



Got It? 5. a. What is the solution of $6 - \sqrt{2x} = 10$?

b. **Reasoning** How can you determine that the equation $\sqrt{x} = -5$ does not have a solution without going through all the steps of solving the equation?



Lesson Check

Do you know HOW?

Solve each radical equation. Check your solution. If there is no solution, write *no solution*.

- $\sqrt{3x} + 10 = 16$
- $\sqrt{r+5} = 2\sqrt{r-1}$
- $\sqrt{2x-1} = x$
- $\sqrt{x-3} = \sqrt{x+5}$

Do you UNDERSTAND?



5. **Vocabulary** Which is an extraneous solution of $s = \sqrt{s+2}$?

- (A) 2 (C) -1
(B) 0 (D) -2

6. **Reasoning** What is the converse of the conditional statement "If $x = y$, then $x^2 = y^2$ "? Is the converse of this statement always true? Explain.



Practice and Problem-Solving Exercises



A Practice

Solve each radical equation. Check your solution.

- | | |
|-------------------------|-------------------------|
| 7. $\sqrt{x} + 3 = 5$ | 8. $\sqrt{t} + 2 = 9$ |
| 9. $\sqrt{z} - 1 = 5$ | 10. $\sqrt{n} - 3 = 6$ |
| 11. $\sqrt{2b} + 4 = 8$ | 12. $3 - \sqrt{t} = -2$ |
| 13. $\sqrt{3a+1} = 7$ | 14. $\sqrt{10b+6} = 6$ |
| 15. $1 = \sqrt{-2v-3}$ | 16. $\sqrt{x-3} = 4$ |

See Problem 1.

17. **Recreation** You are making a tire swing for a playground. The time t in seconds for the tire to make one swing is given by $t = 2\sqrt{\frac{\ell}{3.3}}$, where ℓ is the length of the swing in feet. You want one swing to take 2.5 s. How many feet long should the swing be?

See Problem 2.

18. **Geometry** The length s of one edge of a cube is given by $s = \sqrt{\frac{A}{6}}$, where A represents the cube's surface area. Suppose a cube has an edge length of 9 cm. What is its surface area? Round to the nearest hundredth.

Solve each radical equation. Check your solution.

See Problem 3.

- | | |
|----------------------------------|---------------------------------|
| 19. $\sqrt{3x+1} = \sqrt{5x-8}$ | 20. $\sqrt{2y} = \sqrt{9-y}$ |
| 21. $\sqrt{7v-4} = \sqrt{5v+10}$ | 22. $\sqrt{s+10} = \sqrt{6-s}$ |
| 23. $\sqrt{n+5} = \sqrt{5n-11}$ | 24. $\sqrt{3m+1} = \sqrt{7m-9}$ |

Tell which solutions, if any, are extraneous for each equation.

◀ See Problems 4 and 5.

25. $-z = \sqrt{-z+6}$; $z = -3$, $z = 2$

26. $\sqrt{12-n} = n$; $n = -4$, $n = 3$

27. $y = \sqrt{2y}$; $y = 0$, $y = 2$

28. $2a = \sqrt{4a+3}$; $a = \frac{3}{2}$, $a = -\frac{1}{2}$

29. $x = \sqrt{28-3x}$; $x = 4$, $x = -7$

30. $-t = \sqrt{-6t-5}$; $t = -5$, $t = -1$

Solve each radical equation. Check your solution. If there is no solution, write *no solution*.

31. $x = \sqrt{2x+3}$

32. $n = \sqrt{4n+5}$

33. $\sqrt{3b} = -3$

34. $2y = \sqrt{5y+6}$

35. $-2\sqrt{2r+5} = 6$

36. $\sqrt{d+12} = d$

B Apply

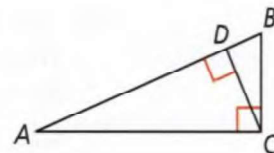
© 37. **Error Analysis** A student solved the equation $r = \sqrt{-6r-5}$ and found the solutions -1 and -5 . Describe and correct the student's error.

© 38. **Think About a Plan** The total surface area A of Earth, in square kilometers, is related to Earth's radius r , in kilometers, by $r = \sqrt{\frac{A}{4\pi}}$. Earth's radius is about 6378 km. What is its surface area? Round to the nearest square kilometer.

- What equation in one variable can you solve to find Earth's surface area?
- How can you check the reasonableness of your solution?

39. **Geometry** In the right triangle $\triangle ABC$, the altitude \overline{CD} is at a right angle to the hypotenuse. You can use $CD = \sqrt{(AD)(DB)}$ to find missing lengths.

- Find AD if $CD = 10$ and $DB = 4$.
- Find DB if $AD = 20$ and $CD = 15$.



40. **Packaging** The radius r of a cylindrical can with volume V and height h is given by $r = \sqrt{\frac{V}{\pi h}}$. What is the height of a can with a radius of 2 in. and a volume of 75 in.³?

© 41. **Writing** Explain how you would solve the equation $\sqrt{2y} - \sqrt{y+2} = 0$.

© 42. **Open-Ended** Write two radical equations that have 3 for a solution.

Solve each radical equation. Check your solution. If there is no solution, write *no solution*.

43. $\sqrt{5x+10} = 5$

44. $-6 - \sqrt{3y} = -3$

45. $\sqrt{7p+5} = \sqrt{p-3}$

46. $a = \sqrt{7a-6}$

47. $\sqrt{y+12} = 3\sqrt{y}$

48. $3 - \sqrt{4a+1} = 12$

STEM 49. **Physics** The formula $t = \sqrt{\frac{n}{16}}$ gives the time t in seconds for an object that is initially at rest to fall n feet. What is the distance an object falls in the first 10 s?