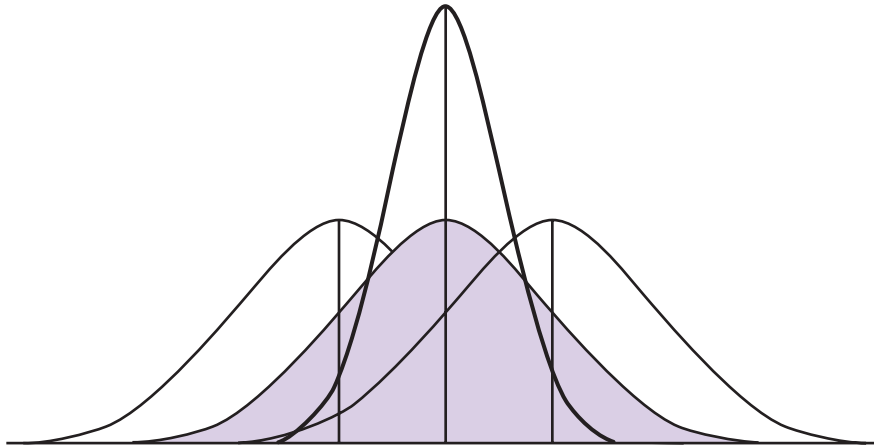


## Making Friends with Standard Deviation

You will be working with the concept of standard deviation to decide which variables actually have an effect on the period of a pendulum. It will be helpful for you to become familiar with what standard deviation means.



1. First explore what happens to the mean and the standard deviation of a set of data when you add the same number to each member in the set.
  - a. As a group, make up a set of five numbers that are all different. Find the mean and the standard deviation of your set.
  - b. Now choose a nonzero number and add it to each member of your set. Find the mean and the standard deviation of your new set.
  - c. Repeat part b, using a different nonzero number. Add this number to each member of your original set of data, and find the mean and standard deviation of the new set. Keep repeating this process until you see patterns, and then describe those patterns.
  - d. Explain why your pattern should occur.
    - Explain why the mean changes as it does when you add the same thing to each member of the set.
    - Explain why the standard deviation changes as it does when you add the same thing to each member of the set.

*continued* ▶

- 2.** Now explore what happens to the mean and the standard deviation of a set of data when you multiply each member in the set by the same number.
  - a.** Begin with the same set of data as in Question 1a. Choose a nonzero number other than 1. Multiply each member of your set by that number and find the mean and the standard deviation of the new set.
  - b.** Choose another nonzero number other than 1, and repeat what you did in part a.
  - c.** Keep choosing new nonzero numbers to use as multipliers for each member in your set. Find the mean and the standard deviation of each new set until you see patterns. Describe those patterns.
  - d.** Explain why your patterns occur.
- 3.** Make up a set of data that satisfies each of the given conditions as closely as you can.
  - a.** Mean, 6; standard deviation, 1
  - b.** Mean, 10; standard deviation, 1
  - c.** Mean, 7; standard deviation, 2