

Volume Build Lab

Measure the space inside three-dimensional solids.

HIGH SCHOOL • MA.912.GR.4

MA.912.GR.4 "Use geometric measurement and dimensions to solve problems."

NAME _____

DATE _____

VOLUME FROM DIMENSIONS

Volume measures the space inside a solid. For a prism or cylinder, multiply the area of the base by the height: $V = Bh$. For a pyramid or cone, use one third of the matching prism or cylinder volume, and for a sphere use $V = \frac{4}{3} \pi r^3$.

WORKED EXAMPLE

Find the volume of a rectangular prism that is 17 cm long, 19 cm wide, and 13 cm high.

1. Use $V = lwh$.
2. $V = 17 \times 19 \times 13$.
3. $V = 4199 \text{ cm}^3$.

Answer: 4199 cm^3

PRACTICE 6 problems

- 1** Find the volume of a rectangular prism that is 8 cm by 9 cm by 2 cm.

ANSWER _____

- 2** A triangular prism has a triangular base with base 10 cm and altitude 12 cm. The prism is 3 cm long. Find its volume.

ANSWER _____

- 3** Find the volume of a cylinder with radius 5 cm and height 8 cm. Leave π in your answer.

ANSWER _____

- 4** Find the volume of a cone with radius 9 cm and height 10 cm. Leave π in your answer.

ANSWER _____

- 5** Find the volume of a square pyramid with base side length 12 cm and height 14 cm.

ANSWER _____

- 6** Find the volume of a sphere with radius 3 cm. Leave π in your answer.

ANSWER _____

APPLY IT Show your work

- 1** A game design club makes a rectangular prize box that is 15 cm long, 18 cm wide, and 20 cm high. How much space can the box hold?

WORK SPACE

ANSWER _____

- 2** For a theater set, a student builds a solid cone-shaped prop with radius 8 cm and height 15 cm. How much material does the prop contain? Leave pi in your answer.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A solid rectangular display block measures 20 cm by 16 cm by 12 cm. A cylindrical hole with radius 3 cm is drilled completely through the 12 cm height. Find the remaining volume of the block. Leave pi in your answer.

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the volume of a rectangular prism that is 8 cm by 9 cm by 2 cm.	144 cm³
2	A triangular prism has a triangular base with base 10 cm and altitude 12 cm. The prism is 3 cm long. Find its volume.	180 cm³
3	Find the volume of a cylinder with radius 5 cm and height 8 cm. Leave pi in your answer.	200pi cm³
4	Find the volume of a cone with radius 9 cm and height 10 cm. Leave pi in your answer.	270pi cm³
5	Find the volume of a square pyramid with base side length 12 cm and height 14 cm.	672 cm³
6	Find the volume of a sphere with radius 3 cm. Leave pi in your answer.	36pi cm³

PART 2 · APPLY IT

1. **5400 cm³** Use $V = lwh$. Multiply $15 \times 18 \times 20$ to find the box's volume.
2. **320pi cm³** Use $V = \frac{1}{3} \pi r^2 h$. Substitute the radius and height, then simplify.

CHALLENGE

3840 - 108pi cm³

Accept equivalent exact expressions, such as $12(320 - 9\pi) \text{ cm}^3$ for the challenge. Require cubic units and leave pi exact when pi appears.