

Date: \_\_\_\_\_

**KEY**

### 3.6 Cubes and Cube Roots

Determine the prime factorization of the following numbers:

<p>72</p> <p><math>2^3 \cdot 3^2</math></p>	<p>216</p> <p><math>2^3 \cdot 3^3</math></p>	<p>24</p> <p><math>2^3 \cdot 3</math></p>
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The cube of a number is the number multiplied by itself, twice:

$$3 \times 3 \times 3 = 27$$

$3^3 = 27$  \* The cube of a whole number is a: perfect cube

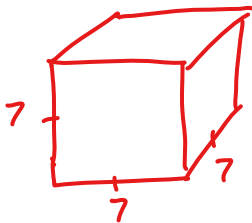
A ~~cube root~~ **cube** is: the number produced when a number is multiplied by itself twice

Ex  $4 \times 4 \times 4 = 64$   
so 64 is the cube of 4

List the first 5 perfect cubes:

$1^3 = 1$	$4^3 = 64$
$2^3 = 8$	$5^3 = 125$
$3^3 = 27$	

Sarah knows that her cube-shaped jewelry box has a side length of 7 cm. What is the volume of the box?



Solution:

Method 1:

$$V = lwh$$

$$= (7)(7)(7)$$

$$V = 343 \text{ cm}^3$$

Method 2:

$$V = s^3$$

$$= (7)^3$$

$$V = 343 \text{ cm}^3$$

A **Cube Root** is: *the number which, when multiplied by itself twice, produces the number in question*

Ex  $4 \times 4 \times 4 = 64$ ,  
so 4 is the cube root of 64

Find the ~~square~~ <sup>cube</sup> root of the following numbers:

$$\sqrt[3]{343} = 7$$

$$\sqrt[3]{125} = 5$$

$$\sqrt[3]{729} = 9$$

How does cubing a number relate to taking the cube root of number?

*They are inverse operations.*

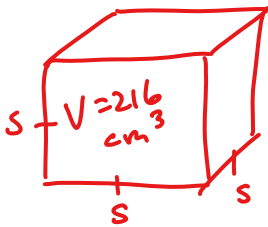
Ex  $6^3 = 216$ , therefore  $\sqrt[3]{216} = 6$

THINK ABOUT THIS!

SPEND TIME GETTING IT STRAIGHT

### Example 1

Joe has a box in the shape of a cube that can hold 216 cm<sup>3</sup>. What is the length of each side of the box?



$$\sqrt[3]{V} = \sqrt[3]{s^3}$$

$$\sqrt[3]{V} = s$$

$$\sqrt[3]{216} = s$$

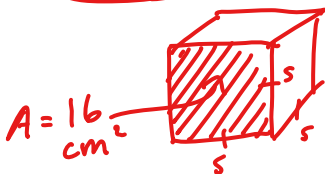
$$6 \text{ cm} = s$$

THINK UNTIL YOU GET IT.

### Example 2

One face of a cube has an area of 16 cm<sup>2</sup>. What is the volume of the cube?

THINK!



PLAN:

- ① USE A TO FIND S
- ② USE S TO FIND V

EXECUTE:

$$\textcircled{1} \sqrt{A} = \sqrt{s^2}$$

$$\sqrt{A} = s$$

$$\sqrt{(16)} = s$$

$$\textcircled{4} = s$$

$$\textcircled{2} V = s^3$$

$$V = (4)^3$$

$$V = 64 \text{ cm}^3$$