8. Insert and modify charts

In this chapter

- Create charts
- Modify charts
- Format charts

Practice files

For this chapter, use the practice files from the Word2016SBS\Ch08 folder. For practice file download instructions, see the introduction.

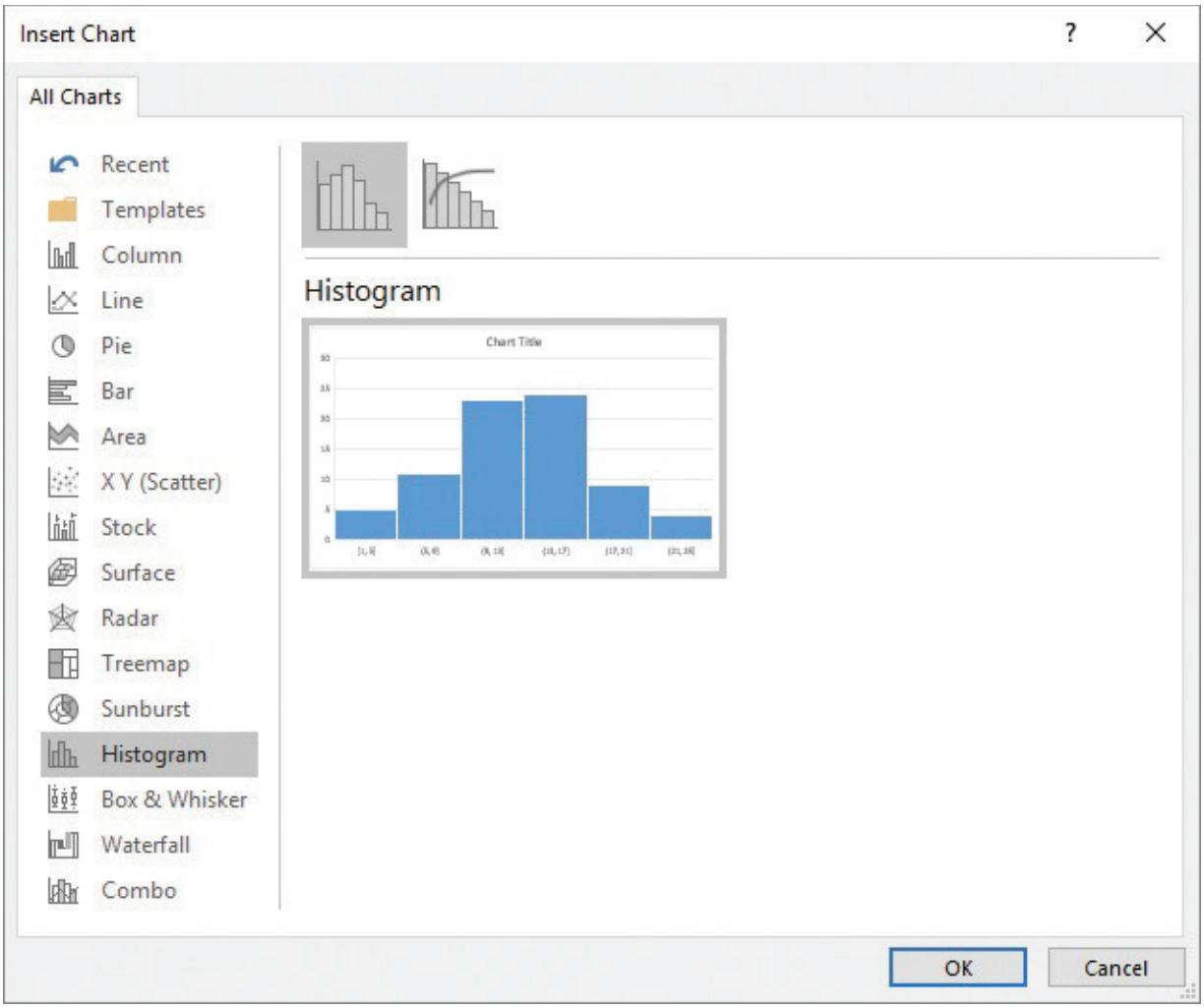
You'll often find it helpful to reinforce the argument you are making in a document by providing facts and figures. When it's more important for your audience to understand trends than identify precise values, you can use a chart to present numerical information in visual ways.

You can create a chart directly in a document or import a completed chart from another app. The chart takes on the design elements of the document template and blends in with the rest of the document content. You can modify the chart layout and the included elements to provide the visual imagery that you want.

This chapter guides you through procedures related to creating, modifying, and formatting charts.

Create charts

You can easily add a chart to a document to help identify trends that might not be obvious from looking at numbers. Word 2016 has 15 chart categories. Some categories include two-dimensional and three-dimensional variations. The Treemap, Sunburst, Histogram, Box & Whisker, and Waterfall categories are new to the Microsoft Office apps in Office 2016.



In the Insert Chart dialog box, you can choose from many types of charts

The most frequently used chart categories include:

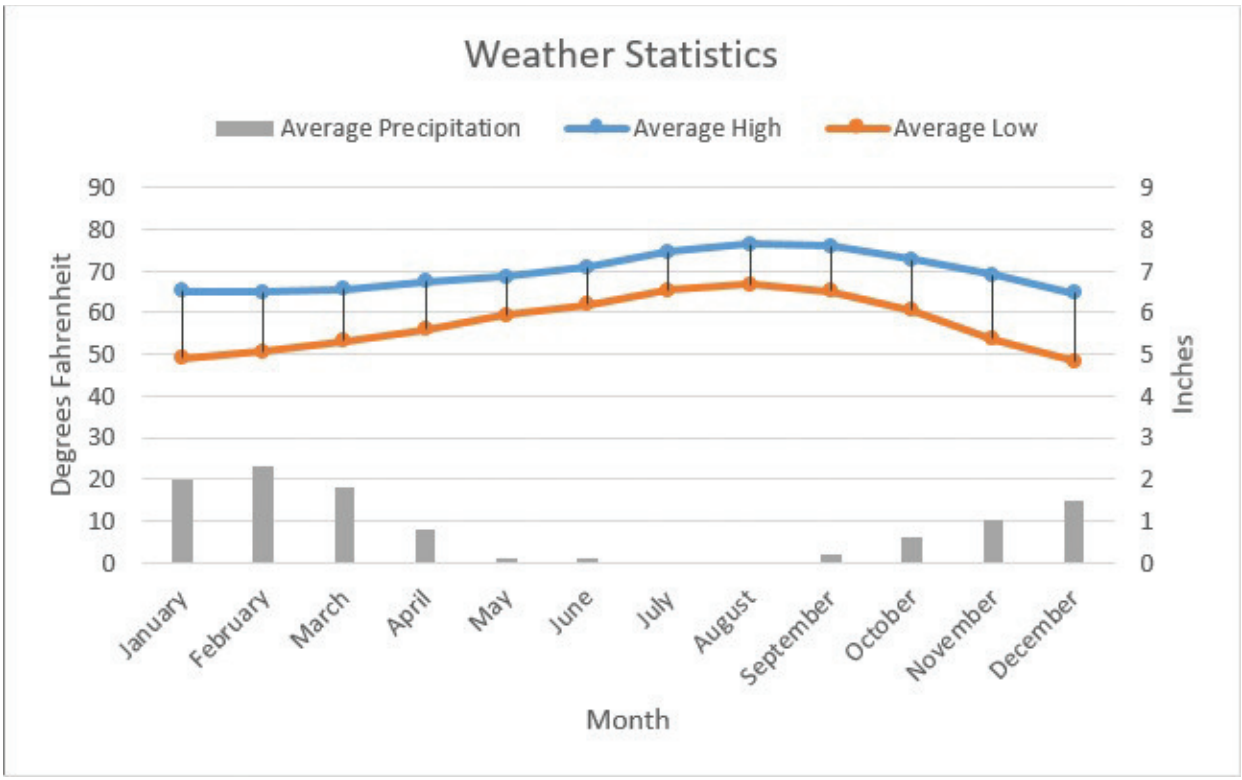
- **Column** These charts show how values change over time.
- **Line** These charts show erratic changes in values over time.
- **Pie** These charts show how parts relate to the whole.

