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Unit 5 McDougal Little Resource
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p. 9, Algebra 2 with Analysis

Unit 5 Holt Resource
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Practice with Power Functions

1. For a certain light bulb, the intensity of the light, measured in lux, can be represented by the function $I(d) = 100d^{-2}$, where *d* is the distance measured in feet from the light bulb.

   a. What is the intensity of the light bulb if you are 5 feet away from the light bulb?

   b. What is the intensity of the light bulb if you are 10 feet away from the light bulb?

2. The distance that a planet is from the sun can be approximated by the power function $f(x) = 92.9x^{\frac{2}{3}}$, where *x* is the number of years for a planet to orbit the sun, and *f(x)* is the distance (in millions of miles) the planet is from the sun.

   a. Uranus takes about 84 years to orbit the sun. What is its distance from the sun?

   b. Mars takes 1.88 years to orbit the sun. What is its distance from the sun?

3. The power (in watts) produced by a windmill is related to the speed of the wind by the formula $P(v) = .015v^3$, where *v* is the wind speed in miles per hour, and *P(v)* is the power (in watts).

   a. If the wind is blowing at 10 mph, how much power is generated?

   b. If the wind is blowing at 20 mph, how much power is generated?

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Rational Exponents

Rewrite each expression using rational exponent notation.

1. $\sqrt[3]{15}$	2. $\sqrt[4]{19}$	3. $\left(\sqrt[7]{5}\right)^3$
4. $\left(\sqrt[8]{11}\right)^5$	5. $\sqrt[3]{5^2}$	6. $\sqrt[8]{21^7}$

Rewrite the expression using radical notation.

7. $7^{\frac{1}{4}}$	8. $13^{\frac{1}{3}}$	9. $5^{\frac{3}{4}}$
10. $8^{\frac{4}{5}}$	11. $9^{\frac{5}{3}}$	12. $17^{\frac{5}{2}}$

Find the indicated real n[th] roots of a.

13. $n = 2, a = 49$ 14. $n = 3, a = -8$

Evaluate the expression using a calculator. Round the result to three decimal places when appropriate.

15. $\sqrt[5]{-32768}$	16. $\sqrt[8]{1354}$	17. $5^{\frac{1}{7}}$
18. $15^{-\frac{1}{5}}$	19. $\left(\sqrt[3]{152}\right)^2$	20. $(-170)^{-\frac{2}{5}}$

Solve the equation. Round your answer to three decimal places when appropriate.

21. $x^6 = 729$	22. $5x^3 = -1080$	23. $(x-3)^4 = 16$
24. $-x^5 = 60$	25. $x^3 - 13 = 25$	26. $x^8 + 10 = 70$

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Simplify the expression. Assume all variables are positive.

1. $5^{\frac{1}{4}} \cdot 5^{\frac{3}{4}}$	2. $\left(7^{\frac{1}{3}}\right)^{6}$	3. $\sqrt[4]{2} \cdot \sqrt[4]{8}$
4. $\left(5^{-\frac{1}{2}}\right)^{4}$	5. $\sqrt[3]{\frac{8}{27}}$	6. $x^{\frac{2}{3}} \cdot x^{\frac{7}{3}}$
7. $\left(y^{\frac{1}{4}}\right)^{8}$	8. $\sqrt{9x^4}$	9. $\sqrt[5]{\frac{x^{15}}{y^5}}$
10. $2^{\frac{1}{2}} \cdot 2^{\frac{5}{2}}$	11. $\left(6^{\frac{1}{3}}\right)^{6}$	12. $\frac{1}{8^{-\frac{1}{3}}}$
13. $\frac{18^{\frac{1}{2}}}{2^{\frac{1}{2}}}$	14. $\left(2^{\frac{1}{2}} \cdot 2^{\frac{1}{3}}\right)^{6}$	15. $\left(\frac{7^3}{8^3}\right)^{-\frac{1}{3}}$
16. $\frac{6^{\frac{3}{2}} \cdot 8^{\frac{3}{2}}}{12^{\frac{3}{2}}}$	17. $\frac{15^{\frac{3}{7}}}{15^{-\frac{2}{7}}}$	18. $\left(6^{\frac{3}{5}} \cdot 2^{\frac{3}{5}}\right)^{-5}$
19. $\sqrt[5]{8} \cdot \sqrt[5]{4}$	20. $\sqrt[3]{10} \cdot \sqrt[3]{100}$	21. $\left(\sqrt[3]{2} \cdot \sqrt{2}\right)^{12}$
22. $\frac{\sqrt[3]{250}}{\sqrt[3]{2}}$	23. $\frac{\sqrt[5]{8} \cdot \sqrt[5]{8}}{\sqrt[5]{2}}$	24. $\frac{\sqrt[3]{10}}{\sqrt[4]{10}}$

