

Volume Vault

Find the space inside curved solids.

GRADE 8 • 8.GSR.8.4

8.GSR.8.4 "Apply the formulas for the volume of cones, cylinders, and spheres and use them to solve in relevant problems."

NAME _____

DATE _____

VOLUME FORMULAS

For a cylinder, $V = \pi r^2 h$. For a cone, $V = \frac{1}{3} \pi r^2 h$, and for a sphere, $V = \frac{4}{3} \pi r^3$. In each formula, r is the radius, so divide a diameter by 2 before substituting.

WORKED EXAMPLE

A cylinder has a radius of 7 cm and a height of 3 cm. Find its volume in terms of π .

1. $V = \pi r^2 h$
2. $V = \pi(7)^2(3)$
3. $V = 147\pi \text{ cm}^3$

Answer: $147\pi \text{ cm}^3$

PRACTICE 6 problems

- 1** Find the volume of a cylinder with radius 4 cm and height 6 cm. Write your answer in terms of π .

ANSWER _____

- 2** Find the volume of a cone with radius 9 cm and height 8 cm. Write your answer in terms of π .

ANSWER _____

- 3** Find the volume of a sphere with radius 5 cm. Write your answer in terms of π .

ANSWER _____

- 4** A cylinder has a diameter of 12 cm and a height of 10 cm. Find its volume in terms of π .

ANSWER _____

- 5** A cone has a diameter of 16 cm and a height of 15 cm. Find its volume in terms of π .

ANSWER _____

- 6** A sphere has a diameter of 18 cm. Find its volume in terms of π .

ANSWER _____

APPLY IT Show your work

- 1** A reusable water bottle is shaped like a cylinder with a radius of 2 cm and a height of 14 cm. What is its volume in terms of pi?

WORK SPACE

ANSWER _____

- 2** At a school game, a cone-shaped snack cup has a radius of 6 cm and a height of 11 cm. What is the cup's volume in terms of pi?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A spherical game ball with radius 6 cm fits exactly inside a cylindrical display tube with radius 6 cm and height 12 cm. How much empty space is inside the tube, in terms of pi?

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Find the volume of a cylinder with radius 4 cm and height 6 cm. Write your answer in terms of pi.	96pi cm³
2	Find the volume of a cone with radius 9 cm and height 8 cm. Write your answer in terms of pi.	216pi cm³
3	Find the volume of a sphere with radius 5 cm. Write your answer in terms of pi.	500/3 pi cm³
4	A cylinder has a diameter of 12 cm and a height of 10 cm. Find its volume in terms of pi.	360pi cm³
5	A cone has a diameter of 16 cm and a height of 15 cm. Find its volume in terms of pi.	320pi cm³
6	A sphere has a diameter of 18 cm. Find its volume in terms of pi.	972pi cm³

PART 2 • APPLY IT

1. **56pi cm³** Use $V = \pi r^2 h$. Substitute $r = 2$ and $h = 14$ to get $\pi(2)^2(14) = 56\pi$.
2. **132pi cm³** Use $V = \frac{1}{3} \pi r^2 h$. Substitute $r = 6$ and $h = 11$ to get $\frac{1}{3} \pi(6)^2(11) = 132\pi$.

CHALLENGE

144pi cm³

Accept equivalent exact forms that include pi. For problems with a diameter, students must first find the radius by dividing by 2.