

Chapter 3: Volume

Section 3.1 - Cubes and Cube Roots

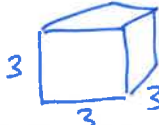
Volume

- The amount of **SPACE** an object occupies
- Measured in **CUBIC** units

Perfect cube

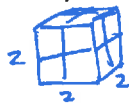
- The result of **MULTIPLYING** a number by **ITSELF**, two times

Ex. $3^3 = 3 \times 3 \times 3 = 27$



Cube root

- The number that when **MULTIPLIED** by itself **TWO** times equals the perfect cube number
- Written as $\sqrt[3]{x}$
- The **SIDE LENGTH** of a perfect cube
- Ex. $\sqrt[3]{8} = 2$



exponent = the # of ~~times~~ bases you are multiplying.
 $(x)^3 = x \cdot x \cdot x$
 ↳ Base = the # being multiplied by itself

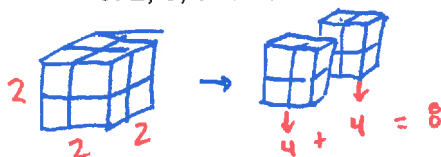
Determining the Cube and Cube Root of a number

Modeling

Use a model to determine the cube of each of 2, 3, and 4.

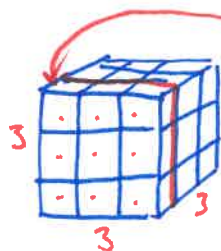
Key Points

- Each number represents the length of each dimension of the cube
 - Height (y), width (x), depth (z)
- The cube of each number is equal to the number of units it takes to make a perfect cube
- The side length of each perfect cube is the cubed root



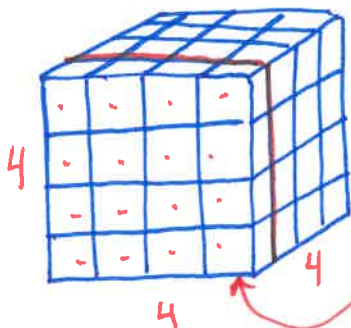
$$\sqrt[3]{8} = 2$$

$4 + 4 = 8$



• 9 blocks in each Layer
 $9 + 9 + 9 = 27$
 or
 $3 \times 3 \times 3 = 27$
 • 3 layers of 9.

$$\sqrt[3]{27} = 3$$



• 16 blocks in each layer (4x4)
 $16 + 16 + 16 + 16 = 64$
 or
 $4 \times 4 \times 4 = 64$
 • 4 layers of 16.

$$\sqrt[3]{64} = 4$$

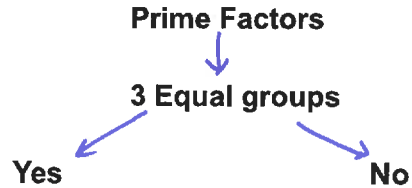
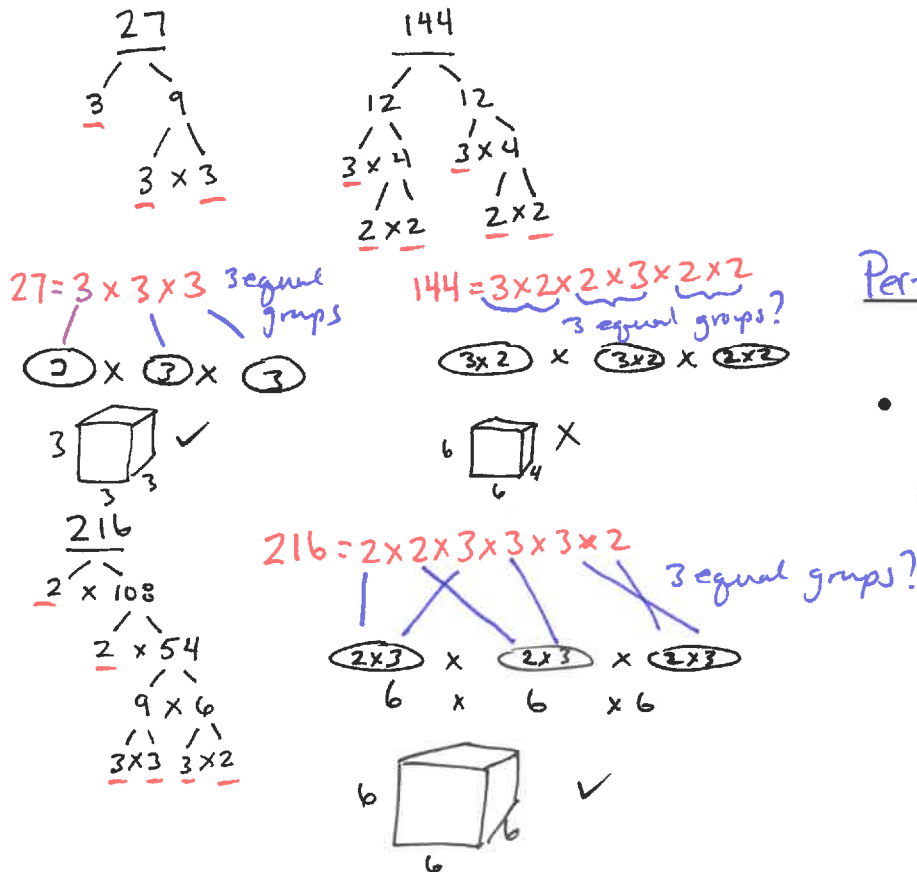
Prime Factorization

Example

Which of the following numbers are perfect cubes? 27, 144, 216

Key Points

- Determine prime factors using a factor tree



Perfect cube

Rectangular Prism.

- Product of each group is the CUBE ROOT of the number and the SIDE LENGTH of the cube/ rectangular prism

Try it out:

Which of the following are perfect cubes

1) 518

343

81

Evaluate the following

2) $(8)^3$

$(6.4\text{cm})^3$

$\sqrt[3]{216}$

$\sqrt[3]{95}$

Practice assignment - page 75 # 1-4, 6, choose two apply (challenge #18 and 19)