4.14 Cylinders: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 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

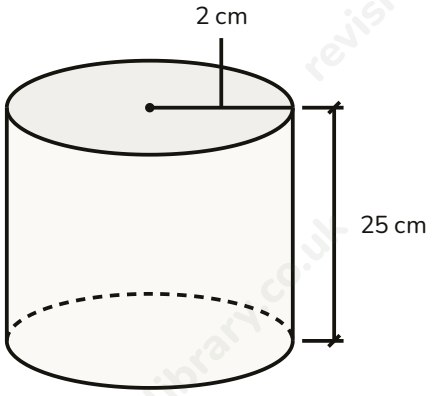
Curved surface area of a cylinder = 2 x pi x r x h

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 Steel has a density of 7.8 g/cm^3. A solid cylindrical steel rod has radius 2 cm and length 25 cm. Work out the mass of the rod, in kilograms. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

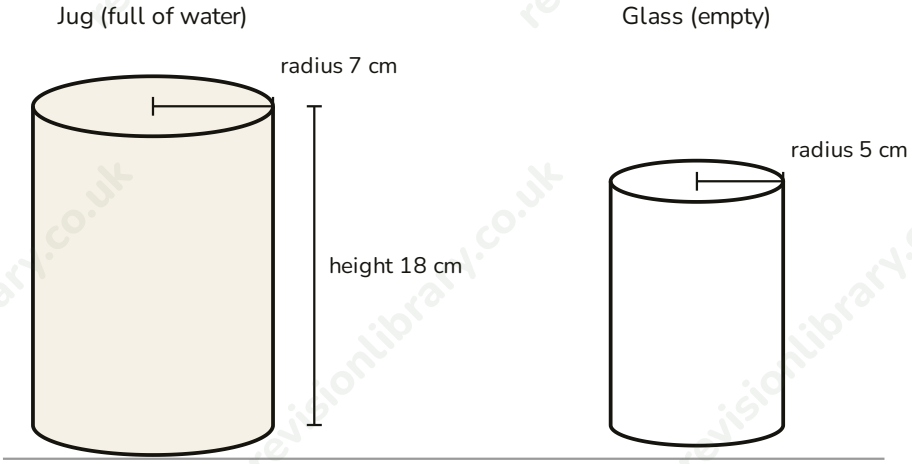


(Total for Question 1 is 4 marks)

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2 Water is poured from a full cylindrical jug of radius 7 cm and height 18 cm into an empty cylindrical glass of radius 5 cm. All of the water fits into the glass, with none left over. Work out the height of the water in the glass. Give your answer correct to 1 decimal place.

Diagram NOT accurately drawn

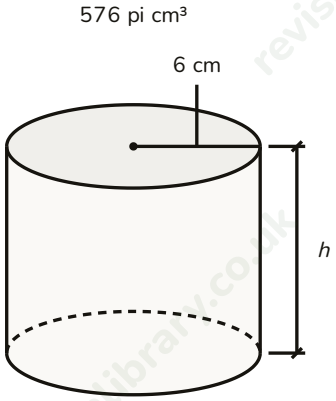


(Total for Question 2 is 4 marks)

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3 A cylinder has radius 6 cm and volume 576 π cm^3.
Work out the height of the cylinder.

Diagram NOT accurately drawn

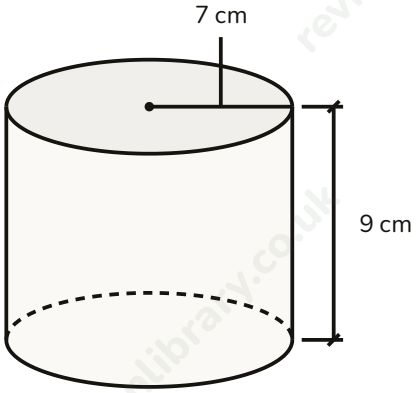


(Total for Question 3 is 3 marks)

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4 A cylinder has radius 7 cm and height 9 cm.
Work out the volume of the cylinder. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

