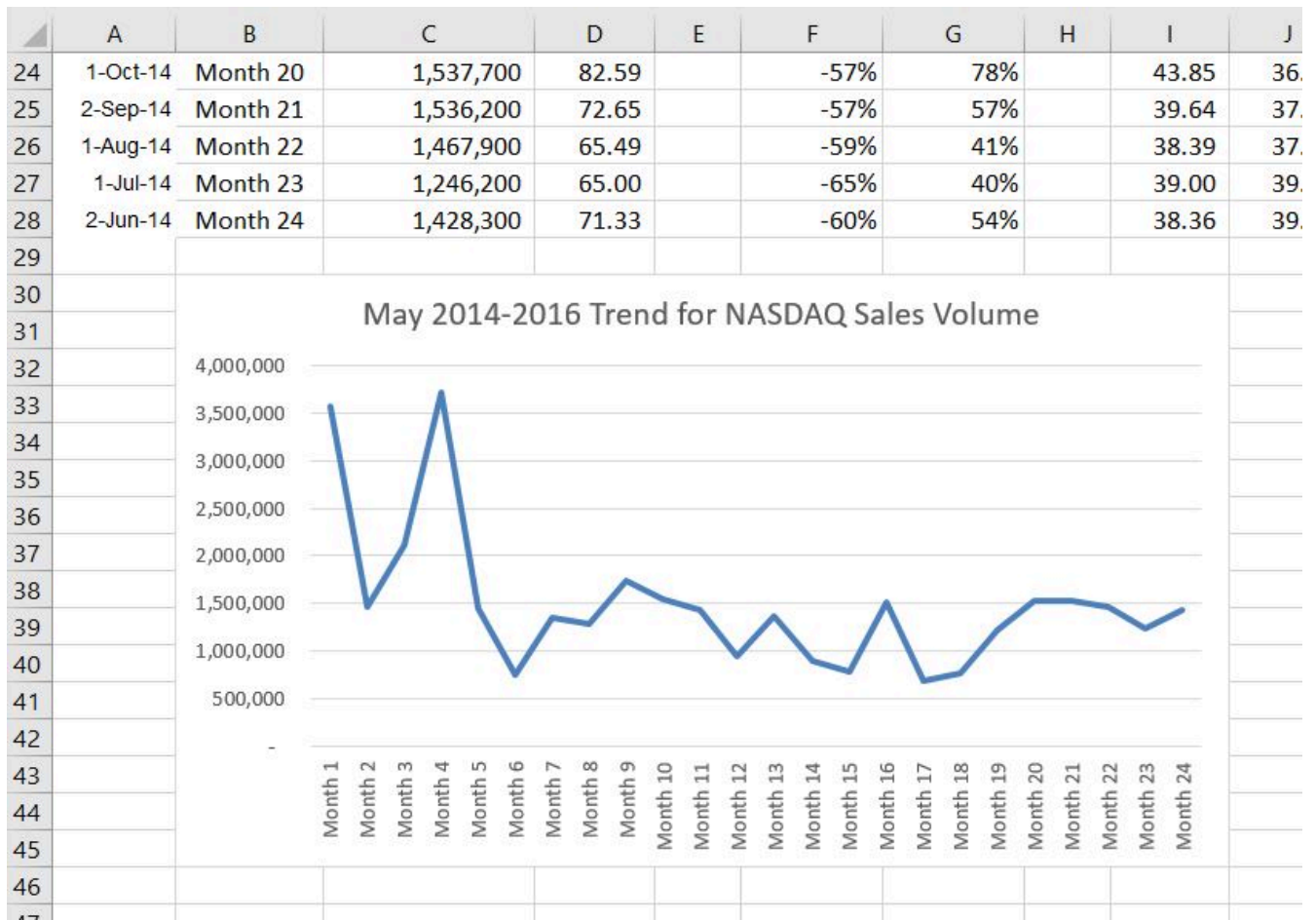Note: keep an eye on your pointer. It will change into ↗ when you are in the right place to resize your chart

	A	B	C	D	E	F	G	H	I	J
24	1-Oct-14	Month 20	1,537,700	82.59		-57%	78%		43.85	36.
25	2-Sep-14	Month 21	1,536,200	72.65		-57%	57%		39.64	37.
26	1-Aug-14	Month 22	1,467,900	65.49		-59%	41%		38.39	37.
27	1-Jul-14	Month 23	1,246,200	65.00		-65%	40%		39.00	39.
28	2-Jun-14	Month 24	1,428,300	71.33		-60%	54%		38.36	39.
29										
30										

May 2014-2016 Trend for NASDAQ Sales Volume

Figure 4.4 Line Chart Moved and Resized

Inserting a Line Chart

Integrity Check

When using line charts in Excel, keep in mind that anything placed on the X axis is considered a descriptive label, not a numeric value. This is an example of a category axis. This is important because there will never be a change in the spacing of any items placed on the X axis of a line chart. If you need to create a chart using numeric data on the category axis, you will have to modify the chart. We will do that later in the chapter.

1. Highlight a range of cells that contain data that will be used to create the chart. Be sure to include labels in your selection.
2. Click the Insert tab of the ribbon.
3. Click the Line button in the Charts group.
4. Select a format option from the Line Chart drop-down menu.

ADJUSTING THE Y AXIS SCALE

After creating an Excel chart, you may find it necessary to adjust the scale of the Y axis. Excel automatically sets the maximum value for the Y axis based on the data used to create the chart. The minimum value is usually set to zero. That is usually a good thing. However, depending on the data you are using to create the chart, setting the minimum value to zero can substantially minimize the graphical presentation of a trend. For example, the trend shown in Figure 4.4 appears to be increasing slightly in recent months. The presentation of this trend can be improved if the minimum value started at 500,000. The following steps explain how to make this adjustment to the Y axis:

1. Click anywhere on the Y (value or vertical) axis on the **May 2014-2016 Trend for NASDAQ Sales Volume** line chart (Stock Trend worksheet).
2. Right Click and select **Format Axis.** The Format Axis Pane should appear, as shown in **Figure 4.5**.

Note: If you do not see "Format Axis . . . on your menu, you have not right clicked in the correct spot. Press "Escape" to turn the menu off and try again
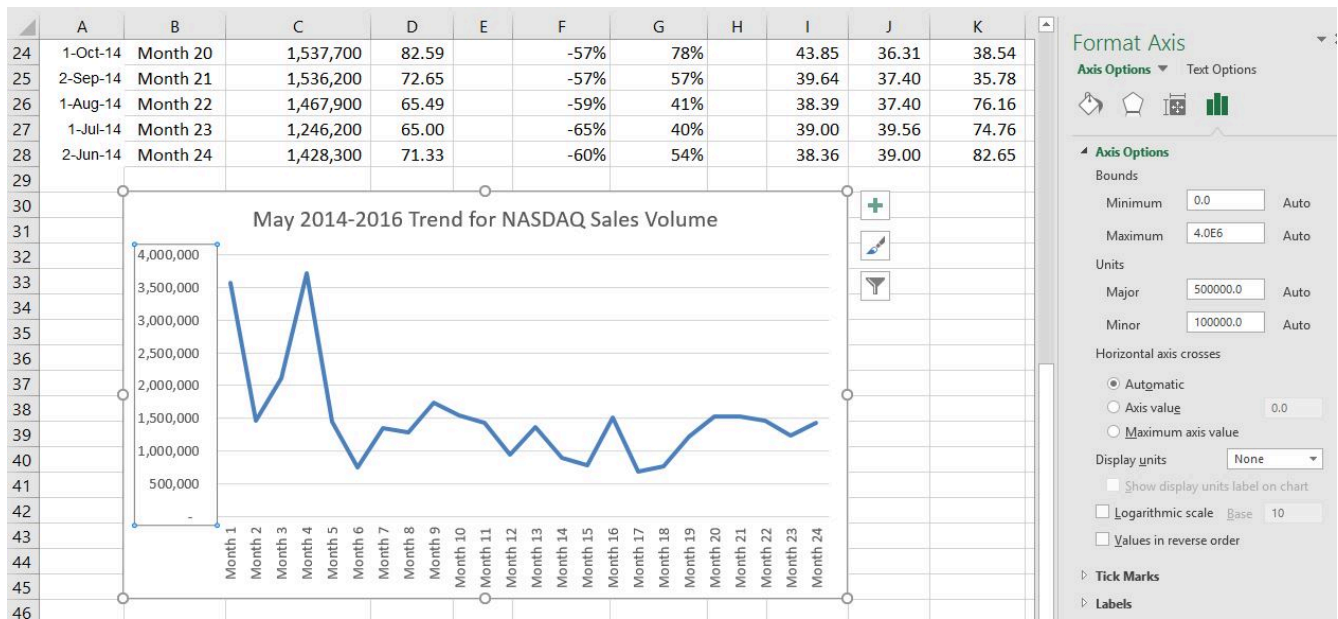
	A	B	C	D	E	F	G	H	I	J	K
24	1-Oct-14	Month 20	1,537,700	82.59		-57%	78%		43.85	36.31	38.54
25	2-Sep-14	Month 21	1,536,200	72.65		-57%	57%		39.64	37.40	35.78
26	1-Aug-14	Month 22	1,467,900	65.49		-59%	41%		38.39	37.40	76.16
27	1-Jul-14	Month 23	1,246,200	65.00		-65%	40%		39.00	39.56	74.76
28	2-Jun-14	Month 24	1,428,300	71.33		-60%	54%		38.36	39.00	82.65

Figure 4.5 Format Axis Pane

1. In the Format Axis Pane, click the input box for the "**Minimum**" axis option and **delete** the zero. Then type the number **500000** and hit Enter. As soon as you make this change, the Y axis on the chart adjusts.
2. Click the X in the upper right corner of the Format Axis pane to close it.
3. Save your work.

Figure 4.6 shows the change in the presentation of the trend line. Notice that with the Y axis starting at 500,000, the trend for the NASDAQ is more pronounced. This adjustment makes it easier for the audience to see the magnitude of the trend.
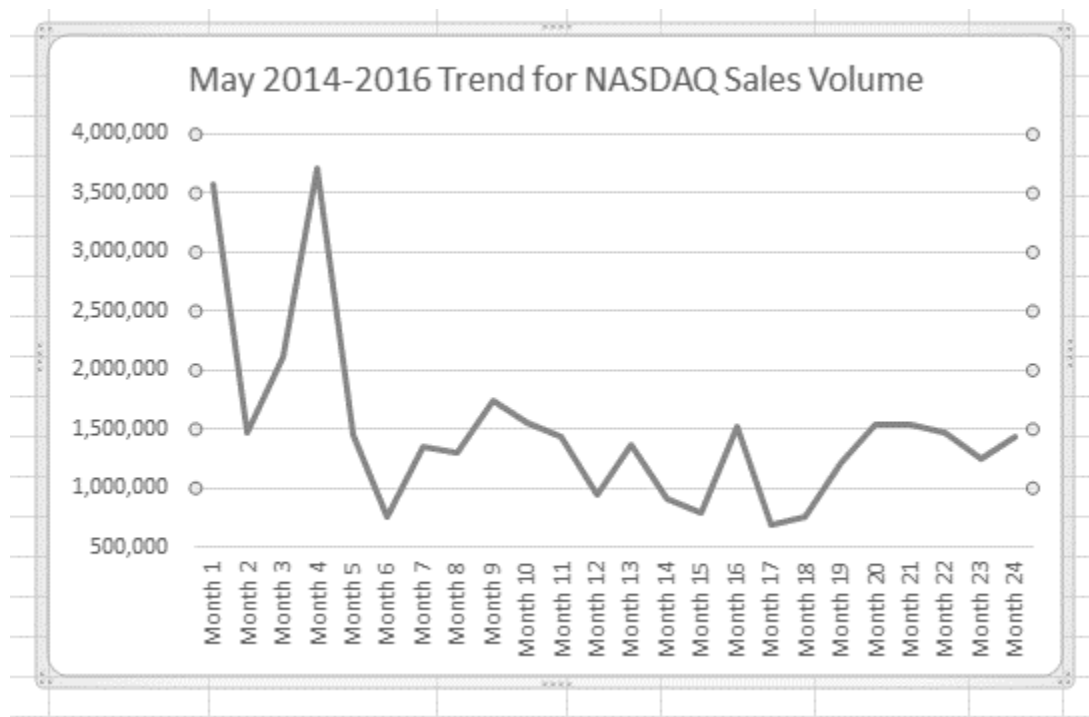
Figure 4.6 Adjusted Y Axis for the S&P 500 Chart

Skill Refresher

Adjusting the Y Axis Scale

1. Click anywhere along the **Y** axis to activate it.
2. Right Click.
   (Note, you can also select the Format tab in the Chart Tools section of the ribbon.)
3. Select **Format Axis** . . .
4. In the **Format Axis pane**, make your changes to the **Axis Options**.
5. Click in the input box next to the desired axis option and then type the new scale value.
6. Click the **Close** button at the top right of the Format Axis pane to close it.

TREND COMPARISONS: LINE CHART 2

We will now create a second line chart using the data in the Stock Trend worksheet. The purpose of this chart is to compare two trends: the change in volume for the NASDAQ and the change in the Closing price.

Before creating the chart to compare the NASDAQ volume and sales price, it is important to review the data in the range B4:D28 on the Stock Trend worksheet. We cannot use the volume of sales and the closing price because the values are not comparable. That is, the closing price is in a range of $45.00 to $115.00, but the data for the volume of Sales is in a range of 684,000 to 3,711,000. If we used these values – without making changes to the chart — we would not be able to see the closing price at all.

The construction of this second line chart will be similar to the first line chart. The X axis will be the months in the range B4:D28.

1. Highlight the range **B4:D28** on the Stock Trend worksheet.
2. Click the **Insert** tab of the ribbon.
3. Click the **Line** button in the **Charts** group of commands.
4. Click the first option from the list, which is a basic line chart.

Figure 4.6.5 shows the appearance of the line chart comparing both the volume and the closing price before it is moved and resized. Notice that the line for the closing price (Close) appears as a straight line at the bottom of the chart. Also, the chart is covering the data again, and the title needs to be changed.
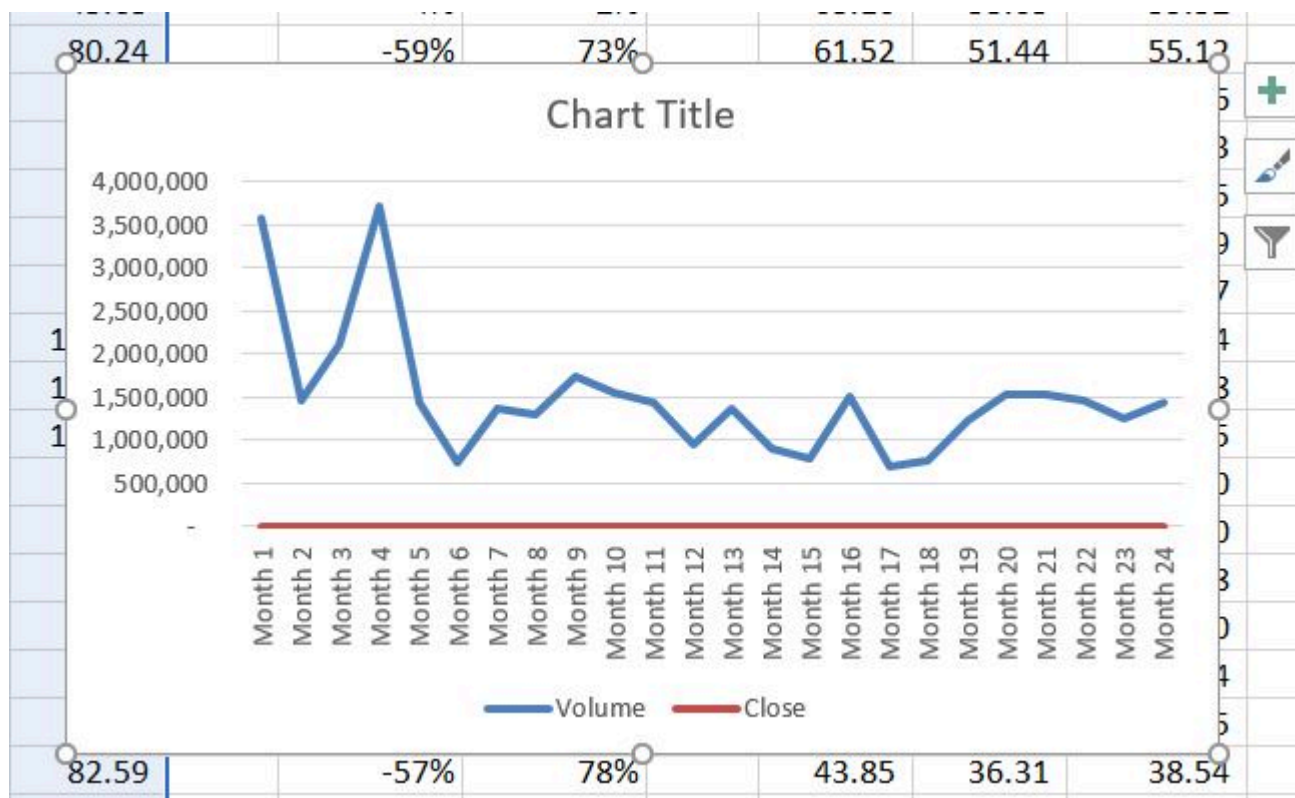
Figure 4.6 Trend Comparison Line Chart

1. Move the chart so the upper left corner is in the middle of cell M3.
2. Resize the chart, using the resizing handles and the ALT key, so the left side is locked to the left

Note: The line representing the closing values is flat along the bottom of the chart. This is hard to see and not very useful as is. Fear not. We will fix that.

side of Column M, the right side is locked to the right side of Column U, the top is locked to the top of Row 3, and the bottom is locked to the bottom of Row 17.

3. Click in the text box that says "**Chart Title**." Delete the text and replace it with the following: **24 Month Trend Comparison.**

Good. But, we still cannot really see the Closing Price data. It is the flat red line at the very bottom of the chart.

1. Right click the red line across the bottom of the chart that represents the Closing Price.
2. On the menu, select Format Data Series. This will open the Format Data Series pane.
3. In the Series Options, select Secondary Axis.
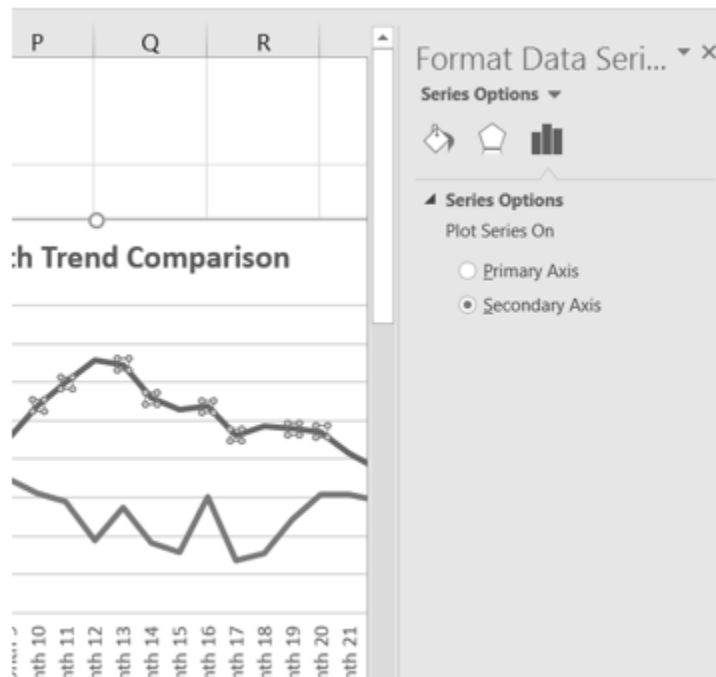
Figure 4.7 Adding a Secondary Axis

Better! But, it would be nice to be able to see that the values on the right represent prices.

1. Right click the Secondary Vertical Axis. (The vertical axis on the right that goes from 0 to 140.)
2. From the menu, select Format Axis.
3. In Axis Options, select Number. (You may have to scroll down to see it.)
4. Use the Symbol list box to add the $.
5. Press the Close button to close the Format Axis pane.
6. Save your work.
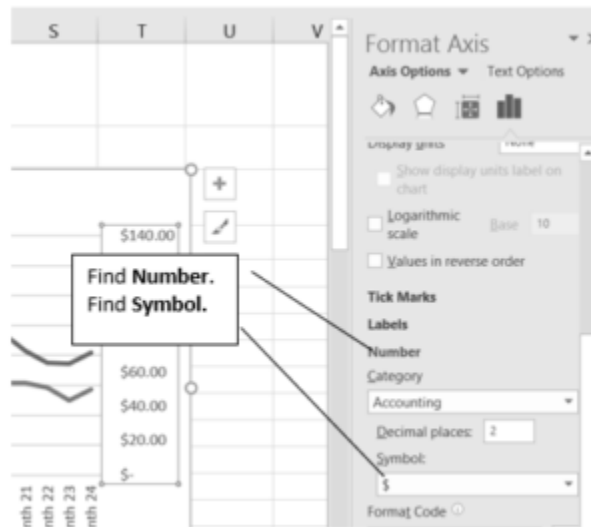
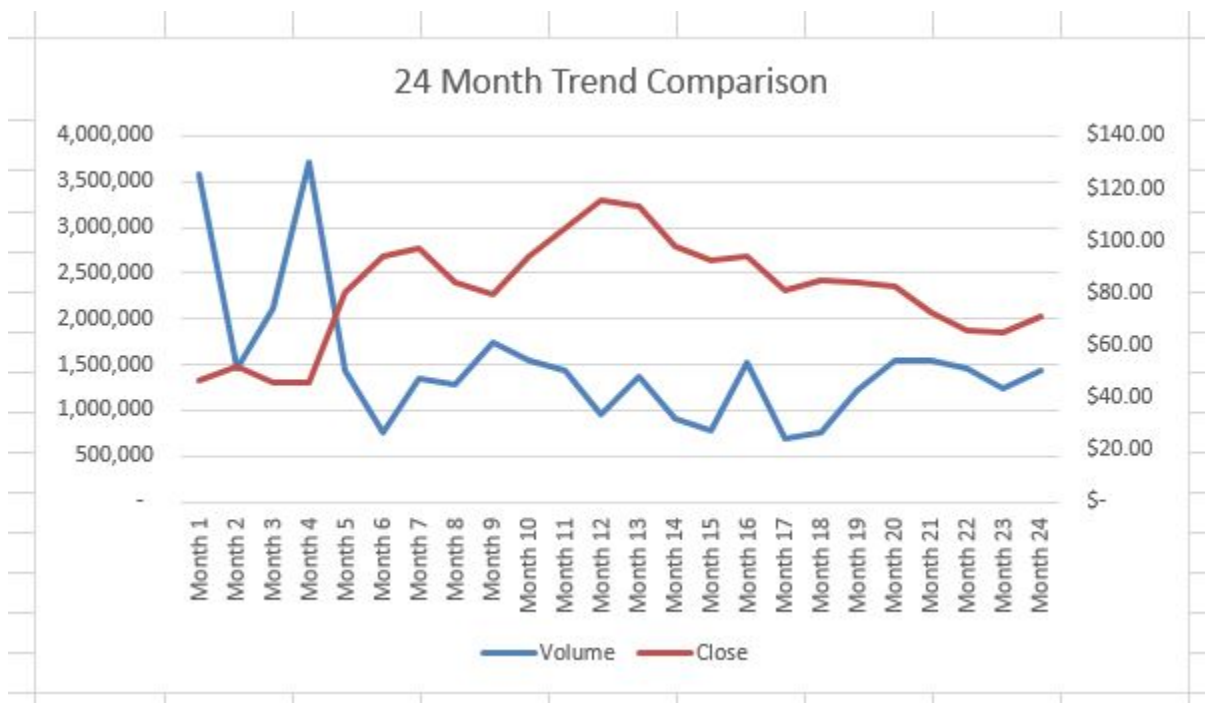*Figure 4.8 Modifying the Secondary Axis*

Figure 4.9 Final Comparison Line Chart

"INSTANT" CHART – F11

On the Stock Trend worksheet:

1. Select **A4:A28.**
2. Hold down the **Ctrl key** and select **D4:D28**. **Figure 4.10** shows what that will look like.

| | | Average Closing Price | | | Change in Price | |
Date	Month	Volume	Close		NASDAQ	% change
2-May-16	Month 1	3,572,300	46.39		0%	0%
1-Apr-16	Month 2	1,461,900	51.70		-59%	11%
1-Mar-16	Month 3	2,112,900	45.87		-41%	-1%
1-Feb-16	Month 4	3,711,200	45.65		4%	-2%
4-Jan-16	Month 5	1,447,700	80.24		-59%	73%
1-Dec-15	Month 6	748,600	94.22		-79%	103%
2-Nov-15	Month 7	1,356,400	97.03		-62%	109%
1-Oct-15	Month 8	1,292,000	83.96		-64%	81%
1-Sep-15	Month 9	1,734,700	79.78		-51%	72%
3-Aug-15	Month 10	1,546,700	94.17		-57%	103%
1-Jul-15	Month 11	1,439,300	104.74		-60%	126%
1-Jun-15	Month 12	946,400	115.30		-74%	149%
1-May-15	Month 13	1,364,200	113.21		-62%	144%
1-Apr-15	Month 14	906,700	97.84		-75%	111%
2-Mar-15	Month 15	789,000	92.52		-78%	99%
2-Feb-15	Month 16	1,513,700	94.01		-58%	103%
2-Jan-15	Month 17	684,800	80.76		-81%	74%
1-Dec-14	Month 18	763,000	84.76		-79%	83%
3-Nov-14	Month 19	1,222,000	83.88		-66%	81%
1-Oct-14	Month 20	1,537,700	82.59		-57%	78%
2-Sep-14	Month 21	1,536,200	72.65		-57%	57%
1-Aug-14	Month 22	1,467,900	65.49		-59%	41%
1-Jul-14	Month 23	1,246,200	65.00		-65%	40%
2-Jun-14	Month 24	1,428,300	71.33		-60%	54%