SEE ALSO

For information about creating pie charts, see the sidebar "Pie charts" later in this chapter.

- **Bar** These charts show the values of several items at one point in time.

You can display multiple types of data by creating a combo chart. Combo charts display multiple data series independently on a common axis.

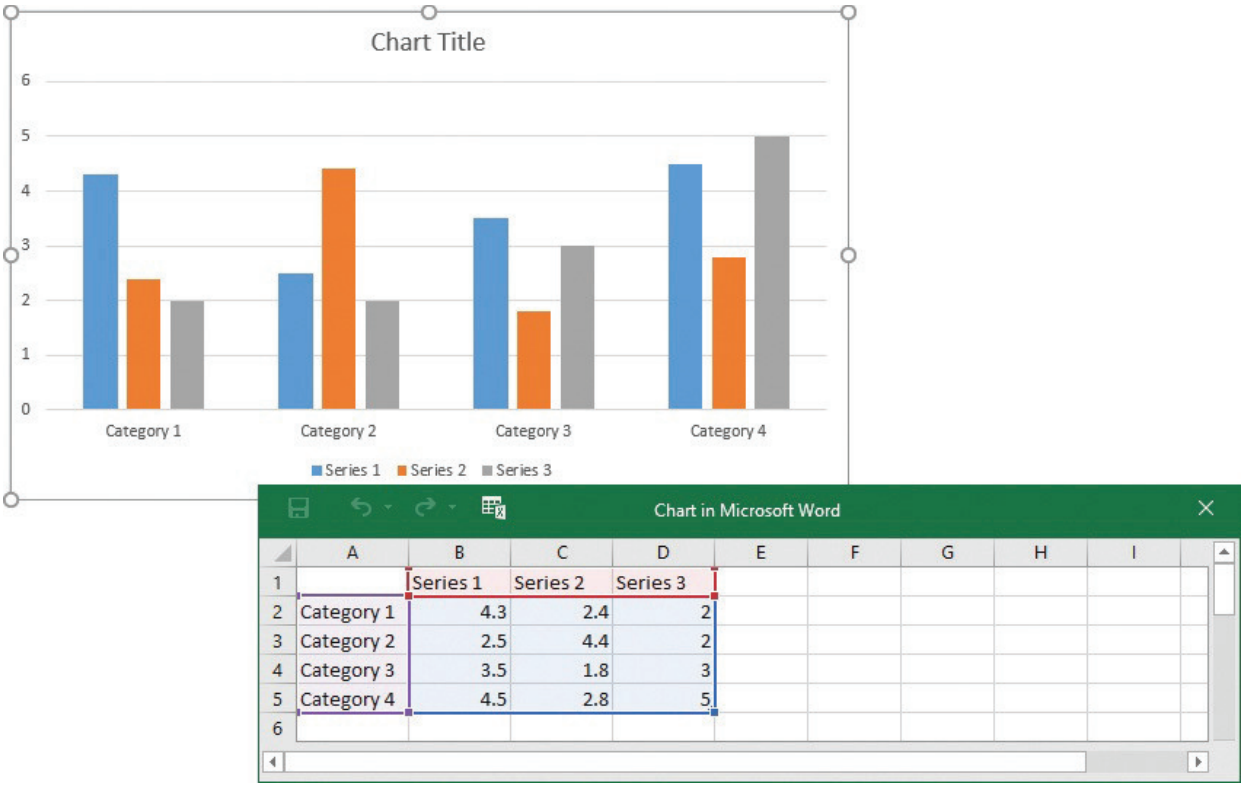


A combo chart that merges line and column charts

When you create a chart in Word, you specify the chart type and then Word opens a linked Microsoft Excel worksheet that contains sample data that is appropriate to the selected chart type. You replace the sample data in the worksheet with your own data, and the chart in the adjacent document window adapts to display your data.

IMPORTANT

The procedures in this chapter assume that you have Excel 2016 installed on your computer. If you don't have this version of Excel, the procedures won't work as described.



The worksheet title bar identifies it as specific to the chart

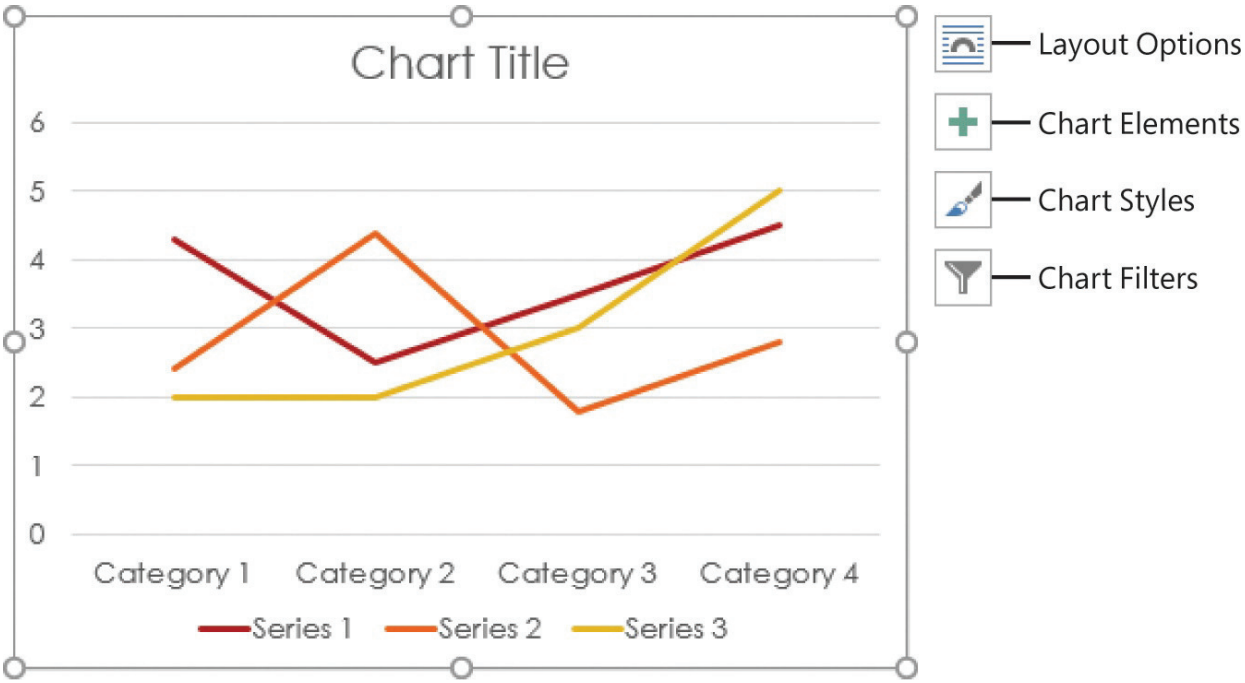
You can enter the data directly into the linked worksheet, or you can copy and paste it from an existing Microsoft Access table, Word table, or Excel worksheet.

