LESSON MAKER PRO

Cone Volume Connection

Compare matching cylinders and cones.

GRADE 8 · TEKS 8.6.B

8.6.B "model the relationship between the volume of a cylinder and a cone having both congruent bases and heights and connect that relationship to the formulas; and"

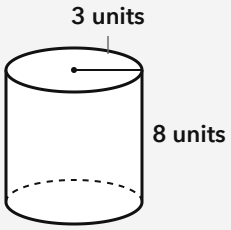
NAME _____ DATE _____

ONE-THIRD RULE

When a cylinder and cone have congruent bases and the same height, the cone holds one-third as much volume as the cylinder. Find the cylinder volume with base area times height, then divide by 3 for the cone.

WORKED EXAMPLE

The shown cylinder has radius 3 units and height 8 units. A cone has the same base and height. Find both volumes.



1. Cylinder volume = pi$(3)^2(8)$.
2. Cylinder volume = 72pi cubic units.
3. Cone volume = 72pi / 3 = 24pi cubic units.

Answer: Cylinder: 72pi cubic units; cone: 24pi cubic units

PRACTICE 4 problems

1 A cylinder has volume 150pi cm^3. A cone has a congruent base and the same height. Find the cone's volume.

ANSWER _____

2 A cone has volume 18pi in^3. A cylinder has a congruent base and the same height. Find the cylinder's volume.

ANSWER _____

3 A cone has radius 2 m and height 12 m. Find its volume.

ANSWER _____

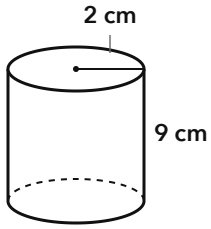
4 A cylinder and cone have radius 4 ft and height 6 ft. Find both volumes.

ANSWER _____

_____

APPLY IT Show your work

1 A 3-D printing club makes a cone with the same base and height as the shown storage cylinder: radius 2 cm and height 9 cm. How much plastic does the cone use?



ANSWER _____

2 A game booth fills a cone-shaped prize container with radius 3 in and height 15 in. A matching cylinder has the same base and height. How much more does the cylinder hold?

WORK SPACE

ANSWER _____

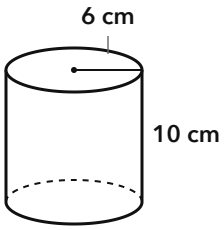
3 Actually model the relationship. Your teacher supplies an open cone and cylinder with the same internal base radius and height, plus dry rice and a tray. Fill the cone level with rice, pour it into the cylinder and repeat until the cylinder is full. Record the number of cone fills. On separate paper, sketch both containers, label their common base area B and height h, and use your model to explain why V(cylinder) = Bh and V(cone) = Bh/3.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The shown cylinder, radius 6 cm and height 10 cm, is full of sand. It is poured into empty cones with congruent bases and the same height. How many full cones can be filled? Explain briefly.



WORK SPACE AND ANSWER

ANSWER KEY # Cone Volume Connection

GRADE 8 · TEKS 8.6.B

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A cylinder has volume 150pi cm^3. A cone has a congruent base and the same height. Find the cone's volume.	**50pi cm^3**
2	A cone has volume 18pi in^3. A cylinder has a congruent base and the same height. Find the cylinder's volume.	**54pi in^3**
3	A cone has radius 2 m and height 12 m. Find its volume.	**16pi m^3**
4	A cylinder and cone have radius 4 ft and height 6 ft. Find both volumes.	**Cylinder: 96pi ft^3; cone: 32pi ft^3**

PART 2 · APPLY IT

1. **12pi cm^3** The matching cylinder has volume pi$(2)^2(9)$ = 36pi cm^3. Divide by 3 to get 12pi cm^3.
2. **90pi in^3** The cone holds 45pi in^3, and the matching cylinder holds 135pi in^3. Subtract to get 90pi in^3.
3. **About 3 cone fills; V(cylinder) = Bh and V(cone) = Bh/3.** Before learners begin, verify that the containers have equal internal base radii and heights. Support actual level fills and pours over a tray. Accept a recorded count near 3 with a reasonable note about spills, packing or fill level, a labeled sketch and the one-third formula connection. The exact geometric relationship is one-third; do not require a fabricated exact experimental result.

CHALLENGE

3 cones; each matching cone has one-third of the cylinder's volume.

Accept exact answers with pi or correct decimal approximations when units are included. For the challenge, accept any correct explanation that a matching cylinder has three times the cone's volume.