SURFACE AREA OF A CYLINDER

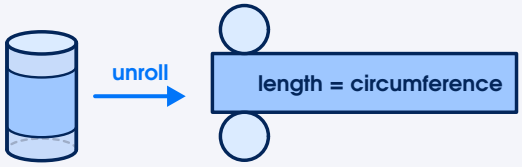
BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

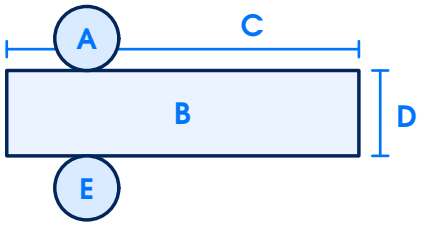
KEY IDEA

Peel the label off a tin and lay it flat: the label is a rectangle.

The net of a cylinder is 2 circles and a rectangle. The rectangle's length is the circumference (the distance round the circle).



1 This is the net of a cylinder. Name each part A to E. Use the words in the box.



circle | rectangle | circumference | height

A _____ D _____

B _____ E _____

C _____

2 Work out the circumference of each circle. Use the π button. Round to 1 d.p.

Circumference = π × diameter

a) 4 cm

π × ☐ = ☐ cm

b) 7 cm

π × ☐ = ☐ cm

c) 10 cm

π × ☐ = ☐ cm

3 Work out the area of each circle. $A = \pi \times r^2$. Use the π button. Round to 1 d.p.

a) 2 cm

$A = \pi \times 2^2 = \pi \times$ ☐ = ☐ cm²

b) 5 cm

$A = \pi \times 5^2 = \pi \times$ ☐ = ☐ cm²

4 Each rectangle is a label peeled off a tin. Work out the area of each label.

Area of a rectangle = length × width

a) length = 12.6 cm, 5 cm

Area = ☐ × ☐ = ☐ cm²

b) length = 31.4 cm, 3 cm

Area = ☐ × ☐ = ☐ cm²

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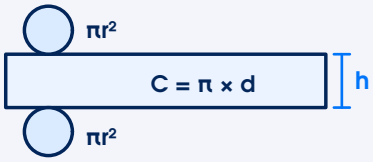
SUPPORT

NAME _____ CLASS _____ DATE _____

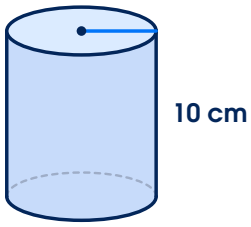
KEY IDEA

Surface area of a cylinder
= area of 2 circles + area of the rectangle
$= 2 \times \pi r^2 + \text{circumference} \times \text{height}$

The rectangle wraps round the circle, so its length is $C = \pi \times d$.



1 Work out the total surface area of this cylinder. Round each answer to 1 d.p.



Area of one circle = π × 6² = ☐ cm²

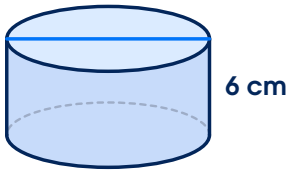
Area of two circles = 2 × ☐ = ☐ cm²

Circumference = π × 12 = ☐ cm

Curved surface = ☐ × 10 = ☐ cm²

Total = ☐ + ☐ = ☐ cm²

2 The diameter of this cylinder is 17 cm. Halve it first. Round each answer to 1 d.p.



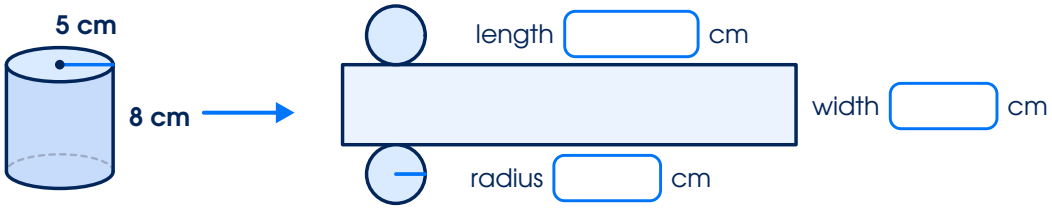
Radius = 17 ÷ 2 = ☐ cm

Area of two circles = 2 × π × ☐ ² = ☐ cm²

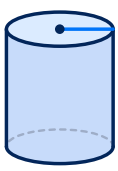
Curved surface = π × 17 × ☐ = ☐ cm²

Total surface area = ☐ + ☐ = ☐ cm²

3 This cylinder is opened out into its net. Write the missing measurements (1 d.p.).



4 This cylinder has radius 4 cm and height 10 cm.



a) Tick the calculation for the area of the curved surface.

☐ $\pi \times 4^2 \times 10$ ☐ $\pi \times 8 \times 10$ ☐ $2 \times \pi \times 4^2$ ☐ $\pi \times 4 \times 10$

b) Work out the area of the curved surface (1 d.p.) ☐ cm²

SURFACE AREA OF A CYLINDER

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

Surface area = $2\pi r^2 + 2\pi rh$ (two circles + curved surface)

Use the radius, not the diameter, in πr^2. Don't forget the second circle.

