

Name: Key

Date: _____

Period: _____

5.1 nth Roots & Rational Exponents CYU Use when you get it right all by yourself**S** Use when you did it all by yourself, but made a silly mistake**H** Use when you could do it alone with a little help from teacher or peer**G** Use when you completed the problem in a group**X** Use when a question was attempted but wrong (get help)**N** Use when a question was not even attempted

CONCEPTS	BASIC	INTERMEDIATE	ADVANCED
Set up the radical	1 - 4		
Simplify nth roots	1 - 4		
Evaluating rational exponents with & w/o calc	5 - 8	9 - 10	
Converting rational exponents to and from radicals	11 - 14		
Evaluating radicals and rational exponents	15 - 18		
Geometry Review	19, 20		
Solving equations with exponents		21 - 23	
Real world problems with exponents			24, 25

Find the indicated real nth root(s) of a.

1. $n = 3$ & $a = 8$

$$\sqrt[3]{8} = 2$$

2. $n = 2$ & $a = 0$

$$\sqrt{0} = 0$$

3. $n = 4$ & $a = 256$

$$\sqrt[4]{256} = \pm 4$$

4. $n = 5$ & $a = -32$

$$\sqrt[5]{-32} = -2$$

Evaluate the expression without using a calculator.

5. $64^{\frac{1}{6}}$

$$\sqrt[6]{64}$$

$$2$$

6. $25^{\frac{3}{2}}$

$$(\sqrt{25})^3 = 5^3$$

$$125$$

7. $(-243)^{\frac{1}{5}}$

$$\sqrt[5]{-243} = -3$$

8. $8^{-\frac{2}{3}}$

$$(\sqrt[3]{8})^{-2} = \frac{1}{4}$$

ERROR ANALYSIS Describe & correct the error in evaluating the expression.

9.

X

$$27^{2/3} = (27^{1/3})^2$$

$$= 9^2$$

$$= 81$$

 $\sqrt[3]{27}$ was wrong.

$$27^{\frac{2}{3}} = (27^{\frac{1}{3}})^2 = 3^2 = 9$$

10.

X

$$256^{4/3} = (\sqrt[4]{256})^3$$

$$= 4^3$$

$$= 64$$

Index & exponent are switched.

$$256^{\frac{4}{3}} = (\sqrt[3]{256})^4 \approx 6.35^4 \approx 1625.50$$

MATCHING Using the proper structure, match the equivalent expressions.

11. $(\sqrt[3]{5})^4$ **B**

A. $5^{-\frac{1}{4}}$

12. $(\sqrt[4]{5})^3$ **D**

B. $5^{\frac{4}{3}}$

13. $\frac{1}{\sqrt[4]{5}}$ **A**

C. $-5^{\frac{1}{4}}$

14. $-\sqrt[4]{5}$ **C**

D. $5^{\frac{3}{4}}$

Evaluate the expression using a calculator. Round your answer to two decimal places when appropriate.

15. $\sqrt[5]{32,768}$

8

16. $25^{-\frac{1}{3}}$

0.34

17. $20,736^{\frac{4}{5}}$

2840.40

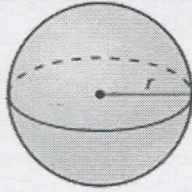
18. $(\sqrt[4]{187})^3$

50.57

MATHEMATICAL CONNECTIONS Find the radius of the figure with the given volume.

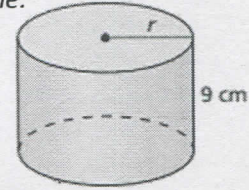
19. $V = 216 \text{ ft}^3$

$r \approx 3.72 \text{ ft}$



20. $V = 1332 \text{ cm}^3$

$r \approx 6.86 \text{ cm}$



Find the real solution(s) of the equation. Do not round your answer. Leave all answers exact.

21. $x^6 + 36 = 100$

$x = \pm 2$

22. $x^3 + 40 = 25$

$x \approx -2.47$ (not exact)

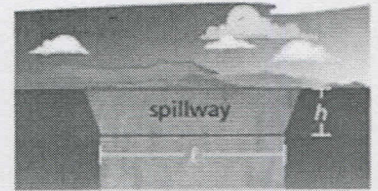
$x = \sqrt[3]{-15}$

23. $\frac{1}{6}x^3 = -36$

$x = -6$

PROBLEM SOLVING

24. A weir is a dam that is built across a river to regulate the flow of water. The flow rate Q (in cubic feet per second) can be calculated using the formula $Q = 3.367lh^{\frac{3}{2}}$, where l is the length (in feet) of the bottom of the spillway and h is the depth (in feet) of the water on the spillway. Determine the flow rate of a weir with a spillway that is 20 feet long and has a water depth of 5 feet.



≈ 753 cubic feet

25. The mass of the particles that a river can transport is proportional to the sixth power of the speed of the river normally flows at a speed of 1 meter per second. What must its speed be in order to transport particles that are twice as massive as usual? 10 times as massive? 100 times as massive?

- ① 1.12 or 1.12 mps
- ② 1.47 or 1.47 mps
- ③ 2.15 or 2.15 mps

CYU Reflection: How far can you go: basic, intermediate, or advanced?

Rate your mastery level!

How confident are you with the skills this CYU covered? Circle the score you would give yourself.

● ● ● ● ● ● ● ●

1	2	3	4	5	6	7	8
Basic		Intermediate			Advanced		Solved ALL!

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