Practice Book

3 Practice and Apply

Use Practice Book pp. 227–228

Assignment Guide	
Decelerated	1–9, 13–18, 26–27
Average	2–24 Even, 26–27
Accelerated	10–12, 19–27

■ Before assigning the exercises on Practice Book pages 227–228, work with students through the examples in the teaching display. Stress the need to check solutions in the original equation.

■ In exercises 1–24, reinforce the need to isolate the radical expression on one side of the equation before squaring both sides. Be sure students check each answer in the original equation to identify extraneous solutions. Note that the equation in exercise 7 states that a positive square root is equal to a negative number, so there can be no real solution. Invite students to identify and predict any other equations with similar results.

Errors Commonly Made

If students try squaring both sides without first ensuring that the radical expression is isolated on one side of the equation, the result will be another equation with a radical expression. Stress the need to isolate the radical on one side, and encourage students to show their work and calculations step-by-step.

■ Exercise 25 provides an application of radical expressions in the real world. Note that the factors 30, D, and f are all part of the radicand. Invite students to draw diagrams to explain their conclusion in part b.

SPIRAL REVIEW

■ Before completing exercises 26–27, students may benefit from referring back to Lessons 9-1 and 7-5, respectively.

9-4 Solve Radical Equations

Name _____ Date _____

Solve: $\sqrt{y-5}+7=21$

$\sqrt{y-5}=14$ ← Use the Subtraction Property of Equality to isolate the radicand.

$(\sqrt{y-5})^2=14^2$ ← Square both sides of the equation.

$y-5=196$ ← Simplify.

$y=201$ ← Use the Addition Property of Equality.

Check: $\sqrt{y-5}+7 \stackrel{?}{=} 21$

$\sqrt{201-5}+7 \stackrel{?}{=} 21$

$\sqrt{196}+7 \stackrel{?}{=} 21$

$14+7 \stackrel{?}{=} 21$

$21 = 21$ **True**

Solve: $5\sqrt{y+2}-3=-28$

$5\sqrt{y+2}=-25$ ← Use the Addition Property of Equality to isolate the radicand.

$\sqrt{y+2}=-5$ ← Use the Division Property of Equality.

$(\sqrt{y+2})^2=(-5)^2$ ← Square both sides of the equation.

$y+2=25$ ← Simplify.

$y=23$ ← Use the Subtraction Property of Equality.

Check: $5\sqrt{y+2}-3=-28$

$5\sqrt{23+2}-3 \stackrel{?}{=} -28$

$5\sqrt{25}-3 \stackrel{?}{=} -28$

$5(5)-3 \stackrel{?}{=} -28$

$25-3 \stackrel{?}{=} -28$

$22 = -28$ **False**

The solution, $y = 23$, is an extraneous solution.
There is no real number solution for $5\sqrt{y+2}-3=-28$.

