LESSON MAKER PRO

Cylinder Volume Lab

Build the formula, then use it.

GRADE 7 · 7.MG.1.a

7.MG.1.a "Develop the formulas for determining the volume of right cylinders and solve problems, including those in contextual situations, using concrete objects, diagrams, and formulas."

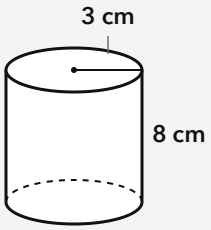
NAME _____ DATE _____

STACKING BASES

A right cylinder is made of equal circular layers. Find the area of one base, pi r^2, then multiply by the height: V = pi r^2h.

WORKED EXAMPLE

Find the volume of the cylinder shown.



1. Base area = pi$(3)^2$ = 9pi cm^2.
2. Multiply by height: V = 9pi x 8.
3. V = 72pi cm^3.

Answer: 72pi cm^3

PRACTICE 4 problems

1 1. A right cylinder has radius 2 cm and height 7 cm. Find its volume.

ANSWER _____

2 2. A right cylinder has diameter 10 in. and height 4 in. Find its volume.

ANSWER _____

3 3. A cylinder has volume 180pi cm^3 and radius 6 cm. Find its height.

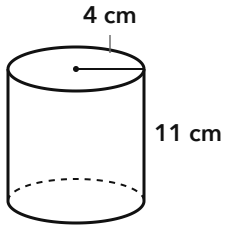
ANSWER _____

4 4. A cylinder's base area is 25pi m^2. Its height is 12 m. Find its volume.

ANSWER _____

APPLY IT Show your work

1 A refill station fills the cylinder-shaped water bottle shown. What volume of water does it hold when full?



ANSWER _____

2 A gaming club makes a cylindrical snack container with a diameter of 14 cm and a height of 15 cm. What is its volume?

WORK SPACE

ANSWER _____

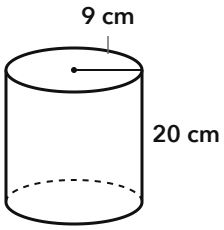
3 Develop the volume formula using a layer model. On this space or extra paper, sketch a right cylinder as a stack of equal circular layers. Label the base area B and total height h. Each 1-unit-thick layer has volume B × 1. Write the volumes for stacks 3 units and 6 units high. Use that pattern to write the volume for height h. Then substitute the circular base-area formula $B = \pi r^2$ and explain why multiplying base area by height gives cubic units.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Cylinder B has the same volume as cylinder A shown, but cylinder B has a height of 5 cm. Find the radius of cylinder B.



WORK SPACE AND ANSWER

ANSWER KEY

Cylinder Volume Lab

GRADE 7 · 7.MG.1.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	1. A right cylinder has radius 2 cm and height 7 cm. Find its volume.	**28pi cm^3**
2	2. A right cylinder has diameter 10 in. and height 4 in. Find its volume.	**100pi in.^{3}**
3	3. A cylinder has volume 180pi cm^3 and radius 6 cm. Find its height.	**5 cm**
4	4. A cylinder's base area is 25pi m^2. Its height is 12 m. Find its volume.	**300pi m^3**

PART 2 · APPLY IT

1. **176pi cm^3** Use V = pi r^{2}h. Compute pi(4)^2(11) = 176pi.
2. **735pi cm^3** The radius is 7 cm. Compute V = pi(7)^2(15) = 735pi.
3. **3B; 6B; V = Bh = πr^{2}h. Base area times height gives cubic units.** Check the actual learner layer sketch and labels B and h, not only a copied formula. Three unit-thick layers give B + B + B = 3B; six give 6B. Generalizing the constant cross-section gives V = Bh. Substitute B = πr^2 to get V = πr^{2}h. Square units × linear units = cubic units.

CHALLENGE

18 cm

Accept equivalent forms with pi, such as 28 × pi. For the challenge, cylinder A has volume 1,620pi cm^3, so pi r^2(5) = 1,620pi and r = 18 cm. For Apply 3, require the layer sketch, both layer totals, general equation and base-area substitution with a unit explanation. Accept equivalent wording and reasonable schematic sketches.