After you plot the data in the chart, you can move and size the chart to fit the space available on the page, change the flow of text around the chart, and add and remove chart elements to most clearly define the chart content for the audience. You can edit the data in the worksheet at any time—both the values and the column and row headings. Word replots the chart to reflect your changes.

When a chart is active, you can work with the chart and its components by using commands from the Design and Format tool tabs that are available on the ribbon, and the Chart Elements, Chart Styles, and Chart Filters panes that open when you click the buttons to the right of the chart. The Layout Options button is also available.

TIP

The Chart Filters button appears only if it is appropriate for this type of chart.



Manage a chart from the ribbon or from option panes

If you decide that the type of chart you initially selected doesn't adequately depict your data, you can change the type at any time.

To create a chart on a page

1. On the **Insert** tab, in the **Illustrations** group, click the **Chart** button.
2. In the left pane of the **Insert Chart** dialog box, click a chart category to display the chart variations in the right pane.
3. In the right pane, click the chart type that you want to create, and then click **OK** to insert a sample chart and open its associated Excel worksheet containing the plotted data.
4. In the linked Excel worksheet, enter the values to be plotted, following the pattern of the sample data.

TIP

If the data you want to plot on the chart already exists in another file, you can save time by reusing it. Set up the chart structure in the linked worksheet first, and then paste the existing data into the linked worksheet.

5. If the chart data range defined by the colored outlines doesn't

automatically expand to include new data, drag the blue handle in the lower-right corner of the range to expand it.

6. Close the Excel window.

To insert a chart from Excel onto a page

1. In the source workbook, click the chart border to select it.
2. Copy the chart to the Clipboard.
3. Switch to Word, display the page, and then paste the chart from the Clipboard.

TIP

You can import data into your chart from a text file, webpage, or other external source, such as Microsoft SQL Server. To import data, first display the associated Excel worksheet. Then on the Excel Data tab, in the Get External Data group, click the button for your data source, and navigate to the source. For more information, refer to Excel Help.

To change the type of a selected chart

1. On the **Design** tool tab, in the **Type** group, click the **Change Chart Type** button.
2. In the **Change Chart Type** dialog box, click a category on the left, click a chart type at the top, and then click **OK**.

TIP

When you click a chart type in the top row, the dialog box displays a preview of that chart type as applied to the current data. You can point to the preview to display a larger version.

Modify charts

You can modify a chart by changing the data or elements that it displays.

Manage chart data

The Excel worksheet is composed of rows and columns of cells that contain values, which in charting terminology are called *data points*. Collectively, a set

of data points is called a *data series*. Each worksheet cell is identified by an address consisting of its column letter and row number—for example, A2. A range of cells is identified by the address of the cell in the upper-left corner and the address of the cell in the lower-right corner, separated by a colon—for example, A2:D5.

By default, a chart is plotted based on the series of data points in the columns of the attached worksheet, and these series are identified in the legend. You can easily switch the chart to base it on the series in the rows instead, or you can select specific cells of the worksheet data to include in the chart.

You can edit the chart data at any time, either in the linked worksheet window or in Excel. The ribbon is available only when you open the worksheet in Excel.

To select a chart for editing

1. Point to a blank area of the chart, outside of the plot area.
2. When the *Chart Area* ScreenTip appears, click once.

To open the linked chart data worksheet in Word

1. Do either of the following:
   - Right-click the chart, and then click **Edit Data**.
   - Select the chart. Then on the **Design** tool tab, in the **Data** group, click the **Edit Data** button.

TIP

The chart must be active (surrounded by a frame) when you make changes to the data in the worksheet; otherwise, the chart won't automatically update.

To open the linked chart data worksheet in Excel

1. Select the chart.
2. On the **Design** tool tab, in the **Data** group, click the **Edit Data** arrow, and then click **Edit Data in Excel**.

TIP

If you open the worksheet in the linked window and then need access to commands on the ribbon, you can open the worksheet in Excel by clicking the Edit Data In Microsoft Excel button on the

Quick Access Toolbar of the linked window.

To switch the data across the category and series axes

1. Open the linked chart data worksheet.
2. In Word, on the **Design** tool tab, in the **Data** group, click the **Switch Row/Column** button.

TIP

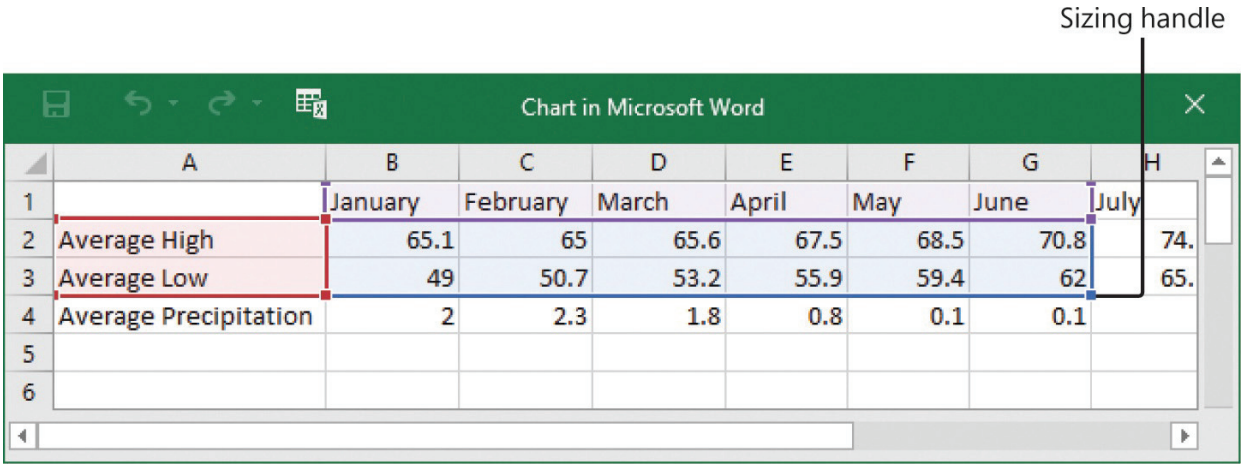
The Switch Row/Column button is active only when the linked worksheet is open.

