4.14 Cylinders: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

Formulae You May Need

Revision Library formulae reminder, styled on Edexcel 1MA1 formulae-sheet conventions; wording is original.

Volume of a cylinder = pi x r^2 x h

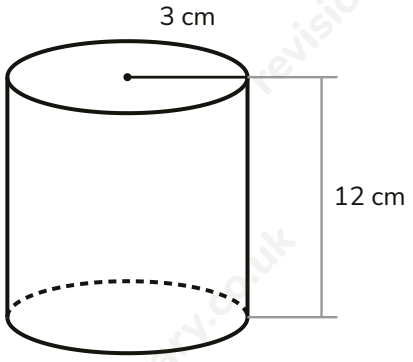
Curved surface area of a cylinder = 2 x pi x r x h

Total surface area of a cylinder = 2 x pi x r x h + 2 x pi x r^2 = 2 x pi x r x (h + r)

The cylinder volume formula follows from prism volume = cross-sectional area x length and circle area = pi x r^2. Derive surface areas from the curved surface and the required circular ends.

1 A cylinder has radius 3 cm and height 12 cm.
Calculate the curved surface area of the cylinder. Give your answer in terms of π.

Diagram NOT accurately drawn

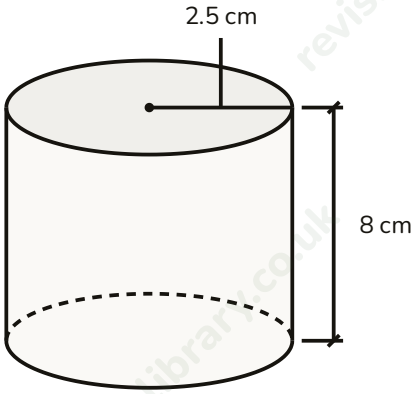


(Total for Question 1 is 2 marks)

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2 Work out the total surface area of a cylinder with radius 2.5 cm and height 8 cm. Give your answer in terms of π.

Diagram NOT accurately drawn

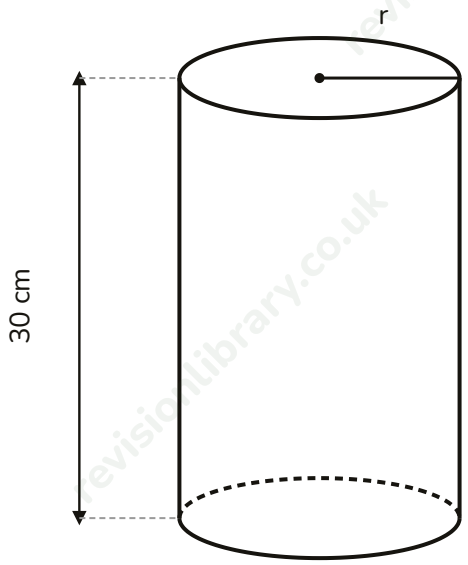


(Total for Question 2 is 3 marks)

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3 A cylinder has height 30 cm. The volume of the cylinder is 15000 cm^3.
Work out the radius of the cylinder. Give your answer correct to 1 decimal place.

Diagram NOT accurately drawn

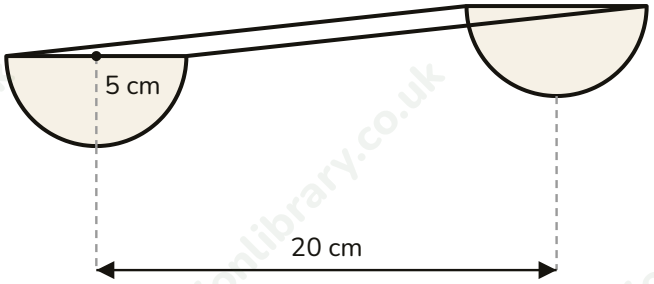


(Total for Question 3 is 3 marks)

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4 A trough is in the shape of a half-cylinder (a cylinder cut in half lengthways). The semicircular cross-section has radius 5 cm and the trough is 20 cm long.
Work out the volume of the trough. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn



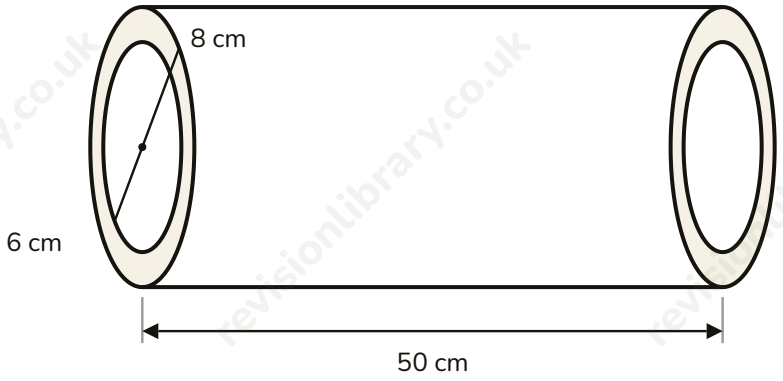
(Total for Question 4 is 3 marks)

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5 A pipe is a hollow cylinder with outer radius 8 cm and inner radius 6 cm. The pipe is 50 cm long.

