

LESSON 5.5 Assignment

Name _____ Date _____

Radical! Because It's Cliché!
Properties of Rational Exponents

1. Use the formulas in the table to answer the questions.

Name of Formula	Formula	Definition of Variables
Volume of a sphere	$V = \frac{4}{3} \pi r^3$	r = radius
Period of a pendulum	$T \approx 2\pi\sqrt{\frac{L}{g}}$	L = length of pendulum g = acceleration due to gravity
Wingspan of a bird	$L = 2.43w^{\frac{1663}{5000}}$	w = weight of bird

a. Determine the radius of a sphere with a volume of 904.32 cubic units. Use 3.14 for π . Show your work.



b. Trevor and Yasmine have rewritten the formula for the period of a pendulum using rational exponents. Their answers are shown below. Determine which student rewrote the formula correctly, and explain the mistake the other student made.

Trevor: $T \approx 2\pi\left(\frac{L}{g}\right)^{\frac{1}{2}}$

Yasmine: $T \approx 2\pi\left(\frac{L}{g}\right)^{-\frac{1}{2}}$

- c. Rewrite the formula for the length of the wingspan of a bird using radicals and exponents. Explain how you determined your answer.

2. Mr. Ashman writes the expression $\left(\frac{8}{27}\right)^{-3}$ on the board and asks his students to simplify the expression completely. The work of three students is shown below. Analyze each student's work and determine who simplified the expression correctly. Explain the mistakes the other students made.

Student 1

$$\begin{aligned} \left(\frac{8}{27}\right)^{-3} &= \frac{1}{\left(\frac{8}{27}\right)^3} \\ &= \frac{1}{\left(\frac{8 \times 3}{27 \times 3}\right)} \\ &= \frac{1}{\frac{24}{81}} \\ &= \frac{81}{24} \end{aligned}$$

Student 2

$$\begin{aligned} \left(\frac{8}{27}\right)^{-3} &= \frac{1}{\left(\frac{8}{27}\right)^{\frac{1}{3}}} \\ &= \frac{1}{3} \\ &= \frac{3}{2} \end{aligned}$$

Student 3

$$\begin{aligned} \left(\frac{8}{27}\right)^{-3} &= \frac{1}{\left(\frac{8}{27}\right)^3} \\ &= \frac{1}{\frac{512}{19,683}} \\ &= \frac{19,683}{512} \end{aligned}$$