

Figure 2-17 Highway Fuel Consumption with Vertical Scale Not Starting at Zero

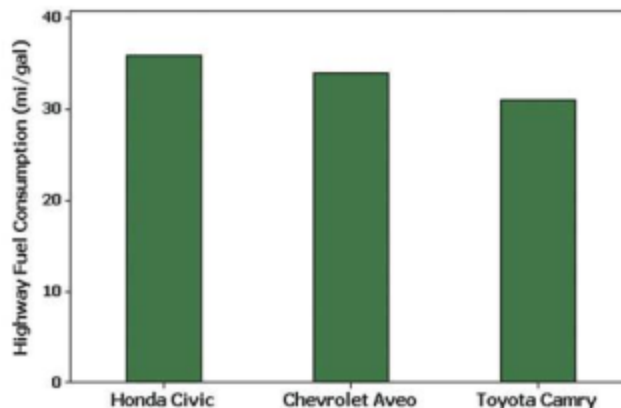


Figure 2-18 Highway Fuel Consumption with Vertical Scale Starting at Zero

Pictographs

Drawings of objects, called *pictographs*, are often misleading. Data that are one-dimensional in nature (such as budget amounts) are often depicted with two-dimensional objects (such as dollar bills) or three-dimensional objects (such as stacks of coins, homes, or barrels). By using pictographs, artists can create false impressions that grossly distort differences by using these simple principles of basic geometry: (1) When you double each side of a square, the area doesn't merely double; it increases by a factor of *four*. (2) When you double each side of a cube, the volume doesn't merely double; it increases by a factor of *eight*. See Figure 2-19 in the following example, and note that the larger airliner is twice as long, twice as tall, and twice as deep as the first airliner, so the volume of the larger airliner is eight times that of the smaller airliner.

Example 14 Pictograph of Airline Passengers

In 1984, U.S. airlines carried 345 million passengers, and in 2010 they carried 706 million passengers, so the number of passengers approximately doubled from 1984 to 2010. The pictograph in Figure 2-19 illustrates these data with images of airliners that are objects of volume. Readers can have a variety of perceptions. Some might think that the numbers of passengers are the same in both images, because the same numbers of seats are included. Others might look at the different sizes of the airliners and see objects of volume, the larger aircraft being roughly eight times the size of the smaller one. Even though Figure 2-19 includes attractive images, it does a very poor job of accurately and unambiguously depicting the data. In contrast, Figure 2-20 is a simple bar graph that does a good job of depicting the data accurately.

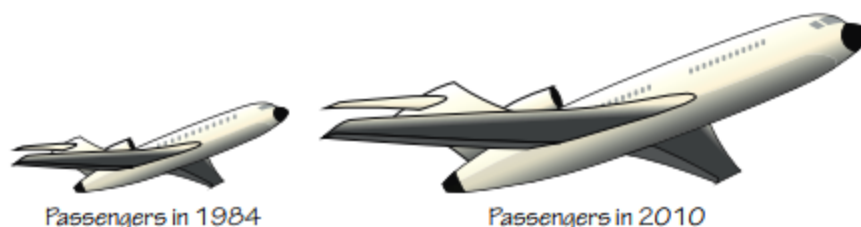


Figure 2-19 Revenue Passengers Carried by U.S. Airlines