LESSON MAKER PRO

Solid Volume Lab

Find the space inside cones and square-based pyramids.

GRADE 8 · 8.MG.2.b

8.MG.2.b "Determine the volume of cones and square-based pyramids, using concrete objects, diagrams, and formulas."

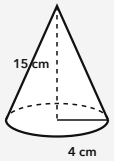
NAME _____ DATE _____

VOLUME RULES

For a cone, volume = (1/3) × π × radius^2 × height. For a square-based pyramid, volume = (1/3) × base side^2 × height. Use the perpendicular height, not a slanted edge.

WORKED EXAMPLE

Find the volume of the cone shown.

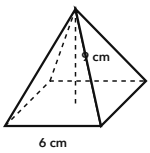


1. Volume = (1/3) × π × radius^2 × height.
2. Volume = (1/3) × π × 4^2 × 15.
3. Volume = 80π cm^3.
4.

Answer: 80π cm^3

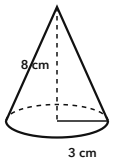
PRACTICE 6 problems

1 Find the volume of the square-based pyramid shown.



ANSWER _____

2 Find the volume of the cone shown.



ANSWER _____

3 A square-based pyramid has a base side length of 10 cm and a perpendicular height of 12 cm. Find its volume.

ANSWER _____

4 A cone has a diameter of 14 cm and a perpendicular height of 6 cm. Find its volume.

ANSWER _____

5 A square-based pyramid has a volume of 196 cm^3 and a base side length of 7 cm. Find its perpendicular height.

ANSWER _____

6 A cone has a volume of 100π cm^3 and a radius of 5 cm. Find its perpendicular height.

ANSWER _____

APPLY IT Show your work

1 A game design club makes a cone-shaped trophy that can be filled with colored sand. The trophy has a radius of 9 cm and a perpendicular height of 10 cm. How much sand can it hold?

WORK SPACE

ANSWER _____

2 For a school art show, students build a square-based pyramid display. Its base side length is 12 cm, and its perpendicular height is 18 cm. What is the volume of the display?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A cone has a radius of 6 cm and a perpendicular height of 9 cm. A square-based pyramid has a base side length of 18 cm and a perpendicular height of 3 cm. Which solid has the greater volume? How much greater is it? Use $\pi \approx 3.14$ when comparing.

WORK SPACE AND ANSWER

ANSWER KEY

Solid Volume Lab

GRADE 8 · 8.MG.2.b

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the volume of the square-based pyramid shown.	**108 cm^3**
2	Find the volume of the cone shown.	**24π cm^3**
3	A square-based pyramid has a base side length of 10 cm and a perpendicular height of 12 cm. Find its volume.	**400 cm^3**
4	A cone has a diameter of 14 cm and a perpendicular height of 6 cm. Find its volume.	**98π cm^3**
5	A square-based pyramid has a volume of 196 cm^3 and a base side length of 7 cm. Find its perpendicular height.	**12 cm**
6	A cone has a volume of 100π cm^3 and a radius of 5 cm. Find its perpendicular height.	**12 cm**

PART 2 · APPLY IT

1. **270π cm^3** Use (1/3) × π × 9^2 × 10. The product simplifies to 270π cm^3.
2. **864 cm^3** Use (1/3) × 12^2 × 18. Divide 18 by 3, then multiply 144 by 6.

CHALLENGE

The cone has the greater volume. It is greater by 108π - 324 cm^3, which is about 15.12 cm^3.

Accept equivalent simplified exact forms with π for cone volumes. For the challenge, accept the exact difference 108π - 324 cm^3 and an approximation of 15.12 cm^3 when π = 3.14 is used.