

LESSON
3.2**Practice B**

For use with the lesson "Apply Properties of Rational Exponents"

Simplify the expression using the properties of radicals and rational exponents.

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| 1. $7^{1/3} \cdot 7^{4/3}$ | 2. $\frac{4^{2/3}}{4^{1/3}}$ | 3. $(6^{2/3})^{3/4}$ |
| 4. $5^{1/4} \cdot 3^{1/4}$ | 5. $\sqrt[4]{2} \cdot \sqrt[4]{8}$ | 6. $\frac{\sqrt[4]{192}}{\sqrt[4]{6}}$ |
| 7. $\frac{11}{\sqrt[4]{11}}$ | 8. $\sqrt[3]{7} \cdot \sqrt[3]{49}$ | 9. $(3^{3/2})^2$ |
| 10. $\left(\frac{54}{64}\right)^{1/3}$ | 11. $\frac{\sqrt[4]{32}}{\sqrt[4]{2}}$ | 12. $\frac{\sqrt[5]{5}}{\sqrt[3]{27}}$ |

Simplify the expression. Assume all variables are positive.

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| 13. $x^{5/3} \cdot x^{4/3}$ | 14. $\sqrt{x^{2/5}}$ | 15. $(x^{1/2})^{2/7}$ |
| 16. $\left(\frac{x^2}{27}\right)^{1/3}$ | 17. $\sqrt[3]{16x^4}$ | 18. $(x^{-3})^{2/5}$ |
| 19. $\frac{x^{7/5}}{x^{4/5}}$ | 20. $\frac{\sqrt[3]{64x^3y}}{4x^{-3}y}$ | 21. $x^5 \cdot x^{\sqrt{3}}$ |
| 22. $(x^{\sqrt{2}})^{3\sqrt{2}}$ | 23. $\frac{x^{4\sqrt{3}}}{2x^{2\sqrt{3}}}$ | 24. $(\sqrt[3]{x^4} \cdot \sqrt{x^5})^{-2}$ |

Perform the indicated operation. Assume all variables are positive.

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| 25. $6\sqrt[3]{5} + 2\sqrt[3]{5}$ | 26. $5\sqrt{5} - \sqrt{45}$ |
| 27. $2\sqrt{27} - 3\sqrt{48}$ | 28. $2\sqrt{x} + 7\sqrt{x}$ |
| 29. $3(x^{1/2}y^3)^2 - (x^3y^{18})^{1/3}$ | 30. $4x^{\sqrt{3}} + x^{\sqrt{3}}$ |

Write the expression in simplest form. Assume all variables are positive.

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| 31. $\sqrt[4]{3x^7y^9z^3}$ | 32. $\sqrt{x^3y^4z} \cdot \sqrt{xyz^4}$ | 33. $\sqrt[3]{\frac{81x^2y^3}{8xy^4z}}$ |
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- 34. Circumference** The equatorial circumference of Earth is 4.01×10^4 kilometers. One kilometer is equivalent to 3.94×10^4 inches. What is the equatorial circumference of Earth in inches?
- 35. Swimming Pool** A wooden deck and a circular swimming pool cover an area of 514.16 square feet of the lawn. The rectangular deck is 20 feet wide and 10 feet long. What is the radius of the pool?

Lesson 3.1 Evaluate n th Roots and Use Rational Exponents, continued

c. cube roots of 1: 1, $\frac{-1 + i\sqrt{3}}{2}$, $\frac{-1 - i\sqrt{3}}{2}$;

cube roots of 8: 2, $\frac{-2 + 2i\sqrt{3}}{2} = -1 + i\sqrt{3}$,

$\frac{-2 - 2i\sqrt{3}}{2} = -1 - i\sqrt{3}$; cube roots of 64:

4, $\frac{-4 + 4i\sqrt{3}}{2} = -2 + 2i\sqrt{3}$, $\frac{-4 - 4i\sqrt{3}}{2} =$

$-2 - 2i\sqrt{3}$ 6. 78 vibrations/sec to 1047

vibrations/sec 7. 28 vibrations/sec to 4186

vibrations/sec 8. about 5 notes above A-440, or high D; about 7 notes below A-440, or middle D

9. The frequency of a note one octave above another note is twice that of the original note.

Lesson 3.2 Apply Properties of Rational Exponents

Teaching Guide

1. Add the exponents. m^9 ; product of powers property 2. $m^{3/4} \cdot m^{3/4} \cdot m^{3/4} \cdot m^{3/4}$; m^3

3. $p^{1/2} \cdot p^{1/2} \cdot p^{1/2}$; $p^{3/2}$ 4. Let m and n be rational numbers. $(a^m)^n = a^{mn}$

Investigating Algebra Activity

1. $\sqrt[n]{a \cdot b} = (a \cdot b)^{1/n} = a^{1/n} \cdot b^{1/n} = \sqrt[n]{a} \cdot \sqrt[n]{b}$

2. The root of a product is equal to the product of the roots.

3. $\sqrt[n]{\frac{a}{b}} = \left(\frac{a}{b}\right)^{1/n} = \frac{a^{1/n}}{b^{1/n}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$, $b \neq 0$

4. The root of a quotient is equal to the quotient of the roots. It is important to state that $b \neq 0$, because division by 0 is undefined.