Figure 4.10 Range Selection

3. Press **F11**. (The F11 function key is on the top row of the keyboard.) If the factory default settings haven't been changed, Excel will create a column chart and place it on a separate chart sheet. (See **Figure 4.11**).
4. Change the name of the chart sheet by double-clicking the worksheet name Chart1. Type Closing Prices as the new name and hit Enter.
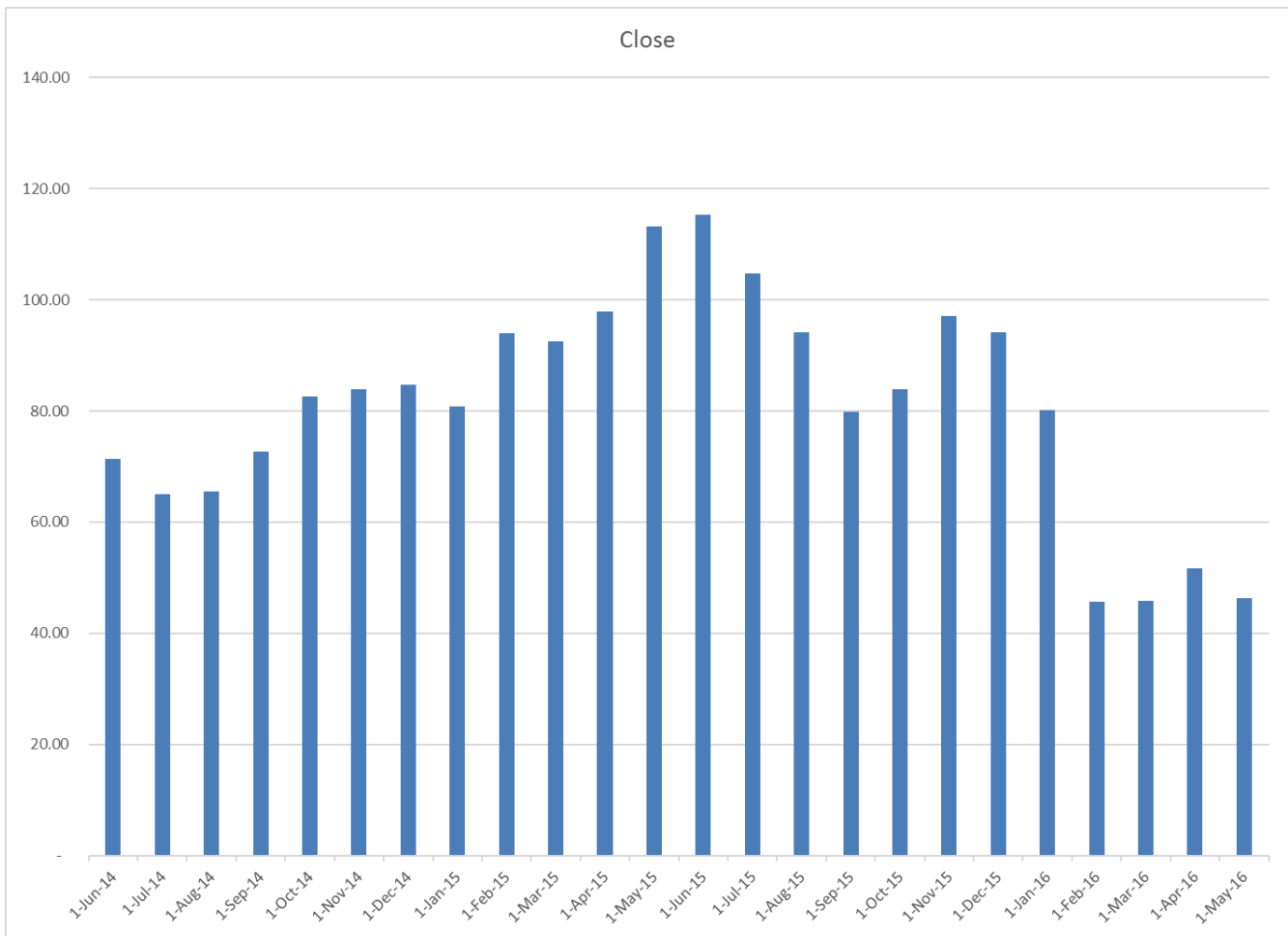5. Save your work.

Figure 4.11 Instant Chart

FREQUENCY DISTRIBUTION: COLUMN CHART 1

A column chart is commonly used to show trends over time, as long as the data are limited to approximately twenty points or less. A common use for column charts is frequency distributions. A frequency distribution shows the number of occurrences by established categories. For example, a common frequency distribution used in most academic institutions is a grade distribution. A grade distribution shows the number of students that achieve each level of a typical grading scale (A, A–, B+, B, etc.). The Grade Distribution worksheet contains final grades for some hypothetical Excel classes. To show the grade frequency distribution for all the Excel classes in that year, the numbers of students appear on the Y axis and the grade categories appear on the X axis. The number of students for this chart is in Column C. The labels for grades are in Column A. The following steps explain how to create this chart:

1. Select the Grade Distribution worksheet.
2. Change the years in Row3 to the current academic term and year.
3. Highlight the range **A3:A8** on the **Grade Distribution** worksheet. Column A shows the grade categories.
4. Hold down the **Crtl key**.
5. Without letting go of the **Ctrl key**, select **C3:C8**

6. Click the **Column** button in the **Charts** group section on the **Insert** tab of the ribbon. Select the first option in the 2-D Column section, which is the **Clustered Column** format.
7. Click and drag the chart so the upper left corner is in the middle of cell **H2**.
8. Resize the chart so the left side is locked to the left side of Column H, the right side is locked to the right side of Column O, the top is locked to the top of Row 2, and the bottom is locked to the bottom of Row 16.
9. If Excel displays a legend, delete it by clicking the legend one time and pressing the **DELETE** key on the keyboard. Since the chart presents only one data series, the legend is not necessary.
10. Add the text **Final Grades for** to the chart title. The chart title should now be **Final Grades for All Excel Classes 2016/2017** (or whichever academic year you are using).
11. Click any cell location on the **Grade Distribution** worksheet to deactivate the chart.
12. Save your work.

Figure 4.12 shows the completed grade frequency distribution chart. By looking at the chart, you can immediately see that the greatest number of students earned a final grade in the B+ to B– range.
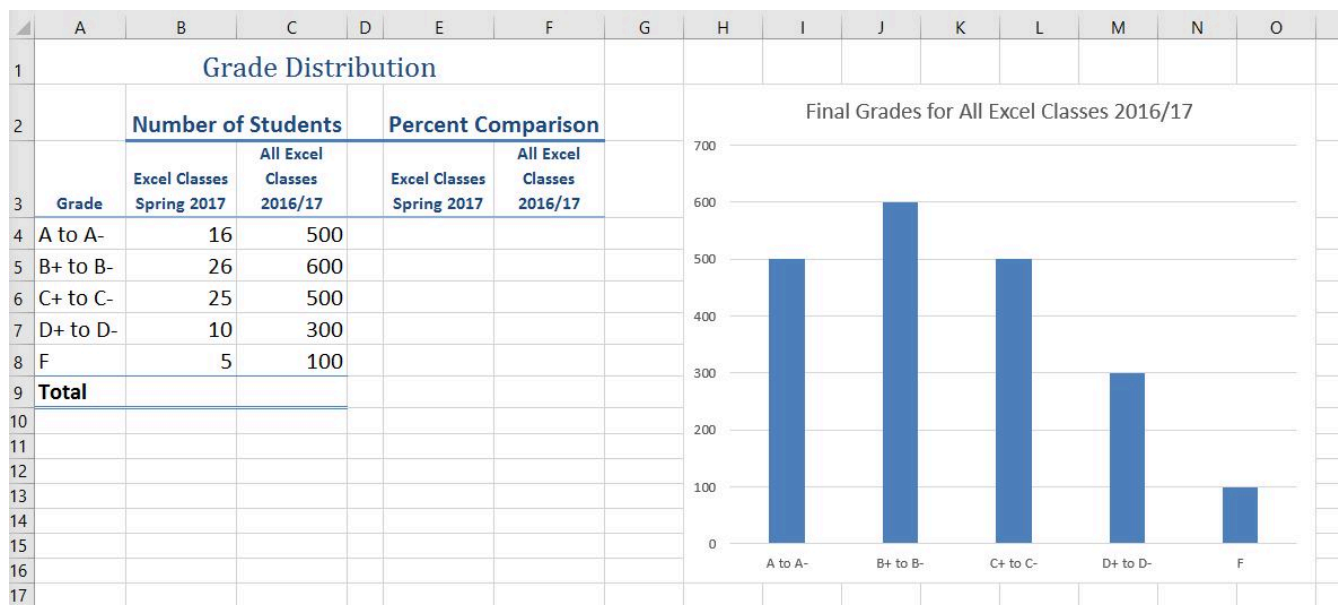

Figure 4.12 Grade Frequency Distribution Chart

CREATING A CHART SHEET

The charts we have created up to this point have been added to, or embedded in, an existing worksheet (with the exception of the Instant Chart we created using F11). Charts can also be placed in a dedicated worksheet called a chart sheet. It is called a chart sheet because it can only contain an Excel chart. Chart sheets are useful if you need to create several charts using the data in a single worksheet. If you embed several charts in one worksheet, it can be cumbersome to navigate and browse through the charts. It is easier to browse through charts when they are moved to a chart sheet because a separate sheet tab is added to the workbook for each chart. The following steps explain how to move the grade frequency distribution chart to a dedicated chart sheet:

1. Click anywhere on the **Final Grades for All Excel Classes** chart on the Grade Distribution worksheet.
2. Right click on the chart. Select **Move Chart . . .** This opens the Move Chart Dialog box.
3. Click the **New sheet** option on the Move Chart dialog box. (The top option.)
4. The entry in the input box for assigning a name to the chart sheet tab should automatically be highlighted once you click the New sheet option. Type **All Excel Classes.** This replaces the generic name in the input box (see **Figure 4.13**).
5. Click the **OK** button at the bottom of the Move Chart dialog box. This adds a new chart sheet to the workbook with the name **All Excel Classes**.
6. Save your work.

Why?

Column Chart vs. Bar Chart

When using charts to show frequency distributions, the difference between a column chart and a bar chart is really a matter of preference. Both are very effective in showing frequency distributions. However, if you are showing a trend over a period of time, a column chart is preferred over a bar chart. This is because a period of time is typically shown horizontally, with the oldest date on the far left and the newest date on the far right. Therefore, the descriptive categories for the chart would have to fall on the horizontal – or category axis, which is the configuration of a column chart. On a bar chart, the descriptive categories are displayed on the vertical axis.
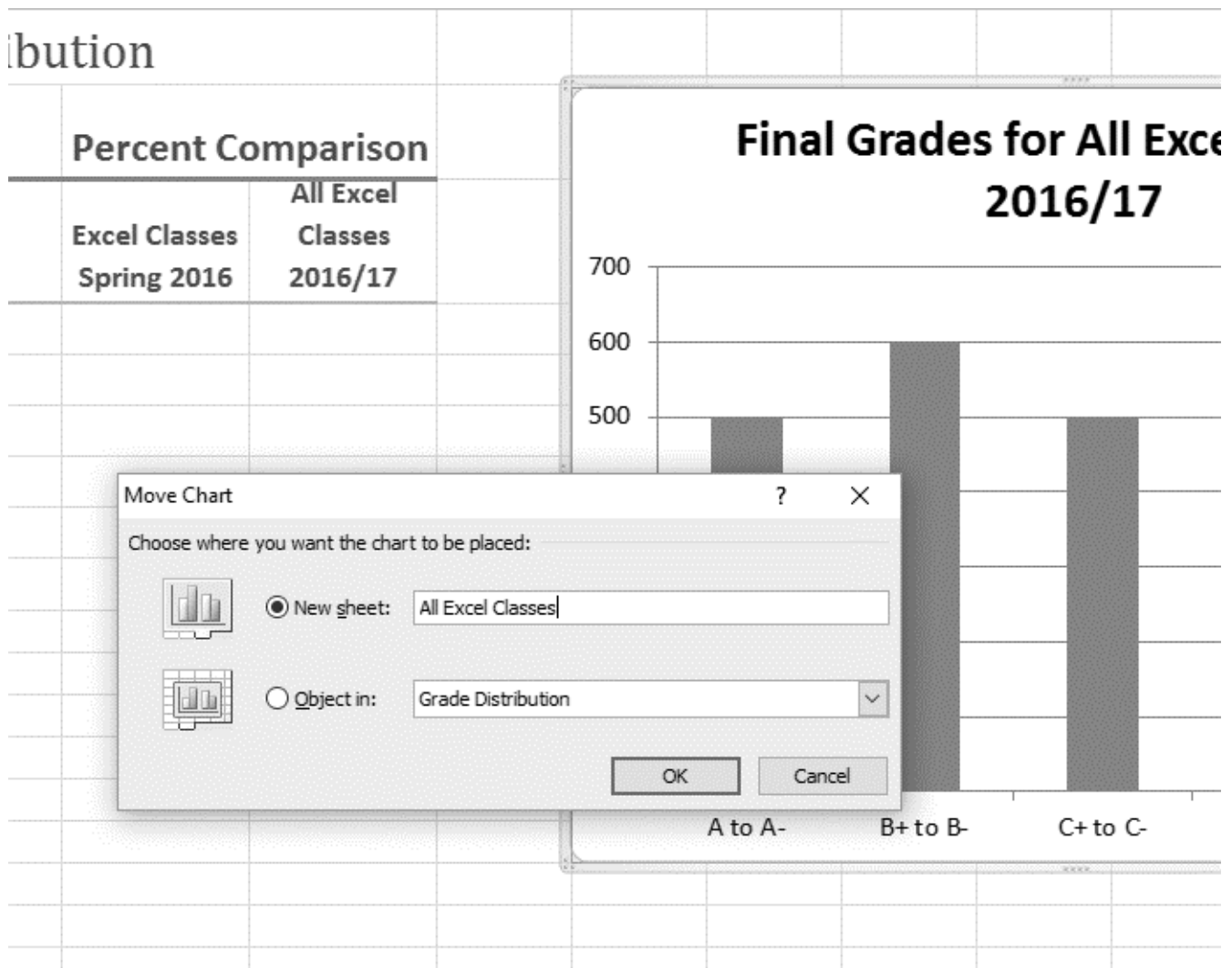
ibution

Percent Comparison

	Excel Classes Spring 2016	All Excel Classes 2016/17

Final Grades for All Exce
2016/17

700
600
500

A to A-   B+ to B-   C+ to C-

Move Chart ? ✕

Choose where you want the chart to be placed:

⦿ New sheet: All Excel Classes

◯ Object in: Grade Distribution ⌄

OK   Cancel

Figure 4.13 Moving a Chart to a Chart Sheet

Figure 4.14 shows the Final Grades for the all the Excel Classes column chart is in a separate chart sheet. Notice the new worksheet tab added to the workbook matches the New sheet name entered into the Move Chart dialog box. Since the chart is moved to a separate chart sheet, it no longer is displayed in the Grade Distribution worksheet.
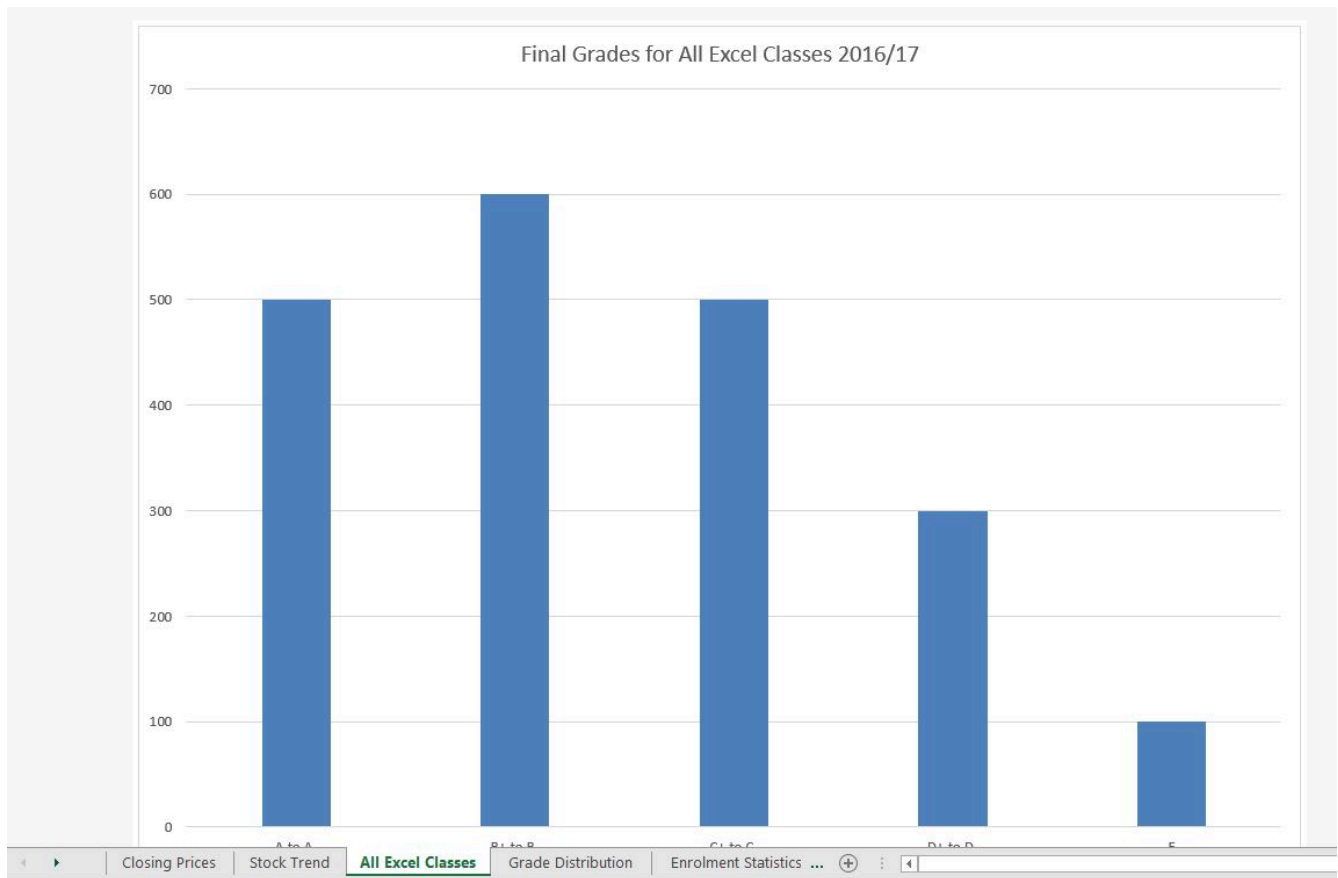
Figure 4.14 Chart Sheet Added to the Workbook

FREQUENCY COMPARISON: COLUMN CHART 2

We will create a second column chart to show a comparison between two frequency distributions. Column B on the Grade Distribution worksheet contains data showing the number of students who received grades within each category for the Spring Quarter. We will use a column chart to compare the grade distribution for Spring (Column B) with the overall grade distribution for the whole year (Column C).

However, since the number of students in the term is significantly different from the total number of students in the year, we must calculate percentages in order to make an effective comparison. The following steps explain how to calculate the percentages:

1. Highlight the range **B9:C9** on the **Grade Distribution** worksheet.
2. Click the **AutoSum** button in the Editing group of commands on the Home tab of the ribbon. This automatically adds SUM functions that sum the values in the range B4:B8 and C4:C8.
3. Activate cell **E4** on the Grade Distribution worksheet.
4. Enter a formula that divides the value in cell **B4** by the total in cell **B9**. Add an absolute reference to cell **B9** in the formula =**B4/$B$9**.
5. Copy the formula in cell **E4** and paste it into the range **E5:E8** using the Paste command. Or, use the Fill Handle to copy the calculation in **E4** all the way down to **E8**.
6. Activate cell **F4** on the Grade Distribution worksheet.

7. Enter a formula that divides the value in cell **C4** by the total in cell **C9**. Add an absolute reference to cell **C9** in the formula =**C4/$C$9**.
8. Copy the formula in cell **F4** and paste it into the range **F5:F8** using the Paste command. Or, use the Fill Handle to copy the calculation in **E4** all the way down to **E8**.

F4			f_x	=C4/$C$9			
	A	**B**	**C**	**D**	**E**	**F**	**G**
1			Grade Distribution				
2			Number of Students		Percent Comparison		
3	Grade	Excel Classes Spring 2016	All Excel Classes 2016/17		Excel Classes Spring 2016	All Excel Classes 2016/17	
4	A to A-	16	500		20%	25%	
5	B+ to B-	26	600		32%	30%	
6	C+ to C-	25	500		30%	25%	
7	D+ to D-	10	300		12%	15%	
8	F	5	100		6%	5%	
9	Total	82	2000				
10							
11							

Figure 4.15 Completed Grade Distribution Percentages

Figure 4.15 shows the completed percentages added to the Grade Distribution worksheet.

The column chart we are going to create uses the grade categories in the range A4:A8 on the X axis and the percentages in the range E4:F8 on the Y axis. This chart uses data that is not in a contiguous range, so we need to use the Ctrl key to select the ranges of cells.

1. Select **A3:A8,** hold down the **Ctrl** key and select **E3:F8.**
2. Click the **Insert** tab of the ribbon.
3. Click the **Column** button in the **Charts** group of commands. Select the first option from the drop-down list of chart formats, which is the **Clustered Column**.
4. Click and drag the chart so the upper left corner is in the middle of cell **H2**.
5. Resize the chart so the left side is locked to the left side of Column H, the right side is locked to the right side of Column N, the top is locked to the top of Row 2, and the bottom is locked to the bottom of Row 16.
6. Change the chart title to **Grade Distribution Comparison**. If you do not have a chart title, you

can add one. On the **Design** tab, select **Add Chart Element**. Find the **Chart Title**. Select the **Above Chart** option from the drop-down list.
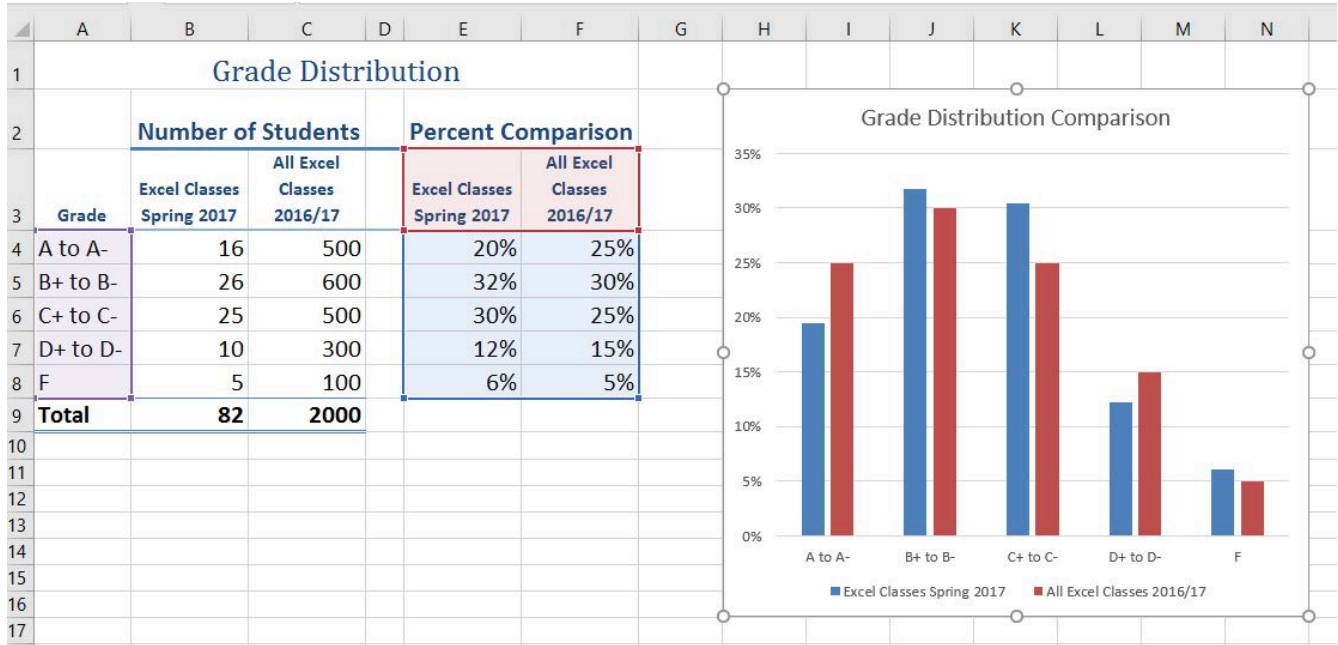
7. Save your work.