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25. $x^{\frac{1}{2}} \cdot x^{\frac{1}{3}}$	26. $\left(z^{12}\right)^{\frac{1}{2}}$	27. $\sqrt[4]{\frac{y^{12}}{x^8}}$
28. $\frac{x^{\frac{4}{3}}y}{xy^{-\frac{2}{3}}}$	29. $\frac{x^{\frac{4}{3}}yz^{-\frac{2}{5}}}{x^{\frac{1}{3}}z^{\frac{3}{5}}}$	30. $\frac{\sqrt[3]{x^6}}{\sqrt[3]{8x} \cdot \sqrt[3]{x^{11}}}$

31. The formula $t = 2\pi\sqrt{\frac{L}{9.8}}$ is used to estimate the number of seconds t it takes a pendulum of length L meters to make one complete swing.

a. How many seconds does it take a pendulum of L = 1.5 meters to make one complete swing?

b. How many seconds does it take a pendulum of length 2.5 meters to make one complete swing?

c. The length of a pendulum is doubled. How many times longer does it take the pendulum to make one complete swing?

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Simplify the expression. Assume all variables are positive.

1. $5^{\frac{1}{4}} \cdot 5^{\frac{3}{4}}$	2. $\left(7^{\frac{1}{3}}\right)^{6}$	3. $\sqrt[4]{2} \cdot \sqrt[4]{8}$
4. $\left(5^{-\frac{1}{2}}\right)^{4}$	5. $\sqrt[3]{\frac{8}{27}}$	6. $x^{\frac{2}{3}} \cdot x^{\frac{7}{3}}$
7. $\left(y^{\frac{1}{4}}\right)^{8}$	8. $\sqrt{9x^{4}}$	9. $\sqrt[5]{\frac{x^{15}}{y^{5}}}$
10. $2^{\frac{1}{2}} \cdot 2^{\frac{5}{2}}$	11. $\left(6^{\frac{1}{3}}\right)^{6}$	12. $\frac{1}{8^{-\frac{1}{3}}}$
13. $\frac{18^{\frac{1}{2}}}{2^{\frac{1}{2}}}$	14. $\left(2^{\frac{1}{2}} \cdot 2^{\frac{1}{3}}\right)^{6}$	15. $\left(\frac{7^{3}}{8^{3}}\right)^{-\frac{1}{3}}$
16. $\frac{6^{\frac{3}{2}} \cdot 8^{\frac{3}{2}}}{12^{\frac{3}{2}}}$	17. $\frac{15^{\frac{3}{7}}}{15^{-\frac{2}{7}}}$	18. $\left(6^{\frac{3}{5}} \cdot 2^{\frac{3}{5}}\right)^{-5}$
19. $\sqrt[5]{8} \cdot \sqrt[5]{4}$	20. $\sqrt[3]{10} \cdot \sqrt[3]{100}$	21. $\left(\sqrt[3]{2} \cdot \sqrt{2}\right)^{12}$
22. $\frac{\sqrt[3]{250}}{\sqrt[3]{2}}$	23. $\frac{\sqrt[5]{8} \cdot \sqrt[5]{8}}{\sqrt[5]{2}}$	24. $\frac{\sqrt[3]{10}}{\sqrt[4]{10}}$

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25. $x^{\frac{1}{2}} \cdot x^{\frac{1}{3}}$	26. $\left(z^{12}\right)^{\frac{1}{2}}$	27. $\sqrt[4]{\frac{y^{12}}{x^8}}$
28. $\frac{x^{\frac{4}{3}} y}{x y^{-\frac{2}{3}}}$	29. $\frac{x^{\frac{4}{3}} y z^{-\frac{2}{5}}}{x^{\frac{1}{3}} z^{\frac{3}{5}}}$	30. $\frac{\sqrt[3]{x^6}}{\sqrt[3]{8x} \cdot \sqrt[3]{x^{11}}}$

31. The formula $t = 2\pi\sqrt{\frac{L}{9.8}}$ is used to estimate the number of seconds t it takes a pendulum of length L meters to make one complete swing.

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c. The length of a pendulum is doubled. How many times longer does it take the pendulum to make one complete swing?

32. $\left(x^{\sqrt{3}}\right)^{\sqrt{3}}$	33. $\left(\frac{x^{\pi}}{y^{2\pi}}\right)^{\frac{1}{\pi}}$	34. $\left(x^{\sqrt{2}} y^{\sqrt{8}}\right)^{\sqrt{2}}$

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Graph the function. Then state the domain and range.

1. $f(x) = \frac{1}{2}\sqrt[3]{x}$

2. $f(x) = \sqrt[3]{x} + 2$

3. $f(x) = \sqrt[3]{x-2}$

4. $f(x) = \frac{1}{4}x^{\frac{1}{3}} + 3$

5. $f(x) = 2\sqrt[3]{x-1} + 3$

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1. $x^{\frac{3}{2}} = 8$

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

3. $5x^{\frac{3}{4}} = 135$

4. $(3x-2)^{\frac{1}{2}} = 4$ ***(6)***