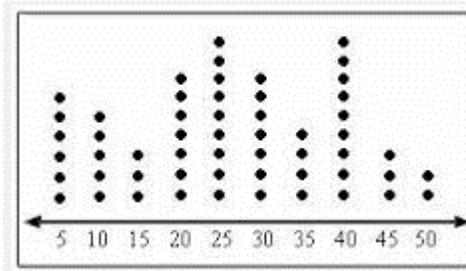


Representing Data

When you have a collection of data (data set), there are a number of ways in which you can organize the data to show it visually. In some cases, the use of a visual representation can help you see the properties of the data clearer.

Dot Plots

Dot plots are used to summarize a small set of data. Heights or weights of students in a class or grades in a class. The dot plot example below shows how each data point is represented on the graph.



Stem-and-Leaf Plots

A stem and leaf plot is another type of graph that is useful for small data sets. It is similar to a dot plot because it shows all of the data points. The “stem” is the first number of your data and the “leaf” is the second number.

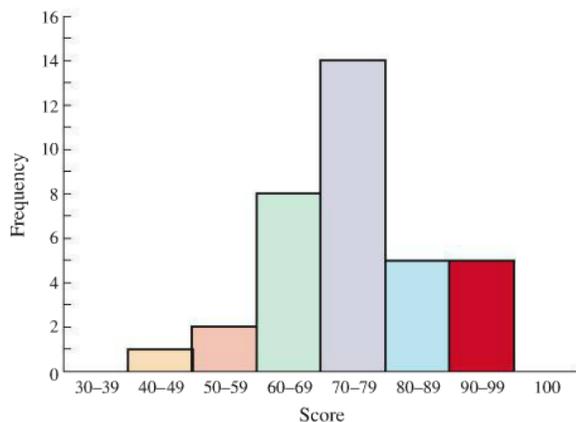
stem	leaf
9	0 4
8	4 7 9 5 3
7	9 2 0 2
6	8 9 5
5	3

The numbers shown on the steam-and-leaf plot to the left are:

90, 94
84, 87, 89, 85, 83
79, 72, 70, 72
68, 59, 65
53

Histograms

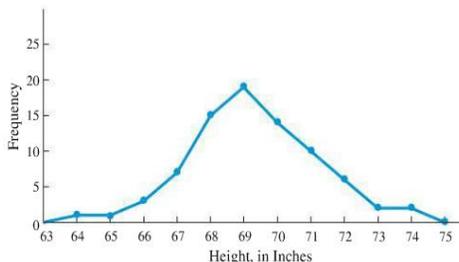
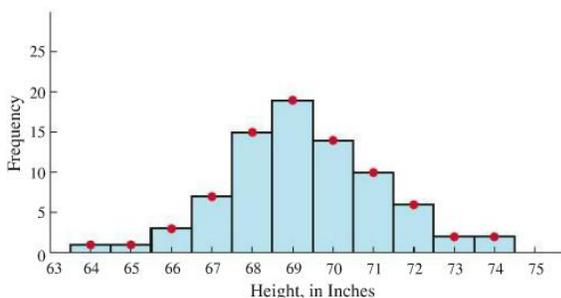
A histogram is useful for summarizing large sets of data that can grouped into intervals. The intervals are of equal size and can be shown using a bar graph which can show the number of times a data value occurs. The number of data values in each of the intervals is the **frequency** of the interval.



The histogram to the left shows the intervals that are used for the data set and the frequency that each interval occurs. We can see that there are 14 scores in the 70-79 range in the data set.

