

VOLUME OF A CYLINDER

Mastery Worksheet & Applied Problems

I DO

A solid cylinder has a radius of 4.5 cm and a height of 10 cm.

Calculate the volume of the cylinder.

Give your answer correct to 3 significant figures.

WE DO

A solid cylinder has a radius of 3.2 cm and a height of 8.5 cm.

Calculate the volume of the cylinder.

Give your answer correct to 1 decimal place.

YOU DO 1

A solid cylinder has a radius of 6 cm and a height of 12 cm.

Calculate the volume of the cylinder.

Give your answer in terms of π .

YOU DO 2

A solid cylinder has a diameter of 15 cm and a height of 20 cm.

Calculate the volume of the cylinder.

Give your answer correct to 3 significant figures.

CHALLENGE 1 (DENSITY & MASS)

A solid metal cylinder has a radius of 5 cm and a height of 14 cm.

The cylinder is made from a material with a density of 8.2 g/cm^3 .

Calculate the mass of the cylinder in kilograms.

Give your answer correct to 3 significant figures.

CHALLENGE 2 (COMPOUND SHAPE)

A solid shape is made from a hemisphere placed on top of a cylinder.

Both the hemisphere and the cylinder have a radius of 4 cm.

The total height of the solid shape is 16 cm.

Calculate the total volume of the shape.

Give your answer correct to the nearest whole number.

(Volume of a sphere = $\frac{4}{3}\pi r^3$)

ANSWERS & WORKED SOLUTIONS

I Do

Step 1: Volume = $\pi \times r^2 \times h$

Step 2: Volume = $\pi \times 4.5^2 \times 10$

Step 3: Volume = $202.5\pi = 636.172\dots$

Answer: 636 cm³

We Do

Step 1: Volume = $\pi \times r^2 \times h$

Step 2: Volume = $\pi \times 3.2^2 \times 8.5$

Step 3: Volume = $87.04\pi = 273.444\dots$

Answer: 273.4 cm³

You Do 1

Step 1: Volume = $\pi \times r^2 \times h$

Step 2: Volume = $\pi \times 6^2 \times 12$

Step 3: Volume = $\pi \times 36 \times 12$

Answer: 432 π cm³

You Do 2

Step 1: Radius = $15 \div 2 = 7.5$ cm.

Step 2: Volume = $\pi \times 7.5^2 \times 20$

Step 3: Volume = $1125\pi = 3534.29\dots$

Answer: 3530 cm³

Challenge 1

Step 1: Volume = $\pi \times 5^2 \times 14 = 350\pi = 1099.557\dots$ cm³.

Step 2: Mass = Density $\times$ Volume = $8.2 \times 1099.557\dots = 9016.37\dots$ g.

Step 3: Convert to kg: $9016.37\dots \div 1000 = 9.01637\dots$ kg.

Answer: 9.02 kg

Challenge 2

Step 1: Height of cylinder = Total height – radius of hemisphere = $16 - 4 = 12$ cm.

Step 2: Volume of cylinder = $\pi \times 4^2 \times 12 = 192\pi = 603.18\dots$ cm³.

Step 3: Volume of hemisphere = $\frac{1}{2} \times \frac{4}{3} \times \pi \times 4^3 = \frac{2}{3} \times 64\pi = 134.04\dots$ cm³.

Step 4: Total Volume = $192\pi + 42.66\dots\pi = 234.66\dots\pi = 737.22\dots$

Answer: 737 cm³