Figure 4.16 Completed Data Series for the Class Grade Distribution

Figure 4.17 shows the final appearance of the column chart. The column chart is an appropriate type for this data because there are fewer than twenty data points and we can easily see the comparison for each category. An audience can quickly see that the class issued fewer As compared to the college. However, the class had more Bs and Cs compared with the college population.
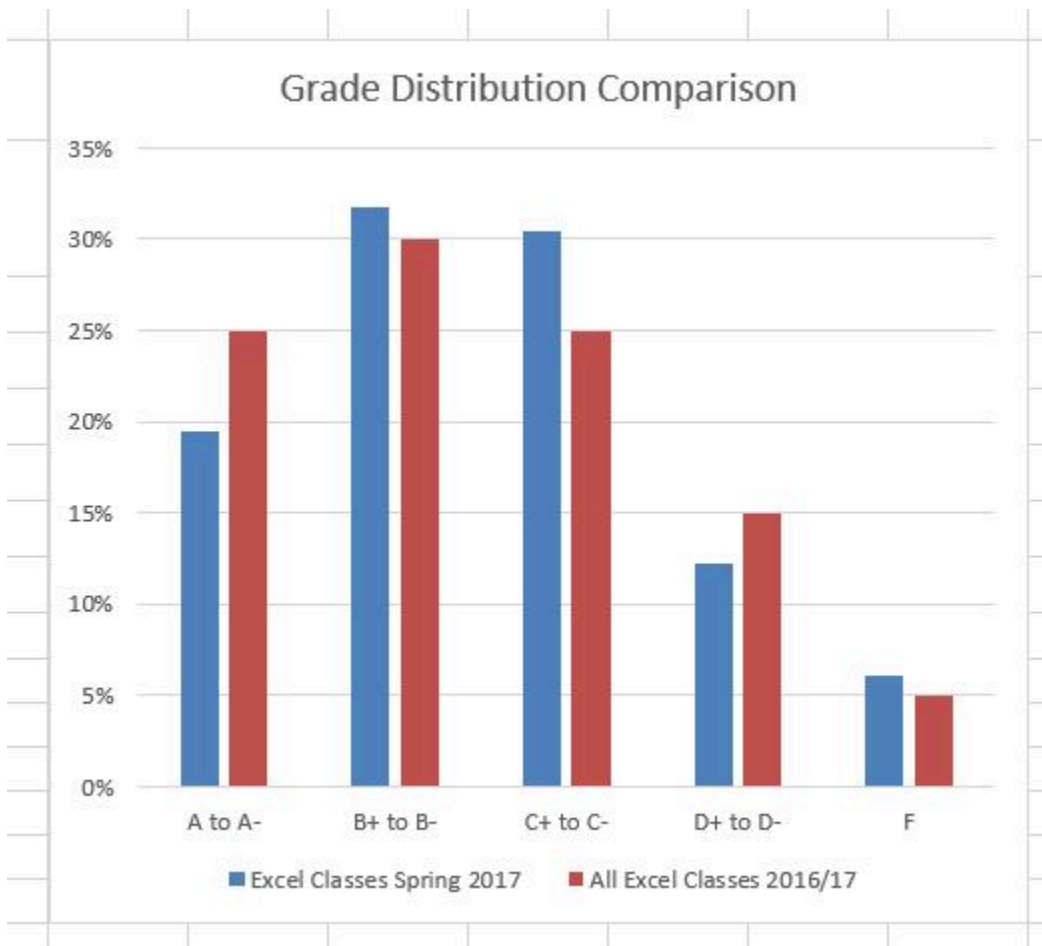
Figure 4.17 Completed Grade Distribution Column Chart

Integrity Check

Too Many Bars on a Column Chart?

Although there is no specific limit for the number of bars you should use on a column chart, a general rule of thumb is twenty bars or less. **Figure 4.18** contains a total of thirty-two bars. This is considered a poor use of a column chart because it is difficult to identify meaningful trends or comparisons. The data used to create this chart might be better used in two or three different column charts, each with a distinct idea or message.
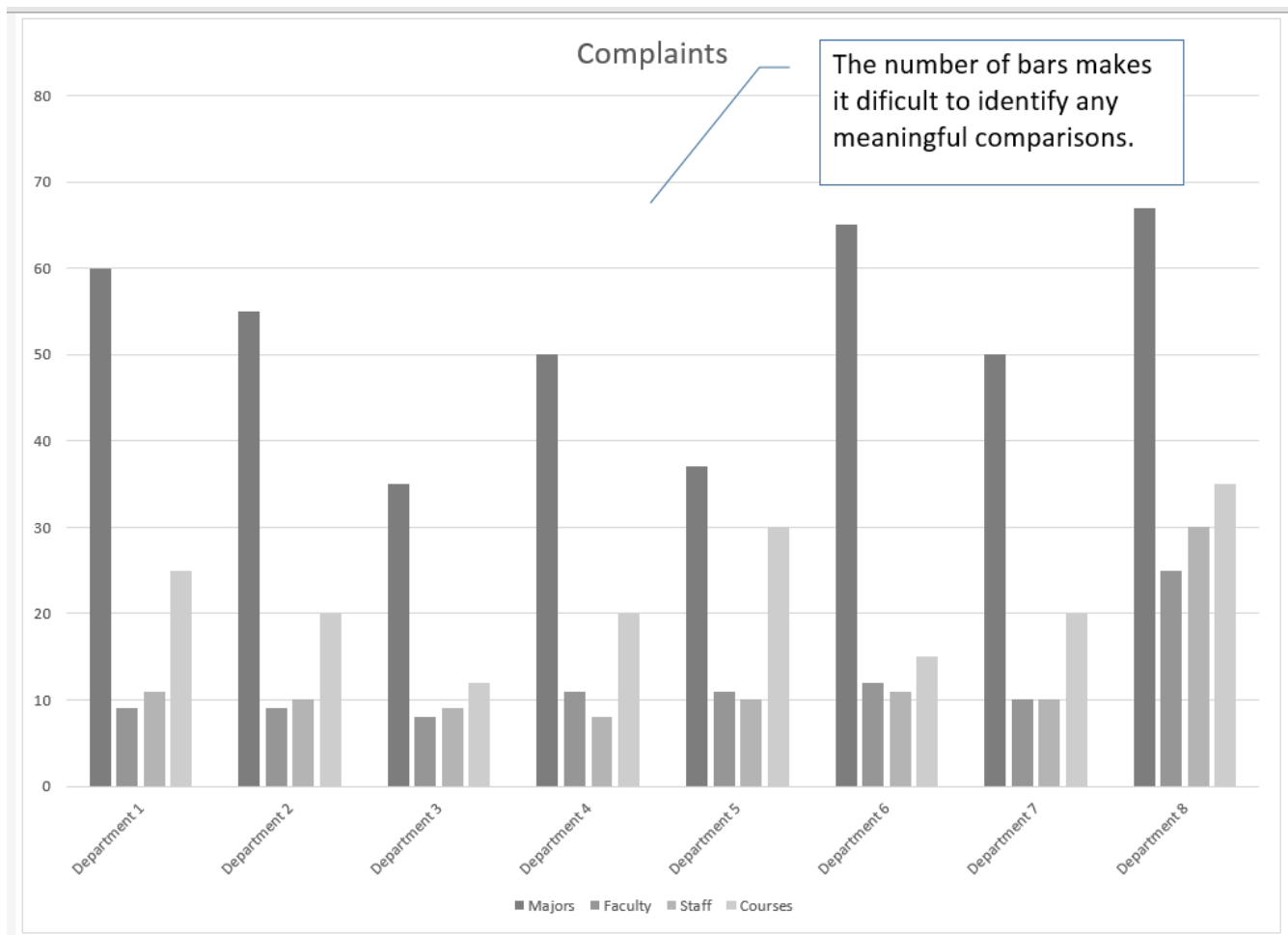
Figure 4.18 Poor Use of a Column Chart

PERCENT OF TOTAL: PIE CHART

The next chart we will demonstrate is a pie chart. A pie chart is used to show a percent of total for a data set at a specific point in time. The data we will use to demonstrate a pie chart is related to enrollment data for Portland Area Community Colleges for Fall of 2014. You will find that data on the Enrollment Statistics sheet.

1. Highlight the range **A2:B6** on the **Enrollment Statistics** worksheet.
2. Click the **Insert** tab of the ribbon.
3. Click the **Pie** button in the **Charts** group of commands.
4. Select the first "**2-D Pie**" option from the drop-down list of options.
5. To make the "slices" stand out better, "explode" the pie chart.

   ◦ Click and hold the mouse button down in any of the slices of the pie.

   ◦ Note that you have selection handles on all of the pie slices.

   ◦ Without letting go of your mouse button; drag one of the slices away from the center.

   ◦ All of the slices "explode" out from the center.

1. Click off the slices and into the white canvas to deselect the pie and select the entire chart.
2. Click and drag the pie chart so the upper left corner is in the middle of cell E2.
3. Resize the pie chart so the left side is locked to the left side of Column E, the right side is locked to the right side of Column L, the top is locked to the top of Row 2, and the bottom is locked to the bottom of Row 10 (see **Figure 4.19**).
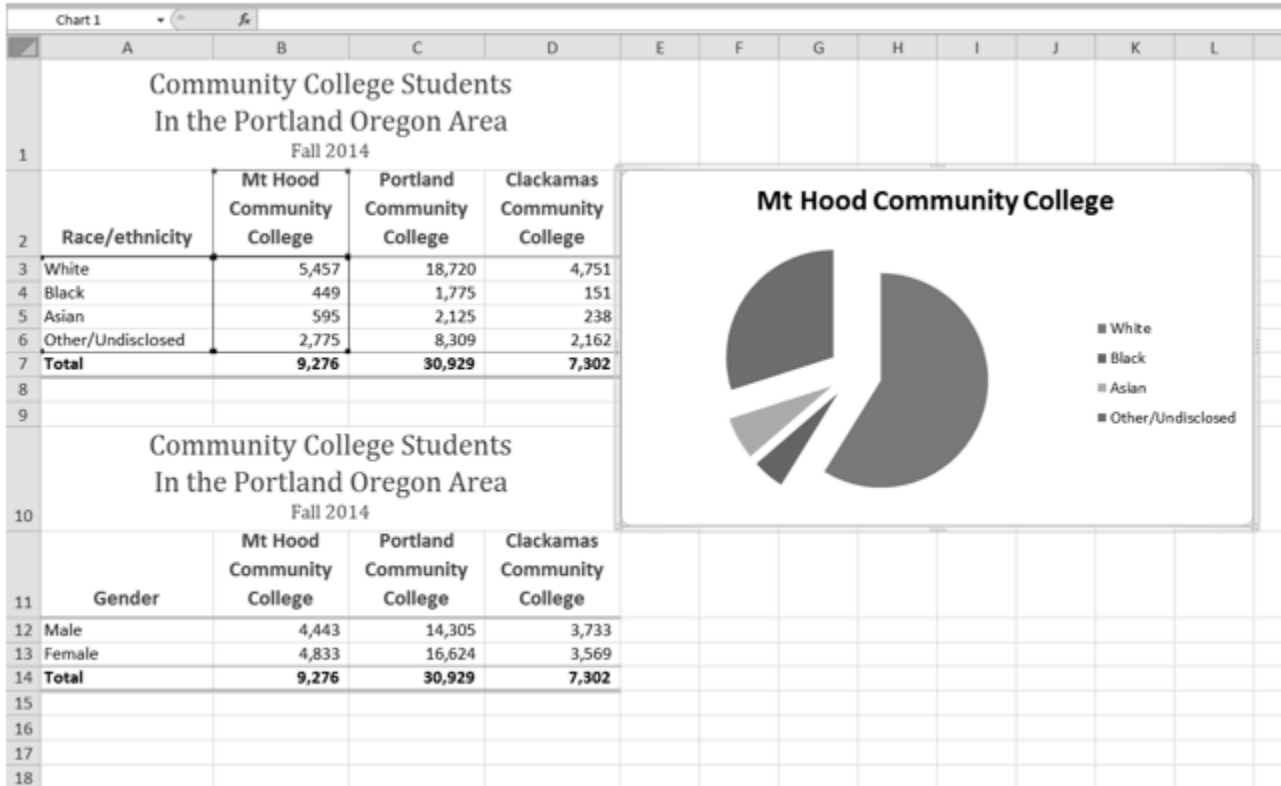

Figure 4.19 Pie Chart Moved and Resized

1. Click the chart **legend** once and press the **DELETE** key on your keyboard. A pie chart typically shows labels next to each slice. Therefore, the legend is not needed.
2. Right click any of the slices in the pie chart, and select **Add Data Labels** from the list. This will add the values for each of the slices in the pie.
3. Now, you can right click one of the numbers and select **Format Data Labels** from the list. This will open the **Format Data Labels** pane on the right.
4. Check the boxes for **Category Name** and **Percentage** in the **Label Options** section in the

Note: if you let go of the mouse button before dragging, you may only get one slice to move when you drag it out from the center. This can be another option for displaying your data. Use the Undo button to undo this if you want to try again.

Format Data Labels pane. This will add the Race/ethnicity labels as well as the percentage data to the pie chart.

5. Uncheck the box next to the **Value** box. This will remove the numbers from the pie chart (see **Figure 4.20**).

6. Click the **Close** button at the top of the Format Data Labels pane.

7. Select the data labels again (if needed). Click the **Home** tab of the ribbon and then click the **Bold** button. This will bold the data labels on the pie chart.
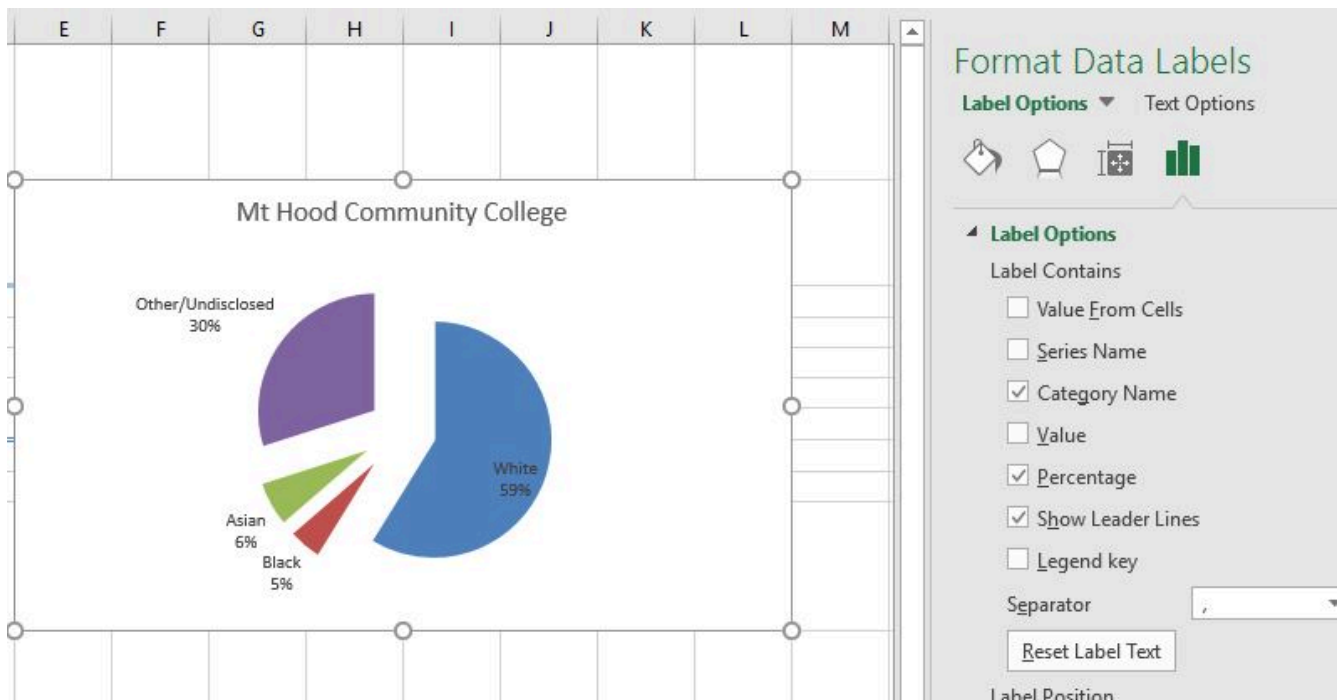
8. Save your work.

Figure 4.20 Final Settings in the Format Data Labels Pane

Although there are no specific limits for the number of categories you can use on a pie chart, a good rule of thumb is ten or less. As the number of categories exceeds ten, it becomes more difficult to identify key categories that make up the majority of the total.
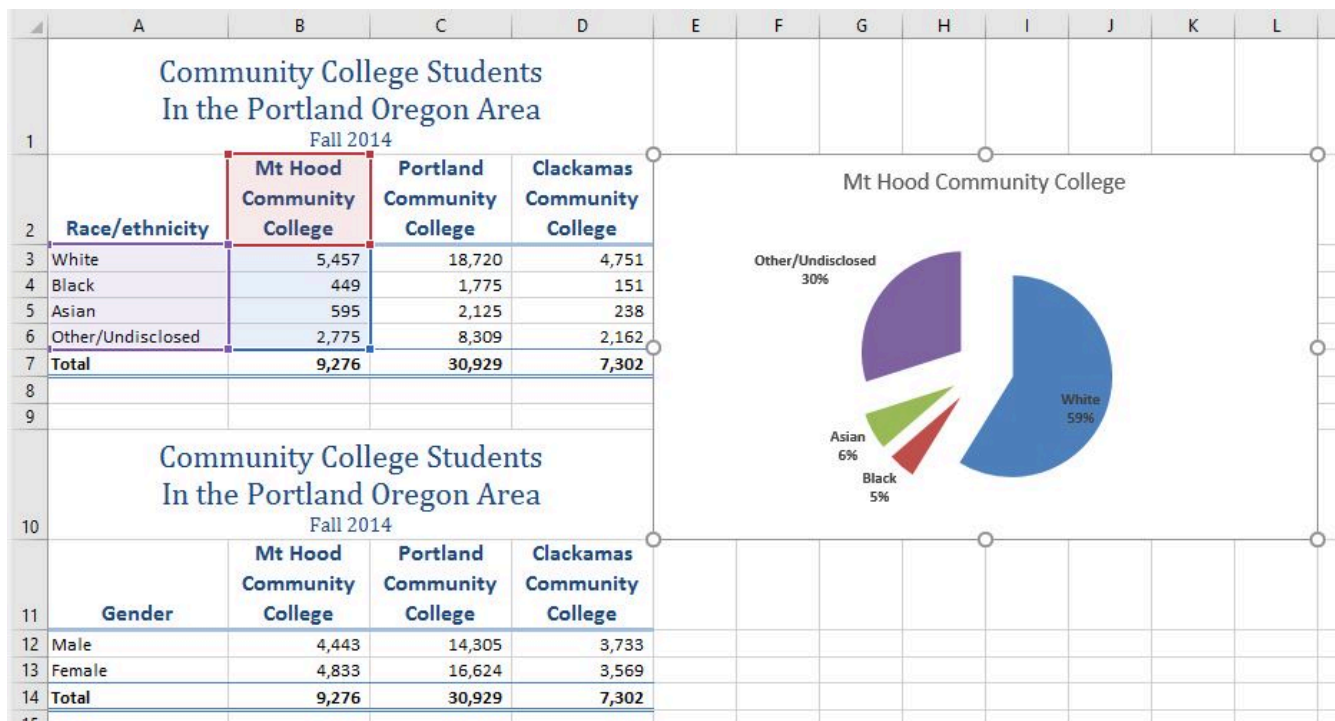
Figure 4.21 Final Enrollment Statistics Pie Chart

Skill Refresher

Inserting a Pie Chart

1. Highlight a range of cells that contain the data you will use to create the chart.
2. Click the Insert tab of the ribbon.
3. Click the Pie button in the Charts group.
4. Select a format option from the Pie Chart drop-down menu.

PERCENT OF TOTAL: STACKED COLUMN CHART

The last chart type we will demonstrate is the stacked column chart. We use a stacked column chart to show a percent of a total . For example, the data on the Enrollment Statistics worksheet shows student enrollment by race for several colleges. We would like to see all of the data on all of the colleges.

1. Highlight the range **A2:D6** on the **Enrollment Statistics** worksheet.
2. Click the **Insert** tab of the ribbon.
3. Click the **Column** button in the **Charts** group of commands. Select the **100% Stacked Column** format option from 2-D Column section in the drop-down list (see **Figure 4.22**).
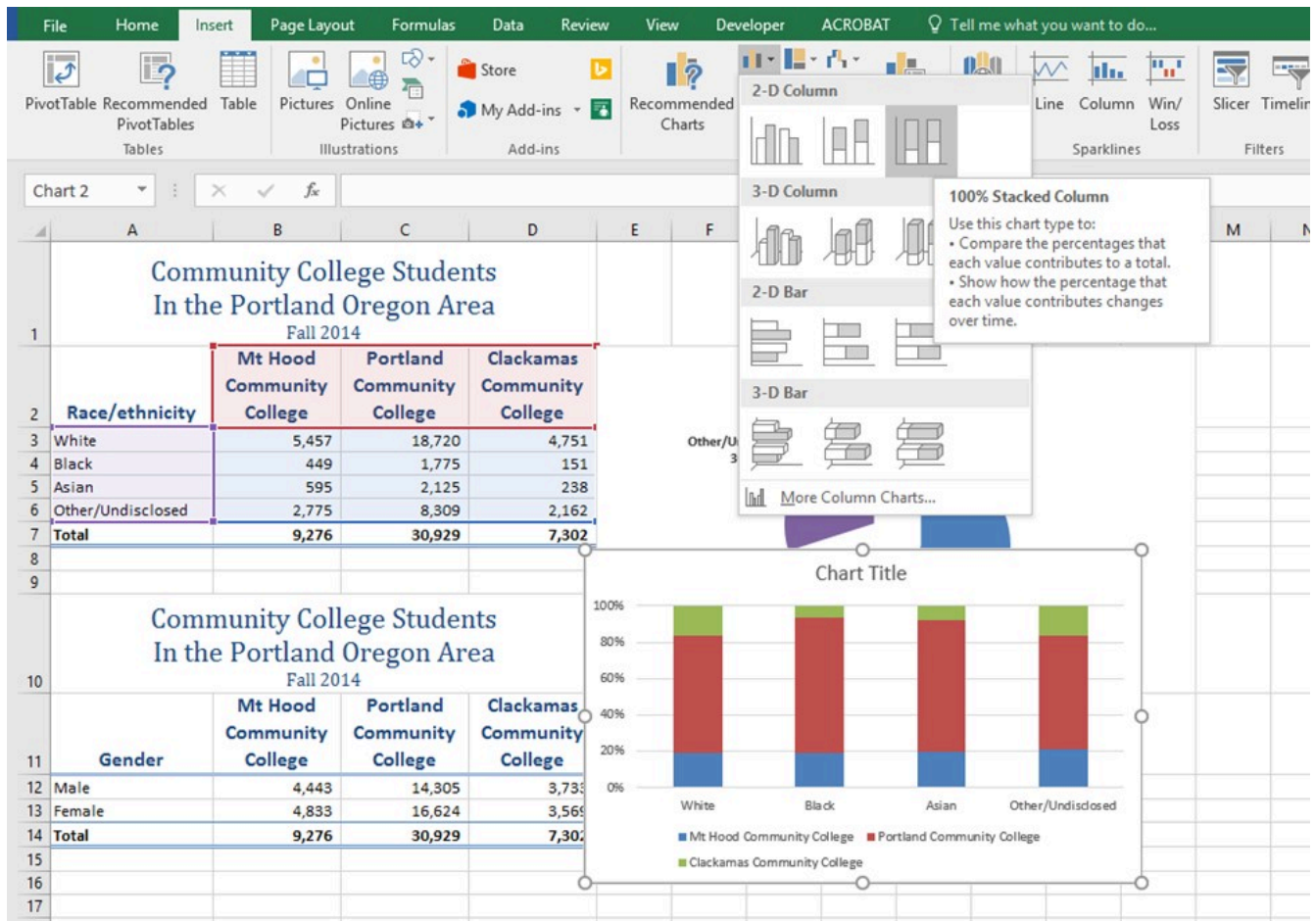
Figure 4.22 Selecting the 100% Stacked Column Chart

Figure 4.23 shows the column chart that is created after selecting the 100% Stacked Column format option. As mentioned, the goal of this chart is to show the enrollment of students by race. However, notice that Excel places the racial categories on the X axis. It would be more useful if the different colleges were there instead.
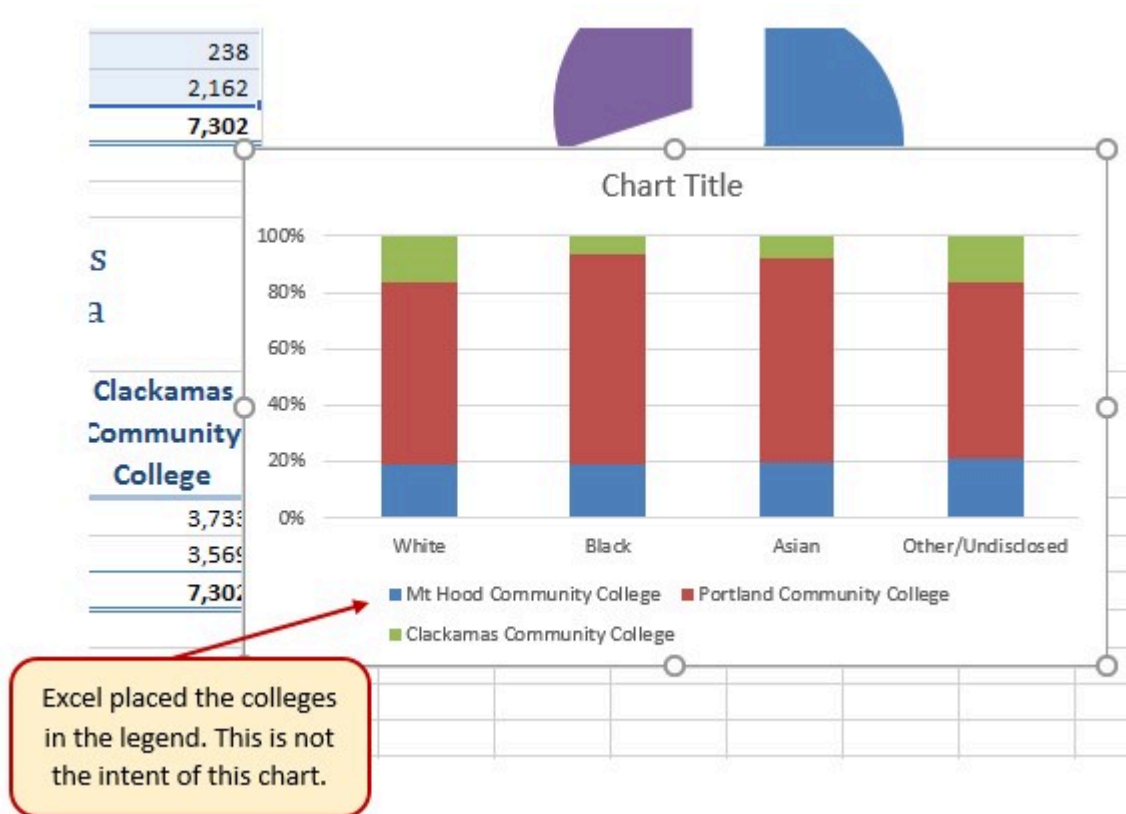
Figure 4.23 Initial Construction of the 100% Stacked Column Chart

The reason that Excel organized the data this way is that there are more Race/ethnicity categories (data in column A) than there are colleges (data in row 2). Not a bad guess. But, not what we wanted in this case.

