H.O.T. Problems Use Higher-Order Thinking Skills

. **FIND THE ERROR** Jada and Fina solved $\sqrt{6-b} = \sqrt{b+10}$. Is either of them correct? Explain.

Jada

$\sqrt{6-b} = \sqrt{b+10}$

$(\sqrt{6-b})^2 = (\sqrt{b+10})^2$

$6-b = b+10$

$-2b = 4$

$b = -2$

Check $\sqrt{6-(-2)} \stackrel{?}{=} \sqrt{(-2)+10}$

$\sqrt{8} = \sqrt{8}$ ✓

Fina

$\sqrt{6-b} = \sqrt{b+10}$

$(\sqrt{6-b})^2 = (\sqrt{b+10})^2$

$6-b = b+10$

$2b = 4$

$b = 2$

Check $\sqrt{6-(2)} \stackrel{?}{=} \sqrt{(2)+10}$

$\sqrt{4} \neq \sqrt{12}$ ✗

no solution

. **REASONING** Which equation has the same solution set as $\sqrt{4} = \sqrt{x+2}$? Explain

A. $\sqrt{4} = \sqrt{x} + \sqrt{2}$ **B.** $4 = x + 2$ **C.** $2 - \sqrt{2} = \sqrt{x}$

. **REASONING** Explain how solving the equation $5 = \sqrt{x} + 1$ is different from solving the equation $5 = \sqrt{x+1}$.

DRIVING The equation $v = \sqrt{2.5r}$ represents the maximum velocity that a car can travel safely on an unbanked curve when v is the maximum velocity in miles per hour and r is the radius of the turn in feet. If a road is designed for a maximum speed of 65 miles per hour, what is the radius of the turn?

EXERCISE Suppose the function $S = \pi\sqrt{\frac{9.8\ell}{7}}$, where S represents speed in meters per second and ℓ is the leg length of a person in meters, can approximate the maximum speed that a person can run.

a. What is the maximum running speed of a person with a leg length of 1.1 meters to the nearest tenth of a meter?

b. What is the leg length of a person with a running speed of 2.7 meters per second to the nearest tenth of a meter?

c. As a person's leg length increases, does their speed increase or decrease? Explain.

. **RIDES** The amount of time t, in seconds, that it takes a simple pendulum to complete a full swing is called the period of the pendulum. It is given by $t = 2\pi\sqrt{\frac{\ell}{32}}$, where ℓ is the length of the pendulum, in feet.

a. The Giant Swing completes a period in about 8 seconds. About how long is the pendulum's arm? Round to the nearest foot.

b. Does increasing the length of the pendulum increase or decrease the period? Explain.

. **STATISTICS** Statisticians use the formula $\sigma = \sqrt{v}$ to calculate a standard deviation σ, where v is the variance of a data set. Find the variance when the standard deviation is 15.

. **GRAVITATION** Helena drops a ball from 25 feet above a lake. The formula $t = \frac{1}{4}\sqrt{25-h}$ describes the time t in seconds that the ball is h feet above the water. How many feet above the water will the ball be after 1 second?

Solve each equation. Check your solution.

2. $\sqrt{10h} + 1 = 21$
3. $\sqrt{7r + 2} + 3 = 7$
4. $5 + \sqrt{g - 3} = 6$
5. $\sqrt{3x - 5} = x - 5$
6. $\sqrt{2n + 3} = n$
7. $\sqrt{a - 2} + 4 = a$

Solve each equation. Check your solution.

9. $\sqrt{a} + 11 = 21$
10. $\sqrt{t} - 4 = 7$
11. $\sqrt{n - 3} = 6$
12. $\sqrt{c + 10} = 4$
13. $\sqrt{h - 5} = 2\sqrt{3}$
14. $\sqrt{k + 7} = 3\sqrt{2}$
15. $y = \sqrt{12 - y}$
16. $\sqrt{u + 6} = u$
17. $\sqrt{r + 3} = r - 3$
18. $\sqrt{1 - 2t} = 1 + t$
19. $5\sqrt{a - 3} + 4 = 14$
20. $2\sqrt{x - 11} - 8 = 4$

Solve each equation. Check your solution.

22. $\sqrt{6a - 6} = a + 1$
23. $\sqrt{x^2 + 9x + 15} = x + 5$
24. $6\sqrt{\frac{5k}{4}} - 3 = 0$
25. $\sqrt{\frac{5y}{6}} - 10 = 4$
26. $\sqrt{2a^2 - 121} = a$
27. $\sqrt{5x^2 - 9} = 2x$

1. $\sqrt{x} = 8$
2. $4 - \sqrt{x} = 3$
3. $\sqrt{2p} + 3 = 10$
4. $4\sqrt{3h} - 2 = 0$
5. $c^{\frac{1}{2}} + 6 = 9$
6. $18 + 7h^{\frac{1}{2}} = 12$
7. $\sqrt[3]{d + 2} = 7$
8. $\sqrt[5]{w - 7} = 1$
9. $6 + \sqrt[3]{q - 4} = 9$
10. $\sqrt[4]{y - 9} + 4 = 0$
11. $\sqrt{2m - 6} - 16 = 0$
12. $\sqrt[3]{4m + 1} - 2 = 2$
13. $\sqrt{8n - 5} - 1 = 2$
14. $\sqrt{1 - 4t} - 8 = -6$
15. $\sqrt{2t - 5} - 3 = 3$
16. $(7v - 2)^{\frac{1}{4}} + 12 = 7$
17. $(3g + 1)^{\frac{1}{2}} - 6 = 4$
18. $(6u - 5)^{\frac{1}{3}} + 2 = -3$
19. $\sqrt{2d - 5} = \sqrt{d - 1}$
20. $\sqrt{4r - 6} = \sqrt{r}$
21. $\sqrt{6x - 4} = \sqrt{2x + 10}$
22. $\sqrt{2x + 5} = \sqrt{2x + 1}$