DIGITAL

independent practice

NAME ______________________________

Module 18 Solving Radical Equations
Lesson 2 Solving Multi-Step Radical Equations

Solve.

1. $\sqrt{p} - 8 = -2$ **p = 36**
2. $\sqrt{n} - 5 = 3$ **n = 64**
3. $\sqrt{d} + 6 = 4$ **no solution**
4. $-\sqrt{m} + 8 = 5$ **m = 9**
5. $\sqrt{p} + 3 = 12$ **p = 81**
6. $-\sqrt{q} - 7 = 6$ **no solution**
7. $2\sqrt{r} = 8$ **r = 16**
8. $\frac{\sqrt{z}}{3} = 5$ **z = 225**
9. $-8\sqrt{c} = -32$ **c = 16**
10. $\frac{2}{5}\sqrt{h} = 2$ **h = 25**
11. $13\sqrt{c} = -39$ **no solution**
12. $\frac{7}{\sqrt{z}} = 1$ **c = 49**
13. $\sqrt[3]{5h} = 5$ **h = 25**
14. $\sqrt{h + 4} = 4$ **h = 12**
15. $\sqrt{z + 6} = -6$ **no solution**
16. $2 = \sqrt{2x} - 6$ **x = 32**
17. $\frac{1}{2}\sqrt{y - 7} = 4$ **y = 71**
18. $\frac{\sqrt{5x}}{3} = 5$ **x = 45**
19. $\frac{30}{\sqrt{5b}} = 5$ **b = 7.2**
20. $-2\sqrt[3]{r - 5} = 6$ **p = –22**
21. $\sqrt{3c + 30} = 9$ **c = 17**
22. $\sqrt[3]{9x + 10} = 4$ **x = 6**

Journal

1. Explain how to solve the equation $\sqrt{x + 5} = 6$. Specifically, identify the order in which inverse operations are used to solve the equation and explain why.
2. Solve the equations $\sqrt{x} + 3 = 12$ and $\sqrt{x + 3} = 12$. How are the steps needed to solve each equation alike? How are they different?
3. To solve the equation $\sqrt{b} + 1 = 4$, Carla wants to square both sides of the equation. Is Carla's method valid? What would you do?
4. Henry solved the equation $-3\sqrt{x - 1} + 5 = 11$ as shown below.

$$-3\sqrt{x - 1} + 5 = 11$$
$$-3\sqrt{x - 1} = 6$$
$$\sqrt{x - 1} = -2$$
$$x - 1 = 4$$
$$x = 5$$

To check his solution, Henry substituted 5 for x in the equation $x - 1 = 4$ to get the true equation $5 - 1 = 4$, and he claimed that his answer was correct. What was his mistake and why?

Cumulative Review

Solve.

1. $-\sqrt{y} = 12$ — **no solution**

2. $\sqrt{t} = 1.4$ — **$t = 1.96$**

3. $-\sqrt[3]{x} = -5$ — **$x = 125$**

4. $-\sqrt[4]{j} = -4$ — **$j = 256$**

Simplify.

5. $\sqrt{50}$ — **$5\sqrt{2}$**

6. $\sqrt{432}$ — **$12\sqrt{3}$**

7. $\sqrt{5} \cdot \sqrt{3}$ — **$\sqrt{15}$**

8. $4\sqrt{2} \cdot 3\sqrt{2}$ — **24**

9. $\frac{\sqrt{50}}{\sqrt{2}}$ — **5**

10. $3\sqrt{3} + 4\sqrt{2}$ — **$3\sqrt{3} + 4\sqrt{2}$**

Possible Journal Answers

1. To solve the equation, square both sides to eliminate the radical, giving the equation $x + 5 = 36$. Next, subtract five from both sides to find the solution $x = 31$. In this case, the inverse operation squaring is used first because all terms on the left side of the equation are in the radical. Then, the inverse operation subtraction is used to solve the equation.
2. To solve $\sqrt{x} + 3 = 12$, subtract three from both sides; then, square both sides. The result is $x = 81$. To solve $\sqrt{x + 3} = 12$, square both sides; then, subtract three from both sides. The result is $x = 141$. In both equations, the same inverse operations are used but in different order.
3. Carla's method is valid (it is generally valid to perform the same operation on both sides of an equation). However, she will have to square the expression $\sqrt{b} + 1$. A simpler option is to subtract one from both sides, leaving the equation $\sqrt{b} = 3$, then to square both sides to get $b = 9$.
4. Henry should have realized, when he got the step $\sqrt{x - 1} = 2$, this equation had no solution. Further, he should have tested his solution in the original equation. It is raising both sides of an equation to a power that produces extraneous solutions. Therefore, this raising both sides could have posed a problem when Henry substituted his answer in an equation in the solution that appears after both sides have been squared. Possible answers must be checked in an equation that appears before both sides are raised to a power. Ideally, the possible solution should be checked in the original equation.