

Round Solids: Cylinder, Cone, Sphere Volume

Grade 8 math · Worksheet Answer Key · Standards: 8.G.C.9

Each solution shows the formula, the substitution, and the unit of the final answer. Compare the radius you used with the key first, since a radius or diameter slip is the most common source of a wrong volume.

Standards: 8.G.C.9 · **Level:** Grade 8

Problem 1 Cylinder in terms of pi

$$V = \pi r^2 h = \pi \cdot 4^2 \cdot 10 = \pi \cdot 16 \cdot 10.$$

$$\mathbf{160\pi \text{ cm}^3}$$

Problem 2 Diameter given

The radius is $12 \div 2 = 6$ in.

$$V = \pi \cdot 6^2 \cdot 5 = \pi \cdot 36 \cdot 5.$$

$$\mathbf{180\pi \text{ in}^3}$$

Problem 3 First cone

$$V = (1/3)\pi \cdot 3^2 \cdot 7 = (1/3)\pi \cdot 63.$$

$$\mathbf{21\pi \text{ in}^3}$$

Problem 4 Wider cone

$$V = (1/3)\pi \cdot 6^2 \cdot 9 = (1/3)\pi \cdot 324.$$

$$\mathbf{108\pi \text{ cm}^3}$$

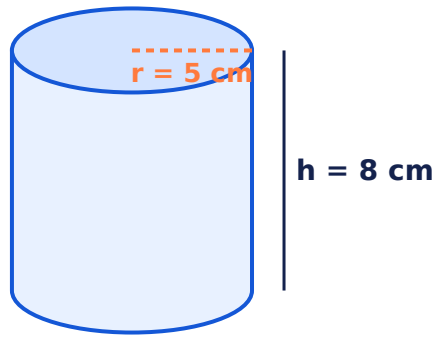
Problem 5 First sphere

$$V = (4/3)\pi \cdot 3^3 = (4/3)\pi \cdot 27.$$

$$\mathbf{36\pi \text{ ft}^3}$$

Problem 6 Cylinder with 3.14

$$V = 3.14 \cdot 5^2 \cdot 8 = 3.14 \cdot 200.$$



$$V = 628 \text{ cm}^3$$

Volume 628 cm³.

628 cm³

Problem 7 Big sphere

$$\text{The radius is 9 cm. } V = (4/3)\pi \cdot 9^3 = (4/3)\pi \cdot 729 = 4\pi \cdot 243.$$

972π cm³

Problem 8 Cone with 3.14

$$V = (1/3) \cdot 3.14 \cdot 5^2 \cdot 12 = 3.14 \cdot 100.$$

314 in³

Problem 9 Sphere with 3.14

$$V = (4/3) \cdot 3.14 \cdot 6^3 = (4/3) \cdot 3.14 \cdot 216 = 288 \cdot 3.14.$$

904.32 in³

Problem 10 Find the height of a cylinder

$$225\pi = \pi \cdot 5^2 \cdot h = 25\pi h.$$

$$h = 225 \div 25.$$

9 cm

Problem 11 Find the height of a cone

$$96\pi = (1/3)\pi \cdot 6^2 \cdot h = 12\pi h.$$

$$h = 96 \div 12.$$

8 cm

Problem 12 Cone versus cylinder

The cone holds one third of the cylinder, so the cylinder holds 3 times as much.

$$3 \cdot 40\pi = 120\pi.$$

$120\pi \text{ in}^3$

Problem 13 Find the radius

$$(4/3)\pi r^3 = (32/3)\pi, \text{ so } 4r^3 = 32 \text{ and } r^3 = 8.$$

$$r = \sqrt[3]{8} = 2.$$

2 in.

Problem 14 Hemisphere bowl

$$V = (1/2)(4/3)\pi \cdot 5^3 = (2/3)\pi \cdot 125 = (250/3)\pi.$$

$$(250/3)\pi \approx 261.8.$$

$(250/3)\pi \text{ in}^3 \approx 261.8 \text{ in}^3$

Problem 15 Water tank

The radius is 4 ft. $V = 3.14 \cdot 4^2 \cdot 10 = 3.14 \cdot 160.$

$$3.14 \cdot 160 = 502.4.$$

The tank holds **502.4 ft^3** .

Problem 16 Ice cream cone

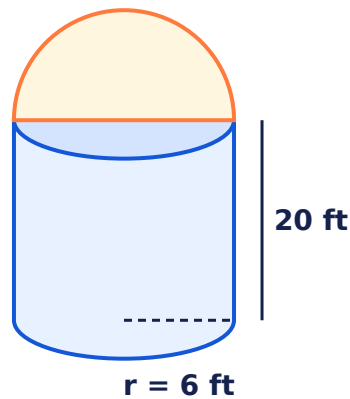
Cone: $(1/3)\pi \cdot 3^2 \cdot 10 = 30\pi$. Hemisphere: $(2/3)\pi \cdot 3^3 = 18\pi$.

Total: $30\pi + 18\pi = 48\pi$. With 3.14: $48 \cdot 3.14 = 150.72$.

$48\pi \text{ cm}^3 \approx 150.72 \text{ cm}^3$

Problem 17 Grain silo

Cylinder: $\pi \cdot 6^2 \cdot 20 = 720\pi$. Hemisphere: $(2/3)\pi \cdot 6^3 = 144\pi$.



Cylinder $720\pi \text{ ft}^3$ + hemisphere $144\pi \text{ ft}^3 = 864\pi \text{ ft}^3$.

Total: 864π . With 3.14: $864 \cdot 3.14 = 2,712.96$.

$864\pi \text{ ft}^3 \approx 2,712.96 \text{ ft}^3$

Problem 18 Ball in a tube

Tube: $\pi \cdot 3^2 \cdot 6 = 54\pi$. Ball: $(4/3)\pi \cdot 27 = 36\pi$.

Empty space: $54\pi - 36\pi = 18\pi$, and $18 \cdot 3.14 = 56.52$.

$18\pi \text{ in}^3 \approx 56.52 \text{ in}^3$

Problem 19 Sand pile

The radius is 6 ft. $V = (1/3) \cdot 3.14 \cdot 6^2 \cdot 5 = 3.14 \cdot 60 = 188.4 \text{ ft}^3$.

$188.4 \div 40 = 4.71$, so 5 loads are needed, since the last load is partly full.

188.4 ft^3 ; 5 loads

Problem 20 Pouring water

Cone volume: $(1/3)\pi \cdot 6^2 \cdot 9 = 108\pi \text{ cm}^3$.

Cylinder: $\pi \cdot 4^2 \cdot h = 16\pi h = 108\pi$, so $h = 108 \div 16 = 6.75$.

6.75 cm