The remaining steps explain how to correct this problem and complete the chart:

1. Click the **Switch Row/Column** button in the **Design** tab on the **Chart Tools** section of the ribbon. This reverses the legend and current X axis categories.
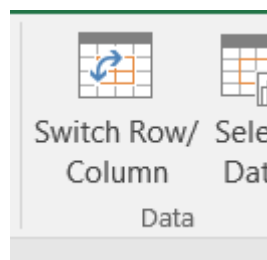
Figure 4.24 Switch Row/Column.

2. Click and drag the chart so the upper left corner is in the middle of cell **E12**.
3. Resize the chart so the left side is locked to the left side of Column E, the right side is locked to

the right side of Column N, the top is locked to the top of Row 12, and the bottom is locked to the bottom of Row 30.

4. Click the **legend** one time and press the **DELETE** key on your keyboard.

5. **Add a Data Table**. This is another way of displaying a legend for a column chart along with the numerical values that make up each component.

   ◦ In earlier versions of Excel, find the **Labels** group of commands and select the **Show Data Table** with **Legend Keys** option from the drop-down menu.

   ◦ In Excel 2016, find the **Add Chart Element** tool on the **Design** tab, select **Data Table With Legend Keys**

6. Change the Chart Title to **Enrollment by Race**.

   ◦ If there is no chart title, you will need to add one using the **Add Chart Element** tool on the **Design** tab.

7. Save your work.

Figure 4.25 shows the final stacked column chart. Notice the similarities and differences in the enrollment at the local community colleges.
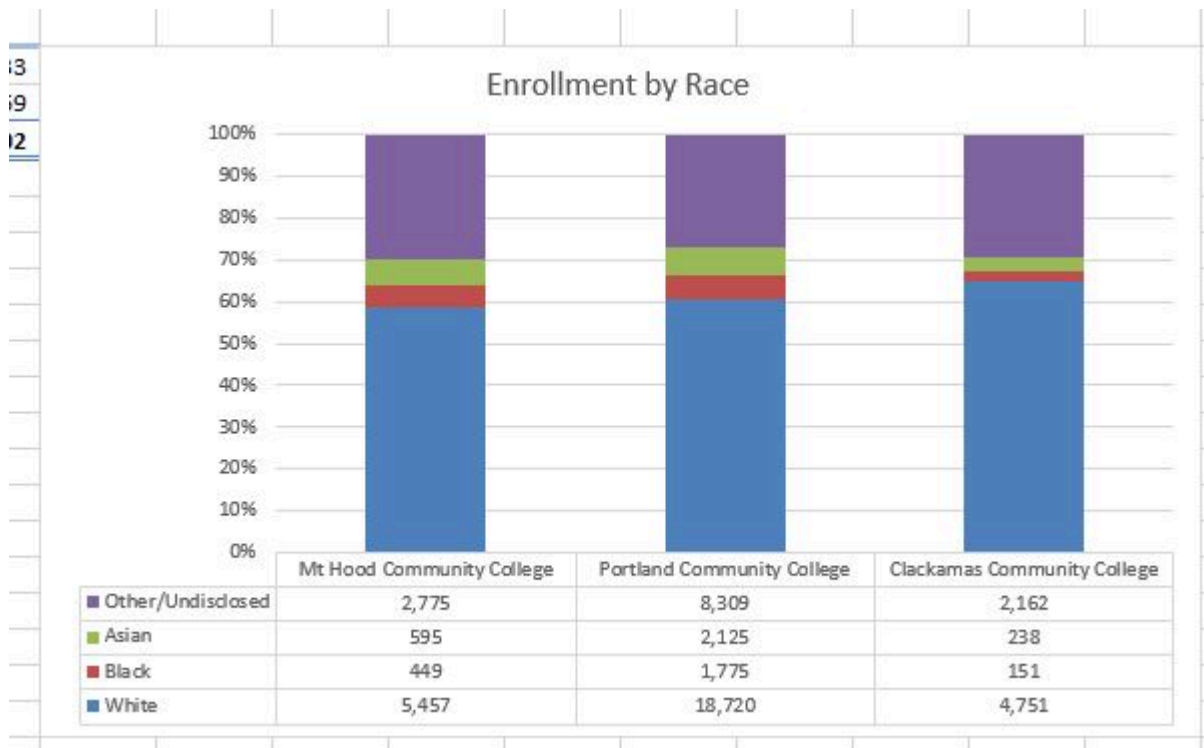

Figure 4.25 Final 100% Stacked Column Chart

Skill Refresher:

Inserting a Stacked Column Chart

1. Highlight a range of cells that contain data that will be used to create the chart.
2. Click the Insert tab of the ribbon.
3. Click the Column button in the Charts group.
4. Select the Stacked Column format option from the Column Chart drop-down menu to show the values of each category on the Y axis. Select the 100% Stacked Column option to show the percent of total for each category on the Y axis.

Key Takeaways

- Identifying the message you wish to convey to an audience is a critical first step in creating an Excel chart.

- Both a column chart and a line chart can be used to present a trend over a period of time. However, a line chart is preferred over a column chart when presenting data over long periods of time.

- The number of bars on a column chart should be limited to approximately twenty bars or less.

- When creating a chart to compare trends, the values for each data series must be within a reasonable range. If there is a wide variance between the values in the two data series (two times or more), the percent change should be calculated with respect to the first data point for each series.

- When working with frequency distributions, the use of a column chart or a bar chart is a matter of preference. However, a column chart is preferred when working with a trend over a period of time.

- A pie chart is used to present the percent of total for a data set.

- A stacked column chart is used to show how a percent total changes over time.

ATTRIBUTION

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4.2 FORMATTING CHARTS

<div style="border:1px solid #000; padding:1em;">

Learning Objectives

1. Apply formatting commands to the X and Y axes.
2. Enhance the visual appearance of the chart title and chart legend by using various formatting techniques.
3. Assign titles to the X and Y axes that clarify labels and numeric values for the reader.
4. Apply labels and formatting techniques to the data series in the plot area of a chart.
5. Apply formatting commands to the chart area and the plot area of a chart.
6. Employ series lines and annotations to enhance trends and provide additional information on a chart.

</div>

You can use a variety of formatting techniques to enhance the appearance of a chart once you have created it. Formatting commands are applied to a chart for the same reason they are applied to a worksheet: they make the chart easier to read. However, formatting techniques also help you qualify and explain the data in a chart. For example, you can add footnotes explaining the data source as well as notes that clarify the type of numbers being presented (i.e., if the numbers in a chart are truncated, you can state whether they are in thousands, millions, etc.). These notes are also helpful in answering questions if you are using charts in a live presentation. We will demonstrate these formatting techniques using the column chart and stacked column chart from the previous section.

X AND Y AXIS FORMATS

There are numerous formatting commands we can apply to the X and Y axes of a chart. Although adjusting the font size, style, and color are common, many more options are available through the Format Axis pane. The following steps demonstrate a few of these formatting techniques on the **Grade Distribution Comparison** chart:

1. Switch to the **Grade Distribution** worksheet and click anywhere along the X axis (horizontal axis) of the Grade Distribution Comparison chart.
2. Right click and select Font.
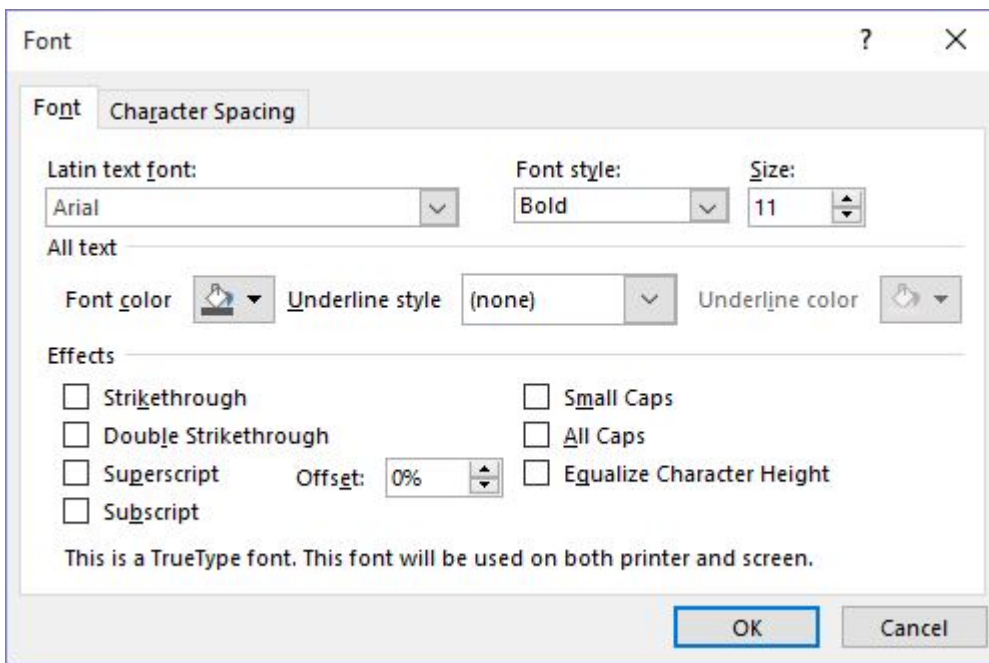3. Change the font to Arial, the Font Style to Bold, and the Size to 11 (see **Figure 4.26**).

Figure 4.26 Font Dialog Box

4. Click anywhere along the Y axis to activate it and repeat steps 2 and 3.
5. Click on the chart title and repeat steps 2 and 3, but set the Size to 14.
6. The final appearance of the axes is shown in Figure **4.27 Formatted X & Y Axes.**
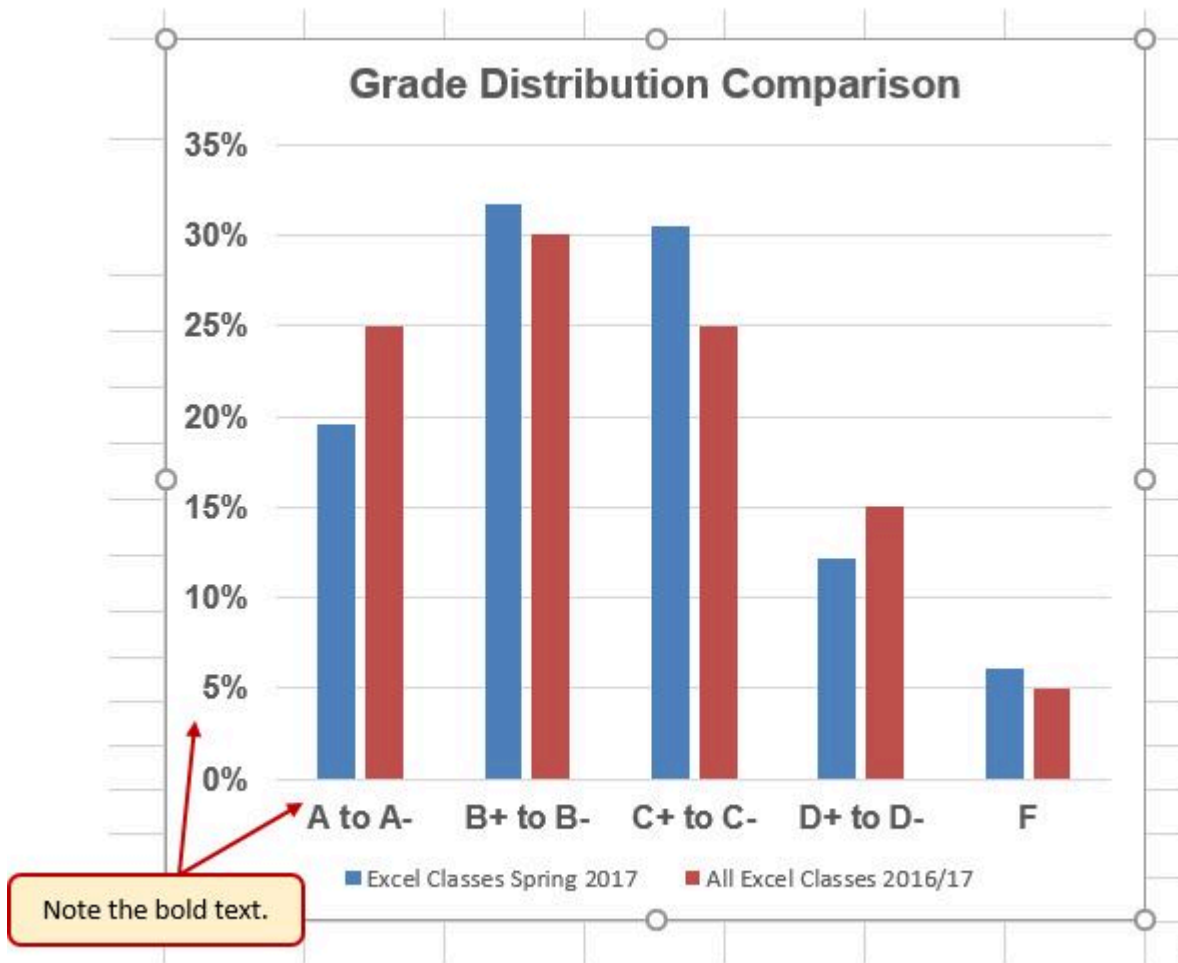
Figure 4.27 Formatted X and Y Axes

Next we want to make some changes to the percentage numbers on the Y (vertical) axis.

1. Right click the vertical (value) axis. Select **Format Axis**. This opens the **Format Axis** pane.
2. Click **Number** from the list of options. The commands in this section of the **Format Axis** pane are used to format numbers that appear on the selected axis of the chart.
3. Click in the Decimal places input box and change the value to **1.**
4. Select **Axis Options**. Change the **Minimum Bound** to **.05** to make the differences in the columns more dramatic. The Format Axis pane should match **Figure 4.28**.
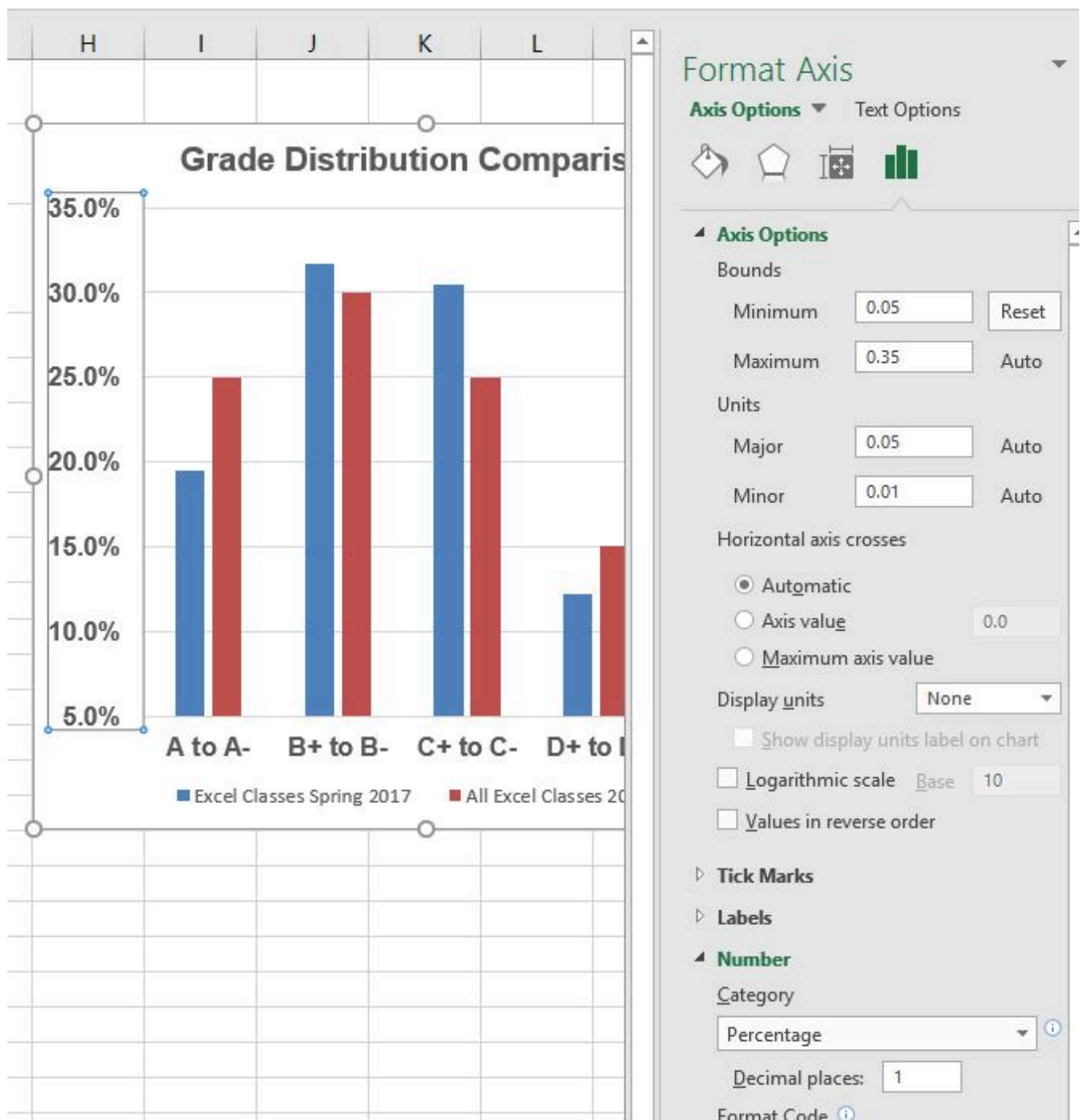5. Click the **Close** button at the top of the Format Axis pane.
6. Save your work.

Figure 4.28 Format Axis Pane changes

Note: Experiment! You can also change font styling using shortcut keys and the buttons on the **Home tab.**

Formatting the X and Y Axes

1. Click anywhere along the X or Y axis to activate it.
2. Click either the Home tab or Design tab of the ribbon.
3. Select any of the available formatting commands in these tabs.

X and Y Axis Number Formats

1. Click anywhere along the X or Y axis to activate it.
2. Click the Layout tab in the Chart Tools section of the ribbon.
3. Click the Format Selection button in the Current Selection group of commands.
4. Click Number from the list of options on the left side of the Format Axis dialog box.
5. Select a number format and set decimal places on the right side of the Format Axis dialog box.
6. Click the Close button in the Format Axis pane.

CHART LEGEND AND TITLE FORMATS

The next items we will format on the Grade Distribution Comparison chart are the chart legend and title. Similar to the how we formatted the X and Y axes, we can format these items by activating them and using the formatting commands in the Home tab or the Format pane. The following steps explain how to add these formats:

1. Right click the legend on the **Grade Distribution Comparison** chart and select **Format Legend**.
2. Select **Right** in the Legend Position options. Close the Format Legend pane.
3. Move the legend by placing your cursor – shaped like a little plus sign with four arrows – on the edge of the selection box. Click and drag the legend so the top of the legend aligns with the 35% line next to the plot area (see **Figure 4.29**).
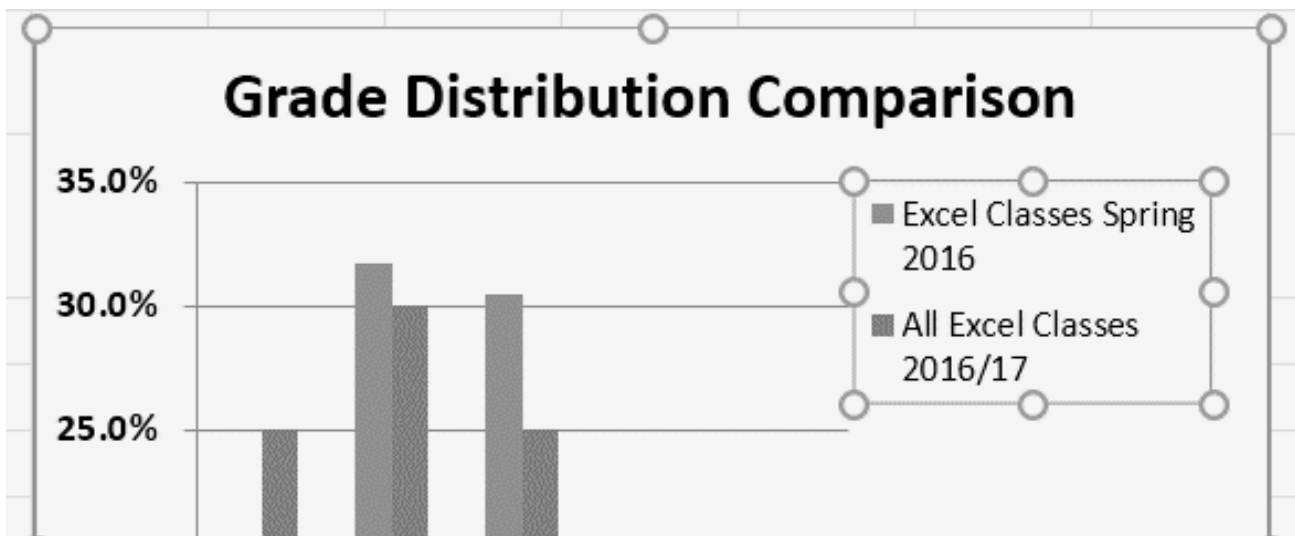
Figure 4.29 Moving the Legend

1. While the legend is still selected, change the font style in the Home tab of the ribbon to Arial.
2. Change the font size to 12 points.
3. Click the bold and italics commands in the Home tab of the ribbon.
4. Click and drag the left sizing handle so the legend is against the plot area (see **Figure 4.30**).

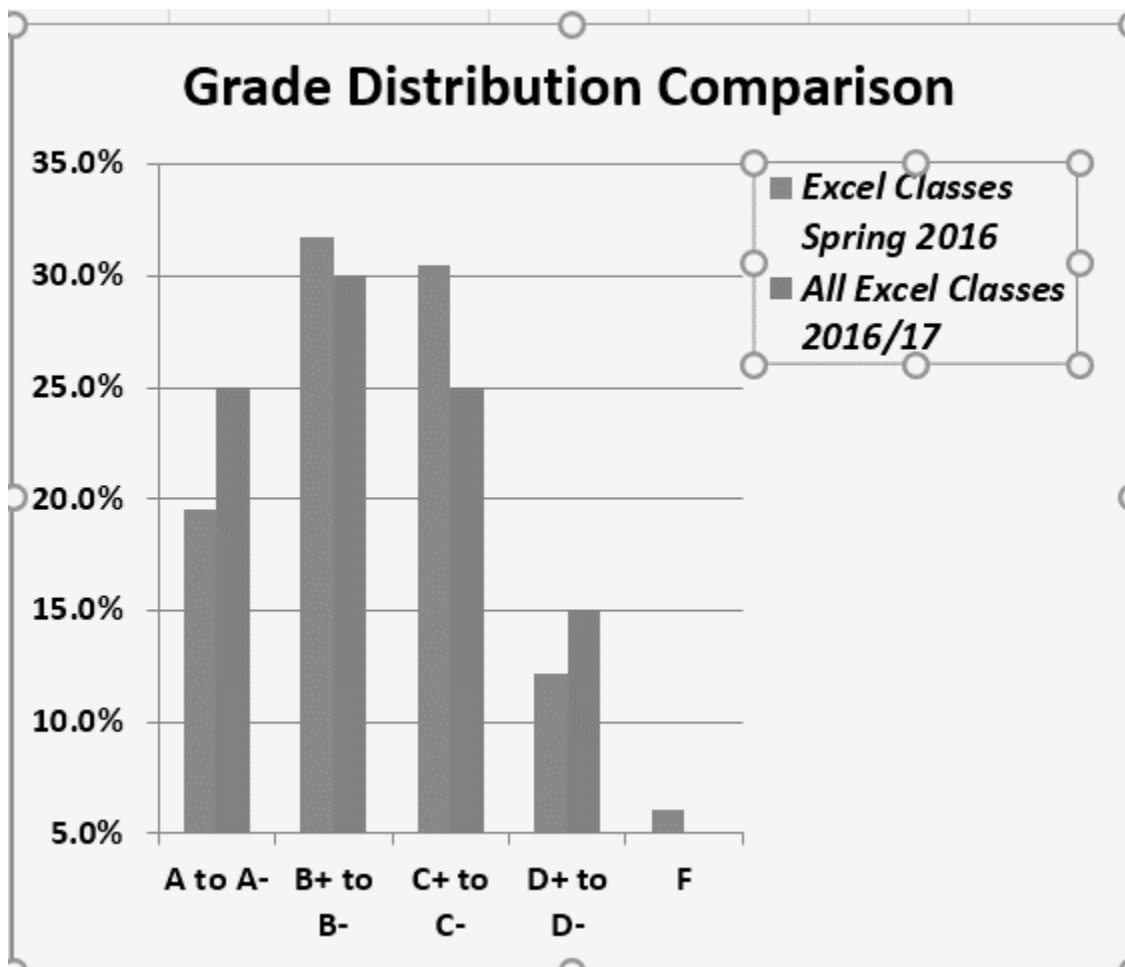## Grade Distribution Comparison

Figure 4.30 Legend Formatted and Resized

1. Click the chart title to activate it.
2. Right click on the chart title and select **Format Chart Title** to open the **Format Chart Title** pane.
3. Under **Title Options** , in the **Effects** group (the option in the middle) give your title one of the **Preset** shadows. Change the color, if you like.
4. Close the Format Chart Title pane.
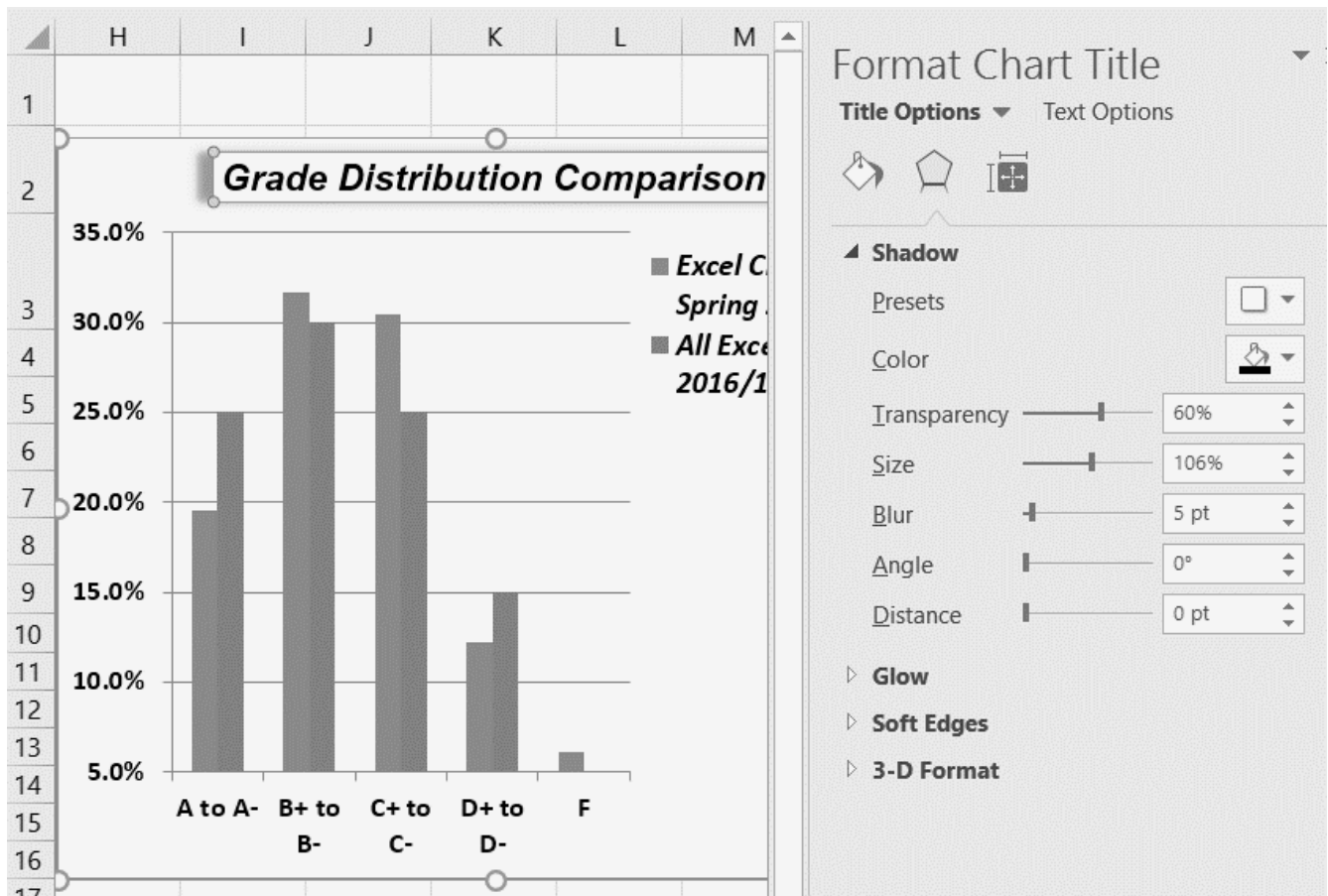5. Save your work.

