Chapter Summary

- An athlete is considered to be **consistent** if his or her distribution of *PERFORMANCES* does not have much variability (spread).
- There are many ways to measure the variability of a distribution, including the range, interquartile range, the mean absolute deviation, and the standard deviation.
- A **deviation** (*PERFORMANCE* − mean) measures how far a *PERFORMANCE* is from the mean and in which direction. A positive deviation indicates that a *PERFORMANCE* is above the mean and a negative deviation indicates that a *PERFORMANCE* is below the mean.
- The **mean absolute deviation** (**MAD**) measures how far the *PERFORMANCES* are from the mean of their distribution, on average. It is calculated using the average of the absolute values of the deviations.
- The **standard deviation** (**SD**) estimates the typical distance a *PERFORMANCE* is from an athlete's *ABILITY*. It is calculated using squared deviations rather than the absolute value of the deviations:

$$SD = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

- **Outliers** can have a big effect on the standard deviation, so it is important to acknowledge any outliers in the distribution being described.
- An athlete's **true standard deviation** measures the typical distance his or her *PERFORMANCES* are from his or her *ABILITY* after an infinite number of *PERFORMANCES*. An athlete's **observed standard deviation** is an estimate of his or her true standard deviation, calculated from the athlete's observed *PERFORMANCES*.
- When testing for a difference between standard deviations in two different contexts, the **null hypothesis** is that the true standard deviations are the same. The **alternative hypothesis** is that the true standard deviation is smaller in the context where you suspect the athlete is more consistent. The **test statistic** is the difference in standard deviations.
- To simulate the distribution of the difference of standard deviations when assuming the true standard deviations are the same, calculate the deviation for each *PERFORMANCE*, write each deviation on a note card, shuffle all the deviations, and divide them into two piles of the same sizes as the original distributions. Then calculate the standard deviation of each pile of deviations, subtract the standard deviations, and repeat many times.