x_i	$x_i - \bar{x}$	$\left(x_i - \bar{x}\right)^2$
7	–9	81
11	–5	25
13	–3	9
14	–2	4
14	–2	4
17	1	1
19	3	9
19	3	9
20	4	16
20	4	16
22	6	36

If we take the sum of the third column, we find $\sum\left(x_i - \bar{x}\right)^2 = 210.$ We can now complete the calculation for the sample standard deviation.

$$s^2 = \frac{\sum\left(x_i - \bar{x}\right)^2}{n-1}$$

$$s = \sqrt{\frac{\sum\left(x_i - \bar{x}\right)^2}{n-1}}$$

$$s = \sqrt{\frac{210}{11-1}}$$

$$\approx 4.58$$

11.R.5 Exercises

Concept Check

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

1. If a number is squared and the principal square root of the result is found, that square root is always equal to the original number.

2. The simplest form of a radical expression can be found by using prime factorization.

3. The fraction $\frac{\sqrt{2}}{3}$ is in simplest form.

Practice

Evaluate each radical expression.

4. $\sqrt{-25}$

5. $-\sqrt{4}$

6. $\sqrt{\frac{36}{49}}$

7. Estimate the radical by identifying which two consecutive integers it falls between.

$\sqrt{53}$

Simplify each expression.

8. $\sqrt{20}$

9. $-\sqrt{\frac{25}{81}}$

Applications

Solve.

10. The following two formulas are used in electricity.

$$\begin{aligned} P &= I^2R \\ E^2 &= PR \end{aligned} \quad \text{where} \begin{cases} P = \text{power (in watts)} \\ I = \text{current (in amperes)} \\ E = \text{voltage (in volts)} \\ R = \text{resistance (in ohms, } \Omega) \end{cases}$$

What is the current in amperes of a light bulb that produces 200 watts of power and has a 10 Ω resistance? Round your answer to two decimal places, if necessary.

11. A nut company is determining how to package their new type of party mix. The marketing department is experimenting with different-sized cans for the party mix packaging. The designers use the equation $r = \sqrt{\frac{V}{h\pi}}$ to determine the radius of the can for a certain height h and volume V. The company decides they want the can to have a volume of 972π cm^3. Find the radius of the can if the height is 4 cm. Keep your answers in simplified radical form.

Writing & Thinking

12. Under what conditions is the expression $\sqrt{a}$ not a real number?