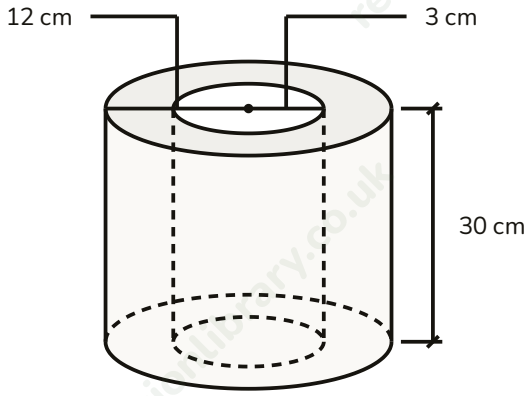


(Total for Question 4 is 3 marks)

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5 A metal pipe is a hollow cylinder of length 30 cm. The outer radius is 12 cm and the inner radius is 3 cm.
Work out the volume of metal used. Give your answer in terms of π.

Diagram NOT accurately drawn

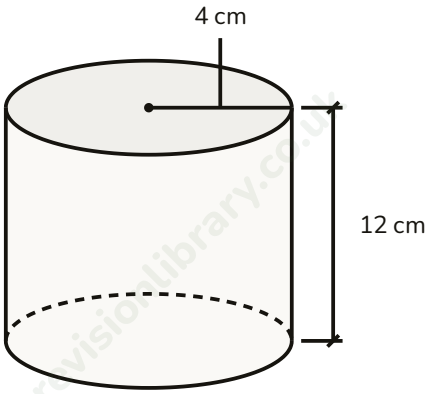


(Total for Question 5 is 4 marks)

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6 A cylinder has radius 4 cm and height 12 cm.
Work out the total surface area of the cylinder. Give your answer in terms of π.

Diagram NOT accurately drawn

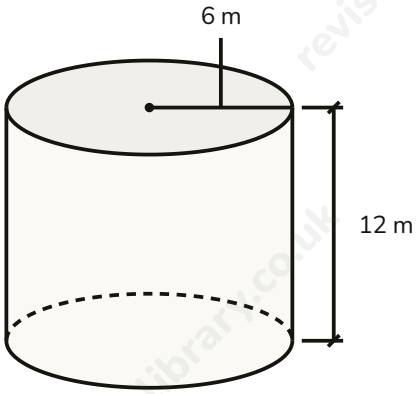


(Total for Question 6 is 3 marks)

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7 A cylinder has radius 6 m and height 12 m.
Work out the volume of the cylinder. Give your answer in terms of π.

Diagram NOT accurately drawn

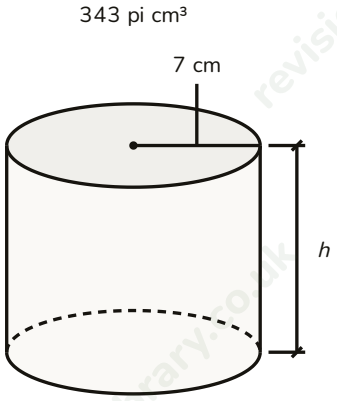


(Total for Question 7 is 2 marks)

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8 A cylinder has radius 7 cm and volume 343 π cm^3.
Work out the height of the cylinder.

Diagram NOT accurately drawn

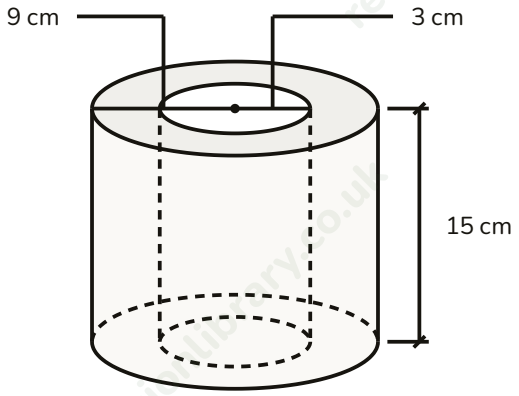


(Total for Question 8 is 3 marks)

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9 A metal pipe is a hollow cylinder of length 15 cm. The outer radius is 9 cm and the inner radius is 3 cm.
Work out the volume of metal used. Give your answer in terms of π.