Figure 4.31 Format Chart Title Pane

1. Click anywhere on the chart title.
2. Click either the Home tab or right click to activate the appropriate formatting pane.
3. Select any of the available formatting commands.

X AND Y AXIS TITLES

Titles for the X and Y axes are necessary for defining the numbers and categories presented on a chart. For example, by looking at the Grade Distribution Comparison chart, it is not clear what the percentages along the Y axis represent. The following steps explain how to add titles to the X and Y axes to define these numbers and categories:

1. Click anywhere on the Grade Distribution Comparison chart in the Grade Distribution worksheet to activate it.
2. On the **Design** tab on the ribbon select the Add Chart Element button, then Axis Titles, then Primary Vertical. (See **Figure 4.32**)
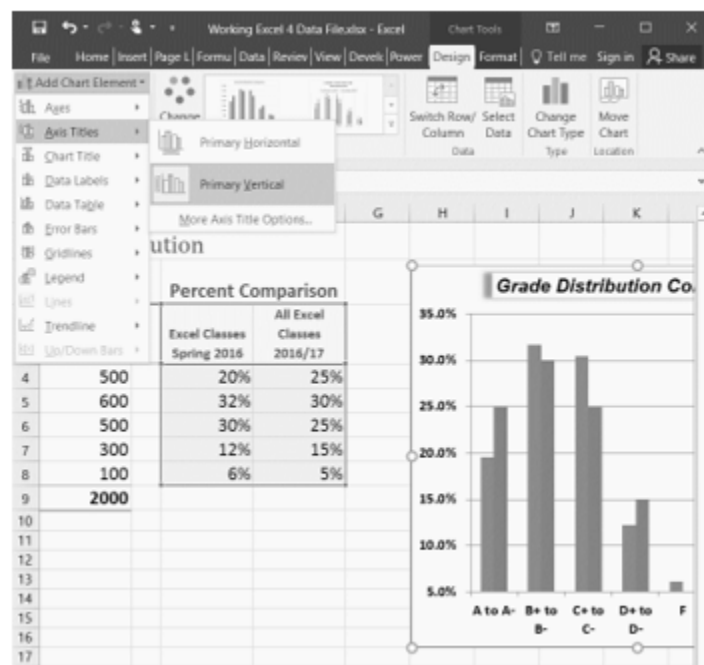

Figure 4.32 Selecting a Title for the Y Axis

3. Using the Home ribbon, change the font of the axis title to Arial, Bold, size 11.
4. Click in the beginning of the Y axis title and delete the generic title. Type Percent of Enrolled Excel Students.(see **Figure 4.33**).
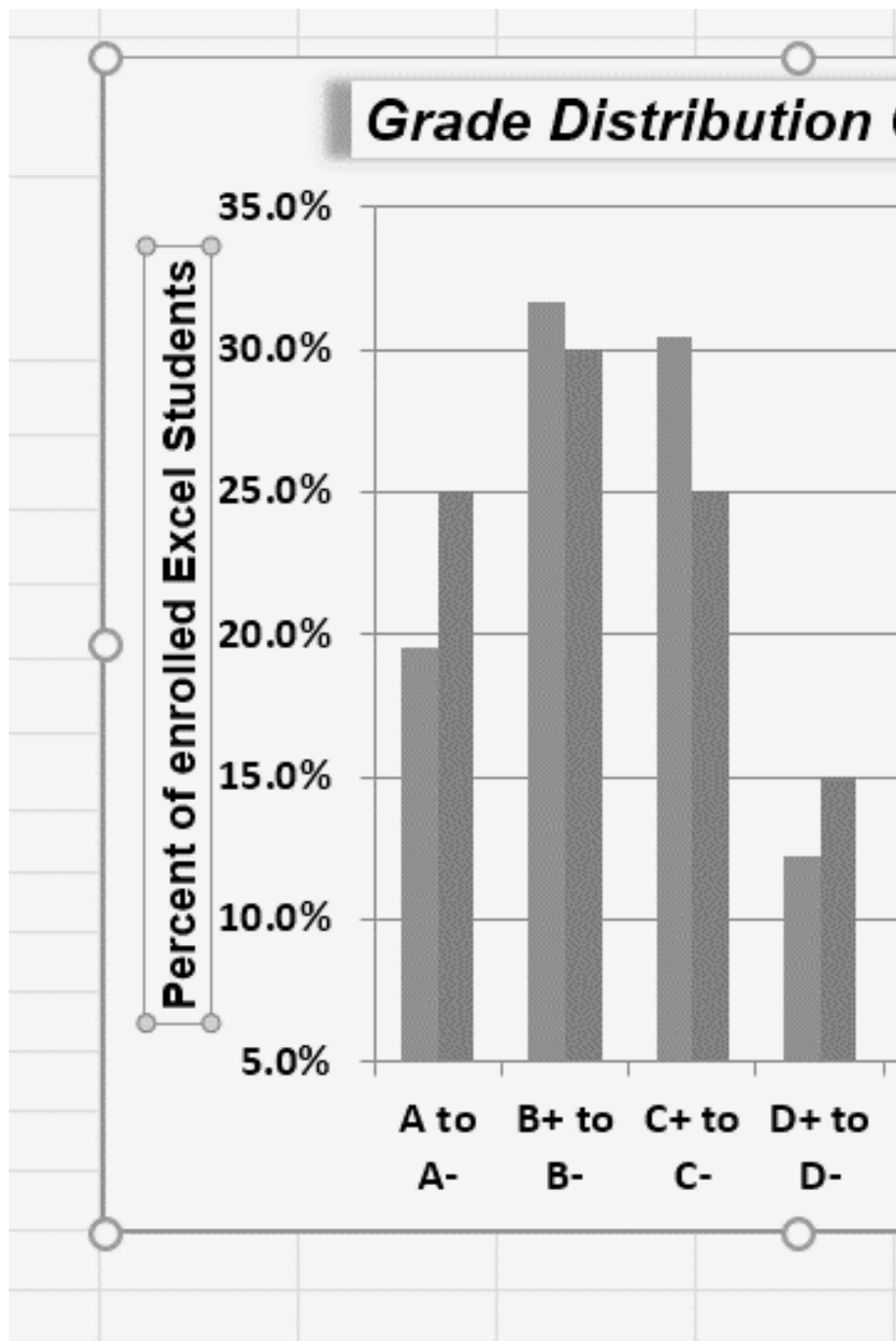
Figure 4.33 Adding and Formatting the Y Axis Title

Next we will add the title for the X axis.

1. On the **Design** tab select the **Add Chart Element** button, then **Axis Titles**, then **Primary Horizontal**.
2. Using the Home ribbon, change the font of the axis title to Arial, Bold, size 11.
3. Click in the beginning of the X axis title and delete the generic title. Type **Final Course Grade**. **Figure 4.34** shows the added titles for the X and Y axes. The titles provide definitions for the grade categories along the X axis as well as the percentages on the Y axis.
4. Save your work.

Figure 4.34 X and Y Axis Titles Added
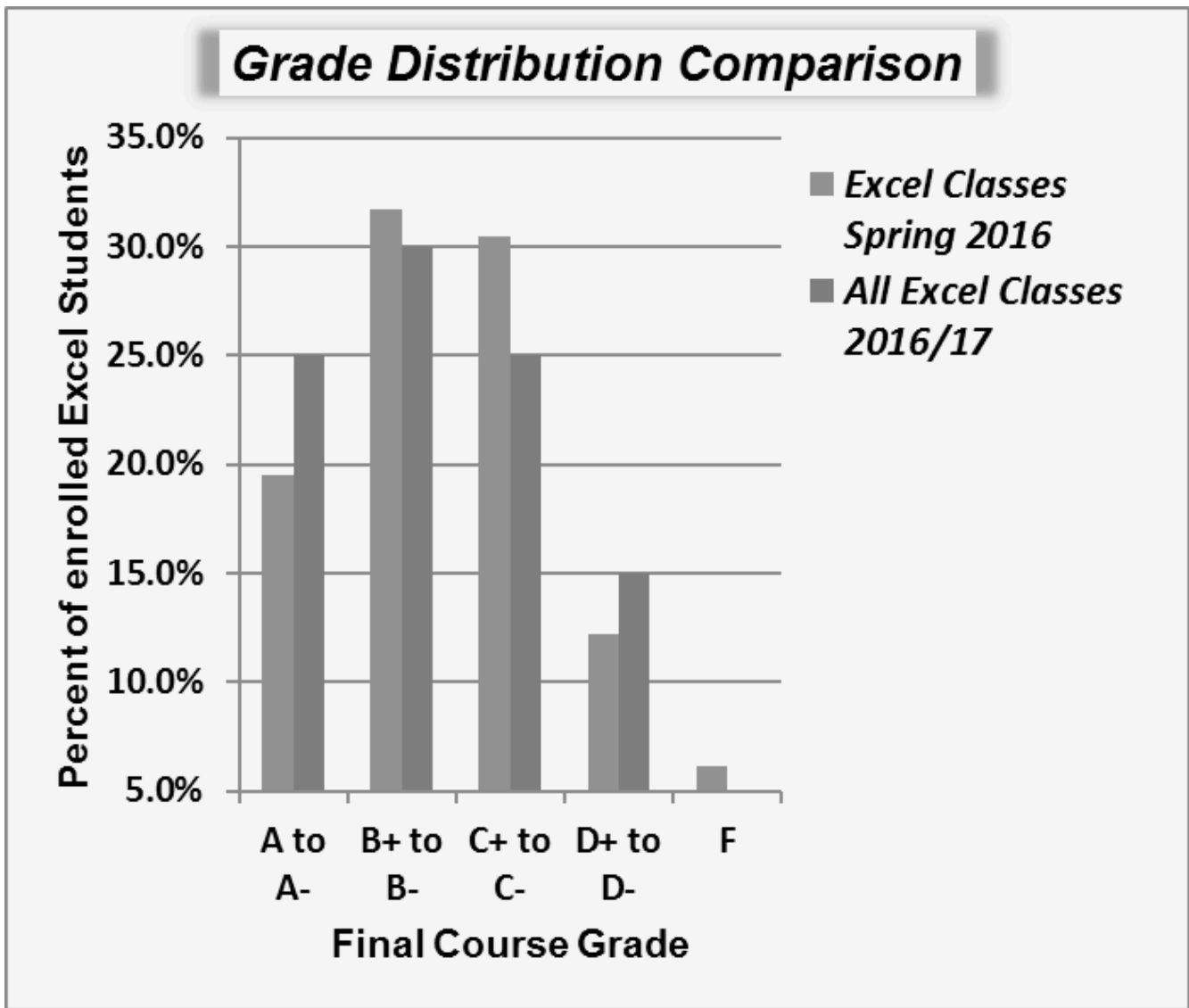
DATA SERIES LABELS AND FORMATS

Adding labels to the data series of a chart is a key formatting feature. A data series is the item that is being displayed graphically on a chart. For example, the blue bars on the Grade Distribution

Comparison chart represent one data series. We can add labels at the end of each bar to show the exact percentage the bar represents. In addition, we can add other formatting enhancements to the data series, such as changing the color of the bars or adding an effect. The following steps explain how to add these labels and formats to the chart:

1. Click on any of the the red bars representing the **All Excel Classes** data series on the **Grade Distribution Comparison** chart in the **Grade Distribution** worksheet. Clicking one bar automatically activates all bars in the data series. If you click a bar a second time, only that bar is activated.
2. Right click and select **Format Data Series** to open up the **Format Data Series** pane.
3. Click the **Fill and Line** (paint bucket) button to bring up the Fill and Border group of commands.
4. Click the word **Fill** (if needed) to expand the list of Fill options.
5. Select **Pattern Fill**. Then select **30%** (fifth column, top row). Changing your fill pattern to a pattern makes it easier to distinguish between the data series when you print or view your chart in black and white. While you are there, make changes to the fill by experimenting with different foreground and background colors.
6. Close the **Format Data Series** pane.
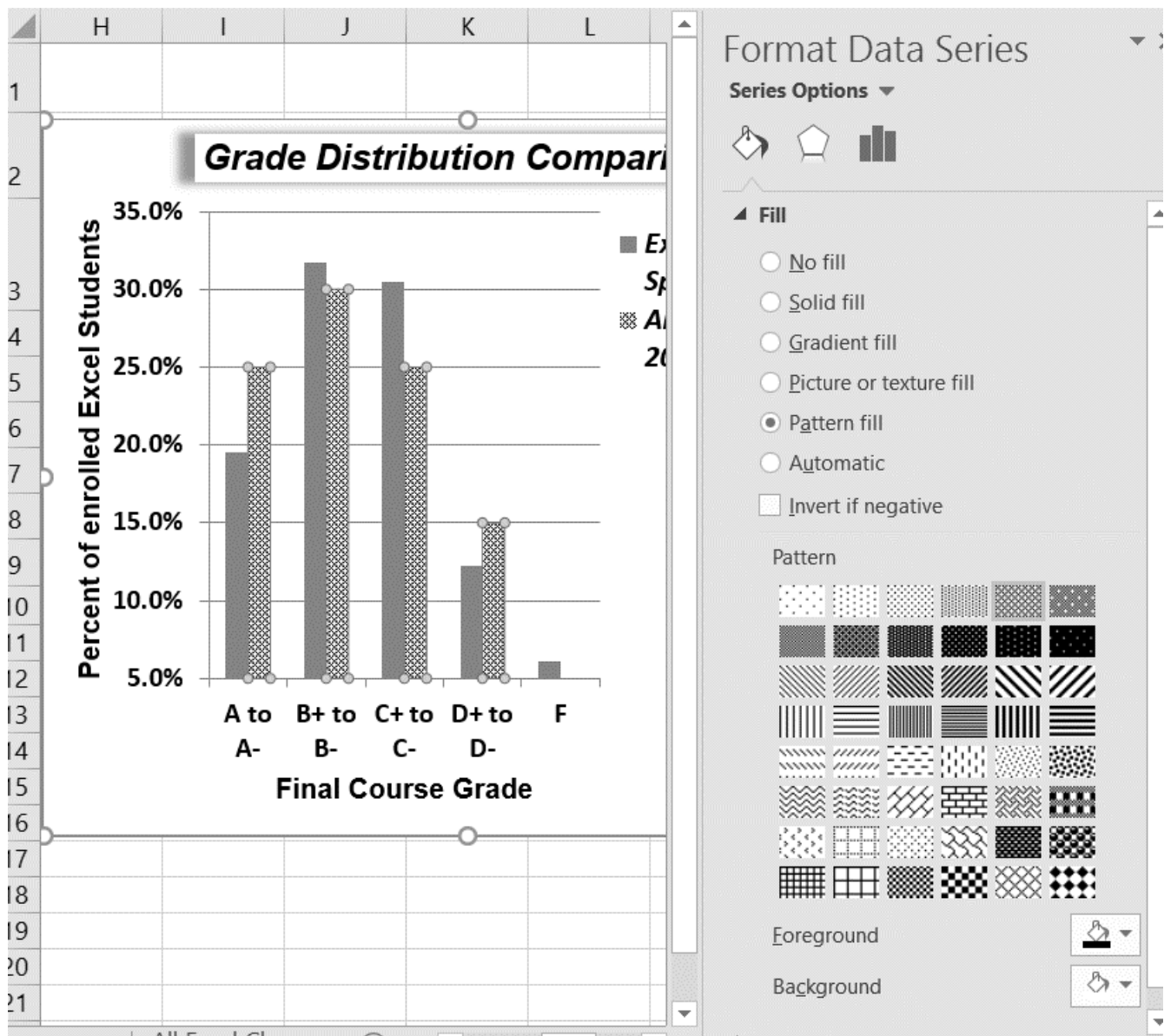
Figure 4.35 Changing the Fill of a Data Series

Now we are going to add the Data Labels at the end of the columns.

1. Be sure that your entire chart is selected, not just one of the data series. Click the **Design** tab in the **Chart Tools** section of the ribbon.
2. On the **Design** tab select the **Add Chart Element** button, then **Data Labels**, then **Outside End** (see **Figure 4.36**.)
3. Click on one of the **Data Labels**. Note that all of the data labels for that data series are selected.
4. Using the **Home** ribbon, change the font to Arial, Bold, size 9.
5. Click on one of the data labels for the other data series. Format those data labels as Arial, Bold, size 9 as well.
6. Save your work.
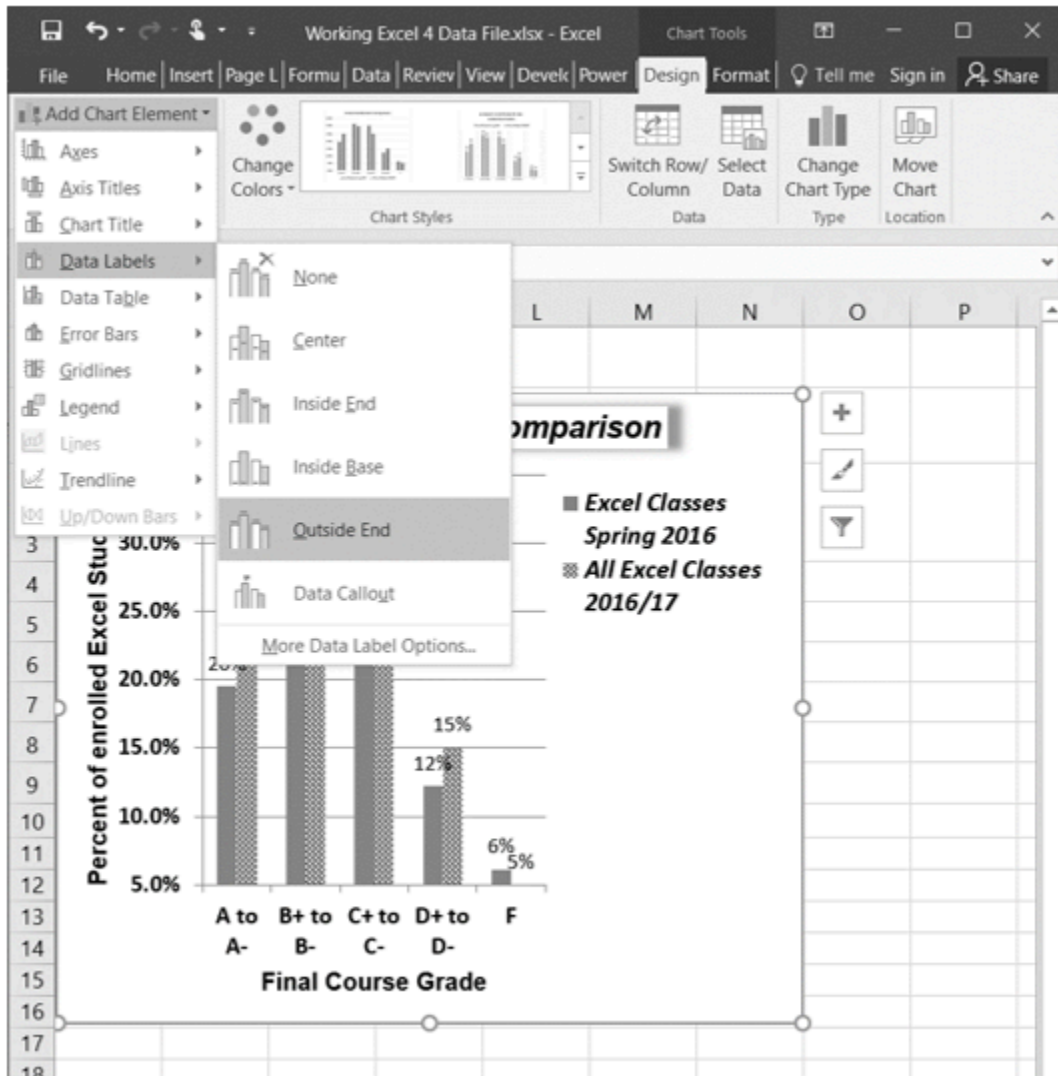
Figure 4.36 Adding Labels to a Data Series

Figure 4.37 shows the Grade Distribution Comparison chart with the completed formatting adjustments and labels added to the data series. Note that we can move each individual data label. This might be necessary if two data labels overlap or if a data label falls in the middle of a grid line. To move an individual data label, click it twice, then click and drag.
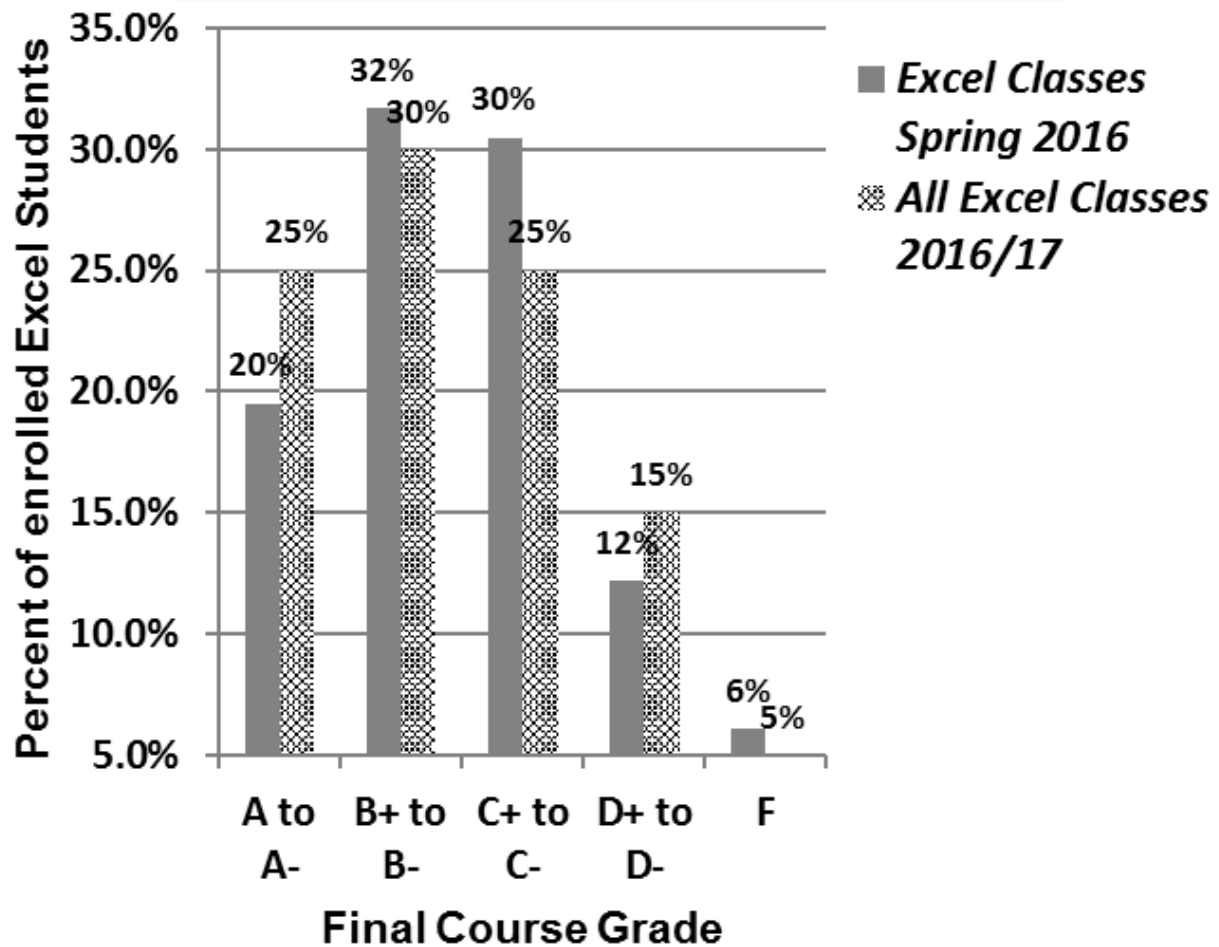
Figure 4.37 Completed Formatting Adjustments for the Data Series

Skill Refresher:

Adding Data Labels

1. Click anywhere on the chart to activate it.
2. Click the Design tab in the Chart Tools section of the ribbon.
3. Click the **Add Chart Element** in the **Chart Layout** group.
4. Then, select **Data Labels**
5. Select one of the preset positions from the drop-down list.

