LESSON MAKER PRO

Volume Vault

Use solid-volume formulas to solve exact-volume problems.

HIGH SCHOOL · HSG-GMD.A.3

CCSS.Math.Content.HSG-GMD.A.3 "Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. *"

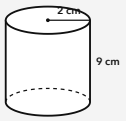
NAME _____ DATE _____

VOLUME FORMULA TOOLKIT

For a cylinder, use $V = \pi r^2 h$. For a cone or pyramid, use $V = 1/3Bh$, and for a sphere, use $V = 4/3\pi r^3$; use the radius, not the diameter.

WORKED EXAMPLE

Find the volume of the cylinder shown. Leave your answer in terms of π.

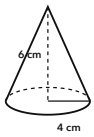


1. Use $V = \pi r^2 h$.
2. Substitute: $V = \pi(2)^2(9)$.
3. Simplify: $V = 36\pi$ cm^3.
4.

Answer: 36π cm^3

PRACTICE 6 problems

1 Find the volume of the cone shown. Leave your answer in terms of π.

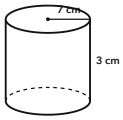


ANSWER _____

2 A sphere has a radius of 5 cm. Find its volume in terms of π.

ANSWER _____

3 Find the volume of the cylinder shown. Leave your answer in terms of π.



ANSWER _____

4 A square pyramid has a base side length of 6 cm and a perpendicular height of 10 cm. Find its volume.

ANSWER _____

5 A cone has a diameter of 12 cm and a height of 7 cm. Find its volume in terms of π.

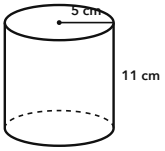
ANSWER _____

6 A sphere has a diameter of 8 cm. Find its volume in terms of π.

ANSWER _____

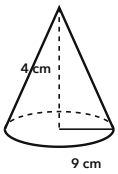
APPLY IT Show your work

1 A student wants to know the maximum amount of drink a pictured cylindrical shaker bottle can hold. Find its volume in terms of π.



ANSWER _____

2 A student is 3-D printing a solid cone-shaped headphone stand. Find the amount of material in the stand, in terms of π.



ANSWER _____

CHALLENGE One step up

A cone has a radius of 3 cm and a height of 12 cm. A sphere has a radius of 3 cm. Do the solids have the same volume? Show formula substitution to explain.

WORK SPACE AND ANSWER

ANSWER KEY

Volume Vault

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the volume of the cone shown. Leave your answer in terms of π.	**32π cm^3**
2	A sphere has a radius of 5 cm. Find its volume in terms of π.	**500/3π cm^3**
3	Find the volume of the cylinder shown. Leave your answer in terms of π.	**147π cm^3**
4	A square pyramid has a base side length of 6 cm and a perpendicular height of 10 cm. Find its volume.	**120 cm^3**
5	A cone has a diameter of 12 cm and a height of 7 cm. Find its volume in terms of π.	**84π cm^3**
6	A sphere has a diameter of 8 cm. Find its volume in terms of π.	**256/3π cm^3**

PART 2 · APPLY IT

1. **275π cm^3** Use $V = \pi r^2 h$. Substitute r = 5 and h = 11 to get $\pi(25)(11) = 275\pi$ cm^3.
2. **108π cm^3** Use $V = 1/3\pi r^2 h$. Substitute r = 9 and h = 4 to get $1/3\pi(81)(4) = 108\pi$ cm^3.

CHALLENGE

Yes. Cone: $V = 1/3\pi(3)^2(12) = 36\pi$ cm^3. Sphere: $V = 4/3\pi(3)^3 = 36\pi$ cm^3.

Accept equivalent exact forms, such as (500π)/3 for 500/3π. Require cubic units and π for answers that are requested in terms of π.