



6-3 Volume

- I can find the volume of rectangular and triangular prisms.



What We Need to Understand

- **Volume** is the amount of space inside a three-dimensional object.
 - In order to measure volume, we need a three-dimensional unit, so we use **cubes**.
 - The size of the cube depends on the unit that the object is measured with, so we can measure with **cubic inches, cubic feet, cubic centimeters**, etc.

What We Need to Understand

- A **cubic inch** is a cube that measures an inch on each of its **sides**.
- A **cubic mile** is a cube that measures a mile on each of its sides. (That's Big!)
- A **cubic centimeter** is a cube that measures a centimeter on each of its sides.
- Also we use this to define the volume of a **milliliter**.

Volume of Rectangular Prisms

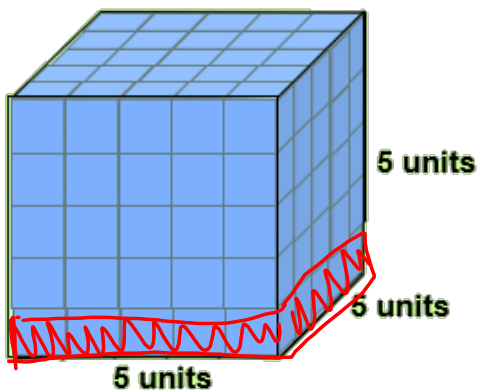
To determine the number of cubes that fill this rectangular prism, first we will find out how many cubes will fit in the bottom.

The number of SQUARES that will fill the bottom (base) is the same as the AREA of the base. Since the bottom is a rectangle, we can use $\text{LENGTH} \times \text{WIDTH}$ to determine the number of squares on the base.

$$\underline{\text{LENGTH} \times \text{WIDTH}}$$

$$5 \text{ un} \times 5 \text{ un} = 25 \text{ un}^2$$

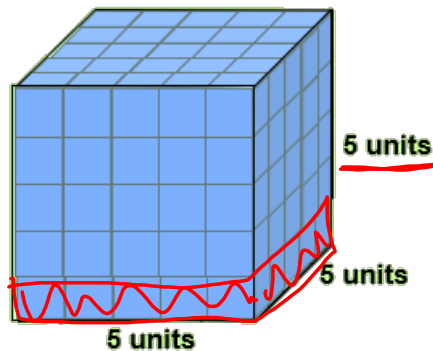
25 squares → 25 cubes
on first layer



Volume of Rectangular Prisms

Now we can determine how many **LAYERS** of these cubes there are in the prism. The number of layers is the same as the prism's **HEIGHT**.

If we know how many **SQUARES** are on the bottom then we could set a cube on each of those squares.



Cubes in Bottom Layer \times Height

$$25 \text{ cubes} \times 5 \text{ layers} \\ = 125 \text{ cubes}$$

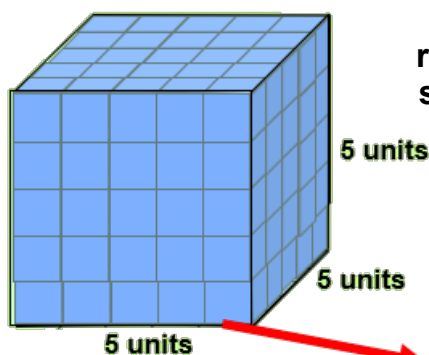
The formula:

Volume of rectangular prism = AREA of the Base \times height

$$V = Bh$$

B = AREA of the Base

h = height or distance between the bases



The area of the base (B) for any rectangular prism is length \times width, so we can also state the formula for a rectangular prism as:

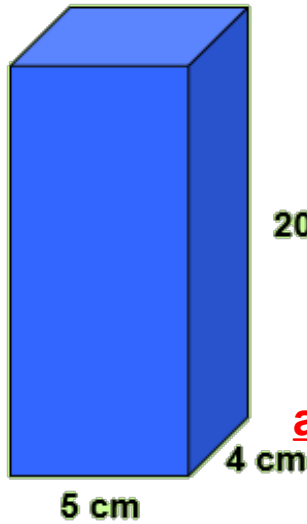
$$V = \underline{l} \times \underline{w} \times \underline{h}$$

$$125 \text{ units}^3$$

$$5 \text{ units} \times 5 \text{ units} \times 5 \text{ units} = \underline{125 \text{ cubic units}}$$

Let's find the volume of this rectangular prism
by using the formula

$$l \times w \times h$$



$$V = l \times w \times h$$

$$V = 5 \text{ cm} \times 4 \text{ cm} \times 20 \text{ cm}$$

$$V = (5 \times 4 \times 20) \text{ cm}^3$$

$$V = 400 \text{ cm}^3$$

Remember that our units will
always be in terms of "cubic" units

(3)

A packing box is 20 cm high, 15 cm wide
and 18 cm deep. Find the volume.

$$\text{Volume of Rect. Prism} = \underline{l \times w \times h}$$

$$\text{Volume} = \underline{20\text{cm} \times 15\text{cm} \times 18\text{cm}}$$

$$\text{Volume} = \underline{300\text{cm}^2 \times 18\text{cm}}$$

$$\text{Volume} = \underline{5400\text{cm}^3}$$