To select worksheet data for editing

1. Do any of the following:
   - To select a cell, click it.
   - To select a column, click the column header (the letter at the top of the column).
   - To select a row, click the row header (the number at the left end of the row).
   - To select multiple cells, columns, or rows, do either of the following:
     - Select the first element, and then hold down the **Shift** key as you select subsequent elements.
     - Drag through adjacent cells, columns, or rows.
   - To select an entire worksheet, click the **Select All** button (the triangle in the upper-left corner of the worksheet, at the intersection of the row and column headers).

To change the area of a worksheet that is included in the chart

1. Drag the blue handle in the lower-right corner of the range to expand or contract it.



Different colors identify the series, categories, and values

To filter the chart to display only specific data

1. Select the chart, and then click the **Chart Filters** button to display the Chart Filters pane. The Chart Filters pane lists all the series and categories in the data set.

TIP

The Chart Filters button appears only if it is appropriate for this type of chart.

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2. Point to any series or category to emphasize it.
3. Clear the check boxes of the series or categories you do not want to plot on the chart.

TIP

To clear all the check boxes in a group at once, clear the Select All check box.

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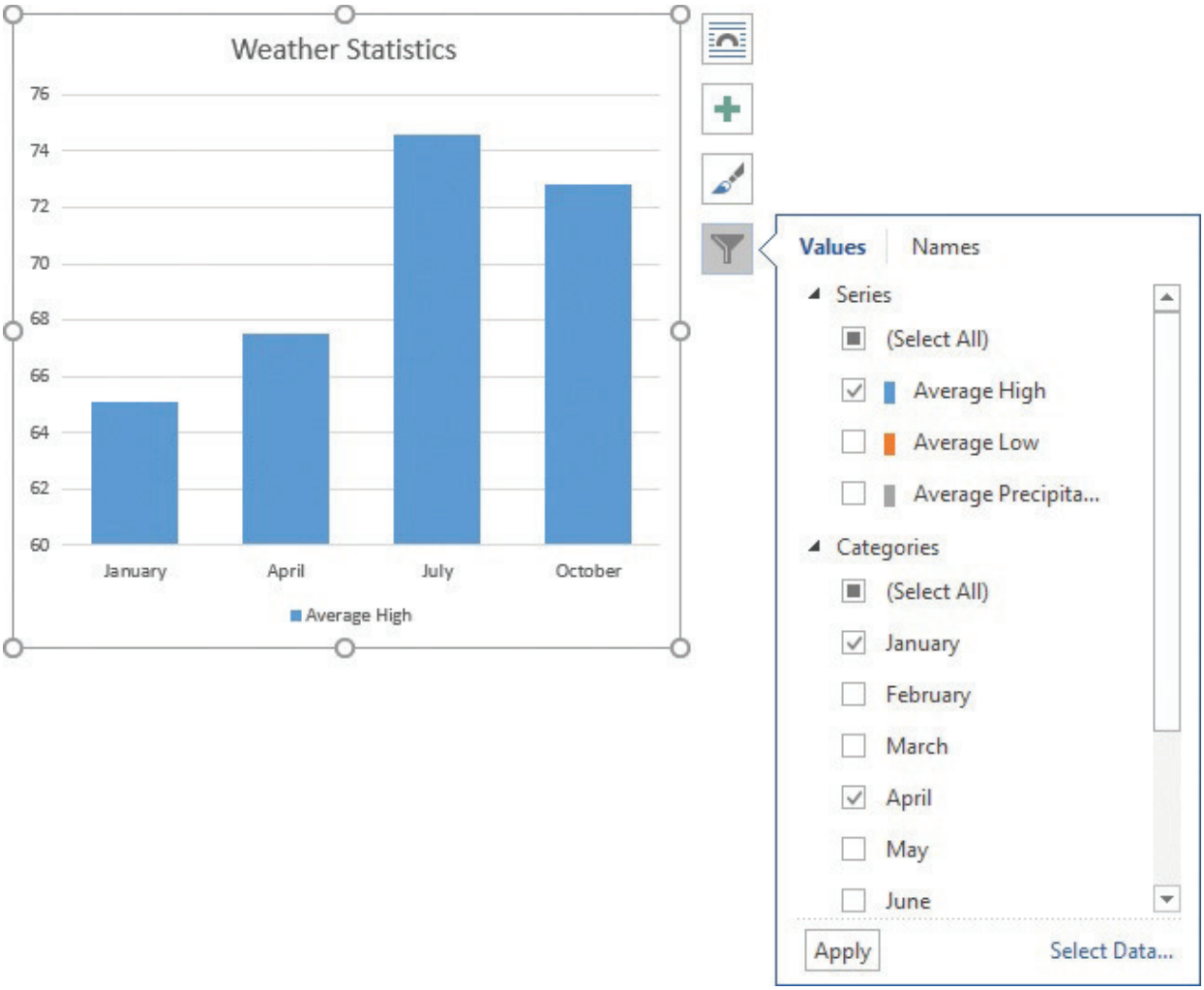
4. At the bottom of the **Chart Filters** pane, click **Apply** to replot the data.



Filtering a chart to display only specific series and categories

5. Click the **Chart Filters** button to close the **Chart Filters** pane.

SEE ALSO

For information about working with the other two buttons to the right of the chart, see "Format charts" later in this chapter.

Modify the display of chart elements

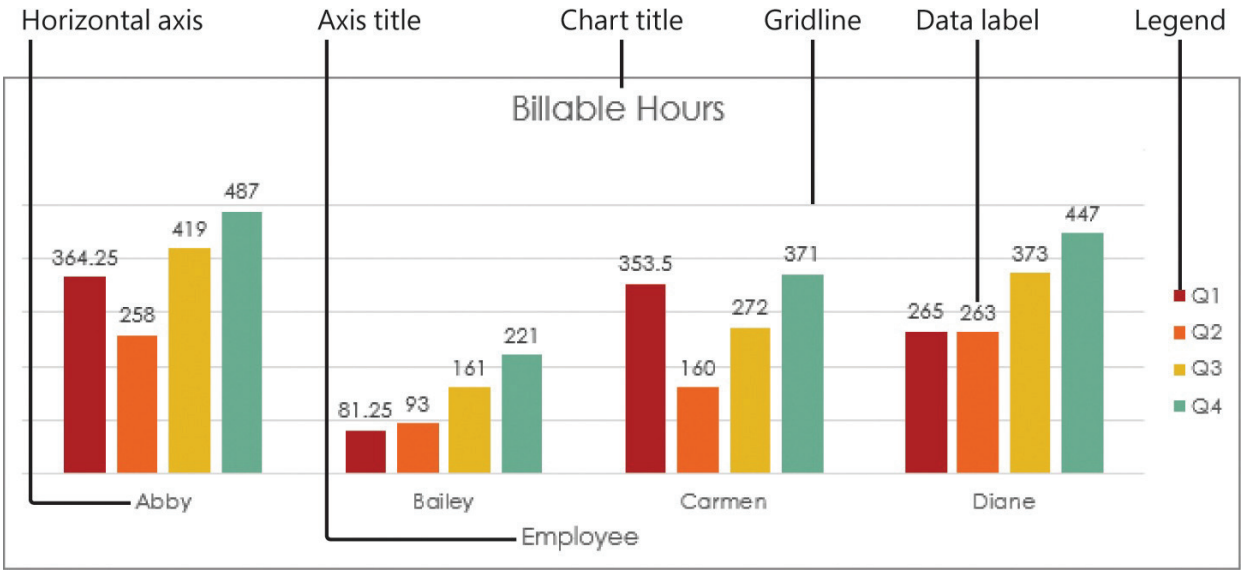
Each data point in a data series is represented graphically in the chart by a data marker. The data is plotted against an x-axis—which is referred to as the *horizontal axis* or *category axis*—and a y-axis—which is referred to as the *vertical axis* or *value axis*. (Three-dimensional charts also have a z-axis—which is referred to as the *depth axis* or *series axis*.)