Diagram NOT accurately drawn

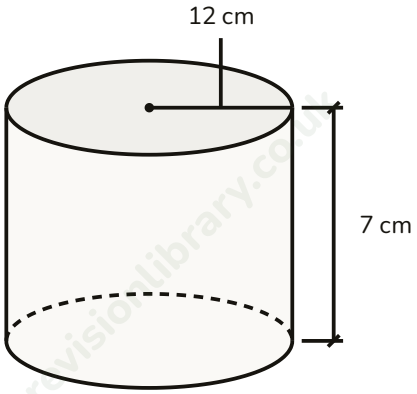


(Total for Question 9 is 4 marks)

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10 A cylinder has radius 12 cm and height 7 cm.
Work out the total surface area of the cylinder. Give your answer in terms of π.

Diagram NOT accurately drawn

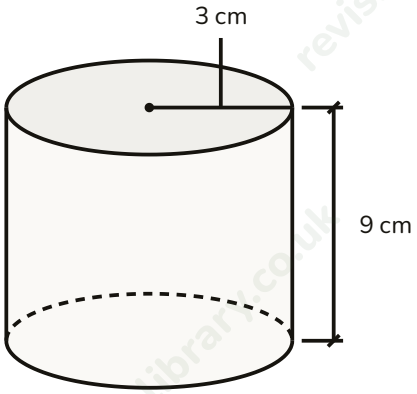


(Total for Question 10 is 3 marks)

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11 A cylinder has radius 3 cm and height 9 cm.
Work out the volume of the cylinder. Give your answer in terms of π.

Diagram NOT accurately drawn

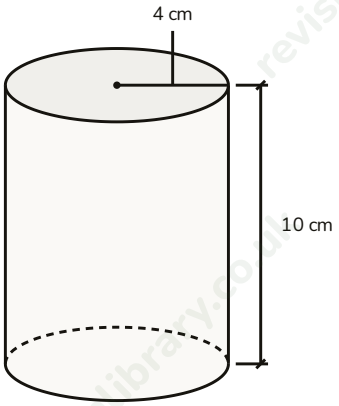


(Total for Question 11 is 2 marks)

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12 A cylinder has radius 4 cm and height 10 cm. Calculate the volume of the cylinder. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

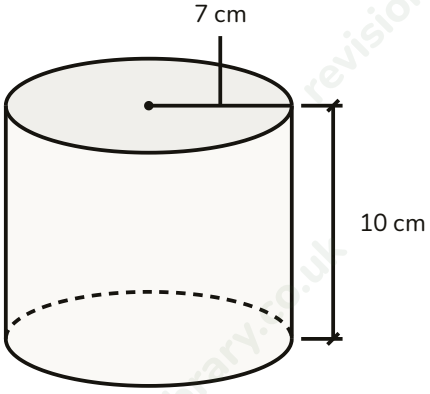


(Total for Question 12 is 2 marks)

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13 Work out the volume of a cylinder with radius 7 cm and height 10 cm. Give your answer in terms of π.

Diagram NOT accurately drawn

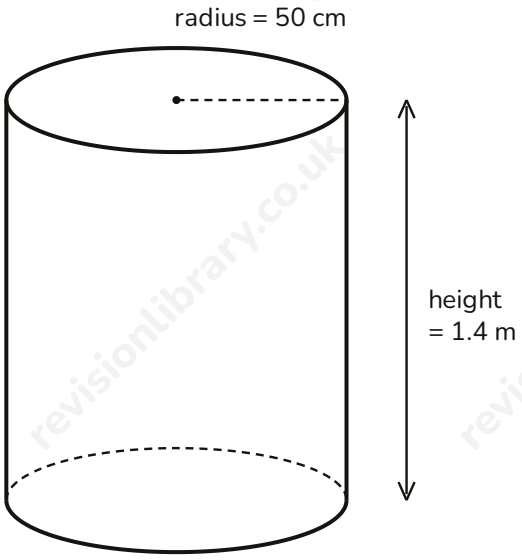


(Total for Question 13 is 2 marks)

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14 A cylindrical water tank has radius 50 cm and height 1.4 m. The tank starts empty and is filled with water at a rate of 15000 cm^3 per minute.
Work out how long it takes to fill the tank completely. Give your answer in minutes, correct to the nearest minute.

