Name ______________________________ Date __________

5.1 Extra Practice

In Exercises 1–3, find the indicated real *n*th root(s) of *a*.

1. $n = 3, a = 343$
2. $n = 6, a = -64$
3. $n = 5, a = -243$

In Exercises 4–9, evaluate the expression without using technology.

4. $36^{3/2}$
5. $16^{3/4}$
6. $(-32)^{2/5}$
7. $(-125)^{5/3}$
8. $256^{-5/4}$
9. $27^{-4/3}$

In Exercises 10–15, evaluate the expression using technology. Round your answer to two decimal places, if necessary.

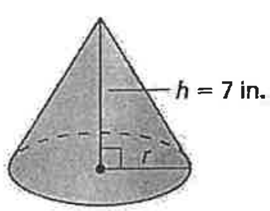
10. $28^{-1/5}$
11. $150^{2/5}$
12. $40{,}351^{6/7}$
13. $750^{-2/5}$
14. $(\sqrt[5]{223})^3$
15. $(\sqrt[7]{-34})^5$

In Exercises 16–21, find the real solution(s) of the equation. Round your answer to two decimal places, if necessary.

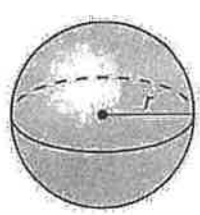
16. $6x^4 = 60$
17. $x^5 = -233$
18. $x^4 + 19 = 100$
19. $x^3 + 17 = 57$
20. $\frac{1}{5}x^4 = 125$
21. $\frac{1}{7}x^3 = -49$

In Exercises 22 and 23, find the radius of the figure with the given volume.

22. $V = 425 \text{ in.}^3$



23. $V = 1458 \text{ m}^3$



24. Kepler's third law states that the relationship between the mean distance d (in astronomical units) of a planet from the Sun and the time t (in years) it takes the planet to orbit the Sun can be given by $d^3 = t^2$.

    a. It takes Venus 0.616 year to orbit the Sun. Find the mean distance of Venus from the Sun (in astronomical units).

    b. The mean distance of Jupiter from the Sun is 5.24 astronomical units. How many years does it take Jupiter to orbit the Sun?

Name ______________________________ Date ________

5.2 Reteach (continued)

The Power of a Product and Power of a Quotient properties can be expressed using radical notation when $m = \frac{1}{n}$ for some integer n greater than 1.

Key Idea

Properties of Radicals

Let a and b be real numbers such that the indicated roots are real numbers, and let n be an integer greater than 1.

Property Name	Definition	Example
Product Property	$\sqrt[n]{a \bullet b} = \sqrt[n]{a} \bullet \sqrt[n]{b}$	$\sqrt[3]{4} \bullet \sqrt[3]{2} = \sqrt[3]{8} = 2$
Quotient Property	$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}, b \neq 0$	$\frac{\sqrt[4]{162}}{\sqrt[4]{2}} = \sqrt[4]{\frac{162}{2}} = \sqrt[4]{81} = 3$

EXAMPLE Using Properties of Radicals

Use the properties of radicals to simplify each expression.

a. $\sqrt{5} \bullet \sqrt{45} = \sqrt{5 \bullet 45} = \sqrt{225} = 15$ Product Property of Radicals

b. $\frac{\sqrt[3]{108}}{\sqrt[3]{4}} = \sqrt[3]{\frac{108}{4}} = \sqrt[3]{27} = 3$ Quotient Property of Radicals

In Exercises 1–6, use the properties of rational exponents to simplify the expression.

1. $\left(7^2\right)^{1/4}$

2. $\left(14^3\right)^{1/2}$

3. $\frac{5^{1/5}}{5}$

4. $\frac{10}{10^{1/4}}$

5. $\left(\frac{6^5}{9^5}\right)^{-1/5}$

6. $\left(7^{-3/4} \bullet 7^{1/4}\right)^{-1}$

7. $\left(2^3 \bullet 6^6\right)^{1/6}$

8. $\left(5^3 \bullet 3^3\right)^{-2/3}$

9. $\frac{\left(9^{2/3}\right)^3}{\left(3^{1/3}\right)^3}$

In Exercises 10–18, use the properties of radicals to simplify the expression.

10. $\sqrt{3} \bullet \sqrt{75}$

11. $\sqrt[3]{81} \bullet \sqrt[3]{9}$

12. $\sqrt[4]{12} \bullet \sqrt[4]{8}$

13. $\sqrt[4]{9} \bullet \sqrt[4]{9}$

14. $\frac{\sqrt[5]{128}}{\sqrt[5]{4}}$

15. $\frac{\sqrt{5}}{\sqrt{80}}$

16. $\frac{\sqrt[3]{375}}{\sqrt[3]{3}}$

17. $\frac{\sqrt[4]{405}}{\sqrt[4]{5}}$

18. $\frac{\sqrt{5}}{\sqrt{125}}$