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

1. $2\sqrt{x}-4=2$

$2\sqrt{x}=6$ | Check: $2\sqrt{9}-4 \stackrel{?}{=} 2$

$\sqrt{x}=3$ | $2(3)-4 \stackrel{?}{=} 2$

$(\sqrt{x})^2=3^2$ | True: $2=2$

$x=9$

2. $3\sqrt{a}-7=11$

$3\sqrt{a}=18$ | Check: $3\sqrt{36}-7 \stackrel{?}{=} 11$

$\sqrt{a}=6$ | $3(6)-7 \stackrel{?}{=} 11$

$a=36$ | True: $11=11$

3. $10+4\sqrt{d}=38$

$4\sqrt{d}=28$ | Check: $10+4\sqrt{49} \stackrel{?}{=} 38$

$\sqrt{d}=7$ | $10+(4)(7) \stackrel{?}{=} 38$

$d=49$ | True: $38=38$

4. $24+6\sqrt{h}=90$

$6\sqrt{h}=66$ | Check: $24+6\sqrt{121} \stackrel{?}{=} 90$

$\sqrt{h}=11$ | $24+6(11) \stackrel{?}{=} 90$

$h=121$ | True: $90=90$

5. $\sqrt{x+9}=4$

$x+9=16$ | Check: $\sqrt{7+9} \stackrel{?}{=} 4$

$x=7$ | $\sqrt{16} \stackrel{?}{=} 4$

| True: $4 \stackrel{?}{=} 4$

6. $\sqrt{w+4}=5$

$w+4=25$ | Check: $\sqrt{21+4} \stackrel{?}{=} 5$

$w=21$ | $\sqrt{25} \stackrel{?}{=} 5$

| True: $5 \stackrel{?}{=} 5$

7. $\sqrt{28-p}=-6$

$28-p=36$ | Check: $\sqrt{28-(-8)} \stackrel{?}{=} -6$

$-p=8$ | $\sqrt{36} \stackrel{?}{=} -6$

$p=28$ | False: $6=-6$

no real solution

8. $\sqrt{89-w}=-10$

$89-w=100$ | Check: $\sqrt{89-(-11)} \stackrel{?}{=} -10$

$-w=11$ | $\sqrt{100} \stackrel{?}{=} -10$

$w=-11$ | False: $10=-10$

no real solution

9. $\sqrt{\frac{p}{3}}=2$

$\frac{p}{3}=4$ | Check: $\sqrt{\frac{12}{3}}=2$

$p=12$ | $\frac{12}{3}=4$

| True: $4=4$

10. $\sqrt{\frac{g}{5}}=3$

$\frac{g}{5}=9$ | Check: $\sqrt{\frac{45}{5}}=3$

$g=45$ | $\frac{45}{5}=9$

| True: $9=9$

11. $-3\sqrt{28x}=52$

$\sqrt{28x}=-14$ | Check: $-3\sqrt{28 \cdot 7} \stackrel{?}{=} 52$

$28x=196$ | $-3(14) \stackrel{?}{=} 52$

$x=7$ | False: $-52=52$

no real solution

12. $-5\sqrt{72k}=60$

$\sqrt{72k}=-12$ | Check: $-5\sqrt{72 \cdot 2} \stackrel{?}{=} 60$

$72k=144$ | $-5(12) \stackrel{?}{=} 60$

$k=2$ | False: $-60=60$

no real solution

Use with SOURCEBOOK Lesson 9-4, pages 234–235.

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

13. $5 + \sqrt{s - 2} = 6$

$\sqrt{s - 2} = 1$
$s - 2 = 1$
$s = 3$

Check:
$5 + \sqrt{3 - 2} = 6$
$5 + \sqrt{1} = 6$
True: $6 = 6$

14. $9 + \sqrt{m - 5} = 12$

$\sqrt{m - 5} = 3$
$m - 5 = 9$
$m = 14$

Check:
$9 + \sqrt{14 - 5} = 12$
$9 + \sqrt{9} = 12$
$9 + 3 = 12$
True: $12 = 12$

15. $\frac{\sqrt{b + 1}}{3} = -5$

$\sqrt{b + 1} = -15$
$b + 1 = 225$
$b = 224$

Check:
$\frac{\sqrt{224 + 1}}{3} \stackrel{?}{=} -5$
$\frac{\sqrt{225}}{3} \stackrel{?}{=} -5$
False: $5 = -5$

no real solution

16. $\frac{\sqrt{h + 2}}{4} = -2$

$\sqrt{h + 2} = -8$
$h + 2 = 64$
$h = 62$

Check:
$\frac{\sqrt{62 + 2}}{4} \stackrel{?}{=} -2$
$\frac{\sqrt{64}}{4} \stackrel{?}{=} -2$
False: $2 = -2$

no real solution

17. $\frac{\sqrt{s - 4}}{5} = 3$

$\sqrt{s - 4} = 15$
$s - 4 = 225$
$s = 229$

Check:
$\frac{\sqrt{229 - 4}}{5} = 3$
$\frac{\sqrt{225}}{5} = 3$
True: $3 = 3$

18. $\frac{\sqrt{v - 11}}{7} = 3$

$\sqrt{v - 11} = 21$
$v - 11 = 441$
$v = 452$

Check:
$\frac{\sqrt{452 - 11}}{7} = 3$
$\frac{\sqrt{441}}{7} = 3$
True: $3 = 3$

19. $\sqrt{2x + 1} = 3$

$2x + 1 = 9$
$2x = 8$
$x = 4$

Check:
$\sqrt{2(4) + 1} = 3$
$\sqrt{9} = 3$
True: $3 = 3$

20. $\sqrt{7z + 4} = 9$

$7z + 4 = 81$
$7z = 77$
$z = 11$

Check:
$\sqrt{7(11) + 4} = 9$
$\sqrt{81} = 9$
True: $9 = 9$

21. $6\sqrt{5n - 3} = 42$

$\sqrt{5n - 3} = 7$
$5n - 3 = 49$
$5n = 52$
$n = \frac{52}{5}$

Check:
$\sqrt{5\left(\frac{52}{5}\right) - 3} = 42$
$6\sqrt{49} = 42$
True: $42 = 42$

