Looking Ahead

Now that you have reviewed and mastered evaluating radicals, you can apply this skill to problems involving more complicated expressions such as the one in the following example.

Example Preview

Solve the following equation.

$$\sqrt{x^2 - 28} = 6$$

Solution

$$\sqrt{x^2 - 28} = 6$$

Begin by squaring both sides of the equation to eliminate the square root.

$$x^2 - 28 = 36$$

Now, since there is only an x^2 variable, we can "extract roots" by adding 28 to both sides and then take the square root of both sides.

$$\begin{aligned} x^2 &= 64 \\ x &= \pm\sqrt{64} \\ x &= \pm 8 \end{aligned}$$

Since both of these do check in the original equation, the correct answers are $x = 8$ and $x = -8$.

2.R.3 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.

a. How long are the sides of the square tile?

b. 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.

a. Assuming the building block is a perfect cube, find the length of each side of the block.

b. If a child stacks 5 blocks directly on top of each other, find the height of the structure that is created.

Writing & Thinking

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

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