

STUDY GUIDE: VOLUME PART II

THIS IS NOT THE SAME ASSIGNMENT.

SAME NOTES, BUT DIFFERENT QUESTIONS.

First, **recall** the formula for area. For area, we have $A = l \times w$, or “Area equals length times width.” When we go from length to area, we multiply the new dimension, width. We do the exact same thing when we go from area to volume by adding height. In that case, we get the formula:

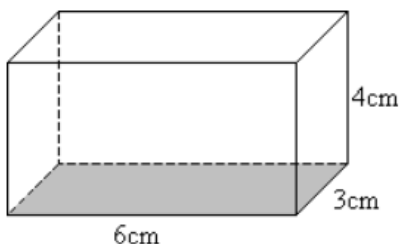
$$V = l \times w \times h$$

Or “Volume equals: length times width times height.” This also gives us a second formula by remembering that $l \times w$ equals A , area. We usually replace it with the letter B , standing for “Base,” but **area and base are THE SAME THING** in these equations.

$$V = A \times h$$

$$V = B \times h$$

So, how can we use these formulae? Well, if we know all three dimensions, we can find volume by multiplying. See the example below:



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

$$V = 6cm \times 3cm \times 4cm$$

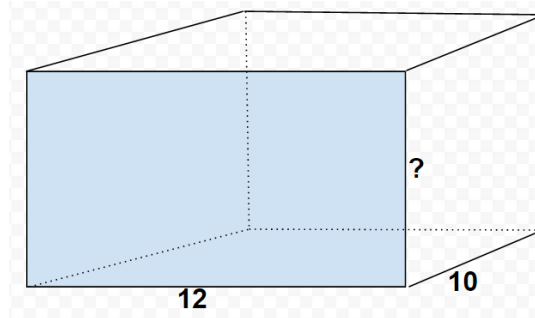
$$V = 72cm^3$$

Notice that our final answer is in cm^3 , with a small three above the unit. This is called a **cubic unit**, or “units cubic.” In this case have centimeters cube, or “cubic cm” (cu cm). **All** volume answers should be cubic.

“But what if we don’t have one of the dimensions, like if I’m missing height?”

This is not a problem if we know the volume – then we can find the missing height by using the formula $V = B \times h$!

This example has a **volume** of $600u^3$, or “ $V = 600u^3$.”



Well, we know the length and the height are 12 and 10, so...

$$V = B \times h$$

$$600u^3 = (12u \times 10u) \times h$$

$$600u^3 = 120u^2 \times h$$

When you reach this step, **divide the volume by the area** to get the height.

$$\frac{600u^3}{120u^2} = h$$

$$5u = h.$$

So our final answer is that our height is 5 units.

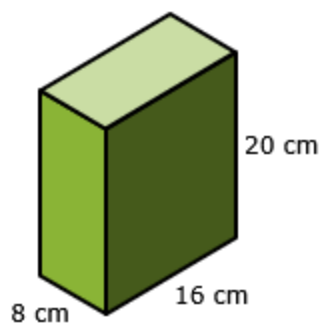
Finally, remember that a **Cube** is similar to its 2D counterpart, a **square**. All side lengths on a cube are the same, therefore, the volume of a cube is as follows:

$$V = l \times l \times l$$

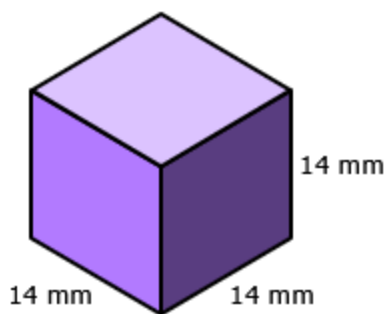
The volume is simply the length **multiplied by itself** three times – NOT multiplied by 3.

Your Turn

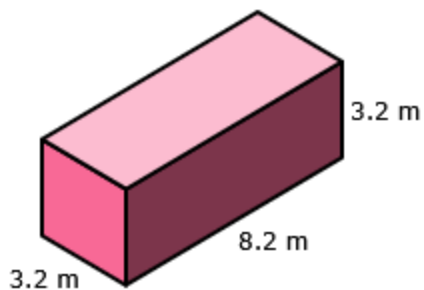
1. Find the volume.



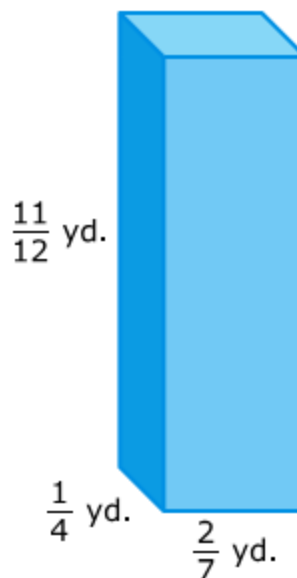
2. Find the volume.



3. Find the volume.



4. Find the volume of the figures on the right.



5. A rectangular prism is 1.5 inches long, 0.75 inches wide, and 5 inches high.
What is the volume of the rectangular prism?

6. Laurette lives in a room that is 10ft long, 15ft wide, and 8 feet high. What is the complete volume of the room she lives in?

7. According to our best estimates, all the gold humans have ever mined in history would fit into a cube that is 22 meters on each side. Given then information, what is the total volume of gold humans have ever mined?

8. Pyrite is a mineral that looks surprisingly like gold but isn't. Its mineral structure typically forms perfect tiny cubes. A sample of pyrite forms a cube with a side length of 1.2cm. What is the volume of the pyrite cube?

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9. A rectangular prism has a length of $\frac{1}{2}u$, a width of $\frac{2}{5}u$, and a height of $4u$. What is the volume of this cube?

Hint: Remember to turn the whole number into a fraction by putting a 1 under it.

10. A rectangular prism has a length of $1\frac{1}{3}u$, a width of $\frac{3}{5}u$, and a height of $3\frac{1}{2}u$. What is the volume of this cube?

Hint: Remember to turn mixed numbers into improper fractions before multiplying.

11. A rectangular prism has a volume of $540in^3$, a length of $10in$, and a width of $6in$. What is the height of the rectangular prism?

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12. A rectangular prism has a volume of 50mm^3 , a length of 0.8mm , and a width of 2mm . What is the height of the rectangular prism?

13. A storage room is being filled with boxes of junk. The boxes do not fill the room entirely, but does estimate it volume. The room will be filled 3 boxes long, 6 boxes wide, and 10 boxes tall.

a. How many total boxes will fill the room?

b. Each box is a rectangular prism with a volume of 20ft^3 . What is the approximate volume of the room?

14. A building shaped like a rectangular prism has a floor with an area of 250yd^2 . Assuming the building has a total volume of $6,250\text{yd}^3$, then what is the height of the building?

Hint: Remember that the “floor” of a building is its base.