22. $10\sqrt{7f - 1} = 50$

$\sqrt{7f - 1} = 5$
$7f - 1 = 25$
$7f = 26$
$f = \frac{26}{7}$

Check:
$10\sqrt{7\left(\frac{26}{7}\right) - 1} = 50$
$10\sqrt{25} = 50$
True: $50 = 50$

23. $2 + 5\sqrt{3k + 18} = 32$

$5\sqrt{3k + 18} = 30$
$\sqrt{3k + 18} = 6$
$3k + 18 = 36$
$3k = 18$
$k = 6$

Check:
$2 + 5\sqrt{3(6) + 18} = 32$
$2 + 5\sqrt{36} = 32$
$2 + 5(6) = 32$
True: $32 = 32$

24. $7 + 3\sqrt{3g + 1} = 22$

Solve.

25. The skid-to-stop formula, $S = \sqrt{30Df}$, relates speed, S, in miles per hour to distance, D, in feet and to drag factor, f.

a. If a car travels at 70 mi/h and skids 500 feet, what is the drag factor of the road? Round to the nearest tenth.

Let $S = 70$, $D = 500$; Substitute into the formula and solve for f: $70 = \sqrt{30 \cdot 500f}$
$4900 = 15{,}000f$; $\frac{49}{150} = f$
$f \approx 0.3$; The drag factor is 0.3.

b. If a car travels at 45 mi/h and the drag factor is 0.2, how long are the skid marks?

Let $S = 45$, $f = 0.2$; Substitute into the formula and solve for D: $45 = \sqrt{30 \cdot 0.2D}$
$2025 = 6D$; $\frac{2025}{6} = D$
$D = 337.5$ ft; The skid marks are 337.5 ft long.

SPIRAL REVIEW

26. Simplify: $-\sqrt{2178}$

$-\sqrt{9 \cdot 121 \cdot 2}$; $-\sqrt{9} \cdot \sqrt{121} \cdot \sqrt{2}$
$-3(11)\sqrt{2}$; $-33\sqrt{2}$

27. Multiply: $(r + 12)^2$

$(r + 12)(r + 12)$
$r^2 + 24r + 144$

Answers for Algebra 1, Practice Book Lesson 9-4, page 228.

24.

$3\sqrt{3g + 1} = 15$
$\sqrt{3g + 1} = 5$
$3g + 1 = 25$
$3g = 24$
$g = 8$

Check:
$7 + 3\sqrt{3(8) + 1} = 22$
$7 + 3\sqrt{25} = 22$
$7 + 3(5) = 22$
True: $22 = 22$

Additional Resources

ONLINE www.progressinmathematics.com

- Meeting Individual Needs Activities
- Alternative Teaching Models
- Vocabulary Activities
- Audio Glossary
- Virtual Manipulatives
- Check Your Progress II
- Practice Activities (Lessons 3–4)

Meeting Individual Needs
See page 225F.

4 Summarize/Assess

Conceptual Thinking

■ To assess whether students have conceptualized the lesson concepts, lead a class discussion in which students describe the steps needed to solve a radical equation. Use an example such as $\sqrt{x + 4} = 3$. $x = 5$

■ Ask a volunteer to explain the meaning of an extraneous solution and why a radical equation may have no real solution. Ask for examples of equations with no real solution, such as $\sqrt{x} + 2 = 1$.

ONLINE **Check Your Progress II**

Administer Check Your Progress II to assess understanding of Lessons 3–4. For additional practice, assign the online Practice Activities.

5 Follow-Up

Reteaching

■ Draw a square on the board, and tell students that its area equals $x + 5$ square feet. Ask, "What is the length of a side of the square?" $\sqrt{x + 5}$ feet
Tell the class that the length of a side of the square equals 6 feet; ask for an equation that could be used to find x. $\sqrt{x + 5} = 6$ Elicit that the area of the square is 36 square feet and that they can also solve the equation $x + 5 = 36$ to find that $x = 31$. Discuss how this equation is equivalent to squaring both sides of the equation $\sqrt{x + 5} = 6$. Then have pairs of students take turns creating and solving similar problems.

ONLINE **See Chapter 9 Alternative Teaching Models.**

End of Lesson