

Surface area of a cylinder

Year 8 About 70 minutes Calculator allowed 45 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/ks3-year-8-surface-area-of-a-cylinder/

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark]

Work out the circumference of a circle of radius 4 cm, to 1 d.p.

A2 Needed today [1 mark]

A rectangle is 12.5 cm long and 8 cm wide. Work out its area.

Answer

Answer

- A3** Last lesson [1 mark]

A cylinder has radius 3 cm and height 5 cm. Write its volume in terms of π .

A4 Year 7 [1 mark]

How many cm^2 are there in 1 m^2 ?

Answer

Answer

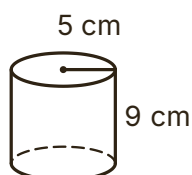
B Example, then your turn

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Your teacher works through each example with you. Then try the one beside it. Opened out, the curved surface is a rectangle $2\pi r$ long and h wide, so its area is $2\pi rh$. The total surface area adds the two circles: $2\pi rh + 2\pi r^2$.

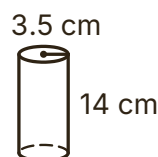
EXAMPLE 1

Work out the curved surface area of this cylinder, to 3 s.f.



Hint The rectangle is as long as the circumference, $2\pi r$, and as wide as the height.

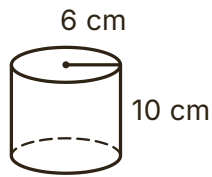
- B1** Work out the curved surface area of this cylinder, to 3 s.f. [2 marks]



Answer ... cm^2

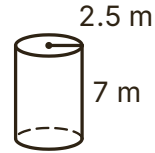
EXAMPLE 2

Work out the total surface area of this cylinder, to 3 s.f.



Hint Curved surface $2\pi rh$, then add two circles, $2\pi r^2$.

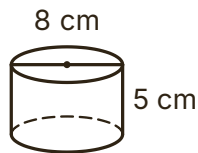
B2 Work out the total surface area [2 marks] of this cylinder, to 3 s.f.



Answer ... m²

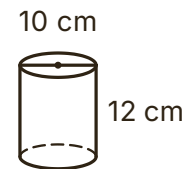
EXAMPLE 3

Work out the total surface area of this cylinder. Give your answer in terms of π .



Hint The diameter is 8 cm, so the radius is 4 cm.

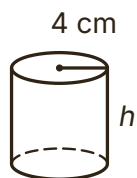
B3 Work out the total surface area [3 marks] of this cylinder. Give your answer in terms of π .



Answer ... cm²

EXAMPLE 4

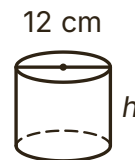
The curved surface area of this cylinder is 250 cm². Work out its height h , to 1 d.p.



Not drawn accurately

Hint $2\pi rh = 250$. Work out $2\pi r$ first, then divide.

B4 The curved surface area of this cylinder is 500 cm². Work out its height h , to 1 d.p. [3 marks]



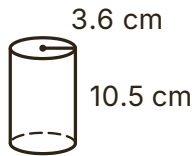
Not drawn accurately

Answer $h = \dots$ cm

C Practice

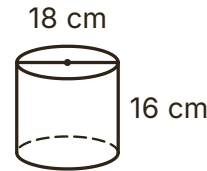
Year 8

- C1** A tin has a radius of 3.6 cm and a height of 10.5 cm. A paper label covers the curved surface, with an extra 1.5 cm overlap for the glue. Work out the area of the label, to the nearest cm^2 . [3 marks]



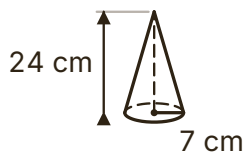
Answer ... cm^2

- C2** A plant pot is a cylinder with no top. Its diameter is 18 cm and its height is 16 cm. Work out the area of its outside surface, to 3 s.f. [3 marks]



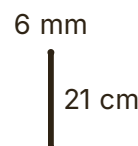
Answer ... cm^2

- C3** A cone has radius 7 cm and height 24 cm. Its total surface area is $\pi r l + \pi r^2$, where l is the slant height. Work out the total surface area, to 3 s.f. [3 marks]



Answer ... cm^2

- C4** A paper straw is a cylinder, open at both ends. Its diameter is 6 mm and its length is 21 cm. Work out the area of paper in it, in cm^2 , to 3 s.f. [2 marks]



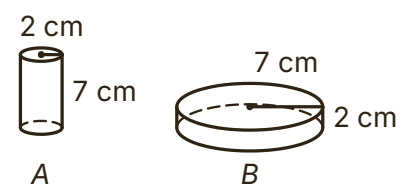
Answer ... cm^2

D Exam-style questions

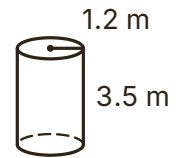
GCSE Foundation

- D1** Mia says, "Cylinders *A* and *B* use the same two numbers, so they have the same total surface area." [3 marks]

Show that Mia is wrong.



- D2** A closed oil tank is a cylinder of radius 1.2 m and height 3.5 m. Its whole outside, top and bottom too, is painted. One tin of paint covers 6 m^2 . How many tins are needed? [4 marks]

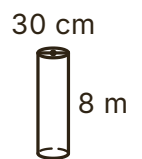


Answer ... tins

- D3** A pipe is 8 m long and has an outside diameter of 30 cm. The curved outside surface is to be painted.

- (a) Work out the area to be painted, in m^2 , to 2 d.p.

[3 marks]



Not drawn accurately

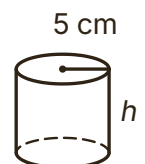
Answer ... m^2

- (b) 1 litre of paint covers 3 m^2 . The paint is sold in 1 litre tins. How many tins are needed? [2 marks]

Answer ... tins

Total for D3: 5 marks

- D4** A closed cylinder has a radius of 5 cm and a total surface area of 400 cm^2 . Work out its height h , to 3 s.f. [4 marks]

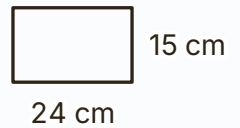


Not drawn accurately

Answer $h = \dots \text{ cm}$

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** A sheet of card 24 cm by 15 cm is rolled into an open tube, with no overlap. It can be rolled so that the tube is 15 cm tall, or so that it is 24 cm tall. Which tube holds more, and by how much? Give your answer to 3 s.f. [4 marks]



Answer ... cm³

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** The edge that goes round becomes the circumference. For the 15 cm tall tube, $2\pi r = 24$.
- Hint 2** 15 cm tall: $r = 24 \div 2\pi = 3.820$ and $V = \pi \times 3.820^2 \times 15 = 687.5 \text{ cm}^3$.
- Hint 3** 24 cm tall: $r = 15 \div 2\pi = 2.387$ and $V = \pi \times 2.387^2 \times 24 = 429.7 \text{ cm}^3$. The difference is 257.8.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

- I can find the curved surface area of a cylinder with $2\pi rh$. ☐ ☐ ☐
- I can find the total surface area of a closed or an open cylinder. ☐ ☐ ☐
- I can work back from a surface area to the height. ☐ ☐ ☐
- I can use surface areas for labels, paint and nets. ☐ ☐ ☐