

## 9.3 Describing Dispersion

- ▶ Use standard deviation to describe the dispersion of a data set.
- ▶ Use standard deviation to describe a data set that is normally distributed.
- ▶ Compare different types of distributions.

### Study Tip

In statistics, the rule at the right is called Chebyshev's inequality. Its estimates are conservative. On page 426, you will see a stronger result for data sets that follow a normal distribution.

### Standard Deviation

**Standard deviation** is a measurement that shows how much variation or dispersion there is from the mean. A small standard deviation indicates that the data are clustered tightly around the mean. A large standard deviation indicates that the data are spread out over a large range of values.

### Standard Deviation and Dispersion

In any data set, at least 75% of the values lie within 2 standard deviations of the mean. At least 89% lie within 3 standard deviations, and at least 94% lie within 4 standard deviations.

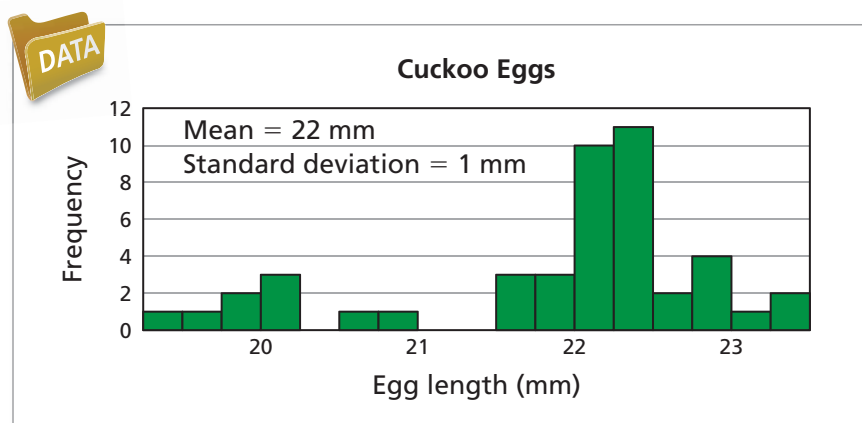
### EXAMPLE 1 Describing Dispersion

The histogram shows the distribution of the lengths of 45 cuckoo eggs.

- a. Describe the dispersion.
- b. What percent of the lengths lie within 2 standard deviations of the mean?



Rather than building its own nest, the common cuckoo lays its eggs in the nests of other birds. When it hatches, the cuckoo chick eventually pushes the other eggs and chicks from the nest.



### SOLUTION

- a. 27 of the lengths lie within  $\frac{1}{2}$  of a standard deviation of the mean.
- b. 41 of the lengths, or about 91%, lie within 2 standard deviations of the mean.

### ✓ Checkpoint

Help at [Math.andYOU.com](http://Math.andYOU.com)

The data set for Example 1 is available at [Math.andYou.com](http://Math.andYou.com). Use the *Histogram Generator* at [Math.andYou.com](http://Math.andYou.com) to display the data. Experiment with different interval widths. The histogram above uses an interval width of 0.25. Try using an interval width of 0.5.