

Looking Ahead

The following example illustrates a statistical application of the square root. The standard deviation of a set of data is the square root of the variance.

Example Preview

Calculate the value of the sample standard deviation for the following data. Round your answer to one decimal place.

$$-12, -12, 2, 7, 7, 2$$

Solution

The sample variance of this data set was calculated in the Looking Ahead section of section 3.R.4 and found to be 77.6. To find the sample standard deviation we simply have to find the square root of this value.

$$s = \sqrt{s^2} = \sqrt{77.6} \approx 8.8 \quad \text{Evaluate the radical expression.}$$

3.R.6 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. There is no real number that can be a square root of a negative number.
3. The index is the number underneath the radical sign.
4. The cube root of -27 is a real number.

Practice

Simplify the following square roots and cube roots.

5. $\sqrt{49}$

6. $\sqrt{289}$

7. $\sqrt[3]{1000}$

8. $\sqrt[3]{\frac{27}{64}}$

9. $\sqrt{0.04}$

Applications

Solve.

10. **Area:** The area of a square tile is 16 square inches.
- How long are the sides of the square tile?
 - How many tiles would be needed for a four-foot-long and four-inch-high backsplash in a newly designed bathroom?
11. **Volume:** The volume of a child's building block is 64 cubic centimeters.
- Assuming the building block is a perfect cube, find the length of each side of the block.
 - If a child stacks 5 blocks directly on top of each other, find the height of the structure that is created.

12. **Calculating Measures of Dispersion:** Use the following sample data and find the range, sample variance, and sample standard deviation.

2.0, 1.7, 1.9, 1.5, 1.6, 1.9, 1.7, 3.0

Writing & Thinking

13. Discuss, in your own words, why the square root of a negative number is not a real number.

14. Discuss, in your own words, why the cube root of a negative number is a negative number.