Practice Level A

1. 25 2. $3^{5/3}$ 3. $4^{2/3} \cdot 3^{2/3}$ 4. $\frac{1}{7^{3/2}}$ 5. $9^{1/5}$

6. $\frac{5^{1/6}}{4^{1/6}}$ 7. $\sqrt{10}$ 8. 14 9. 3 10. $\frac{2}{3}$

11. 10 12. $\sqrt{14}$ 13. $x^{5/3}$ 14. $x^{4/5}$ 15. $x^{3/4}$

16. $2x^{1/3}$ 17. $\frac{1}{x^{4/3}}$ 18. $\frac{1}{x^{5/2}}$ 19. $x^{2/3}$ 20. $\frac{1}{x}$

21. $\frac{16}{x^{2/3}}$ 22. $4\sqrt{5}$ 23. $3\sqrt{7}$ 24. $7\sqrt[5]{13}$

25. $3\sqrt{5}$ 26. $26\sqrt{3}$ 27. $5\sqrt[3]{2}$ 28. $-5\sqrt{x}$

29. $7\sqrt[3]{x}$ 30. $-10\sqrt[4]{x}$ 31. $8x\sqrt{x}$ 32. $\frac{\sqrt{x}}{x}$

33. $xyz\sqrt[3]{yz^2}$ 34. $2xy^2z\sqrt[3]{z}$ 35. $4yz\sqrt{xz}$

36. $\frac{z^2\sqrt[3]{x^2yz}}{y}$ 37. $2\sqrt{3}$

Practice Level B

1. $7^{5/3}$ 2. $4^{1/3}$ 3. $6^{1/2}$ 4. $15^{1/4}$ 5. 2 6. $2\sqrt[4]{2}$

7. $11^{3/4}$ 8. 7 9. 27 10. $\frac{3\sqrt[3]{2}}{4}$ 11. 2

12. $\frac{\sqrt[5]{45}}{3}$ 13. x^3 14. $x^{1/5}$ 15. $x^{1/7}$ 16. $\frac{x^{2/3}}{3}$

17. $2x\sqrt[3]{2x}$ 18. $\frac{1}{x^{6/5}}$ 19. $x^{3/5}$ 20. $\frac{x^4\sqrt[3]{y}}{y}$

21. $x^5 + \sqrt[3]{x}$ 22. x^6 23. $\frac{x^{2\sqrt{3}}}{2}$ 24. $\frac{1}{x^{23/3}}$

25. $8\sqrt[3]{5}$ 26. $2\sqrt{5}$ 27. $-6\sqrt{3}$ 28. $9\sqrt{x}$

29. $2xy^6$ 30. $5x^{\sqrt{3}}$ 31. $xy^2\sqrt[4]{3x^3yz^3}$

32. $x^2y^2z^2\sqrt{yz}$ 33. $\frac{3\sqrt[3]{3xy^2z^2}}{2yz}$

34. 1.58×10^9 in. 35. 10 ft

Practice Level C

1. $16 \cdot 5^{9/4}$ 2. $3^{3/2}$ 3. $7^{6/5}$ 4. $5^{1/2}$ 5. 4

6. $\sqrt[4]{6}$ 7. $\frac{\sqrt{6}}{3}$ 8. $9\sqrt[5]{81}$ 9. $\frac{\sqrt{70}}{35}$ 10. $x^3\sqrt[3]{3}$

11. $\frac{x^4\sqrt[4]{x}}{y^2}$ 12. $x^{1/4}$ 13. $x^{1/3}y^{1/6}$ 14. $\frac{8x^4y^{1/5}}{z^3}$

15. $\frac{\sqrt{3}z^{1/4}}{x^{1/2}y^{1/3}}$ 16. $\frac{y^{9/2}}{8x^{3/2}z^{3/2}}$ 17. $9x^4\sqrt[4]{x^3}$

18. $x^{23/120}$ 19. $2\sqrt[4]{3}$ 20. $3x^2z\sqrt[3]{xyz^2}$ 21. $\sqrt[8]{x}$

22. $\frac{\sqrt[3]{50x + 25\sqrt{x}}}{5}$ 23. $2\sqrt[3]{x}$ 24. $4x^2z\sqrt{xyz}$

25. 4.29×10^8 in. 26. 4.3 in.

Study Guide

1. 24 2. $10^{2/3}$ 3. $\frac{1}{5}$ 4. 121 5. $9\sqrt{6}$ 6. $4\sqrt[3]{6}$

7. 5 8. 2 9. $6\sqrt[3]{2}$ 10. $\frac{\sqrt[4]{54}}{3}$ 11. $8(6)^{1/4}$

12. $24(6)^{1/2}$ 13. $\frac{3m}{2n^2}$ 14. $4p^4q^2$ 15. $\frac{\sqrt[3]{6xy}}{3y}$

16. $-2\sqrt{h}$ 17. $7a^{1/2}b$ 18. $y^2\sqrt{5}$

Problem Solving Workshop:

Worked Out Example

1. about 2.83 in. 2. about 2.42 mm 3. 9 ft

4. about 1.59; The surface area of the Canadian lynx is about 1.59 times as greater as the surface area of an average house cat.