

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 _____

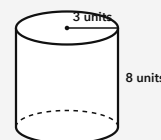
DATE _____

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 cylinder shown has the same base and height as a cone. Find both volumes.



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

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

PRACTICE 4 problems

- 1** A cylinder has volume $150\pi \text{ cm}^3$. A cone has a congruent base and the same height. Find the cone's volume.

ANSWER _____

- 2** A cone has volume $18\pi \text{ in}^3$. 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.

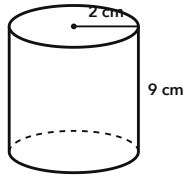
ANSWER _____

- 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 storage cylinder shown. How much plastic does the cone use?



ANSWER _____

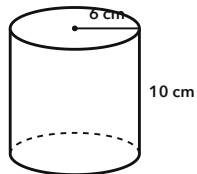
- 2** A game booth fills a cone-shaped prize container with radius 3 in and height 15 in. A matching cylinder has the same base and height. How much more does the cylinder hold?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The cylinder shown 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

PART 1 • PRACTICE

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

PART 2 • APPLY IT

- $12\pi \text{ cm}^3$** The matching cylinder has volume $\pi(2)^2(9) = 36\pi \text{ cm}^3$. Divide by 3 to get $12\pi \text{ cm}^3$.
- $90\pi \text{ in}^3$** The cone holds $45\pi \text{ in}^3$, and the matching cylinder holds $135\pi \text{ in}^3$. Subtract to get $90\pi \text{ in}^3$.

CHALLENGE

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

Accept exact answers with π 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.