The primary components of a chart on a page are the following:

The primary components of a chart on a page are the following:

- **Chart area** This is the entire area within the chart frame.
- **Plot area** This is the rectangular area bordered by the axes.
- **Data markers** These are the graphical representations of the values, or data points, of each data series in the linked worksheet.

You can add chart elements to the chart components to help explain the data.



Some default and optional chart elements

The available chart elements include the following:

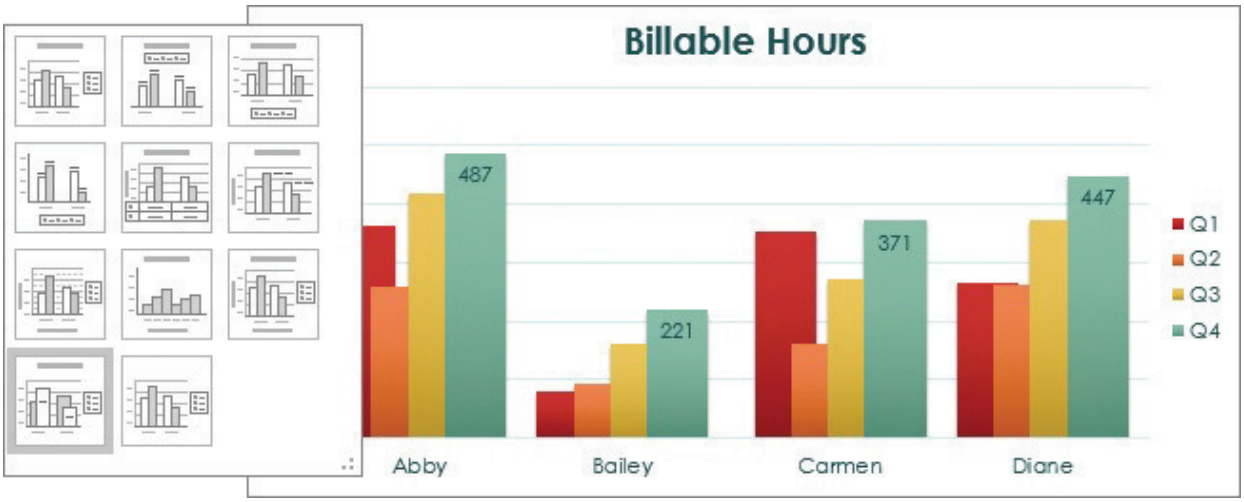
- **Axes** These elements control the display of the category and value axis labels, not the display of the data.
- **Axis titles** These identify the categories, values, or series along each axis.
- **Chart title** A title by which you identify the chart. The chart title can appear above the chart or overlaid across the center of the chart.
- **Data labels** These identify the exact values represented by the data markers on the chart. They can be displayed inside or outside of the data markers.
- **Data table** This table provides details of the plotted data points in table format, essentially mimicking the worksheet. A data table can incorporate a legend.
- **Error bars** These indicators mark a fixed amount or percentage of deviation from the plotted value for one or more series.
- **Gridlines** Major and minor horizontal and vertical gridlines identify measurement points along each axis and help to visually quantify the data

points.

- **Legend** This listing correlates the data marker color and name of each data series. The legend can be displayed on any side of the plot area.
- **Lines** On charts that plot data that doesn't touch the category axis (such as an area chart or line chart), these lines drop from the plotted points to the corresponding value on the category axis.
- **Trendline** This line marks a value that is calculated on all the series values in a category. It most commonly marks the average of the values but can also be based on other equations.
- **Up/down bars** These bars indicate the difference between the high and low values for a category of data in a series.

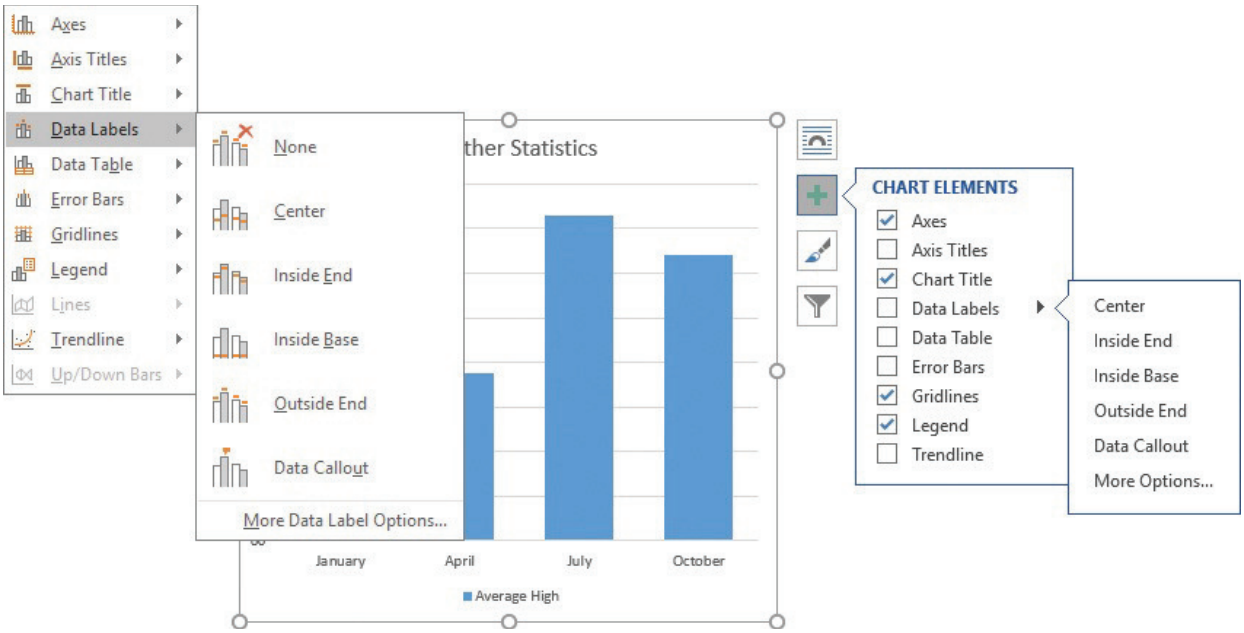
All of the chart elements are optional. Some chart types don't support all of the elements. For example, a pie chart doesn't display axes or gridlines.

Each chart type has a set of Quick Layouts that you can use to display or position specific sets of chart elements.



