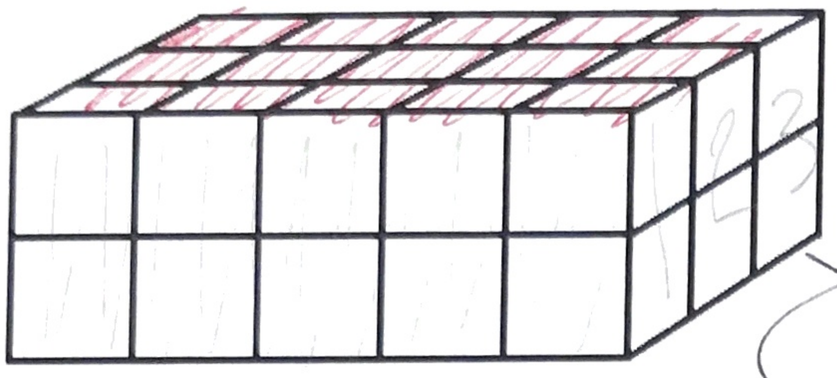
Name: _____ Date: Feb 21 Hour: ____Alg 1____

Unit 6 Day 4: Volume and Cube Roots

Focus Question: How do I find the side length of a cube?

A. Volume Basics

1. How many cubes were used to create the rectangular solid below? Explain how you found your answer.



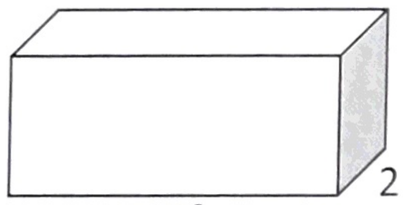
in^3
ft^3
yd^3
3 yd

5.2 • 3
Front side # of rows → 30 units cube
5.3 • 2
Bottom height
side (# of layers)

2. The formula for volume of a rectangular prism is $V = lwh$. Use #1 to explain where this formula comes from.

length • width • height
Area of a rectangle • the 3rd dimension
base shape

3. Find the volume of the solid below (work with your units throughout the problem).



V = lwh
V = 8 ft • 2 ft • 4 ft
V = 8 • 2 • 4 • ft ft ft
V = 64 ft^3

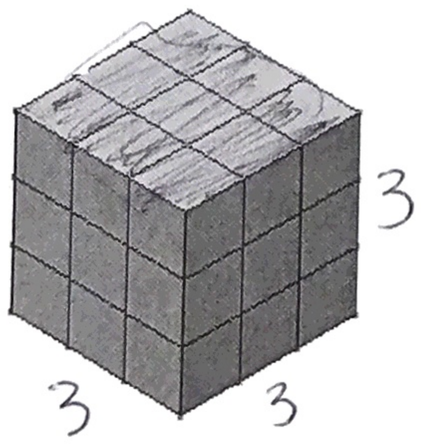
4. A more generic formula for volume of ANY prism is $V = Bh$. What do you think B stand for?

Area of the base
height

5. The shape below (in #6) is a **cube**. It is a rectangular solid, but we give it a more specific name. Why do you think it has a more specific name?

All sides are equal

6. It also has a more specific formula. Show how the generic prism formula of $V = Bh$ can lead us to the specific formula for a cube.



V = lwh
= 3 • 3 • 3
= 3^3

area of a square
height is the same length
V = S^2 • S
V = S^3 ← memorize

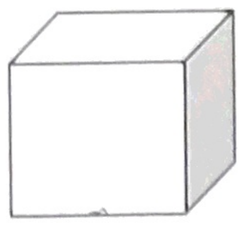
7. Using 1-6 above, define volume.

Volume is the number of cubic units, required to form/build/fill a solid.

B. Using Volume formula of a cube

Write the volume formula for a cube. Then use substitution to find the missing value. (Remember to work with units correctly throughout.)

1.



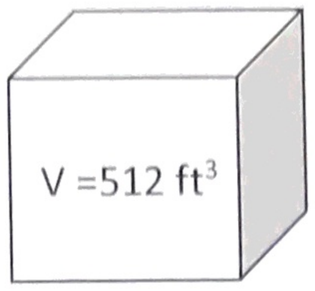
$V = s^3$

$V = (6\text{cm})^3$

$V = 6^3\,\text{cm}^3$

$V = 216\,\text{cm}^3$

2.



$V = s^3$

$(512)^{\frac{1}{3}} = (s^3)^{\frac{1}{3}}$

$8\,\text{ft} = s$

C. Cube Roots

1. Explain how you solved problem #2 above.

2. The ½ power is the same as square root. How else could you say the 1/3 power? How is this written?

$\sqrt{\ }$ square root cube root $\sqrt[3]{512}$

3. Use a calculator to find each of the following

a. $\sqrt[3]{125}$ 5

b. $\sqrt[3]{512}$ 8

c. $\sqrt[3]{9}$ ≈2.08

d. $1728^{\frac{1}{3}}$ 12

4. Which answer above expands your knowledge of irrational numbers? Explain.

ⓒ $\sqrt[3]{9}$ 9 is not a perfect cube
So $\sqrt[3]{9}$ goes on forever w/no pattern

5. You should memorize the following perfect cubes.

1^3	2^3	3^3	4^3	5^3	6^3	7^3
1	8	27	64	125	216	343

6. You will not be required to know it in this class, but in algebra 2 you will work much more with rational exponents. The $\frac{1}{2}$ power and $\frac{1}{3}$ power are examples of rational exponents. Why do you think they are called rational exponents?

a ratio of integers & $\frac{1}{2}$ & $\frac{1}{3}$ are ratios of integers

7. Just as a preview: $\sqrt[3]{412^5} = 412^{\frac{5}{3}}$. Why have we not been putting an exponent as part of our root?

$\sqrt[3]{125^1} = 125^{\frac{1}{3}}$ the root is the denominator

the 1 is implied