LESSON MAKER PRO

Cylinder Space

Find the space inside right cylinders.

GRADE 8 · PA.GM.2.4

PA.GM.2.4 "Develop and use the formulas V=πr²h and V=Bh to determine the volume of right cylinders, in terms of π and using approximations for pi (π). Justify why base area (B) and height (h) are multiplied to find the volume of a right cylinder..."

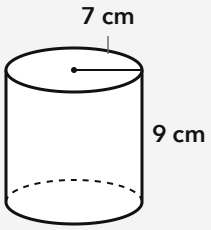
NAME _____ DATE _____

THE BIG IDEA

Every 1-unit-high layer of a right cylinder has the same area as its circular base. Multiply the base area B by the height h to find the volume: $V = Bh$. Since $B = \pi r^2$, you can also use $V = \pi r^2 h$.

WORKED EXAMPLE

Find the exact volume of the cylinder shown.

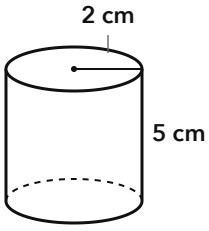


1. Find the base area: $B = \pi \times 7^2 = 49\pi$ cm^2.
2. Multiply by the height: $V = 49\pi \times 9$.
3. $V = 441\pi$ cm^3.

Answer: 441π cm^3

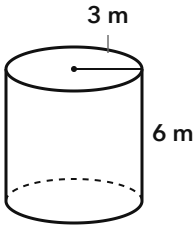
PRACTICE 6 problems

1 Find the exact volume of the cylinder shown.



ANSWER _____

2 Find the exact volume of the cylinder shown.

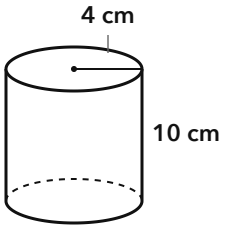


ANSWER _____

3 A right cylinder has a base area of 12 cm^2 and a height of 5 cm. Find its volume.

ANSWER _____

4 Use 3.14 for π to find the volume of the cylinder shown.



ANSWER _____

5 A right cylinder has a radius of 6 m and a height of 2 m. Find its exact volume.

ANSWER _____

6 The circular base of a right cylinder has an area of 18π cm^2. Its height is 5 cm. Find its exact volume.

ANSWER _____

APPLY IT Show your work

1 A reusable water bottle has a cylindrical interior with a radius of 3 cm and a height of 10 cm. About how much water can it hold? Use 3.14 for π.

WORK SPACE

ANSWER _____

2 A student stores game pieces in a cylindrical container. Its circular base has an area of 40π cm^2, and its height is 8 cm. What is the container's exact volume?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A cylinder has a diameter of 10 cm and a height of 6 cm. Find its exact volume and its volume using 3.14 for π. Then explain in two sentences why multiplying base area by height finds the volume.

WORK SPACE AND ANSWER

Cylinder Space

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the exact volume of the cylinder shown.	**20π cm^3**
2	Find the exact volume of the cylinder shown.	**54π m^3**
3	A right cylinder has a base area of 12 cm^2 and a height of 5 cm. Find its volume.	**60 cm^3**
4	Use 3.14 for π to find the volume of the cylinder shown.	**502.4 cm^3**
5	A right cylinder has a radius of 6 m and a height of 2 m. Find its exact volume.	**72π m^3**
6	The circular base of a right cylinder has an area of 18π cm^2. Its height is 5 cm. Find its exact volume.	**90π cm^3**

PART 2 · APPLY IT

1. **282.6 cm^3** Use $V = \pi r^2 h$. With $\pi = 3.14$, the volume is $3.14 \times 3^2 \times 10 = 282.6$ cm^3.
2. **320π cm^3** Multiply the base area by the height: $V = 40\pi \times 8 = 320\pi$ cm^3.

CHALLENGE

Exact: 150π cm^3. Using 3.14: 471 cm^3. Each 1 cm layer has the same area as the circular base, 25π cm^2. Six equal layers fill the 6 cm height, so multiplying the base area by the height gives the volume.

For exact answers, accept equivalent expressions containing π. In the challenge, accept any two-sentence explanation that connects equal-area layers to multiplying base area by height.