Apply a Quick Layout to quickly change multiple chart elements

The Quick Layouts are preset combinations of the available chart elements. When the preset layouts don't produce the chart you want, you can create a custom layout by mixing and matching different chart elements. You can control the display of chart elements from the Add Chart Element menu on the Design tool tab, and from the Chart Elements pane that opens when you click the button to the right of the chart.



The menu and pane include only chart elements that apply to the current chart type

You can apply the same chart elements from both locations. The Add Chart Element menu provides a bit more visual guidance than the Chart Elements pane but is further from the chart.

You can adjust a chart layout by adding, deleting, moving, and sizing chart elements. To perform any of those tasks, you must first select the element. The following table describes some of the options available for common chart elements.

Chart element	Options
Axes	Primary Horizontal, Primary Vertical, or both
Axis Titles	Primary Horizontal, Primary Vertical, or both
Chart Title	Above Chart or Centered Overlay
Data Labels	Center, Inside End, Inside Base, Outside End, or Data Callout
Data Table	With Legend Keys or No Legend Keys
Error Bars	Standard Error, Percentage, or Deviation
Gridlines	Primary Major Horizontal, Primary Major Vertical, Primary Minor Horizontal, Primary Minor Vertical, or any combination of the four options
Legend	Right, Top, Left, or Bottom
Lines	Drop Lines or High-Low Lines
Trendline	Linear, Exponential, Linear Forecast, or Moving Average
Up/Down Bars	(on or off)

TIP

You can use standard techniques to add pictures, shapes, and independent text boxes to pages to enhance charts.

To apply a preset layout to a chart

1. Select the chart. On the **Design** tool tab, in the **Chart Layouts** gallery, click the **Quick Layout** button, and then click the layout you want.

To display the Add Chart Element menu

1. Select the chart. On the **Design** tool tab, in the **Chart Layouts** group, click the **Add Chart Element** button.

To display the Chart Elements pane

1. Select the chart, and then click the **Chart Elements** button that appears to the right of the chart.

To specify which chart elements to display on the chart

1. Select the chart, and then open the **Add Chart Element** menu.

2. On the **Add Chart Element** menu, click the chart element, and then click one or more options to select or clear them.

Or

1. Select the chart, and then open the **Chart Elements** pane.
2. In the **Chart Elements** pane, do either of the following:
   - Clear the check box for the chart elements you want to remove from the chart.
   - Select the check box for the chart elements you want to open on the chart. Click the arrow that appears to the right of the element to display the display options menu for that element, and then click the option you want.

To change the size of a selected chart or chart element

1. Point to any sizing handle (the hollow dots around the chart frame), and when the pointer changes to a double-headed arrow, drag in the direction you want the chart to grow or shrink.

TIP

If an element cannot be resized, it doesn't have sizing handles when selected.

To change the position of a selected chart element

1. Point to the border around the element, away from any handles, and when the four-headed arrow appears, drag the chart to the new location.

TIP

Some elements cannot be moved, even if the four-headed arrow appears.

To rotate a three-dimensional chart layout

1. Right-click the chart, and then click **3-D Rotation**.
2. In the **3-D Rotation** area of the **Effects** page of the **Format Chart Area** pane, set the angle of rotation for each axis.

Pie charts

Unlike column, bar, and line charts, which plot at least two series of data points, pie charts plot only one series, with each data point, or *slice*, reflecting a fraction of the whole series. If you plot a multiseries chart and then change the chart type to a pie chart, Word hides all but the first series, retaining the hidden information in case you change back to a chart type capable of showing more than one series. You can switch to a different series by clicking the Chart Filters button to the right of the chart, selecting the series you want in the Series area of the Chart Filters pane, and clicking Apply.

When you plot a pie chart, you can use an effective formatting option that is not available with multiseries chart types. To draw attention to individual data points, you can "explode" the pie by dragging individual slices away from the center. Or you can double-click a slice to select it and open the Format Data Point pane, where you can set a precise Angle Of First Slice and Point Explosion percentage.

Format charts

You can quickly format a chart and its individual parts by applying fills, outlines, and effects to the following components:

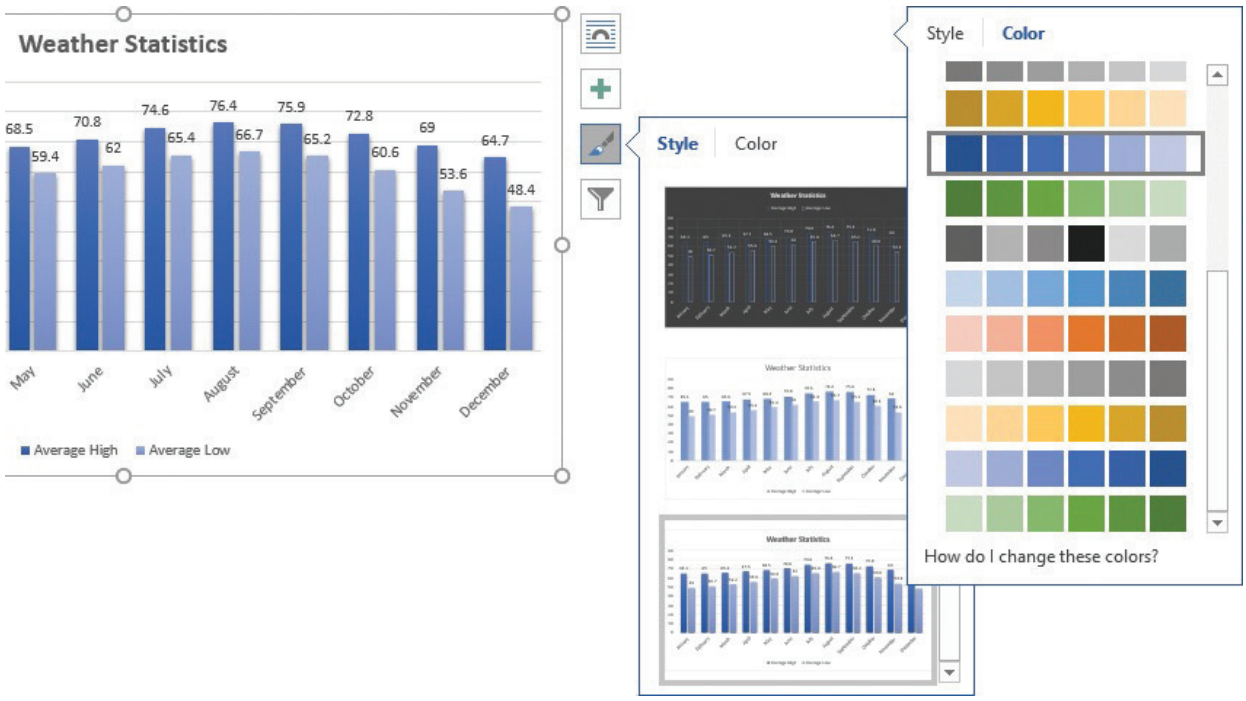
- **Chart area** You can specify the background fill, the border color and style, effects such as shadows and edges, the 3-D format and rotation, and the size and position. You can also attach text to be displayed when someone points to the chart.
- **Plot area** You can specify the background fill, the border color and style, effects such as shadows and edges, and the 3-D format and rotation.
- **Data markers** You can specify the background fill, the border color and style, effects such as shadows and edges, and the 3-D format. You can also precisely determine the gap between data points.
- **Legend** You can specify the background fill, the border color and style, and effects such as shadows and edges. You can also specify the legend's position and whether it can overlap the chart.
- **Axes** You can specify the background fill, the line color and style, effects such as shadows and edges, and the 3-D format and rotation. For the category axis, you can also specify the scale, add or remove tick marks, adjust the label position, and determine the starting and maximum values. You can set the number format (such as currency or percentage), and set

the axis label alignment.

