GCSE Maths: Volume of cylinders, and density (Higher): answers

GCSE Maths - Volume, Surface Area and 3D Shapes - Higher - Lesson 19.6

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at **websink.site/gcse/maths/ch19-volume-surface-area-3d/higher/volume-of-cylinders-and-density/**

Exercise 19F Cylinders and density: exact answers (non-calculator)

Non-calculator

1 Work out the volume of each cylinder. Give your answers in terms of π.

(a) radius 3 cm, height 10 cm

Answer: 90π cm^3

(b) radius 5 cm, height 4 cm

Answer: 100π cm^3

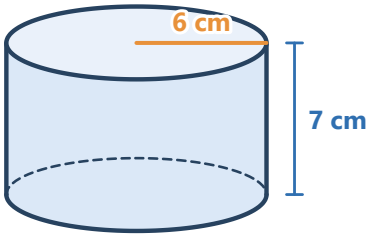
(c) diameter 8 cm, height 5 cm

Answer: 80π cm^3

(d) radius 1.5 cm, height 8 cm

Answer: 18π cm^3

2 The diagram shows a cylinder. Work out its volume. Leave your answer in terms of π.



Answer: 252π cm^3

3 Work out the height of each cylinder.

(a) Radius 5 cm, volume 150π cm^3

Answer: 6 cm

(b) Radius 6 cm, volume 252π cm^3

Answer: 7 cm

(c) Radius 4 cm, volume 96π cm^3

Answer: 6 cm

4 A tin of tomatoes is a cylinder with radius 3.5 cm and height 10 cm. Use $\pi = 22 \div 7$ to work out the volume of the tin.

Answer: 385 cm^3

5 **Cylinder A has radius 2 cm and height 9 cm. Cylinder B has radius 3 cm and height 4 cm. Show that the two cylinders have the same volume.**

> **Answer:** Both are 36π cm^3

6 **A prism has a semicircle as its cross-section. The semicircle has radius 6 cm. The prism is 10 cm long. Work out the volume, in terms of π.**

> **Answer:** 180π cm^3

7 **Work out each missing value.**

(a) A block has mass 450 g and volume 50 cm^3. Find the density.

> **Answer:** 9 g/cm^3

(b) Aluminium has density 2.7 g/cm^3. Find the mass of 200 cm^3.

> **Answer:** 540 g

(c) A metal has density 8 g/cm^3. A piece has mass 600 g. Find its volume.

> **Answer:** 75 cm^3

8 **A block of wood is a cuboid 10 cm by 5 cm by 4 cm. Its mass is 160 g. Work out the density of the wood.**

> **Answer:** 0.8 g/cm^3

9 **The density of a type of oak is 750 kg/m^3. A plank has volume 0.04 m^3. Work out the mass of the plank.**

> **Answer:** 30 kg

10 **A cylindrical water tank has radius 10 cm and height 20 cm. Show that its capacity is 2π litres.**

> **Answer:** 2000π cm^3 = 2π litres

11 **A cylinder contains water of volume 900π cm^3. The radius of the cylinder is 10 cm. Work out the depth of the water.**

> **Answer:** 9 cm

12 **Ali works out the volume of a cylinder with diameter 10 cm and height 6 cm. He writes $V = \pi \times 10^2 \times 6 = 600\pi$ cm^3. What mistake has he made? Write the correct volume.**

> **Answer:** He used the diameter instead of the radius. Volume = 150π cm^3

13 **A cylinder has radius *r* and height *h*. Write what happens to its volume when (a) the height is doubled, (b) the radius is doubled.**

(a) The height is doubled

> **Answer:** The volume doubles

(b) The radius is doubled

> **Answer:** The volume is multiplied by 4

14 **A cylinder has volume 90π cm^3 and height 10 cm. Work out the radius.**

> **Answer:** 3 cm

15 Work out the radius of a cylinder with volume 200π cm^3 and height 2 cm.

> **Answer:** 10 cm

16 A cylinder of radius r and height h just fits inside a cuboid with a square base, as shown in a plan: the cuboid has base of side $2r$ and the same height h. Show that the ratio of the volume of the cylinder to the volume of the cuboid is $\pi : 4$.

> **Answer:** $\pi : 4$

Exercise 19G Cylinders and density (calculator) Calculator allowed

1 Work out the volume of each cylinder. Give your answers to 3 significant figures.

(a) radius 4 cm, height 10 cm

> **Answer:** 503 cm^3

(b) radius 2.5 cm, height 7.2 cm

> **Answer:** 141 cm^3

(c) diameter 12 cm, height 15 cm

> **Answer:** 1700 cm^3

(d) radius 0.8 m, height 1.5 m

> **Answer:** 3.02 m^3

2 Work out the volume of each cylinder. Give your answers correct to 1 decimal place.

(a) radius 6.4 cm, height 3 cm

> **Answer:** 386.0 cm^3

(b) diameter 6.6 cm, height 11 cm

> **Answer:** 376.3 cm^3

3 A can of drink is a cylinder with diameter 6.6 cm and height 11 cm. A label says the can holds 330 ml. Is the label correct? Show your working and give a reason.

> **Answer:** Yes: the volume is about 376 cm^3, so the can holds about 376 ml when full, which is more than 330 ml.

4 A water tank is a cylinder with radius 0.8 m and height 1.5 m. Work out the capacity of the tank in litres. Give your answer to the nearest litre.

> **Answer:** 3016 litres

5 A metal pipe is a hollow cylinder 20 cm long. The outer radius is 5 cm and the inner radius is 4 cm. Work out the volume of metal in the pipe, to 3 significant figures.

> **Answer:** 565 cm^3

6 Can A has radius 3 cm and height 10 cm. Can B has radius 4 cm and height 6 cm. Which can holds more, and by how much? Give the difference to 3 significant figures.

> **Answer:** Can B, by 18.8 cm^3

7 An iron rod is a cylinder with radius 1.5 cm and length 40 cm. The density of iron is 7.8 g/cm^3. Work out the mass of the rod in kilograms, to 3 significant figures.

> **Answer:** 2.21 kg

8 A cylindrical jug has radius 8 cm. It holds 2 litres when full. Work out the height of the jug, to 3 significant figures.

> **Answer:** 9.95 cm

9 A trough is a prism whose cross-section is a semicircle of radius 15 cm. The trough is 2 m long. How many litres of water does it hold when full? Give your answer to 3 significant figures.

> **Answer:** 70.7 litres

10 A cylinder of radius 5 cm and height 10 cm fits exactly inside a cube of side 10 cm. What percentage of the volume of the cube is taken up by the cylinder? Give your answer to 3 significant figures.

> **Answer:** 78.5%

11 A brass cylinder has radius 2 cm and height 5 cm. Its mass is 420 g. Work out the density of brass, to 1 decimal place.

> **Answer:** 6.7 g/cm^3

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