

Volume in Action

Use solid models to measure real objects.

HIGH SCHOOL • HSG-MG.A

CCSS.Math.Content.HSG-MG.A "Apply geometric concepts in modeling situations"

NAME _____

DATE _____

CHOOSE THE SOLID

Match the object to a geometric solid, then use its volume formula. For a prism, use $V=Bh$. For a cylinder, use $V=\pi r^2 h$, and for a pyramid or cone, use $V=\frac{1}{3}Bh$. State volume in cubic units and keep π exact unless told otherwise.

WORKED EXAMPLE

A storage crate is modeled by a rectangular prism that is 11 inches long, 5 inches wide, and 2 inches high. Find its volume.

1. Use the prism formula: $V=lwh$.
2. Substitute: $V=11 \times 5 \times 2$.
3. Multiply: $V=110$.

Answer: 110 cubic inches

PRACTICE 6 problems

- 1** A sneaker display box is modeled by a rectangular prism that is 8 inches long, 6 inches wide, and 1 inch deep. Find its volume.

ANSWER _____

- 2** A cylindrical Bluetooth speaker has a radius of 3 inches and a height of 10 inches. Find its volume.

ANSWER _____

- 3** A cube-shaped storage bin has side length 9 inches. Find its volume.

ANSWER _____

- 4** A rectangular stage riser is 12 feet long, 6 feet wide, and 1 foot high. Find its volume.

ANSWER _____

- 5** A square pyramid award has a base with side length 8 centimeters and a height of 9 centimeters. Find its volume.

ANSWER _____

- 6** A cone-shaped sports marker has a radius of 6 centimeters and a height of 10 centimeters. Find its volume.

ANSWER _____

APPLY IT Show your work

- 1** The environmental club builds a rectangular planter for a school garden. Its inside dimensions are 9 feet by 6 feet by 1 foot. Soil comes in bags that each hold $\frac{1}{3}$ cubic foot. How many bags of soil are needed to fill the planter?

WORK SPACE

ANSWER _____

- 2** A robotics team fills a solid cylindrical counterweight mold with metal. The mold has radius 3 centimeters and height 8 centimeters. The metal has a density of 6 grams per cubic centimeter. What is the mass of the counterweight?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

The inside of a reusable water bottle is modeled by a cylinder with radius 3 centimeters and height 9 centimeters, plus a hemispherical bottom with the same radius. Use $V_{\text{hemisphere}} = \frac{2}{3}\pi r^3$. Find the bottle's capacity and explain why the two volumes are added.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A sneaker display box is modeled by a rectangular prism that is 8 inches long, 6 inches wide, and 1 inch deep. Find its volume.	48 cubic inches
2	A cylindrical Bluetooth speaker has a radius of 3 inches and a height of 10 inches. Find its volume.	90π cubic inches
3	A cube-shaped storage bin has side length 9 inches. Find its volume.	729 cubic inches
4	A rectangular stage riser is 12 feet long, 6 feet wide, and 1 foot high. Find its volume.	72 cubic feet
5	A square pyramid award has a base with side length 8 centimeters and a height of 9 centimeters. Find its volume.	192 cubic centimeters
6	A cone-shaped sports marker has a radius of 6 centimeters and a height of 10 centimeters. Find its volume.	120π cubic centimeters

PART 2 • APPLY IT

- 162 bags** The planter holds $9 \times 6 \times 1 = 54$ cubic feet of soil. Divide 54 by $\frac{1}{3}$ to get 162 bags.
- 432 π grams** The mold's volume is $\pi \times 3^2 \times 8 = 72\pi$ cubic centimeters. Multiply by 6 grams per cubic centimeter to get 432 π grams.

CHALLENGE

99 π cubic centimeters. The cylinder holds 81 π cubic centimeters and the hemispherical bottom holds 18 π cubic centimeters, so their volumes are added because they are two non-overlapping parts of the bottle.

Accept equivalent exact forms that use π and include appropriate cubic units. For the challenge, accept a correct explanation that the cylinder and hemisphere are separate, non-overlapping parts of one container.