- **Gridlines** You can set the line color, line style, and effects such as shadows and edges.
- **Data table** You can specify the background fill, the border color and style, effects such as shadows and edges, and the 3-D format. You can also set table borders.
- **Titles** You can specify the background fill, the border color and style, effects such as shadows and edges, and the 3-D format. You can also set the title's alignment, direction, and angle of rotation.

If you don't want to spend a lot of time formatting individual chart elements, you can apply a predefined chart style to create a sophisticated appearance with a minimum of effort. Chart styles affect only the formatting of the chart components and elements; they don't change the presence of the chart elements.

The Chart Styles pane has two pages: Style and Color. From the Style page, you can preview and apply the chart styles. From the Color page, you can change the colors that are used in the chart without affecting other document elements.

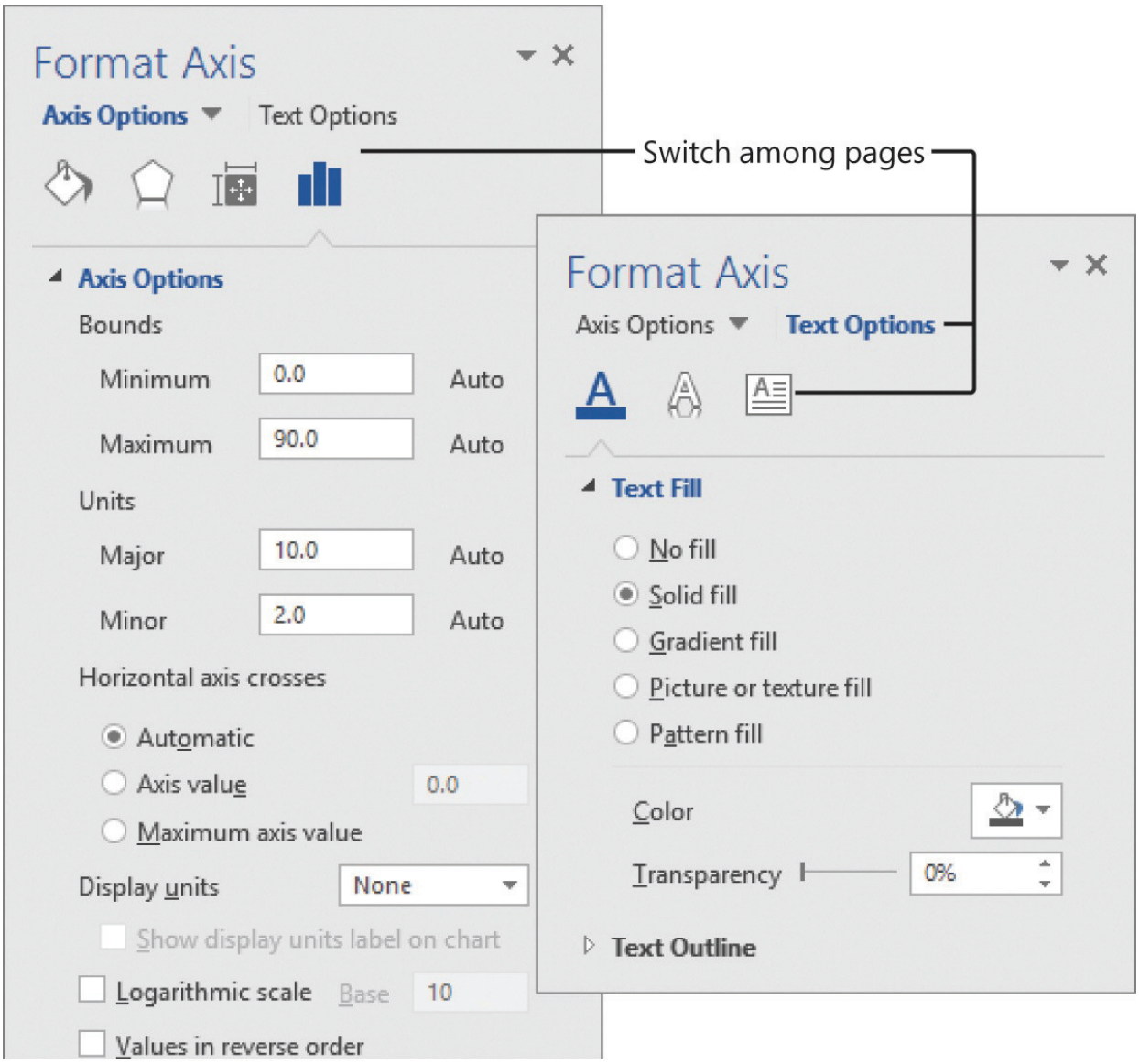


Change the chart colors without changing the template

You can apply these same styles and colors from the Chart Styles group on the Design tool tab. From the Format tool tab, you can apply shape styles and WordArt styles to chart elements.

You can fine-tune the formatting of a selected chart element in its Format pane.

Each type of element has a specific Format pane. Most Format panes have settings that are divided into multiple pages, such as Fill & Line, Effects, Size & Position, and an Options page that is specific to the selected chart element. You can display different options by clicking the elements in the pane header.



Commands for formatting different elements are on separate pages of the pane

To apply a chart style to a chart

1. Select the chart, and then do either of the following:
   - On the **Design** tool tab, in the **Chart Styles** gallery, click the style you want.
   - Click the **Chart Styles** button, and then on the **Style** page of the **Chart Styles** pane, click the style you want.

To change the colors of chart elements without changing the template colors

1. Select the chart, and then do either of the following:
   - On the **Design** tool tab, in the **Chart Styles** gallery, click the **Change Colors** button, and then click the color set you want.
   - Click the **Chart Styles** button, and then on the **Color** page of the **Chart Styles** pane, click the style you want.

To select a chart component for formatting

1. Do either of the following:
   - On the chart, click the element once.
   - If the element is difficult to identify or click, on the **Format** tool tab, in the **Current Selection** group, display the **Chart Elements** list, and then click the component you want to select.

TIP

If you want to activate the chart (that is, select the chart area), be sure to click a blank area inside the chart frame. Clicking any of the chart's elements will activate that element, not the chart as a whole.

To apply a preset style to a selected chart component

1. On the **Format** tool tab, in the **Shape Styles** gallery, click the style you want.

To apply a fill color, outline color, or effect to a selected chart component

1. On the **Format** tool tab, in the **Shape Styles** group, click the **Shape Fill**, **Shape Outline**, or **Shape Effects** button, and then click the option you want.

