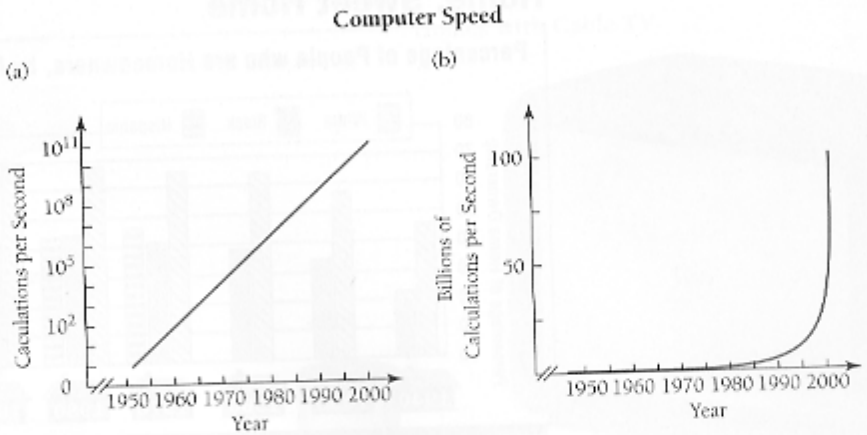

FIGURE 3.41

BY THE way...

In 1965, Intel founder Gordon E. Moore predicted that advances in technology would allow computer chips to double in power roughly every two years. This idea is now called *Moore's law*, and it has held fairly true ever since Moore first stated it.

points that are relatively close together. Nevertheless, as this example shows, it can be visually deceptive if you don't study the scale carefully.

Sometimes the scale may not be deceptive, but should still be studied carefully to avoid misinterpretation. Consider Figure 3.41a, which shows the change in computer speed from 1950 to 2000. At first glance, it may appear that the speeds have been increasing linearly; for example, it might look as if the speed increased by the same amount from 1990 to 2000 as it did from 1950 to 1960. However, when you look at the vertical scale more closely, you'll see that each tick mark represents a *tenfold* increase in speed. Thus, from 1950 to 1960 the computer speed grew from about 1 to 100 calculations per second, while from 1990 to 2000 it grew from about 100 million to 10 billion calculations per second. This type of scale is called an *exponential scale* because it grows by powers of 10 and powers of 10 are *exponents*. (For example, 3 is the exponent in 10^3.) In general, exponential scales are useful for displaying data that vary over a huge range of values. Recasting the computer data with an ordinary scale, as in Figure 3.41b, makes it impossible to see any detail in the early years shown on the graph, because the speeds have grown so rapidly.

Time out to think

Based on Figure 3.41a, can you predict the speed of the fastest computers in 2010? Could you make the same prediction with Figure 3.41b? Explain.

Case Study Asteroid Threat

Asteroids and comets occasionally hit the Earth. Small ones tend to burn up in the atmosphere or create small craters on impact. But larger ones can cause substantial devastation. About 65 million years ago, an asteroid about 10 kilometers in diameter