Formatting a Data Series

1. Click any bar or line for a data series.
2. Right click to activate the **Format Data Series** pane.
3. Use the formatting tools in the pane to make changes to the data series.

ADDING SERIES LINES AND ANNOTATIONS TO A CHART

The last formatting features we will demonstrate are adding series lines and annotations to a chart. To demonstrate these skills, we will use the Change in Enrollment Statistics Spend Source stacked column chart. Series lines are commonly used in stacked column charts to show the change from one stack to the next. Annotations are useful for clarifying the data presented in a chart or for identifying data sources. In addition to demonstrating these skills, we will review several of the formatting skills that were covered in this section. The following steps include the skills review as well as the new formatting features:

1. Locate the **Enrollment by Race** stacked column chart on the **Enrollment Statistics** worksheet. Activate the chart by clicking anywhere inside the chart perimeter.
2. Move the chart to a separate chart sheet by clicking the **Move Chart** button in the **Design** tab of the ribbon. Type the following in the New sheet input box: **Enrollment by Race Chart**. Click the **OK** button.
3. Click anywhere on the data table (on the x axis) to activate it. Using the **Home** ribbon, change the font to Arial, Bold, size 12.
4. Activate the **Y** axis and apply the same formatting adjustments as stated in step 3.
5. Add a **Y** axis title using **Add Chart Elements – Axis Titles –** then **More Axis Title Options**.
6. In the **Format Axis Title** pane change the fill color and border to colors of your choice.
7. Then, using the **Home** tab of the ribbon, change the font to Arial, Bold, size 14.
8. Change the text of the **Y** axis title to **Percent Enrollment by Race**.
9. Check the horizontal axis to see if this process created an extra axis title there. If it did, delete it.
10. Activate the title of the chart by clicking it once. The **Format Chart Title** pane should be open. If not, right click the Chart title and select **Format Chart Title** from the menu. Change the fill and border to match your vertical Axis label.
11. Then, using the **Home** tab of the ribbon, change the font of the chart title to Arial, Bold, size 20.
12. Close the **Formatting** pane.
13. Click the **Add Chart Elements** tool (Design tab), then **Lines**, then **Series Lines**. This adds lines to the chart, connecting each data series between the three stacks (see **Figure 4.38**).
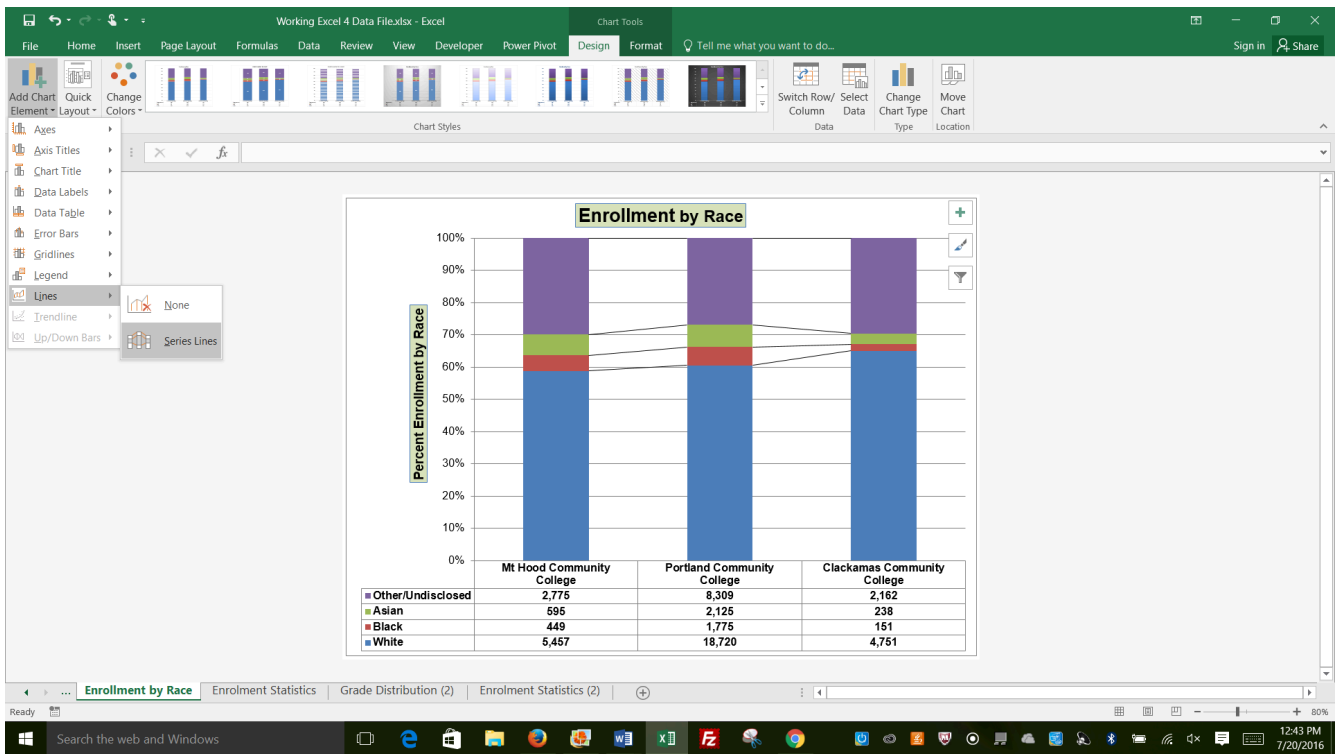
Figure 4.38 Selecting the Series Lines Option

1. Right click on any of the series lines added to the chart. Clicking one line will activate all lines on the chart. (If the Format Pane is open, you will not need to right click. Just left click on any of the series lines to change the format pane to Format Series Lines)
2. Select **Format Series Lines**. This will open the **Format Series Lines** pane.
3. Change the width to **2.25**.
4. Close the **Format Series Lines** pane.

Figure 4.39 shows the appearance of the chart with the series lines connecting the two stacks. This formatting enhancement is common for stacked column charts. The lines help focus the audience's attention to changes in the percent of total trend.
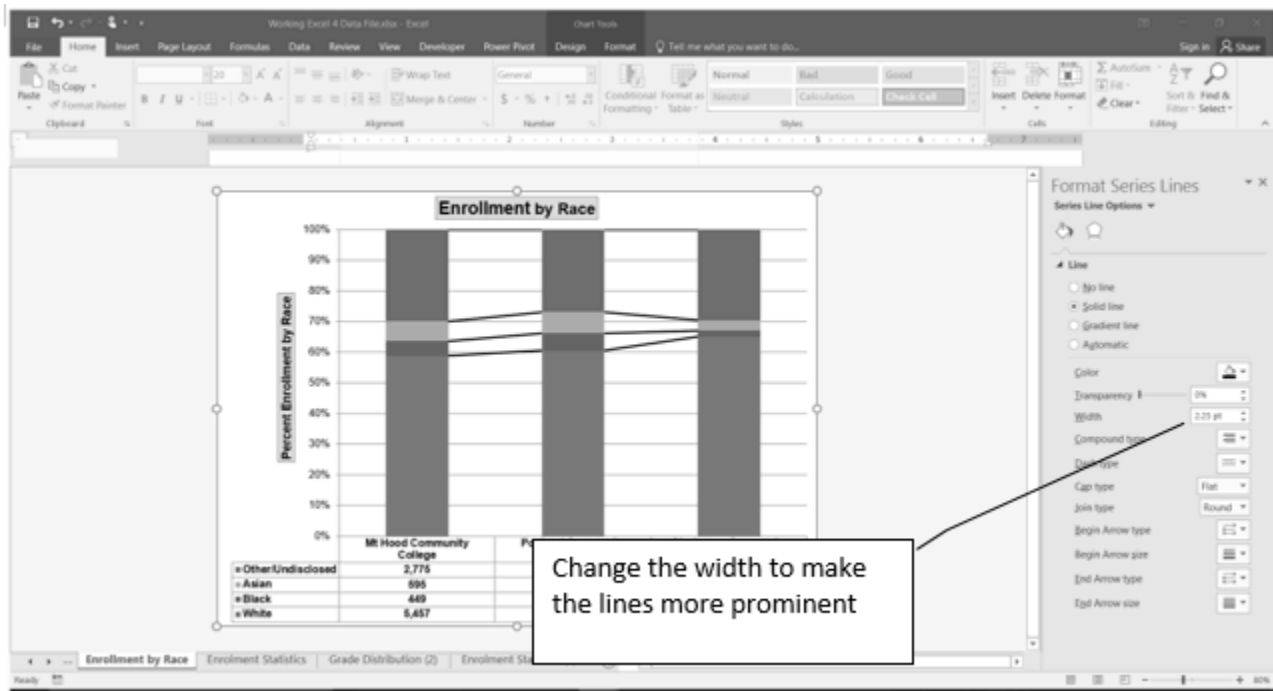
Figure 4.39 Series Lines Added to the Stacked Column Chart

Our chart demonstrates the percentage differences in enrollment between the community colleges. But, it would be handy to know the total Enrollment at each of the colleges. To display that, we will add text boxes above each column. To start with, we need to make room for the text boxes.

1. Select the **Plot Area**. Place your cursor on the top center handle of the Plot Area and drag down about ½ inch.
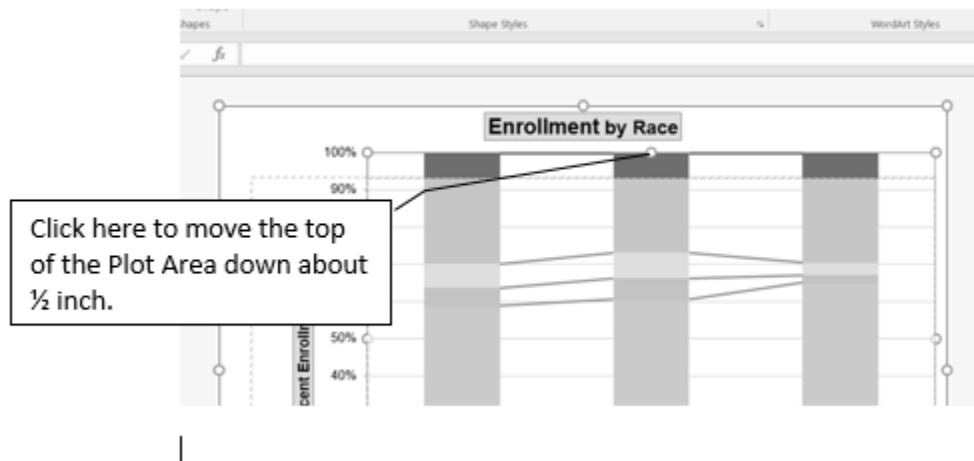
Figure 4.40 Resizing the Plot Area

ADD TEXT BOXES TO INCLUDE ADDITIONAL INFORMATION IN THE CHART.

1. Click the **Text Box** button in the **Text** group on the **Insert** tab of the ribbon (see **Figure 4.41**).
2. Place the mouse pointer on the left edge of the chart area approximately one-quarter inch from

the top. Click and drag a rectangle approximately one and a half inches wide and one-quarter inch high (see **Figure 4.41**). Don't worry if it's not exact – you can move and resize text boxes at any time.

3. Type **Total Enrollment**. This tells the audience the size of each school.
4. Select all of the text in the text box. (You can either highlight the text or click on the border of the text box once to select all of the text). Using the **Home** tab of the ribbon, change the font to Arial, size 14.
5. Repeat the process to add and format text boxes above each column. You can try to copy and paste the text boxes if you would like to save time.
6. In each text box, type the Total Enrollment for each school:

   ◦ Mt Hood – 9,276

   ◦ Portland – 30,929

   ◦ Clackamas – 7,302

7. Save your work.

	Mt Hood Community College	Portland Community College	Clackamas Community College
Other/Undisclosed	2,775	8,309	2,162
Asian	595	2,125	238
Black	449	1,775	151
White	5,457	18,720	4,751
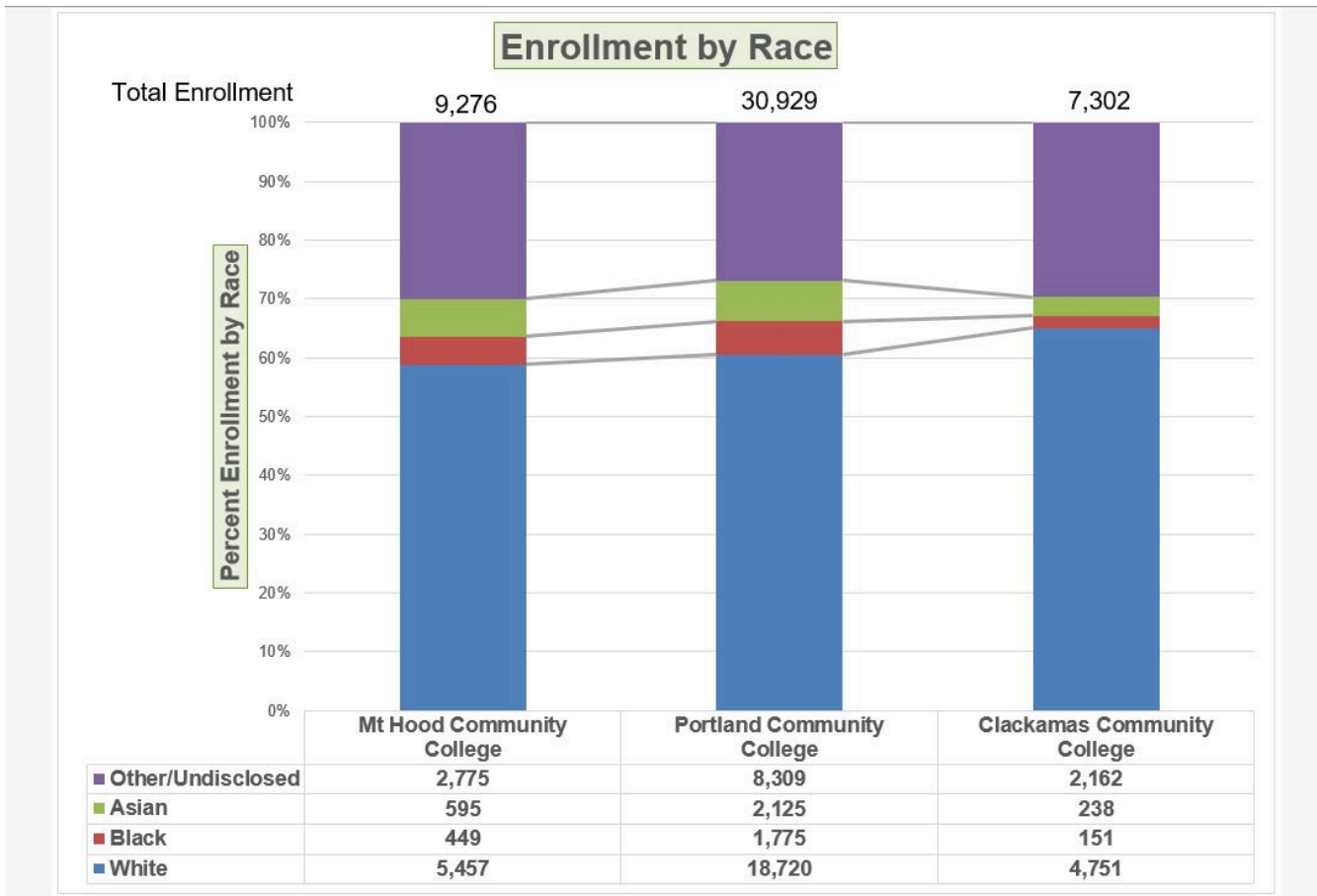
Figure 4.41 Completed Stacked Column Chart

Adding Series Lines

1. Click anywhere on the chart area.
2. Click the Layout tab of the ribbon.
3. Click the Lines button in the Analysis group of commands.
4. Click the Series Lines option from the drop-down list.

Skill Refresher:

Adding Annotations

1. Click anywhere on the chart area.
2. Click the Insert tab of the ribbon.
3. Click the Text Box button in the Text group of commands.
4. Click and drag the size of the text box needed on the chart.
5. Apply any desired format changes from the Home tab of the ribbon.
6. Type the desired text.

Integrity Check

Annotations and Axis Titles

Although adding annotations and axis titles can be a tedious process, doing so maintains a high level of integrity for your charts. People can misinterpret the message being conveyed by the chart if they make inaccurate assumptions about the values displayed. Axis titles and annotations help prevent readers from making false assumptions and ensure that readers see the most accurate representation of the message being conveyed by the chart.

- Applying appropriate formatting techniques is critical for making a chart easier to read.

- Many formatting commands in the Home tab of the ribbon can be applied to a chart.

- To change the number format for a data label, you must use the Number section in the Format Data Labels dialog box. You cannot use the Number format commands in the Home tab of the ribbon.

- To change the number format for the values on the Y axis, and the X axis in the case of a scatter chart, you must use the Number section of the Format Axis dialog box. You cannot use the Number format commands in the Home tab of the ribbon.

- Axis titles and annotations help prevent false assumptions from being made and ensure that the reader sees the most accurate representation of the information presented on a chart.

ATTRIBUTION

4.3 USING CHARTS WITH MICROSOFT® WORD® AND MICROSOFT® POWERPOINT®

<div style="background:#000;color:#fff;padding:8px;text-align:center">Learning Objectives</div>

1. Learn how to paste an image of an Excel chart into a Word document.
2. Learn how to paste a link to an Excel chart into a PowerPoint slide.

Charts that are created in Excel are commonly used in Microsoft Word documents or for presentations that use Microsoft PowerPoint slides. Excel provides options for pasting an image of a chart into either a Word document or a PowerPoint slide. You can also establish a link to your Excel charts so that if you change the data in your Excel file, it is automatically reflected in your Word or PowerPoint files. We will demonstrate both methods in this section.

PASTING A CHART IMAGE INTO WORD

For this exercise you will need two files:

The Excel spreadsheet you have been working with in this chapter — Ch 4 Charting.

The Word document – Ch 4 Diversity

Excel charts can be valuable tools for explaining quantitative data in a written report. Reports that address business plans, public policies, budgets, and so on all involve quantitative data. For this example, we will assume that the Change in Enrollment Statistics Spend Source stacked column chart (see Figure 4.44) is being used in a student's written report. The following steps demonstrate how to paste an image, or picture, of this chart into a Word document:

1. Open *Ch 4 Diversity*. Save it as *Ch 4 Diversity in Enrollment in Community Colleges*
2. Click below the figure heading in the Word document that reads: **Figure 1: Enrollment by Race**.
   The image of the stacked column chart will be placed below this heading.
3. Open your Excel file — *Ch 4 Charting*. Activate the **Enrollment by Race** chart in the Enrollment by Race chart sheet.
4. Click the down arrow on the **Copy** button in the **Home** tab of the ribbon. Select **Copy as Picture**

5. Select **OK** — Accepting the Copy Pictures defaults:

   ◦ As shown on Screen

   ◦ Picture

6. Go back to the *Ch4 Diversity in Enrollment in Community Colleges* Word document by clicking the file in the taskbar.
7. Click the **Paste** button in the Home tab of the ribbon. Or, Press **Crtl V**.
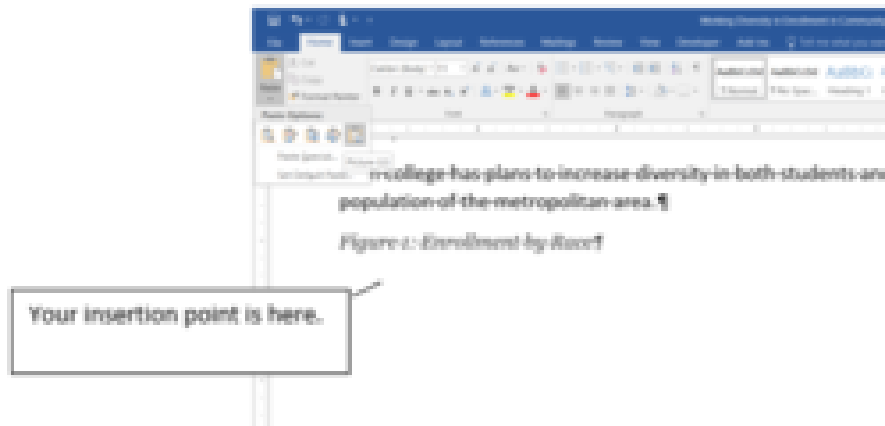
Figure 4.42 Paste Picture in Word

Oh no!! The picture is so big that it falls on to the next page. We will need to change its size.

1. Click anywhere on the picture of the chart to activate it.
2. Click the **Format** tab under the **Picture Tools** section of the ribbon (see **Figure 4.43**).
3. Click the down arrow on the **Shape Width** button in the **Size** group of commands. Continue to click the down arrow until the width of the picture is **5.4**.” As you reduce the width of the picture, the height is automatically reduced as well. (The height should be ~ **3.92″**)
4. Center the chart.

   ◦ While the chart is selected, go ot the **Home** tab to the **Paragraph** group. Select **Center.**

5. Save your work.
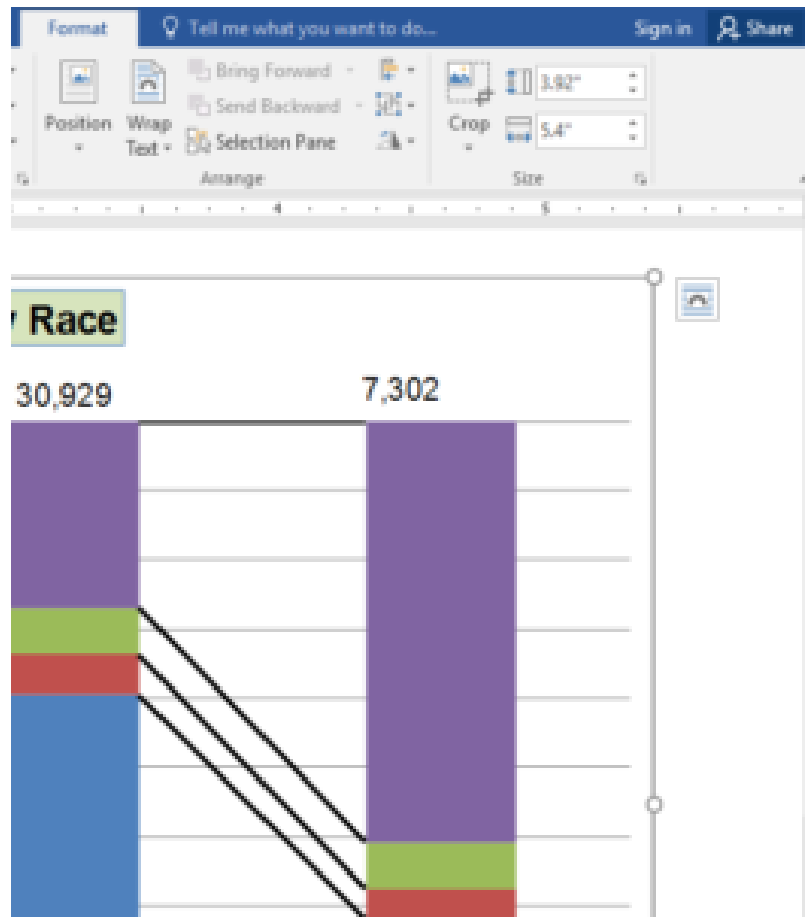
Figure 4.43 Changing the Size of a Picture in Word

Figure 4.44 shows the final appearance of the Enrollment by Race Source chart pasted into a Word document. It is best to use either the Shape Width or Shape Height buttons to reduce the size of the chart. Using either button automatically reduces the height and width of the chart in proper proportion. If you choose to use the sizing handles to resize the chart, holding the SHIFT key while clicking and dragging on a corner sizing handle will also keep the chart in proper proportion.
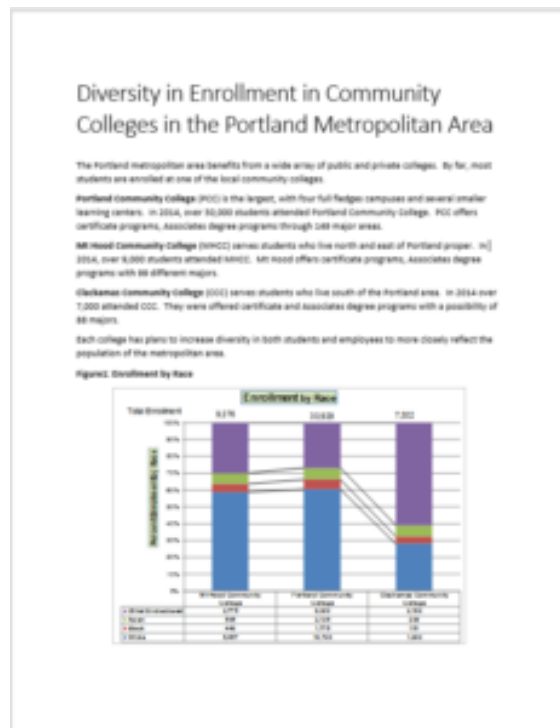
Figure 4.44 Final Appearance of Pasting a Chart Image into Word

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Skill Refresher

Pasting a Chart Image into Word

1. Activate an Excel chart and click the Copy button in the Home tab of the ribbon.
2. Click on the location in the Word document where the Excel chart will be pasted.
3. Click the down arrow of the Paste button in the Home tab of the ribbon.
4. Click the Picture option from the drop-down list.
5. Click the Format tab in the Picture Tools section of the ribbon.
6. Resize the picture by clicking the up or down arrow on the Shape Width or Shape Height buttons.

