LESSON MAKER PRO

Solid Shape Sprint

Find volume and surface area of 3D shapes.

GRADE 8 · 8.MG.2.d

8.MG.2.d "Solve problems in context involving volume of cones and square-based pyramids and the surface area of square-based pyramids."

NAME _____ DATE _____

VOLUME AND SURFACE AREA

For a cone, V = 1/3 pi r^2 h. For a square-based pyramid, V = 1/3 s^2 h and SA = s^2 + 2sl. Use vertical height h for volume and slant height l for the triangular faces in surface area.

WORKED EXAMPLE

Find the volume of a cone with radius 4 cm and vertical height 15 cm.

1. V = 1/3 pi r^2 h
2. V = 1/3 pi(4^2)(15)
3. V = 1/3 pi(16)(15) = 80pi

Answer: 80pi cm^3

PRACTICE 6 problems

1 Find the volume of a cone with radius 3 cm and vertical height 8 cm. Leave your answer in terms of pi.

ANSWER _____

2 Find the volume of a cone with radius 6 cm and vertical height 5 cm. Leave your answer in terms of pi.

ANSWER _____

3 Find the volume of a square-based pyramid with base side length 7 cm and vertical height 9 cm.

ANSWER _____

4 Find the total surface area of a square-based pyramid with base side length 10 cm and slant height 13 cm.

ANSWER _____

5 Find the volume of a square-based pyramid with base side length 12 cm and vertical height 11 cm.

ANSWER _____

6 Find the total surface area of a square-based pyramid with base side length 5 cm and slant height 7 cm.

ANSWER _____

APPLY IT Show your work

1 A student in the maker club is building a solid cone-shaped rocket nose from foam. The nose has a radius of 9 cm and a vertical height of 10 cm. What is its volume? Leave your answer in terms of pi.

WORK SPACE

ANSWER _____

2 The art club is making a square-pyramid trophy cover from cardboard. Its base side length is 14 cm, and the slant height of each triangular face is 8 cm. How much cardboard is needed to cover all five faces, including the base?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A right square-based pyramid has a volume of 384 cm^3 and a vertical height of 8 cm. Its slant height is 10 cm. Find the base side length, then find the total surface area.

_____

_____

ANSWER KEY

Solid Shape Sprint

GRADE 8 · 8.MG.2.d

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the volume of a cone with radius 3 cm and vertical height 8 cm. Leave your answer in terms of pi.	**24pi cm^3**
2	Find the volume of a cone with radius 6 cm and vertical height 5 cm. Leave your answer in terms of pi.	**60pi cm^3**
3	Find the volume of a square-based pyramid with base side length 7 cm and vertical height 9 cm.	**147 cm^3**
4	Find the total surface area of a square-based pyramid with base side length 10 cm and slant height 13 cm.	**360 cm^2**
5	Find the volume of a square-based pyramid with base side length 12 cm and vertical height 11 cm.	**528 cm^3**
6	Find the total surface area of a square-based pyramid with base side length 5 cm and slant height 7 cm.	**95 cm^2**

PART 2 · APPLY IT

1. **270pi cm^3** Use V = 1/3 pi r^2 h. Substitute 9 for r and 10 for h: 1/3 pi(9^2)(10) = 270pi cm^3.
2. **420 cm^2** Use SA = s^2 + 2sl. The base area is 14^2 = 196 cm^2, and the four triangular faces have area 2(14)(8) = 224 cm^2.

CHALLENGE

Base side length: 12 cm; total surface area: 384 cm^2

Accept equivalent exact forms that keep pi, such as pi times 24. Surface-area answers must include the square base as well as all four triangular faces.