Work out the volume of material used to make the pipe. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

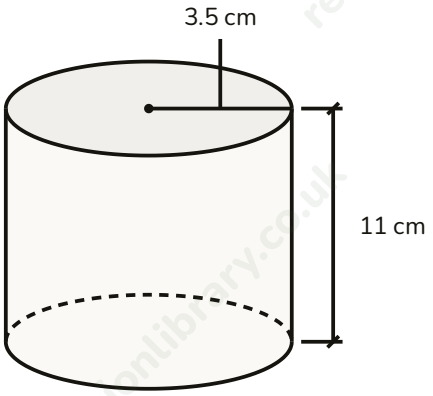


(Total for Question 5 is 4 marks)

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6 A cylindrical can of soup has radius 3.5 cm and height 11 cm. The label covers the curved surface area only, with no overlap. Card for the label costs 0.8p per cm^2.
Work out the cost of the label. Give your answer to the nearest penny.

Diagram NOT accurately drawn

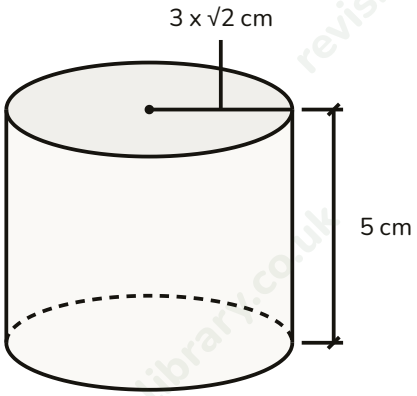


(Total for Question 6 is 3 marks)

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7 A cylinder has radius $3 \times \sqrt{2}$ cm and height 5 cm.
Calculate the exact volume of the cylinder. Give your answer in terms of π.

Diagram NOT accurately drawn

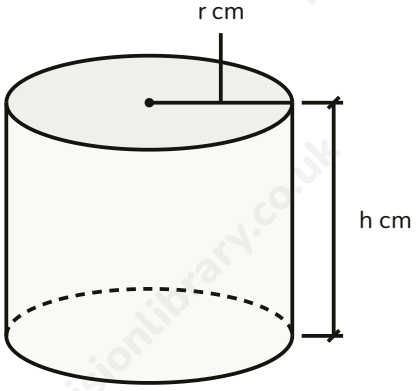


(Total for Question 7 is 3 marks)

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8 A cylinder has radius r cm and height h cm, where r and h are both greater than zero. The curved surface area of the cylinder, in cm^2, is numerically equal to the volume of the cylinder, in cm^3. Show that r = 2, whatever the value of h.

Diagram NOT accurately drawn



(Total for Question 8 is 4 marks)

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Mark scheme · 4.14 Cylinders: 30-minute Pack

Question 1

2 x π x 3 x 12 oe	**M1**
72pi cao (units cm^2)	**A1**

Answer: 72pi cm^2

Question 2

use total surface area = 2 * π * r * (r + h)	**M1**
substitute r = 2.5, h = 8 to get 2 * π * 2.5 * 10.5 = 52.5pi	**M1**
52.5pi cm^2 cao	**A1**

Answer: 52.5pi cm^2

Question 3

r^2 = V / (π x h) oe rearrangement	**M1**
15000 / (π x 30) oe substitution, then square root	**M1**
awrt 12.6 (units cm)	**A1**

Answer: 12.6 cm (1 d.p.)

Question 4

area of semicircle = 0.5 x π x 5^2 oe	**M1**
their area x 20 (length) oe	**M1**
awrt 785 (units cm^3)	**A1**

Answer: 785 cm^3 (3 s.f.)

Question 5

8^2 - 6^2 (= 28), area of cross-section of the material oe	**M1**
π x 28 oe (= 28pi)	**M1**
their area x 50 oe (= 1400pi)	**M1**
awrt 4400 (units cm^3)	**A1**

Answer: 4400 cm^3 (3 s.f.)

Question 6

CSA = 2 x π x 3.5 x 11 oe (= 77pi)	**M1**
cost = their CSA x 0.8 oe	**M1**
awrt 194p (or £1.94), correctly rounded to the nearest penny	**A1**

Answer: 194p (£1.94)

Question 7

$(3 \times \sqrt{2})^2 = 18$ oe	**M1**
π x 18 x 5 oe	**M1**
90pi cao (units cm^3)	**A1**

Answer: 90pi cm^3

Question 8

setting curved surface area equal to volume: 2 x π x r x h = π x r^2 x h, oe	**M1**
dividing both sides by π x r x h (valid since r > 0 and h > 0)	**M1**
correct statement that h cancels from both sides, so the result is independent of h	**B1**
r = 2 shown, cso	**A1**

Answer: r = 2 (shown, for any h > 0)

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