## EXAMPLE 2 Interpret normally distributed data

**READING**
The abbreviation "mg/dl" stands for "milligrams per deciliter."

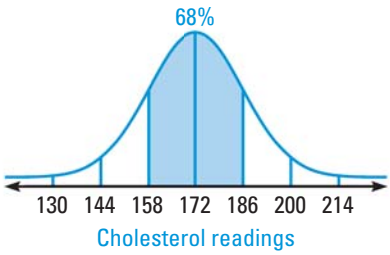
**HEALTH** The blood cholesterol readings for a group of women are normally distributed with a mean of 172 mg/dl and a standard deviation of 14 mg/dl.

**a.** About what percent of the women have readings between 158 and 186?

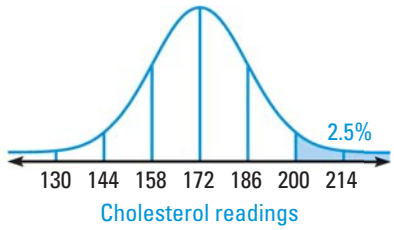
**b.** Readings higher than 200 are considered undesirable. About what percent of the readings are undesirable?

**Solution**

**a.** The readings of 158 and 186 represent one standard deviation on either side of the mean, as shown below. So, 68% of the women have readings between 158 and 186.




**b.** A reading of 200 is two standard deviations to the right of the mean, as shown. So, the percent of readings that are undesirable is 2.35% + 0.15%, or 2.5%.




## GUIDED PRACTICE for Examples 1 and 2

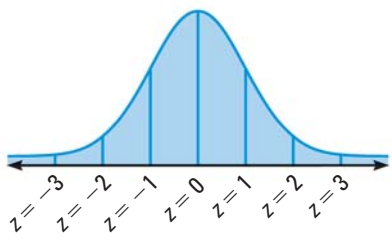
**A normal distribution has mean $\bar{x}$ and standard deviation $\sigma$. Find the indicated probability for a randomly selected $x$-value from the distribution.**

1. $P(x \le \bar{x})$
2. $P(x \ge \bar{x})$
3. $P(\bar{x} \le x \le \bar{x} + 2\sigma)$
4. $P(\bar{x} - \sigma \le x \le \bar{x})$
5. $P(x \le \bar{x} - 3\sigma)$
6. $P(x \ge \bar{x} + \sigma)$
7. **WHAT IF?** In Example 2, what percent of the women have readings between 172 and 200?

**STANDARD NORMAL DISTRIBUTION** The **standard normal distribution** is the normal distribution with mean 0 and standard deviation 1. The formula below can be used to transform $x$-values from a normal distribution with mean $\bar{x}$ and standard deviation $\sigma$ into $z$-values having a standard normal distribution.

**Formula:** $z = \dfrac{x - \bar{x}}{\sigma}$

Subtract the mean from the given $x$-value, then divide by the standard deviation.




The $z$-value for a particular $x$-value is called the ***z*-score** for the $x$-value and is the number of standard deviations the $x$-value lies above or below the mean $\bar{x}$.