PASTING A LINKED CHART IMAGE INTO POWERPOINT

For this exercise you will need two files:

The Excel spreadsheet you have been working with in this chapter — Ch4 Charting.

The PowerPoint document – CH4 Diversity.

Microsoft PowerPoint is perhaps the most commonly used tool for delivering live presentations. The charts used in a live presentation are critical for efficiently delivering your ideas to an audience. Similar to written documents, a wide range of presentations may require the explanation of

quantitative data. This demonstration includes a PowerPoint slide that could be used in a presentation. We will paste the Enrollment by Race chart into this PowerPoint slide. However, instead of pasting an image, as demonstrated in the Word document, we will establish a link to the Excel file. As a result, if we change the chart in the Excel file, the change will be reflected in the PowerPoint file. The following steps explain how to accomplish this:

Open *Ch4 Diversity.pptx*. Save it as *Ch4 Open the Diversity in Enrollment in Community Colleges*.

Open *Ch4 Charting*.

1. Open your Excel file — *Ch4 Charting*. Activate the **Enrollment by Race** chart in the Enrollment by Race chart sheet.
2. Click the down arrow on the **Copy** button in the **Home** tab of the ribbon. Select **Copy** (Not Copy as Picture.)
3. Go back to the *Ch4 Open the Diversity in Enrollment in Community Colleges* file by clicking the file in the taskbar.
4. Navigate to **Slide 6 – Diversity in Enrollment** Click on the **outside edge** of the empty prompt box on the right.
5. Click the down arrow below the **Paste** button in the **Home** tab of the ribbon in the PowerPoint file.
6. Select the **Keep Source Formatting & Link Data** option from the drop-down list (see Figure **4.45**). This pastes an image of the Excel chart into the PowerPoint slide. In addition, a link is created so that any changes made to the chart appear on the PowerPoint slide.
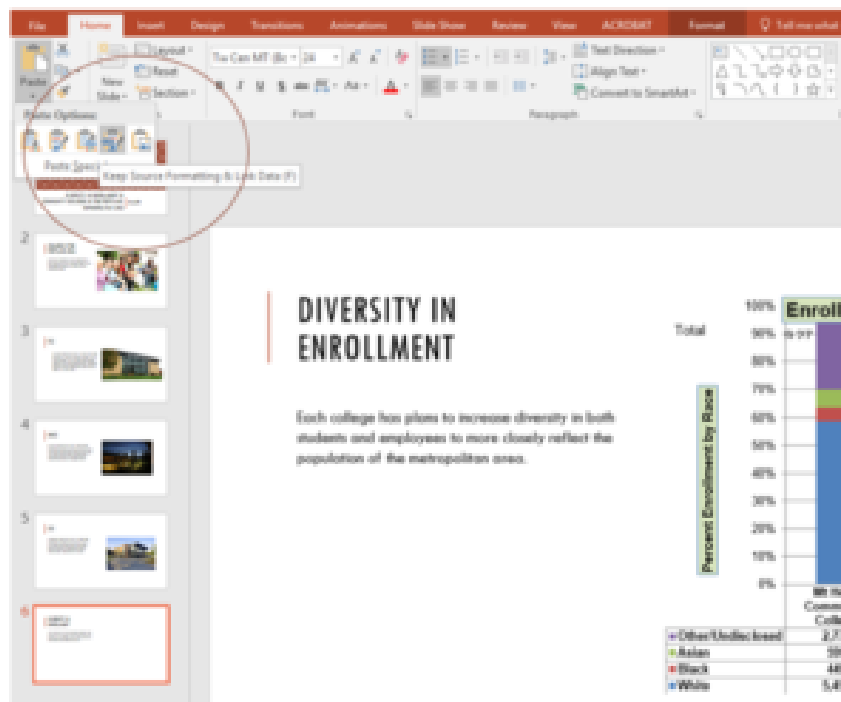

Figure 4.45 Creating a Link to an Excel Chart in PowerPoint

1. Select the outside edge of this prompt box.
2. Select the **Keep Source Formatting & Link Data** option

3. Click anywhere in the plot area of the column chart pasted into the PowerPoint slide. You will see the same **Excel Chart Tools** tabs added to the ribbon (see **Figure 4.46**).

4. On the **Design** tab, select **Style 8** in the **Chart Style** group.
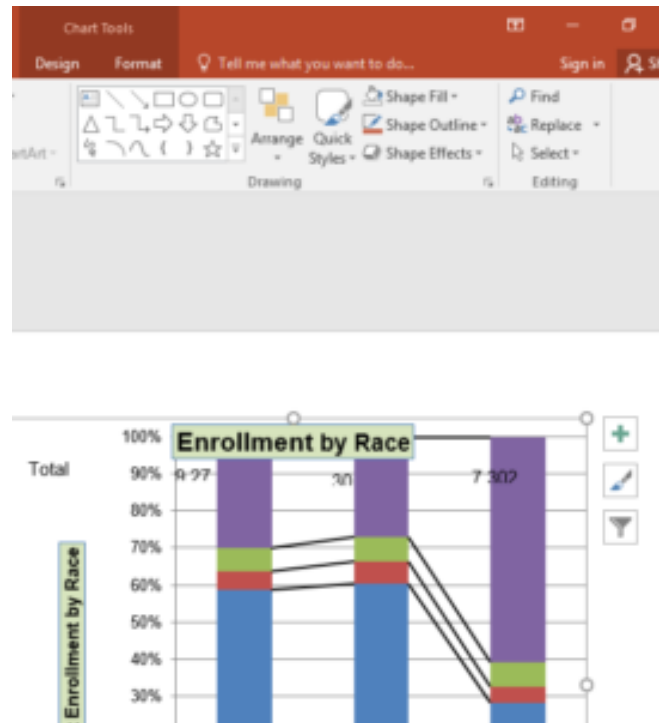
Figure 4.46 Modifying an Excel Chart Pasted into a PowerPoint Slide

Paste linking this chart causes trouble with the text boxes we added. Let's delete them.

1. Select each text box. Try for the outside edge of the text box. Press the delete key on your keyboard.
   Be sure that the outline is solid. A dotted outline is visible if you are planning to edit the contents of the text box.

2. The benefit of adding this chart to the presentation in this way is that it will automatically update when you change the data in the linked spreadsheet.

3. Return to the *Ch4 Charting* Data File. Select the **Enrollment Statistics** sheet. (The one with the Enrollment data.) In cell D3, type: **1000**.
   You have just changed the number of white students at Clackamas Community College to **1000**. This isn't true, but you want to change the data enough to see the effect in the charts.

4. Select the **Enrollment by Race** chart sheet. Notice how the chart has changed.

5. Return to the Diversity in Enrollment in Community Colleges PowerPoint file by clicking the file in the taskbar.

6. On Slide6, you should see the updated chart.

7. If the chart has not changed; be sure that your chart is selected, click the **Design** tab in the **Chart Tools** section of the ribbon. Click the **Refresh Data** button (see **Figure 4.47**). The change made in the Excel workbook is now reflected on the PowerPoint slide.

8. If that still doesn't work, you may have created a "normal" link — instead of a **Paste Link**. Delete the chart and follow these steps again. Start from the beginning of this section.

9. Save your work.
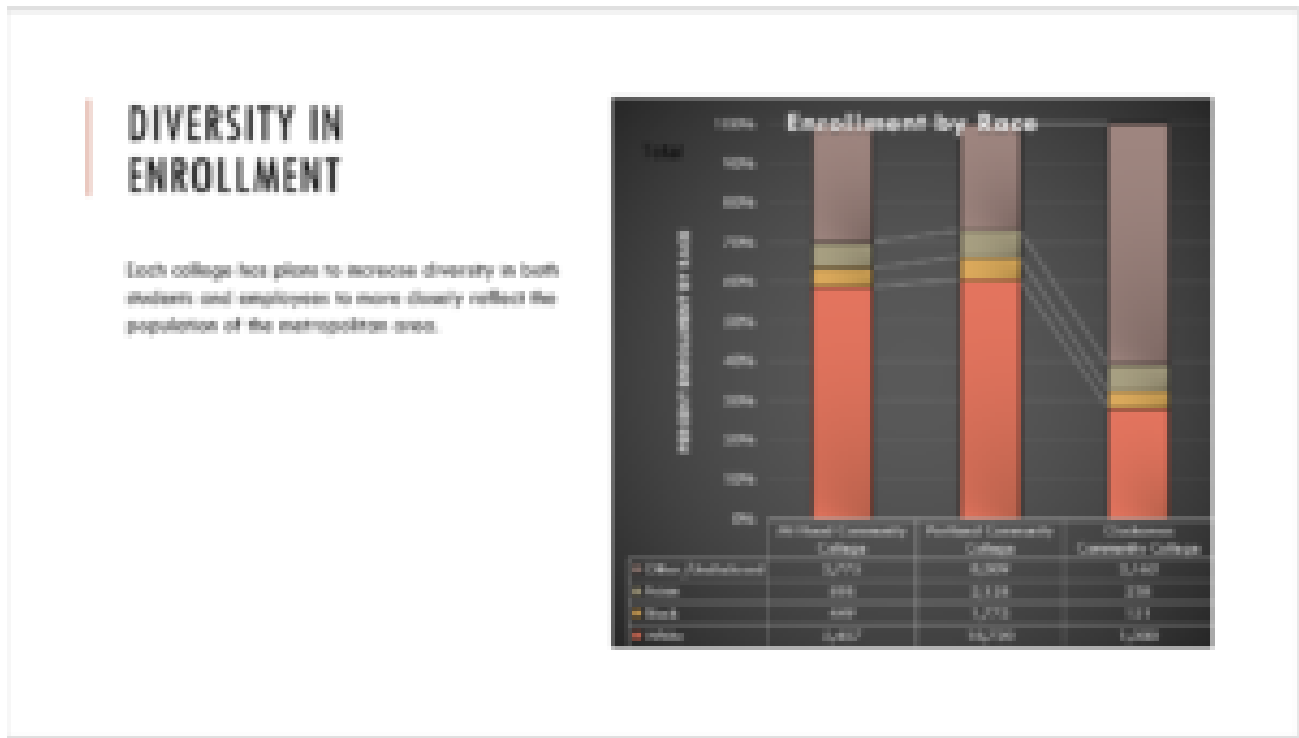
Figure 4.47 Styled and Updated Chart.

Figure 4.47 shows the appearance of the column chart after the change was made in the Enrollment Statistics worksheet in the Excel file. Note that the Data Chart at the bottom reflects the new number, too. The change that was made in the Excel file will appear in the PowerPoint file after clicking the Refresh Data button.

Integrity Check

Refreshing Linked Charts in PowerPoint and Word

When creating a link to a chart in Word or PowerPoint, you must refresh the data if you make any changes in the Excel workbook. This is especially true if you make changes in the Excel file prior to opening the Word or PowerPoint file that contains a link to a chart. To refresh the chart, make sure it is activated, then click the Refresh Data button in the Design tab of the ribbon. Forgetting this step can result in old or erroneous data being displayed on the chart.

Key Takeaways

- When pasting an image of an Excel chart into a Word document or PowerPoint file, use the **Picture** option from the Paste drop-down list of options – if you want the image to act as an image. You will not be able to make any changes to the content of the picture.

- When creating a link to a chart in Word or PowerPoint, you may need to refresh the data if you make any changes in the originating spreadsheet. You should not use the **Picture** option.

ATTRIBUTION

Adapted by Noreen Brown from How to Use Microsoft Excel: The Careers in Practice Series, adapted

Integrity Check

Severed Link?

When creating a link to an Excel chart in Word or PowerPoint, you must keep the Excel workbook in its original location on your computer or network. If you move or delete the Excel workbook, you will get an error message when you try to update the link in your Word or PowerPoint file. You will also get an error if the Excel workbook is saved on a network drive that your computer cannot access. These errors occur because the link to the Excel workbook has been severed. Therefore, if you know in advance that you will be using a USB drive to pull up your documents or presentation, move the Excel workbook to your USB drive before you establish the link in your Word or PowerPoint file.

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4.4 PREPARING TO PRINT

Learning Objectives

1. Review each worksheet in a workbook in Print Preview.
2. Modify worksheets as needed to professionally print data and charts.

In this section we will take a look at each of the worksheets created in the previous sections. Since these worksheets contain a combination of data and charts, there are specific things to watch for if you will be printing the sheets.

We will start by looking at each worksheet in Print Preview in Backstage View. We will then make any changes necessary, such as changing the orientation and scaling, or moving charts around on the worksheet. To make sure we don't miss any worksheets, we are going to review the worksheets in the order they appear in the tabs.

PREVIEWING CHART SHEETS FOR PRINTING

Data file: Continue with CH4 Charting.

The first worksheet, Closing Prices, is a chart sheet. This means that it does not contain any data; remember that chart sheets just contain charts. We still need to review it in Print Preview.

1. Click on the **Closing Prices** worksheet tab.
2. Go to Print Preview by clicking Print in Backstage View.
3. Notice that the chart will print on the entire page, in Landscape orientation.
4. There is nothing to change. Exit Backstage View.

PRINTING WORKSHEETS WITH DATA AND CHARTS

The next worksheet (Stock Trend) has a lot of data and multiple charts. We need to print the data and the charts, which will require some modifications of the page setup.

1. Click on the **Stock Trend** worksheet tab.
2. Go to Print Preview by clicking Print in Backstage View.
3. Notice that this worksheet is currently printing on seven pages.
4. As you click through each page you should make the following observations:

- ◦ The data is split between the first and third pages.
- ◦ The line chart starts on the first page, but part of it is also on the second page.
- ◦ The double-line chart starts on the third page, and then finishes on the fifth page.
- ◦ The fourth and sixth pages are blank.
- ◦ The last page has a column of seemingly random numbers.

5. Exit Backstage View.

The first thing we are going to do is remove the numbers that are appearing on page 7. To do this, we will **hide** the column where they are being stored. We are going to hide the column, instead of deleting the numbers, in case the numbers are being utilized somewhere else in the workbook.

1. Scroll to the right on the worksheet until you find the numbers in column AH.
2. Click anywhere in column AH.
3. On the Home ribbon, click the **Format** button in the Cells group.
4. In the Visibility section, select **Hide & Unhide** then select **Hide Columns** (see **Figure 4.64**).
5. The visible column headings should now go from AG to AI.
6. Return to Print Preview in Backstage View to see the changes to the printed worksheet.
7. Notice that there are now five pages. The data and charts are still splitting across multiple pages, but the numbers in column AH are no longer going to print.
8. Remain in Backstage View for the next steps.
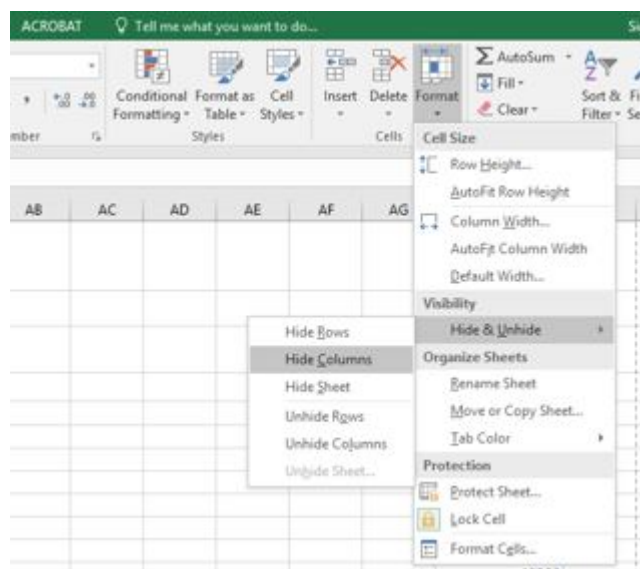
Figure 4.64 Hide Columns in Format Menu

The data is still split between pages 2 and 3, and the charts are splitting oddly as well. The first step we will try to fix these issues is to change the page orientation and scaling.

1. While still in Backstage View, change the **page orientation** to Landscape (use the Orientation drop-down menu in the Settings section).
2. This puts all of the data on one sheet, but the charts are still split between multiple pages.

3. Change the **page scaling** to Fit Sheet on One Page (use the Scaling drop-down menu in the Settings section).
4. This fits everything on one page, but it is too small to be able to read.
5. Change the page scaling back to No Scaling.

The next thing we will try is moving one, or both, of the charts. In order to move the charts, we need to exit out of Backstage View.

1. Exit Backstage View.
2. Switch to the View ribbon and then select Page Break Preview. Your screen should look similar to **Figure 4.65**. (Remember that the dotted blue lines indicate automatic page breaks.)
3. Move the 24 Month Comparison (double-line) chart closer to the top of its page.
4. Move the May 2014-2015 Trend for NASDAQ Sales Volume (line chart) so that it is under the 24 Month Comparison chart.
5. The link to the data source is still at the bottom of page 2 (in A50:A51) so you need to move it as well. Using your preferred method, move the text from A50:A51 to M31:M32.
6. Now your screen should look similar to **Figure 4.66**.

Figure 4.65 Page Break Preview before moving the charts in Step 3

Stock Trend Comparison
24 Months from May 2014 to May 2016

NASDAQ

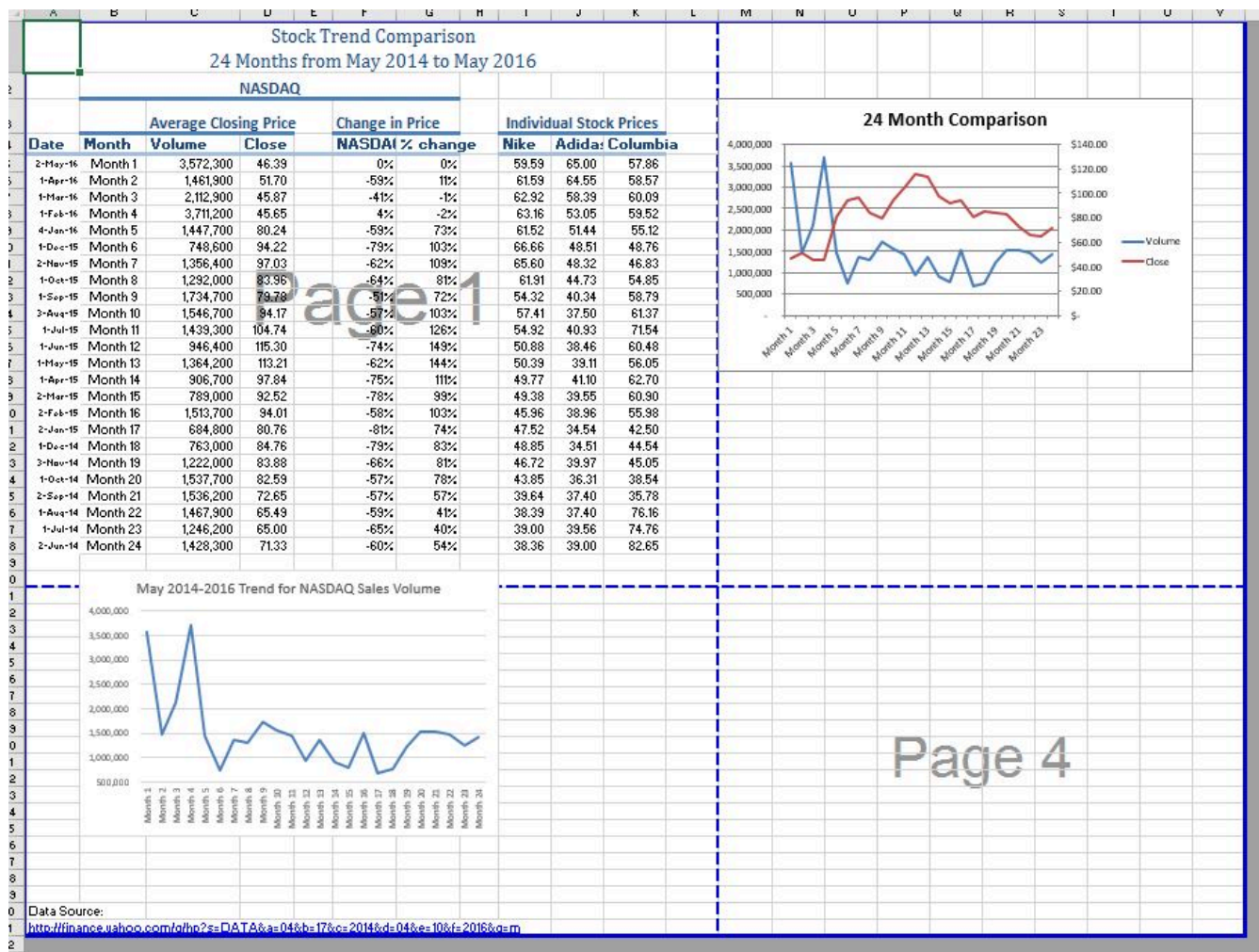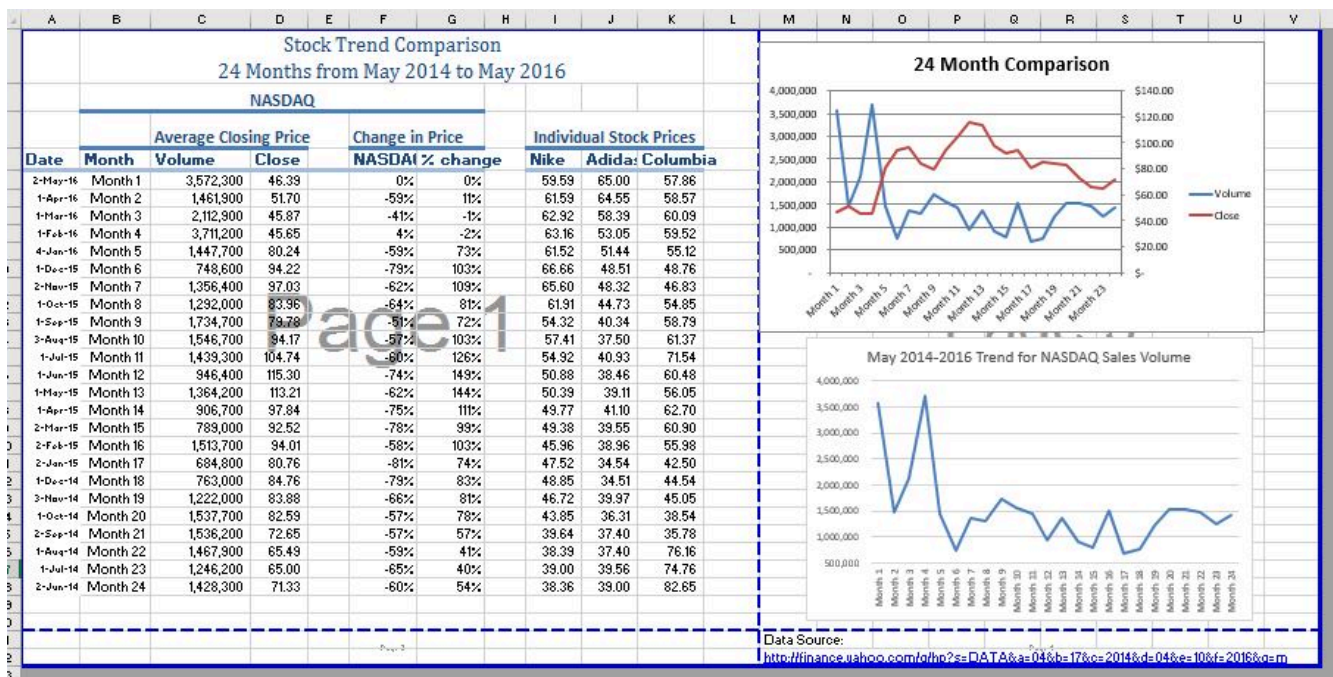| Date	Month	Average Closing Price		Change in Price		Individual Stock Prices		
		Volume	Close	NASDAQ	% change	Nike	Adidas	Columbia
2-May-16	Month 1	3,572,300	46.39	0%	0%	59.59	65.00	57.86
1-Apr-16	Month 2	1,461,900	51.70	-59%	11%	61.59	64.55	58.57
1-Mar-16	Month 3	2,112,900	45.87	-41%	-1%	62.92	58.39	60.09
1-Feb-16	Month 4	3,711,200	45.65	4%	-2%	63.16	53.05	59.52
4-Jan-16	Month 5	1,447,700	80.24	-59%	73%	61.52	51.44	55.12
1-Dec-15	Month 6	748,600	94.22	-79%	103%	66.66	48.51	48.76
2-Nov-15	Month 7	1,356,400	97.03	-62%	109%	65.60	48.32	46.83
1-Oct-15	Month 8	1,292,000	83.96	-64%	81%	61.91	44.73	54.85
1-Sep-15	Month 9	1,734,700	79.78	-51%	72%	54.32	40.34	58.79
3-Aug-15	Month 10	1,546,700	94.17	-57%	103%	57.41	37.50	61.37
1-Jul-15	Month 11	1,439,300	104.74	-60%	126%	54.92	40.93	71.54
1-Jun-15	Month 12	946,400	115.30	-74%	149%	50.88	38.46	60.48
1-May-15	Month 13	1,364,200	113.21	-62%	144%	50.39	39.11	56.05
1-Apr-15	Month 14	906,700	97.84	-75%	111%	49.77	41.10	62.70
2-Mar-15	Month 15	789,000	92.52	-78%	99%	49.38	39.55	60.90
2-Feb-15	Month 16	1,513,700	94.01	-58%	103%	45.96	38.96	55.98
2-Jan-15	Month 17	684,800	80.76	-81%	74%	47.52	34.54	42.50
1-Dec-14	Month 18	763,000	84.76	-79%	83%	48.85	34.51	44.54
3-Nov-14	Month 19	1,222,000	83.88	-66%	81%	46.72	39.97	45.05
1-Oct-14	Month 20	1,537,700	82.59	-57%	78%	43.85	36.31	38.54
2-Sep-14	Month 21	1,536,200	72.65	-57%	57%	39.64	37.40	35.78
1-Aug-14	Month 22	1,467,900	65.49	-59%	41%	38.39	37.40	76.16
1-Jul-14	Month 23	1,246,200	65.00	-65%	40%	39.00	39.56	74.76
2-Jun-14	Month 24	1,428,300	71.33	-60%	54%	38.36	39.00	82.65

24 Month Comparison

— Volume
— Close

May 2014-2016 Trend for NASDAQ Sales Volume

Data Source:
http://finance.yahoo.com/q/hp?s=DATA&a=04&b=17&c=2014&d=04&e=10&f=2016&g=m

Figure 4.66 Page Break Preview after moving the charts and text

We don't want the data source link text to print on its own page, but there is no room to move it onto the same page as the charts. To fix this, we are going to remove the automatic page break between the charts and the text in M31:M32.