Line Graph

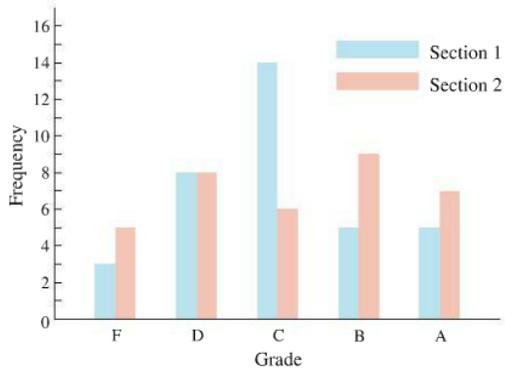
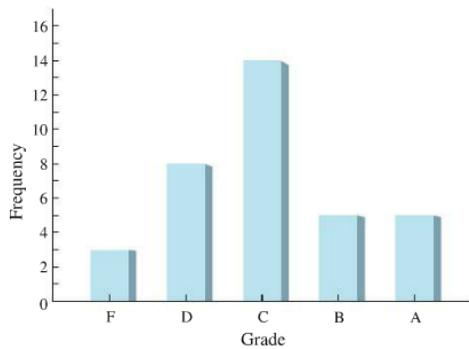
A line is exactly what it sounds like – a graph with a line on it. You can visually see how a histogram and a line graph are similar. To create a line graph from a histogram, you draw a line from the center top of each bar, connecting each bar together. The bar graph and the line graph show the same data.



Since the vertical axis represents the frequency of each measurement, the line graph of a data set is often called a **frequency polygon**.

Bar Graph

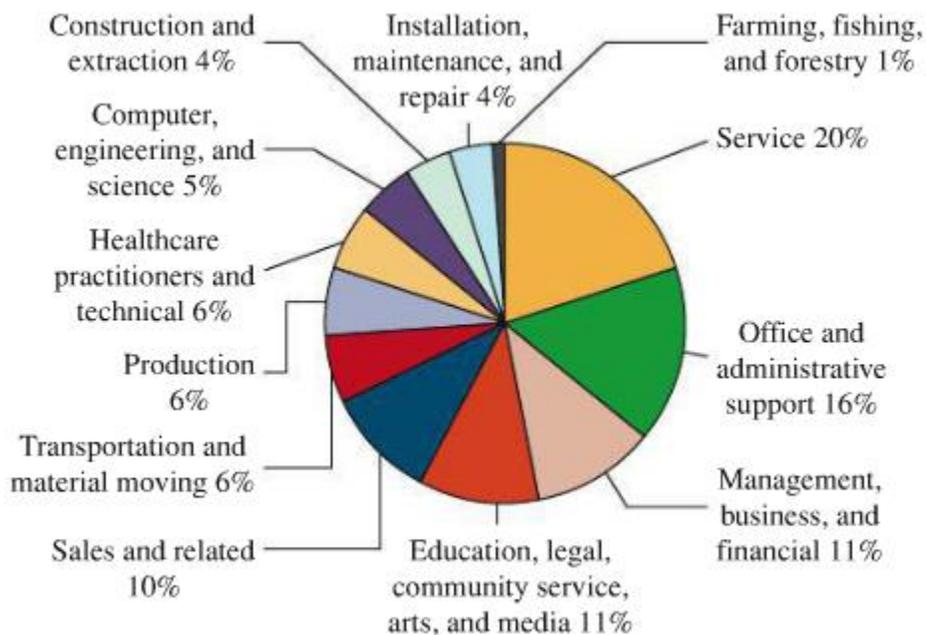
Bar graphs are similar to histograms and are useful in conveying information about categorical data. The horizontal axis scale represents a non-numerical attribute. Bar graphs can also be used to show comparisons between similar groups. The bar graph on the left below shows data from a single collection of data. The bar graph on the right below shows two groups of similar data shown on one bar graph.



Pie Charts

A pie chart is also called a circle plot. A pie chart is often used to show how a whole (budget, revenues, resources) is divided up. A pie chart represents 360° of a circle. The pie chart can be broken down into percents based on the degrees of a circle. For example, the pie chart below shows U.S. Government revenue for fiscal year 1991.

Source: 1992 IRS Form 1040 instruction booklet.



Pictographs

A pictograph is a chart showing small figures or icons that are used to represent data or trends. The picture or icon used are closely related to the data that is being represented. For a pictograph to be understood, you should always include a key so the viewer can understand your representation. The pictograph below shows the top ten countries of the world in terms of computers. This data is from 2011.

United States	
China	
Japan	
Germany	
India	
United Kingdom	
Russia	
France	
Brazil	
Italy	

Which to choose to represent your data?

According to Long, DeTemple, and Millman, “Each of the graphical representations discussed in this chapter is appropriate to summarize and present data so that the reader can visualize frequencies and determine trends. The various representations are more appropriate in some instances than others, and most are subject to serious distortion if the intent is to confuse the reader” (2012, p. 722).