NAME _____

Module 18 Solving Radical Equations
Lesson 1 Solving One-Step Radical Equations

Solve.

1. $\sqrt{x} = 2$ **$x = 4$**
2. $\sqrt{s} = 5$ **$s = 25$**
3. $\sqrt{h} = 16$ **$h = 256$**
4. $\sqrt{k} = 4$ **$k = 16$**
5. $\sqrt{x} = 6$ **$x = 36$**
6. $\sqrt{n} = 9$ **$n = 81$**
7. $-\sqrt{v} = -2$ **$v = 4$**
8. $-\sqrt{v} = 5$ **no solution**
9. $\sqrt{x} = -10$ **no solution**
10. $-\sqrt{a} = -4$ **$a = 16$**
11. $-\sqrt{m} = -0.8$ **$m = 0.64$**
12. $-\sqrt{f} = -\frac{1}{3}$ **$f = \frac{1}{9}$**
13. $\sqrt[3]{x} = 3$ **$w = 27$**
14. $\sqrt[3]{w} = -1$ **$w = -1$**
15. $-\sqrt[3]{n} = -2$ **$n = 8$**
16. $\sqrt[4]{g} = 2$ **$g = 16$**
17. $\sqrt[4]{r} = 4$ **$r = 256$**
18. $\sqrt[4]{t} = -1$ **no solution**
19. $-\sqrt[4]{t} = -3$ **$t = 81$**
20. $\sqrt[3]{p} = \frac{3}{5}$ **$p = \frac{27}{125}$**

Journal

1. Jorge is asked for the solution to the equation $\sqrt[4]{w} = -2$. Explain why his solution $w = -16$ is incorrect.
2. Explain how inverse operations can be used to solve radical equations like $\sqrt{b} = 4$.
3. For what values of a does the equation $\sqrt{x} = a$ have a solution? Explain.
4. For what values of a does the equation $\sqrt[3]{x} = a$ have a solution? Explain.
5. Rosita solved the equation $\sqrt{x} = -3$ as shown.

$$\sqrt{x} = -3$$
$$\sqrt{x^2} = -3^2$$
$$x = -9$$

Identify her mistake. How could Rosita have prevented her mistake?

Cumulative Review

Solve.

1. $\frac{x}{2} = -3$

   $x = -6$

2. $\frac{3}{x} + \frac{4}{x} = 14$

   $x = \frac{1}{2}$

3. $\frac{4}{5} = \frac{2}{x+3}$

   $x = -\frac{1}{2}$

Simplify.

4. $\frac{4}{x} \cdot \frac{3x}{2}$

   6

5. $\frac{2}{3x} \div \frac{1}{x}$

   $\frac{2}{3}$

6. $\frac{1}{3} + \frac{3}{x-2}$

   $\frac{x+7}{3x-6}$

7. $\sqrt{3} \cdot \sqrt{4}$

   $2\sqrt{3}$

8. $\sqrt{6} \cdot \sqrt{3}$

   $3\sqrt{2}$

9. $\frac{\sqrt{40}}{\sqrt{10}}$

   2

10. $3\sqrt{3} + 5\sqrt{27}$

    $18\sqrt{3}$

Possible Journal Answers

1. When finding answers to even indexed radicals such as $\sqrt[4]{\ }$ or $\sqrt{\ }$, it is understood the implied answer is nonnegative. Because the principal (positive) root is taken, this number must be nonnegative.
2. To solve a radical equation, use an inverse operation to eliminate the radical. For example, in the equation $\sqrt{b} = 4$, the operation is taking the square root. The inverse operation is squaring. When both sides are squared, the equation becomes $b = 16$, which is the solution.
3. The equation $\sqrt{x} = a$ has a real solution for any real number $a \geq 0$. When finding answers to even indexed radicals such as $\sqrt[4]{\ }$ or $\sqrt{\ }$, the solution is always nonnegative. So, the equation has a solution for $a \geq 0$.
4. The equation $\sqrt[3]{x} = a$ has a solution for any real number. The cube of positive numbers is positive, and the cube of negative numbers is negative. Therefore, the cube root of a negative number is negative, and the cube root of a positive number is positive. The cube root of zero is zero, so the solution to $\sqrt[3]{x} = a$ can be positive, negative, or zero.
5. Squaring an equation is a proper operation. However, the square root of a number is nonnegative. So, the equation $\sqrt{x} = -3$ cannot be true. To save work for herself, Rosita should have realized there is no solution to this equation.