To apply a WordArt style to the text in a selected chart

1. On the **Format** tool tab, in the **WordArt Styles** gallery, click the style you want.

To apply WordArt style components to a selected chart component

1. In the **WordArt Styles** group, click the **Text Fill**, **Text Outline**, or **Text Effects** button, and then click the option you want.

To open the Format pane for a chart element

1. Do any of the following:

- Double-click the chart element.
- Right-click the element, and then click **Format** *Element*.
- At the top of an open **Format** pane, click the downward-pointing triangle to the right of the **Options** label, and then click an element to open that Format pane.

Or

1. If you have trouble double-clicking a smaller chart element, on the **Format** tool tab, in the **Current Selection** group, display the **Chart Elements** list, and then click the element you want to select.

TIP

To open the Format Major Gridlines pane, right-click any gridline, and then click Format Gridlines. To open the Format Data Table pane, right-click the selected data table, and then click Format Data Table.

Skills review

In this chapter, you learned how to:

- Create charts
- Modify charts
- Format charts

Custom chart templates

If you make extensive modifications to the design of a chart, you might want to save it as a template. Then when you want to plot similar data in the future, you can avoid having to repeat all the changes by applying the template as a custom chart type.

To save a customized chart as a template, follow these steps:

1. Select the chart (not a chart element).
2. Right-click the chart, and then click **Save as Template** to open the **Save Chart Template** dialog box displaying the contents of your **Charts** folder.

TIP The default Charts folder is the *AppData\Roaming\Microsoft\Templates\Charts* subfolder of your

user profile folder.

3. Enter a name for the chart template in the **File name** box, and then click **Save**.

You can work with custom chart templates in the following ways:

- To locate a custom chart type, open the Chart Type or Change Chart Type dialog box, and then click Templates.
- To delete a custom chart type, display the Templates folder in the Chart Type or Change Chart Type dialog box. In the lower-left corner, click Manage Templates. Then in the File Explorer window that opens, right-click the template and click Delete.

Practice tasks

The practice files for these tasks are located in the Word2016SBS\Ch08 folder. You can save the results of the tasks in the same folder.

Create charts

Open the CreateCharts document, and then perform the following tasks:

1. Position the cursor in the blank paragraph below the *Regional Averages* heading.
2. Insert a chart, using the **3-D Clustered Column** chart type (fourth from the left in the **Column** category).
3. In the linked chart data worksheet, select and delete all the sample data, leaving only the colors that identify the series, categories, and values.
4. In cell **B1**, enter **March**. Then press the **Tab** key to enter the heading on the chart and move to the next cell of the worksheet.
5. In cells **C1** through **E1**, enter **June**, **September**, and **December**.

TIP

If you were entering a sequential list of months, you could enter *January* and then drag the fill handle in the lower-right corner of the cell to the right to fill subsequent cells in the same row with the names of the months.

When you enter *December*, notice that it is outside of the colored guides and does not appear on the chart in the document. You will fix this in the next set of practice tasks.

6. In cells **A2** through **A4**, enter **Minimum**, **Average**, and **Maximum**, pressing the **Enter** key between entries.

TIP

Press Enter to move down in the column (or to the beginning of a data entry series) or Shift+Enter to move up. Press Tab to move to the right in the same row or Shift+Tab to move to the left.

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7. In cell **B2**, enter **37**, and press **Tab**. Notice that a corresponding column appears in the chart.
8. In cells **C2** through **E2**, enter **54**, **53**, and **29**, pressing **Tab** to move from cell to cell. After you enter the last number, press **Enter** to move to cell **B3**.
9. Enter the following data into the chart worksheet, noticing as you enter data that the chart columns and scale change to reflect the data.

	B	C	D	E
3	47	67	66	35
4	56	80	70	41

10. Close the **Chart in Microsoft Word** window.

    Notice that the temperatures on the chart are grouped by category rather than by month, and the December temperatures are missing. You will fix these issues in the next set of practice tasks.

11. Open the **Temperatures** workbook from the practice file folder. Select the chart that is on the worksheet, and copy it to the Clipboard.
12. Return to the **CreateCharts** document. Position the cursor in the blank paragraph after the *Local Averages* heading, and then paste the chart from the Clipboard into the document. Notice that the chart takes on the color scheme of the document.

    The chart type used for this data, Stacked Column, sums the minimum, average, and maximum temperatures for each month.

13. Change the chart type of the new chart to **Line with Markers** (the fourth chart from the left in the **Line** category) to display the three temperature series individually.
14. Save and close the document. Then close the workbook.

Modify charts

Open the ModifyCharts document, and then perform the following tasks:

1. Select the chart, and open the linked chart data worksheet in Word.
2. In the worksheet, drag the blue handle so that the colored cells include only those that contain content (A1:E4). Notice that the December data appears in the chart.
3. In the document, select the chart. Then switch the data across the category and series axes to display the temperatures in groups by month.
4. In the worksheet, change the text in cells **B1:E1** to **Spring**, **Summer**, **Fall**, and **Winter**. Then close the linked chart data worksheet.
5. Open the **Chart Filters** pane, and then do the following:
   - Point to each item in the **Series** and **Category** areas of the pane to highlight those values on the chart.
   - Clear all the check boxes in the **Series** area, and then select only the **Average** check box.
   - Click **Apply** to modify the chart.
6. Repeat step 5 to display only the **Minimum** and **Maximum** series values.
7. From the **Quick Layout** gallery on the **Design** tool tab, apply **Layout 9** to the chart. Notice that this adds a chart title, axis titles, and a legend to the chart area.
8. Add the following elements to the chart:
   - Primary Minor Horizontal gridlines
   - Data labels

TIP

You can add data labels to the chart only from the Chart Elements pane, not from the Add Chart Elements menu.

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9. Remove the horizontal **Axis Title** placeholder from the chart.

10. Replace the vertical **Axis Title** placeholder with **Degrees Fahrenheit**.
11. Replace the **Chart Title** placeholder with **Regional Averages**.
12. Select the legend. Drag its top border to align with the top horizontal gridline, and its bottom border to align with the bottom horizontal gridline. Notice that the legend entries move to fill the space.
13. Drag the chart title to the right so that it right-aligns with the legend. Then click outside the chart to view the results.
14. Experiment with any other chart modification procedures that interest you. Then save and close the document.

Format charts

Open the FormatCharts document, and then perform the following tasks:

1. Select the chart. From the **Chart Styles** gallery on the **Design** tool tab, apply **Style 8** to the chart. Notice that the legend changes location.
2. Change the colors of the chart elements to the **Color 17** color set without affecting the document theme.
3. Select the legend. From the **Shape Styles** gallery on the **Format** tool tab, apply a **Moderate Effect** of your choice.
4. Select the chart title. From the **WordArt Styles** gallery, apply a WordArt style of your choice. Then change the fill and outline colors, and add a shadow effect if the WordArt style doesn't already have one.
5. Select the vertical axis title, and change the font size to **12** points.
6. Select the plot area (not the chart area), and double-click it to open its Format pane. In the **Format Plot Area** pane, explore the various options that are available for formatting this component.
7. At the top of the pane, click the downward-pointing arrow next to **Plot Area Options**, and select another chart component or element to display its Format pane.
8. Experiment with any other chart formatting procedures that interest you. Then save and close the document.