

Volume of Cylinders, Cones and Spheres: math practice, Grade 8 – download the PDF

23 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 A cylinder

★ ★ ★

A cylinder has radius **4 cm** and height **10 cm**. Find its volume, first in terms of π , then to the nearest tenth using $\pi \approx 3.14$.

2 A cone

★ ★ ★

A cone has radius **3 cm** and height **7 cm**. Find its volume in terms of π and to the nearest hundredth with $\pi \approx 3.14$.

3 A sphere

★ ★ ★

A sphere has radius **3 in**. Find its volume in terms of π and approximately with $\pi \approx 3.14$.

4 Diameter given

★ ★ ★

A cylindrical pipe section has diameter **10 m** and length **2 m** (the length is the height of the cylinder). Find its volume with $\pi \approx 3.14$.

5 True or false?



Decide whether each statement is true or false and justify.

- a. If you double the height of a cylinder and keep the radius, the volume doubles.
- b. If you double the radius of a cylinder and keep the height, the volume doubles.

6 Cone and cylinder



A cylinder and a cone both have radius **6 cm** and height **9 cm**. Find the volume of each in terms of π . How many times larger is the cylinder?

7 A soup can



A soup can has radius **4 cm** and height **11 cm**. How many milliliters of soup can it hold? Use $\pi \approx 3.14$ and round to the nearest tenth.

8 Finding the height



A cylinder has radius **5 ft** and volume **$300\pi \text{ ft}^3$** . Find its height.

9 Finding the radius of a cone



A cone has height **9 cm** and volume **$75\pi \text{ cm}^3$** . Find its radius.

10 Finding the radius of a sphere



A sphere has volume **$972\pi \text{ cm}^3$** . Find its radius and its diameter.

11 Ice cream cone

An ice cream cone has radius **3 cm** and height **10 cm**. A scoop shaped like a hemisphere with the same radius sits on top of the opening. Find the total volume of cone plus scoop in terms of π and approximately with $\pi \approx 3.14$.

12 A water tank

A cylindrical water tank has radius **1.5 m** and height **4 m**. Find its volume in cubic meters, then in liters ($1 \text{ m}^3 = 1,000 \text{ L}$). Use $\pi \approx 3.14$.

13 A pile of sand

A pile of sand forms a cone with base diameter **6 ft** and height **4 ft**. What is its volume to the nearest tenth of a cubic foot? Use $\pi \approx 3.14$.

14 A ball

A ball has diameter **24 cm**. Find its volume in terms of π and to the nearest whole cubic centimeter with $\pi \approx 3.14$.

15 Same volume, same radius

A cylinder and a cone have the same radius, **6 cm**, and the same volume. The cylinder has height **5 cm**. What is the height of the cone?

16 A capsule

★★★

A medicine capsule is a cylinder with radius **2 cm** and height **6 cm**, with a hemisphere of radius **2 cm** attached at each end. Find the total volume in terms of π and to the nearest tenth with $\pi \approx 3.14$.

17 A cone removed from a cylinder

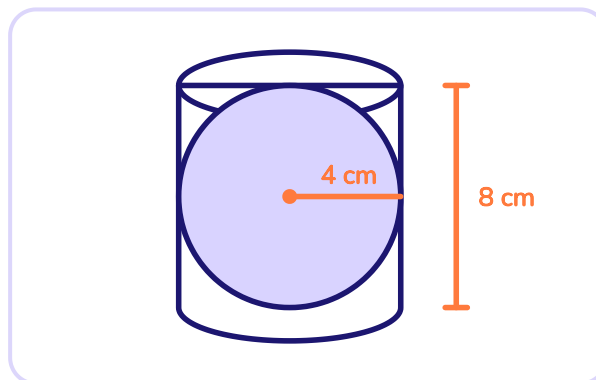
★★★

A solid metal cylinder has radius **5 cm** and height **8 cm**. A cone-shaped hole with the same base and the same height is drilled out. Find the volume of the metal that remains in terms of π and to the nearest tenth with $\pi \approx 3.14$.

18 A sphere in a cylinder

★★★

A sphere of radius **4 cm** fits exactly inside a cylinder of radius **4 cm** and height **8 cm** (see the figure).



- Find the volume of the cylinder and the volume of the sphere.
- What fraction of the cylinder is filled by the sphere?
- Find the volume of empty space, to the nearest tenth with $\pi \approx 3.14$.

19 Filling a tank

A cylindrical tank has radius **3 ft** and height **5 ft**. Water flows in at a rate of **10 ft³** per hour. How long does it take to fill the empty tank? Use $\pi \approx 3.14$ and round to the nearest tenth of an hour.

20 Melting a sphere

A solid metal sphere of radius **3 cm** is melted and recast into a solid cylinder of radius **1.5 cm**. How tall is the cylinder?

21 Water displacement

A cylindrical jar with radius **5 cm** contains water. A marble-like solid sphere of radius **3 cm** is dropped in and sinks completely. By how many centimeters does the water level rise?

22 Find the error

A cone has diameter **10 in** and height **6 in**. A student writes

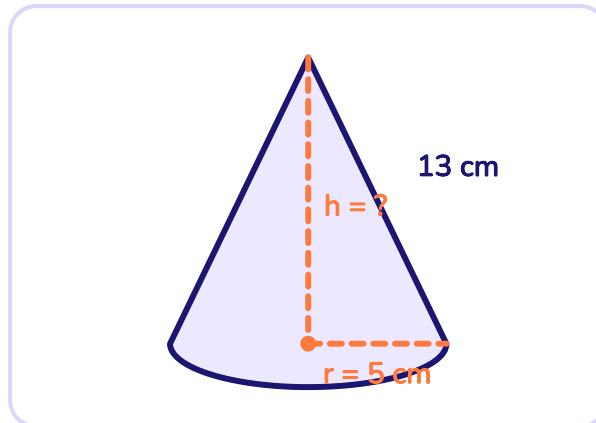
$V = \frac{1}{3}\pi \times 10^2 \times 6 = 200\pi \text{ in}^3$. Explain the mistake and give the correct volume.

23

Using the slant height

★★★

A cone has radius **5 cm** and slant height **13 cm** (the slanted side). The height is not given.



- Use the Pythagorean theorem to find the height.
- Find the volume to the nearest tenth with $\pi \approx 3.14$.

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