Diagram NOT accurately drawn

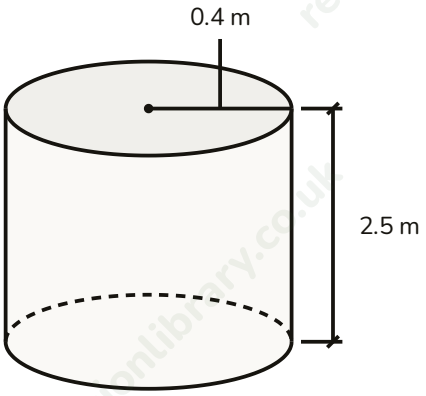


(Total for Question 14 is 4 marks)

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15 A cylindrical column has radius 0.4 m and height 2.5 m. Only the curved surface is to be painted. One litre of paint covers 6 m². Calculate how many litres of paint are needed. Give your answer to the nearest whole litre.

Diagram NOT accurately drawn



(Total for Question 15 is 3 marks)

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Mark scheme · 4.14 Cylinders: 1-hour Pack

Question 1

volume = π x 2^2 x 25 oe (= 100pi)	**M1**
mass = 7.8 x their volume oe	**M1**
convert grams to kilograms (divide by 1000)	**M1**
awrt 2.45 (units kg)	**A1**

Answer: 2.45 kg (3 s.f.)

Question 2

volume of jug = π x 7^2 x 18 oe (= 882pi)	**M1**
h = volume / (π x 5^2) oe rearrangement	**M1**
882pi / (π x 25) oe substitution	**M1**
awrt 35.3 (units cm)	**A1**

Answer: 35.3 cm (1 d.p.)

Question 3

π x 6^2 x h = 576 π	**M1**
576 / 36	**M1**
16 cm	**A1**

Answer: 16 cm

Question 4

π x 7^2	**M1**
x 9	**M1**
1390 cm^3	**A1**

Answer: 1390 cm^3

Question 5

outer volume π x 12^2 x 30	**M1**
inner volume π x 3^2 x 30	**M1**
subtracts	**M1**
4050 π cm^3	**A1**

Answer: 4050 π cm^3

Question 6

curved surface 2 x π x 4 x 12 = 96 π	**M1**
two circular ends 2 x π x 4^2 = 32 π	**M1**
128 π cm^2	**A1**

Answer: 128 π cm^2

Question 7

π x 6^2 x 12	**M1**
432 π m^3	**A1**

Answer: 432 π m^3

Question 8

π x 7^2 x h = 343 π	**M1**
343 / 49	**M1**
7 cm	**A1**

Answer: 7 cm

Question 9

outer volume π x 9^2 x 15	**M1**
inner volume π x 3^2 x 15	**M1**
subtracts	**M1**
1080 π cm^3	**A1**

Answer: 1080 π cm^3

Question 10

curved surface 2 x π x 12 x 7 = 168 π	**M1**
two circular ends 2 x π x 12^2 = 288 π	**M1**
456 π cm^2	**A1**

Answer: 456 π cm^2

Question 11

π x 3^2 x 9	**M1**
81 π cm^3	**A1**

Answer: 81 π cm^3

Question 12

correct substitution into V = π x r^2 x h, e.g. π x 4^2 x 10 (oe)	**M1**
awrt 503 cm^3 (cao)	**A1**

Answer: 503 cm^3 (3 s.f.)

Question 13

use V = π * r^2 * h with r = 7, h = 10	**M1**
490 π cm^3 cao	**A1**

Answer: 490 π cm^3

Question 14

1.4 m converted to 140 cm	**M1**
volume = π x 50^2 x 140 oe	**M1**
time = their volume / 15000 oe	**M1**
awrt 73 (units minutes)	**A1**

Answer: 73 minutes (nearest minute)

Question 15

calculate curved surface area 2 * π * r * h = 2 * π * 0.4 * 2.5 = 2 π m^2	**M1**
divide by coverage: litres = (2 π) / 6 = π / 3	**M1**
π/3 approx 1.05 so 1 litre to the nearest whole litre awrt	**A1**

Answer: 1 litre

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