FLUENCY

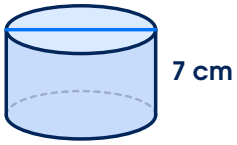
1 Work out the total surface area of each cylinder. Round to 1 d.p.

a)



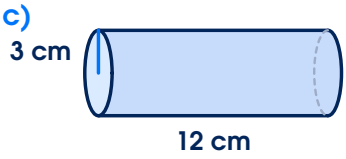
_____ cm²

b)



_____ cm²

c)



_____ cm²

2 Work out the total surface area of each cylinder. Give each answer in terms of π.

a) radius 2 cm, height 5 cm _____ π cm²

b) radius 5 cm, height 3 cm _____ π cm²

c) diameter 6 cm, height 10 cm _____ π cm²

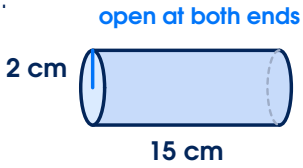
REASONING

3 Not every cylinder has two circular faces. Work out each area. Round to 1 d.p.



a) A plant pot has no lid. Work out its outside surface area.

_____ cm²



b) A card tube is open at both ends. Area of card?

_____ cm²

4 Mia works out the total surface area of a cylinder. Her answer is wrong.

Radius 3 cm, height 8 cm

Circle: $\pi \times 6^2 = 113.1$

Curved: $\pi \times 6 \times 8 = 150.8$

Total = 113.1 + 150.8 = 263.9 cm²

a) Explain her two mistakes.

.....

.....

b) Correct answer (1 d.p.) _____

SURFACE AREA OF A CYLINDER

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

Give an example or a reason for each answer.

a) Doubling the height doubles the surface area. ALWAYS SOMETIMES NEVER

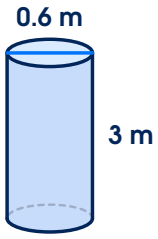
b) The curved surface is bigger than the two circles. ALWAYS SOMETIMES NEVER

c) The rectangle in the net of a cylinder is a square. ALWAYS SOMETIMES NEVER

d) If h = r, the surface area is $4\pi r^2$. ALWAYS SOMETIMES NEVER

PROBLEM SOLVING

2 A pillar is a cylinder with diameter 0.6 m and height 3 m.

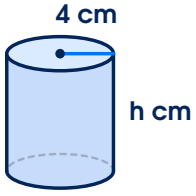


Two coats of paint go on the curved surface. The top and bottom are not painted. One tin of paint covers 2.5 m^2.

a) Area of the curved surface (1 d.p.) _____ m^2

b) How many tins are needed? Show your working. _____

3 Work backwards from the surface area of a cylinder of radius 4 cm.



a) Its total surface area is 120π cm^2. Find h. _____ cm

b) Another cylinder has radius 3 cm and total surface area 300 cm^2. Find its height to 1 d.p. _____ cm

★ CHALLENGE FOR ALL

4 The height of a cylinder is the same as its diameter.



a) Show that its total surface area is $6\pi r^2$.

b) Its surface area is 150π cm^2. Find the radius. _____

SURFACE AREA OF A CYLINDER – ANSWERS

ANSWERS

BUILDING BLOCKS

1 A circle · B rectangle · C circumference · D height · E circle
2 a) $\pi \times 4 = 12.6$ cm b) $\pi \times 7 = 22.0$ cm c) $\pi \times 10 = 31.4$ cm
3 a) $\pi \times 2^2 = \pi \times 4 = 12.6$ cm^2 b) $\pi \times 5^2 = \pi \times 25 = 78.5$ cm^2
4 a) $12.6 \times 5 = 63$ cm^2 b) $31.4 \times 3 = 94.2$ cm^2

SUPPORT

1 one circle 113.1 · two circles $2 \times 113.1 = 226.2$ · circumference 37.7 · curved $37.7 \times 10 = 377$ · total $226.2 + 377 = 603.2$ cm^2
2 radius 8.5 cm · two circles $2 \times \pi \times 8.5^2 = 454.0$ cm^2 · curved $\pi \times 17 \times 6 = 320.4$ cm^2 · total 774.4 cm^2
3 length 31.4 cm ($\pi \times 10$) · width 8 cm · radius 5 cm
4 a) $\pi \times 8 \times 10$ b) 251.3 cm^2

CORE

1 a) $104\pi = 326.7$ cm^2 b) $120\pi = 377.0$ cm^2 c) $90\pi = 282.7$ cm^2
2 a) 28π cm^2 b) 80π cm^2 c) 78π cm^2
3 a) $25\pi + 120\pi = 145\pi = 455.5$ cm^2 b) curved surface only: $\pi \times 4 \times 15 = 60\pi = 188.5$ cm^2
4 a) She used the diameter (6) instead of the radius in πr^2 and included only one circle. b) $2 \times \pi \times 3^2 + \pi \times 6 \times 8 = 18\pi + 48\pi = 66\pi = 207.3$ cm^2

GREATER DEPTH

1 a) never (the two circles stay the same, so the total less than doubles) b) sometimes (true only when $h > r$, since $2\pi rh > 2\pi r^2 \Leftrightarrow h > r$) c) sometimes (only when $h = \pi d$) d) always ($2\pi r^2 + 2\pi r \times r = 4\pi r^2$)
2 a) $\pi \times 0.6 \times 3 = 5.7$ m^2 (5.654...) b) two coats: 11.3 m^2 ÷ 2.5 = 4.5..., so 5 tins
3 a) $32\pi + 8\pi h = 120\pi$, so $8h = 88$, $h = 11$ cm b) $18\pi + 6\pi h = 300$, so $h = (300 - 18\pi) \div 6\pi = 12.9$ cm
4 a) $2\pi r^2 + 2\pi r \times 2r = 2\pi r^2 + 4\pi r^2 = 6\pi r^2$ b) $6\pi r^2 = 150\pi$, $r^2 = 25$, $r = 5$ cm