1. Place your pointer on the horizontal blue dashed line (automatic page break) between the line chart and the Data Source link text.
2. When your pointer changes to the double arrow (pointing up and down), drag the page break down into the gray area. This removes the page break.
3. If your vertical automatic page break between columns L and M moves, drag it back between columns L and M. This will make it a solid blue line, which will no longer adjust automatically.
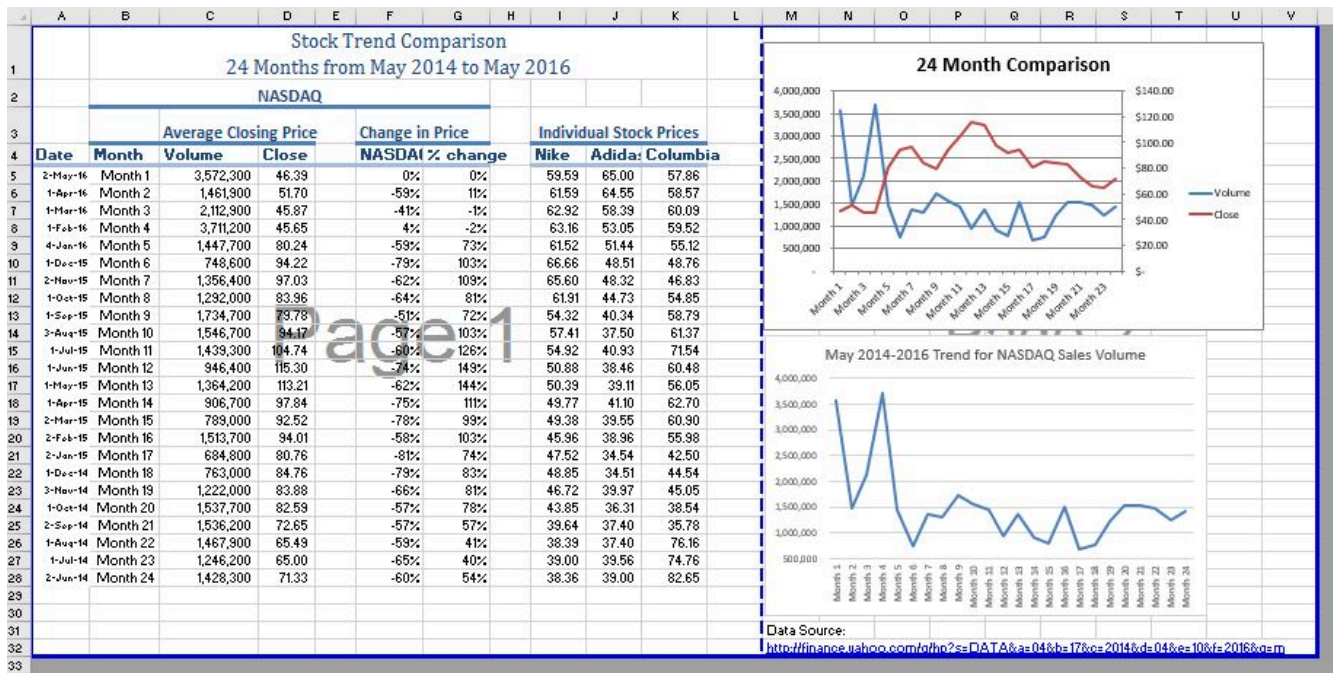4. Your screen should now look like **Figure 4.6**7.

Figure 4.67 Page Break Preview after removing a page break

Now you need to do one final check of this worksheet in Print Preview.

1. Go to Print Preview and look at both pages. Page 1 should contain just the data and page 2 should have both charts and the Data Source link text.
2. Exit Backstage View and save the file.

PREVIEW REMAINING WORKSHEETS FOR PRINTING

There are four remaining worksheets to be reviewed. Some of them will need minor changes and some will not need any changes. You will need to preview each one and then make the specified changes. In the following steps you will preview and modify the next three worksheets.

1. **All Excel Classes** – this is a chart sheet, so it should not need any changes.
2. **Grade Distribution** – the chart is split across two pages. Fix this by changing the orientation (Landscape) and scaling (Fit Sheet on One Page).
3. **Enrollment by Race Chart** – this is a chart sheet, so it should not need any changes.

PRINTING A CHART ONLY

Sometimes you might have a worksheet that has data and a chart, but you only want the chart to print. That is the case with the **Enrollment Statistics** worksheet.

1. Switch to the **Enrollment Statistics** worksheet.
2. Select the chart.
3. Go to Print Preview. Only the chart is printing. (*If it shows the data printing along with the chart, exit Backstage View and be sure to select just the chart on the worksheet.*)
4. If needed, change the orientation to Landscape. This orientation looks better when printing just a chart.

5. Exit Backstage View.

HIDING A WORKSHEET

You have actually decided that you do not want the **Enrollment by Race Chart** sheet to be visible at all, but you do not want to delete it. We are going to hide it from anyone looking at the workbook.

1. Right-click on the **Enrollment by Race Chart** tab.
2. Select **Hide** from the menu that appears. The Enrollment by Race Chart sheet should no longer be visible.
3. Save the **CH4 Charting** workbook.
4. Compare your work with the self-check answer key (found in the Course Files link) and then submit the **CH4 Charting** workbook as directed by your instructor.

If you want to unhide a worksheet, right-click on any other worksheet tab and select Unhide from the menu. A list of hidden worksheets will be displayed. Select the one you want and click OK.

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4.5 CHAPTER PRACTICE

To assess your understanding of the material covered in the chapter, please complete the following assignments.

Although Excel is primarily used in business and scientific applications, you will find it useful in other areas of study as well. In these exercises we will use Excel to create charts using historical, health, and social justice data.

CHARTING HISTORICAL DATA (COMPREHENSIVE REVIEW)

Download Data File: PR4 Data

Excel is an excellent tool for helping to display historical date. In this exercise we will be examining ways to display information on minimum mage data and life expectancy.

TASK1 – NATIONAL MINIMUM WAGE IN THE US – 1960-2014

Since the beginning of the previous century, the United States has set a minimum wage, in order to set a "floor" beneath which wages cannot fall. Most states have set their own minimum wages, but none are lower than the national minimum wage. To learn more about the national minimum wage, look here: https://en.wikipedia.org/wiki/Minimum_wage_in_the_United_States

1. Open the file named **PR4 Data** and then Save As **PR4 Historical Data.**
2. On the **Minimum Wage** worksheet, select the range **B4:C60**
3. Select the **Insert** tab, then the **Recommended Chart** tool in the **Charts** group.
   Recommended Charts allows users to first see how selected data would be represented on a variety of chart types before committing to a particular type of chart. Being able to see your data as it would look in a variety of charts helps you select the kind of chart that best matches your date.
   It does a particularly good job when you want to use dates or years as labels. Sometimes, Excel gets confused and thinks that dates are part of the data – instead of labels.
4. Select the first **Line chart**. Press **OK**.
5. Your line chart is embedded in the **Minimum Wage** worksheet.
6. Make sure that the upper left corner of your chart is in the upper left corner of **E4**. The lower right corner is in the lower right corner of **M20**.
7. Adjusting the chart title: Click the **chart title** once. Then click in front of the first letter. You should see a blinking cursor in front of the letter. This allows you to modify the title of the chart.

8. Type the following in front of the first letter in the chart title: **US National**
9. While your chart is still selected, select the **Design** tab. You will find the **Chart Styles** group in the middle of the ribbon. If necessary, press the **More** button to see the available styles.
10. Float your cursor over the available styles so you can see how they will affect your chart. Select **Style 4**.
11. The years across the **X** (category) axis are a little hard to read.
    Select the labels. When you have them selected, you will see a box surrounding the list of years. On the **Home** tab, in the **Alignment** Group, select the **Orientation** tool. Select **Angle Counter Clockwise**.
12. Prepare the **Minimum Wage** worksheet for printing by changing the scaling to **Fit Sheet on One Page**.

TASK2 – OREGON: PROJECTED LIFE EXPECTANCY AT BIRTH

In the past 40 years, between 1970 and 2010, life expectancy for Oregon men improved by 8.7 years and for women by 5.5 years. Oregon's life expectancy has remained slightly higher than the U.S. average. The life expectancy will continue to improve for both men and women. However, the gain for men has been outpacing the gain for women. Consequently, the difference between men's and women's life expectancies has continued to shrink.

https://www.oregon.gov/das/OEA/Documents/OR_pop_trend2012.pdf

1. On the **Life Expectancy** sheet, select **A5:B11**
2. Press **F11**
3. This creates a column chart, and puts it on a separate sheet.
4. Double click the chart sheet tab, change the name to **Men**.
5. Take a good look at this chart. It is not what we were expecting. Excel has made a mistake and charted the Birth Year information as though it was data, instead of using it to label the bottom (category) axis. That needs to be fixed. We need to tell Excel that the data in Column A are labels, not values.
6. With the chart selected, go to the **Design** tab, and select the **Select Data** tool.
   This opens the Select Data Source dialog box. The box at the top tells us the range we selected, which looks fine.

The **Legend Entries** need to be corrected to fix the issue with the data series (columns). Also, the **Horizontal Axis Labels** are just a series of default numbers. They need to be the range that contains the years.

7. In the **Legend Entries**, click in the small box in front of **Birth Year** to remove the check mark. This will remove the Birth Year as a data series on the chart.
8. In the **Horizontal (Category) Axis Labels** box, press the **Edit** button. This will open the **Axis Labels** dialog box. Press the **Select** range button.
9. Navigate to the **Life Expectancy** tab and select **A6:A11**. After "=**'Life Expectancy'!$A$6:$A$11**" is displayed in the box, press the **Select Range** button. Press **OK**.
   Press **OK**
10. Change the chart title so that it reads: **Life Expectancy for Oregon Men.**

11. Remove the Legend from the bottom of the chart by right-clicking on it and selecting Delete.
12. Return to the **Life Expectancy** tab, select **A5:All** , **C5:C11** (Select the first range, hold down the CTRL key, select the next to select both noncontiguous ranges at the same time.
13. Repeat steps 2-11 above to create a matching chart for **Life Expectancy for Oregon Women**.
14. Return to the **Life Expectancy** tab, select **A5:D11**
15. Use the **Recommended Charts** tool to create a simple line chart.
16. Change the Chart Title to **Oregon: Projected Life Expectancy at Birth**.
17. The green line across the bottom of the chart represents the difference between men's and women's life expectancy. It is not very helpful as it is.
    Right click on the green line to open the pop up menu. Select **Format Data Series**. In the **Format Data Series** pane, under the **Series Options** tab, select the radio button in front of Secondary Axis.
18. Close the **Format Data Series** pane.
19. Add a text box that explains the Difference calculation. While the chart is still selected:

    1. On the **Insert** tab, on the right side of the ribbon, find **Text**. Select the **Text Box** tool.
    2. When you select it, your cursor will turn into cross hair (thin black plus sign)
    3. Click once in the lower left corner of your chart. This creates a text box.
    4. Type the following into the text box: **Difference** = **Female life expectancy minus male**. Move or resize the text box if you wish.

20. Move or resize your chart so that it no longer is on top of the spreadsheet data.
21. Use the **Chart Style**s tools to change your chart to something a bit more dramatic.
22. Preview the **Life Expectancy** worksheet in Print Preview and make any necessary changes.
23. Save the **PR4 Historical Data** workbook.
24. Compare your work with the self-check answer key (found in the Course Files link) and then submit the **PR4 Historical Data** workbook as directed by your instructor.

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4.6 SCORED ASSESSMENT

CHARTING SOCIAL JUSTICE DATA (COMPREHENSIVE REVIEW)

Download Data File: SC4 Data

TASK 1 INTERNATIONAL INCARCERATION RATES

1. Open the file named **SC4 Data** and then Save As **SC4 Social Justice.**
2. On the **International** tab, make D20 your active cell. Put an =AVERAGE function in the cell.
3. Create a bar chart that looks like this:

Figure 4.68

1. Move and or resize it so that it does not cover any of the data.
2. In cell A25 write a brief note explaining why a bar (or column) chart is a better choice for this data than a pie chart.
3. Set the **Print Area** so that everything prints, except for the explanation you added in cell A25.
4. Preview the **International** worksheet in Print Preview and make any changes needed to print professionally on one page.

Felony disenfranchisement is the exclusion from voting of people otherwise eligible to vote (known as disfranchisement) due to conviction of a criminal offense, usually restricted to the more serious class of crimes: felonies. Jurisdictions vary as to whether they make such disfranchisement permanent, or restore suffrage after a person has served a sentence, or completed parole or probation. Affected individuals suffer "collateral consequences" including loss of access to jobs, housing, and other facilities.

Opponents have argued that such disfranchisement restricts and conflicts with principles of universal suffrage. It can affect civic and communal participation in general.

https://en.wikipedia.org/wiki/Felony_disenfranchisement

On the Disenfranchisement rate sheet, use the Recommended Chart tool to create the following three charts. Put each chart on its own individual sheet. (Note: Not an object in a spreadsheet.)

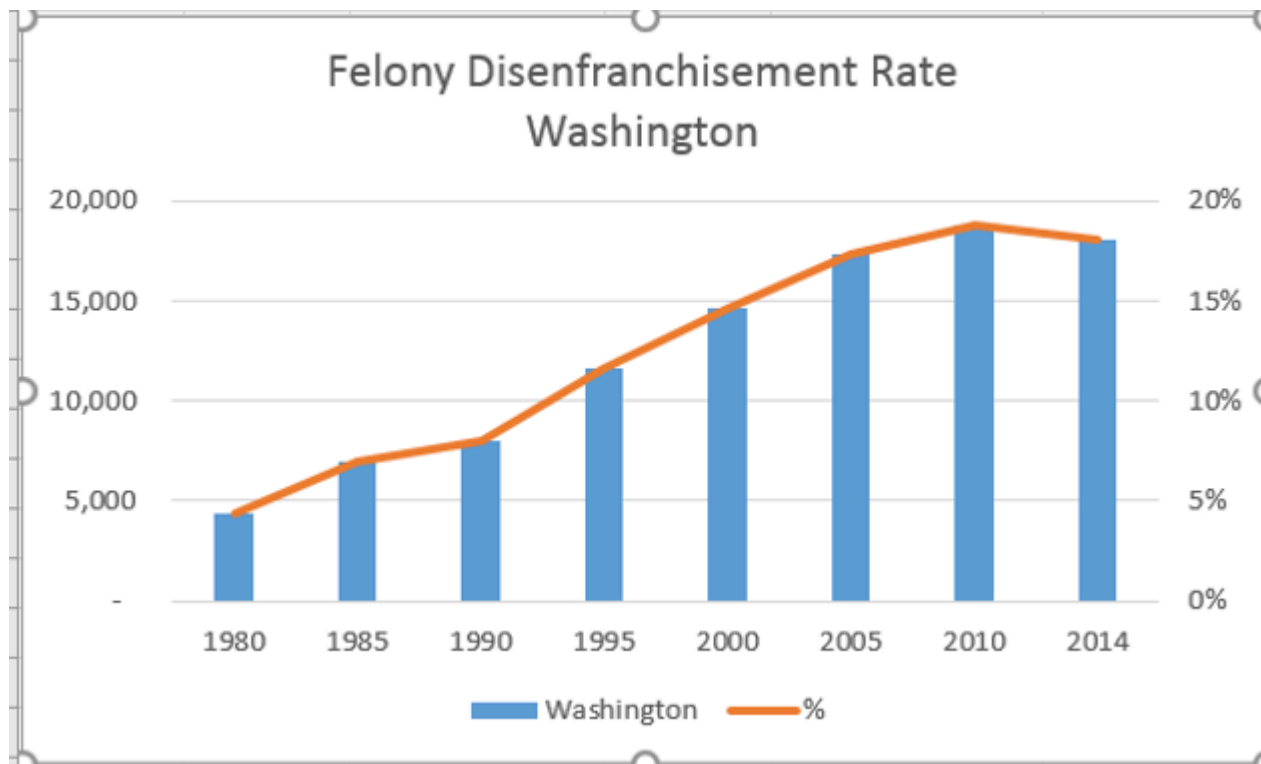**Chart1 —** Felony Disenfranchisement Rate Washington

Figure 4.69
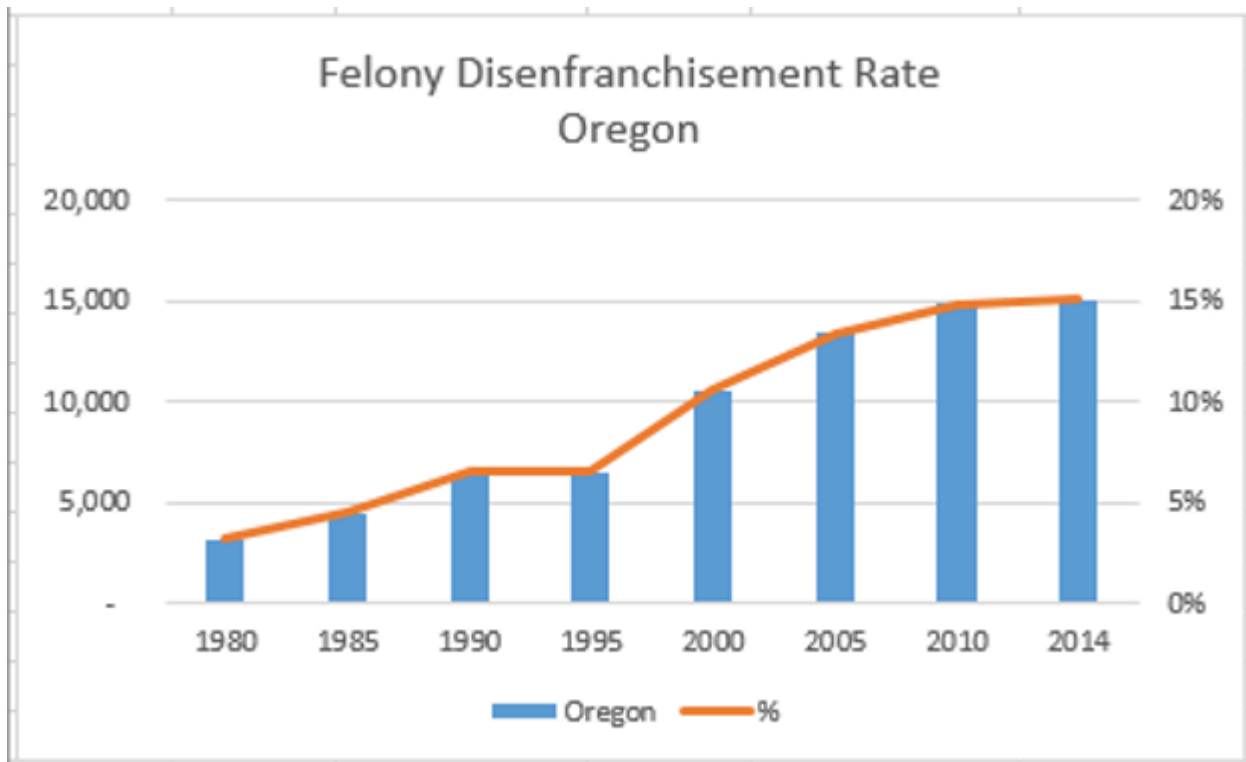
Chart2 — Felony Disenfranchisement Rate Oregon

Figure 4.70

Notes

This is called a Clustered column chart in the Recommended charts tool, but it is really a combo chart – with some data displayed as columns and some data displayed as a line.

You will need to edit the Chart Title.

You may need to adjust the chart size to make it look like the illustration.

Put the chart on its own individual sheet — don't leave it as an object on the spreadsheet.

Notes:

Take a look at both the Washington and Oregon charts. They are the same kind of chart, but your charts may look different because the data is a bit different.

To make them more similar – make sure that the vertical axes are the same in both charts. Format the left vertical (value) axis, so that the Maximum is **20000**. Format the right vertical axis, so that the Maximum is **.20**.

Chart3 – Comparison – Oregon and Washington
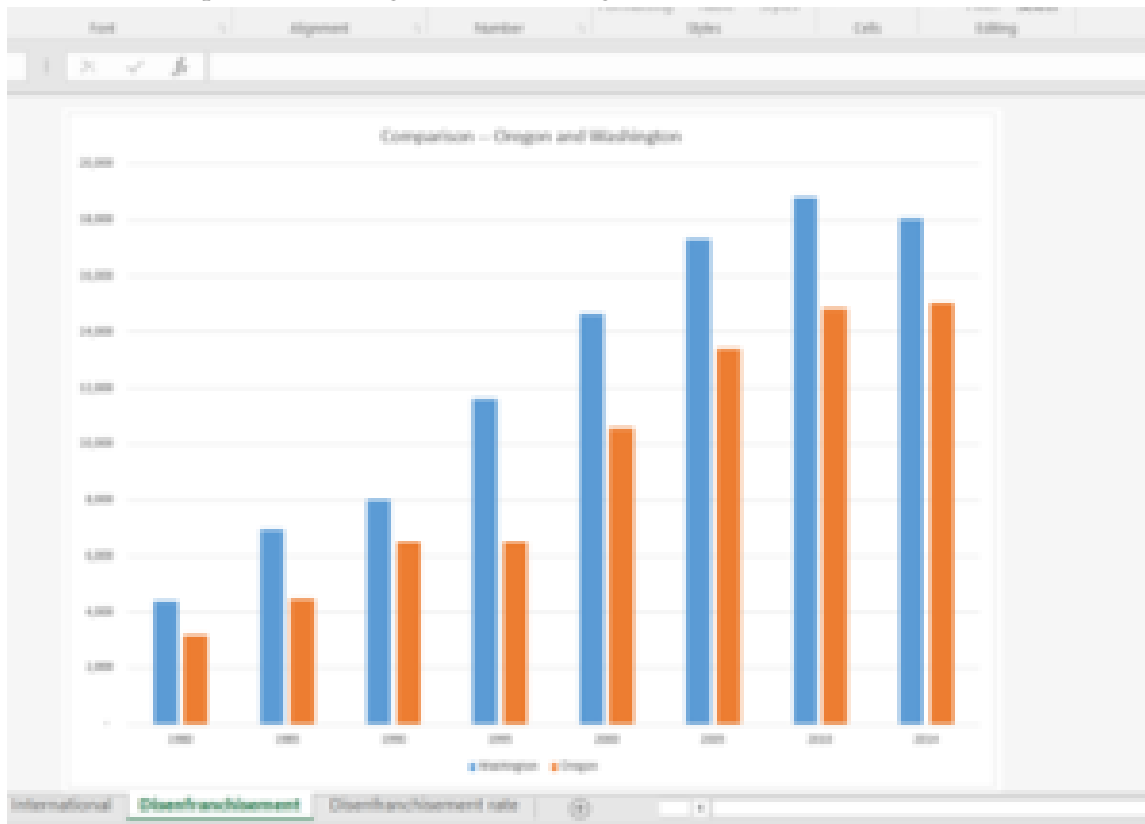
1. When you have completed all three charts, save your work. Preview the worksheet(s) in Print Preview and make any necessary changes for professional printing.
2. Submit the **SC4 Social Justice** workbook as directed by your instructor.

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Notes:

Be sure that you have years as labels on the horizontal axis (not 1, 2, 3 . . .)

This chart is on its own separate sheet.

CHAPTER 5 - TABLES

Excel workbooks are designed to store lots of information. Organizing this information so that they display meaningful data can be challenging! Excel has many features that can help you organize your data and find what you need efficiently. Setting up your data as a table from the onset will allow you to sort, filter, total, and subtotal your data. In Excel, a table is a collection of data about a particular subject stored in adjacent rows and columns. Tables can improve the look and feel of your workbook. This chapter explores how to best set up Excel tables, how to edit them, and then how to work with them effectively. These skills will be demonstrated in the context of a multi-sheet file that shows national average weather for two very different cities in the United States. Weather data is often voluminous and difficult to summarize since we collect weather data every hour of every day. Providing meaningful summaries of such data is a useful skill to have.The skills learned with this data can easily be transferred to data specific to your professional and personal needs.

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CHAPTER 6 - MULTIPLE SHEET FILES

Excel workbooks often contain a large amount of data, and worksheets can quickly become overwhelming.When one worksheet becomes cumbersome, data can be broken out into smaller subsets and placed in separate worksheets within the same Excel file. Separating out spreadsheet data into smaller pieces can lead to better data organization within a file and increase its ease of use.When a retail company needs to track overall sales, as well as, individual store sales, it makes sense to place each store's sales data in a separate sheet within a file. Adding a summary sheet that sums across all the sheets will allow for total company sales data in the same file! This chapter will show how to set up a workbook to make multi-sheet formulas quick and easy.

Other examples of when multiple sheets make the most sense are when you are comparing regional data, data for a salesforce and wish to evaluate individual salesperson performance along with overall sales, and data over a period of time where sheets can be broken out by year or by month. When comparing data across several sheets, it is essential that all the sheets are laid out in the same way. To facilitate this, a template can be used. A template is the basic pattern for each new sheet that can be used repeatedly to make sure each new sheet has the same setup, formatting, formulas, etc. as the existing sheets in a file. In this chapter, we will use both pre-made, Microsoft Excel templates, as well as, ones we will create from scratch to meet the specific needs of our work.

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