

# Edexcel GCSE

## Mathematics (Linear) – 1MA0

# VOLUME AND SURFACE AREA OF CYLINDER

### Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.  
Tracing paper may be used.

### Items included with question papers

Nil



### Instructions

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Use black ink or ball-point pen.

Fill in the boxes at the top of this page with your name, centre number and candidate number.

Answer all questions.

Answer the questions in the spaces provided – there may be more space than you need.

Calculators may be used.

### Information

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The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.

Questions labelled with an **asterisk** (\*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

### Advice

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Read each question carefully before you start to answer it.

Keep an eye on the time.

Try to answer every question.

Check your answers if you have time at the end.

1.

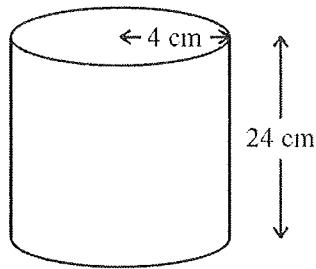


Diagram NOT accurately drawn

A cylinder has a height of 24 cm and a radius of 4 cm.  
Work out the volume of the cylinder.  
Give your answer correct to 3 significant figures.

$$\begin{aligned} \text{Volume} &= \text{Area of circle} \times \text{height} \\ &= \pi r^2 h \end{aligned}$$

$$r = 4$$

$$h = 24$$

Sub values into formula

$$\pi \times 4^2 \times 24$$

Into calculator

$$384\pi$$

S $\leftrightarrow$ D button - whole display  
1206.371579

3 significant figures  
1210 cm<sup>3</sup>

..... 1210 ..... cm<sup>3</sup>  
(Total 2 marks)

2. A can of drink is in the shape of a cylinder.  
The can has a radius of 4 cm and a height of 15 cm.

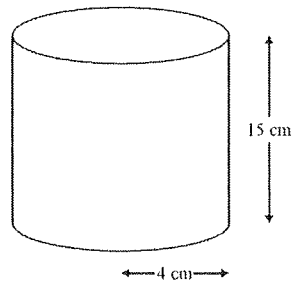


Diagram NOT accurately drawn

Calculate the volume of the cylinder.  
Give your answer correct to 3 significant figures.

$$Vol = \pi r^2 h \quad r = 4 \quad h = 15$$

$$\text{Sub in} \rightarrow \pi \times 4^2 \times 15$$

$$\text{calc display} \rightarrow 753.9822369$$

$$3 \text{ sig fig} \rightarrow 754$$

$$\dots\dots\dots 754 \text{ cm}^3 \dots\dots\dots$$

(Total 3 marks)

- 3.

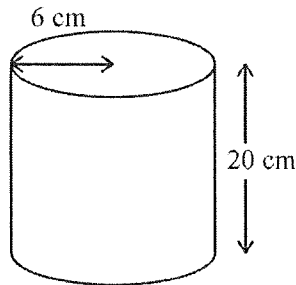


Diagram NOT accurately drawn

A solid cylinder has a radius of 6 cm and a height of 20 cm.

Calculate the volume of the cylinder.

Give your answer correct to 3 significant figures.

$$\text{Volume} = \pi r^2 h \quad r = 6 \quad h = 20$$

$$\text{Sub in} \rightarrow \pi \times 6^2 \times 20$$

$$\text{calc display} \rightarrow 2261.946711$$

$$3 \text{ sig fig} \rightarrow 2260 \text{ cm}^3$$

$$\dots\dots\dots 2260 \text{ cm}^3 \dots\dots\dots$$

(Total 2 marks)

4.

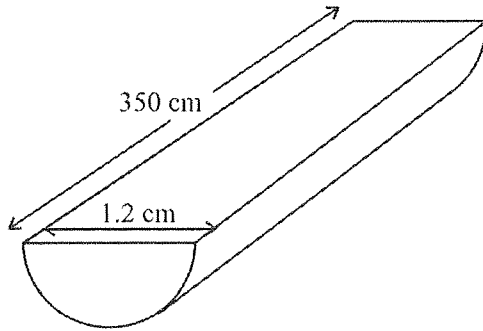


Diagram NOT accurately drawn

The diagram shows a piece of wood.  
The piece of wood is a prism of length 350 cm.  
The cross-section of the prism is a semi-circle with diameter 1.2 cm.

Calculate the volume of the piece of wood.  
Give your answer correct to 3 significant figures.

Area of semi-circle  $\rightarrow \frac{1}{2}$  of  $\pi r^2$  so  $\frac{1}{2}\pi r^2$

Volume of half cylinder  $\rightarrow \frac{1}{2}\pi r^2 h$   $r = 0.6$  (since  $d = 1.2$ )  
 $h = 350$

Sub in values  $\rightarrow \frac{1}{2} \times \pi \times 0.6^2 \times 350$

calc display  $\rightarrow 197.9203372$

3 sig fig  $\rightarrow 198 \text{ cm}^3$

.....198.....  $\text{cm}^3$   
(Total 4 marks)

5.

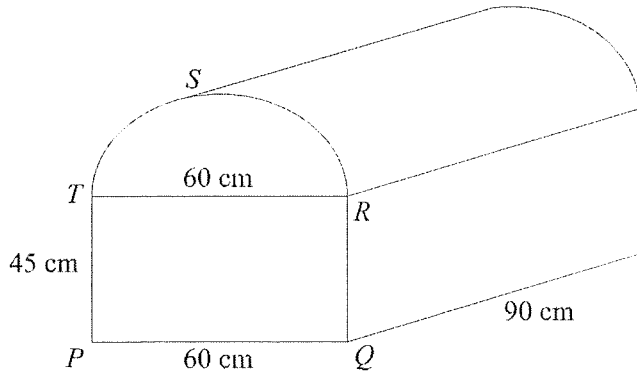


Diagram NOT accurately drawn

The diagram shows a prism of length 90 cm.

The cross section,  $PQRST$ , of the prism is a semi-circle above a rectangle.

$PQRT$  is a rectangle.

$RST$  is a semi-circle with diameter  $RT$ .

$PQ = RT = 60$  cm.

$PT = QR = 45$  cm.

Calculate the volume of the prism.

Give your answer correct to 3 significant figures.

State the units of your answer.

Split into 2

Cuboid  
 $45 \times 60 \times 90$   
 $h \times w \times b$   
 $243000 \text{ cm}^3$

Half cylinder  
 $\frac{1}{2} \pi r^2 h$   
 $r = 30$   
 $h = 90$   
 $\frac{1}{2} \times \pi \times 30^2 \times 90$   
 $127234.5025 \text{ cm}^3$

Bring together and add  
 $370234.5025$

3 sig fig  
 $370000 \text{ cm}^3$

$370000 \text{ cm}^3$

(Total 5 marks)

6.

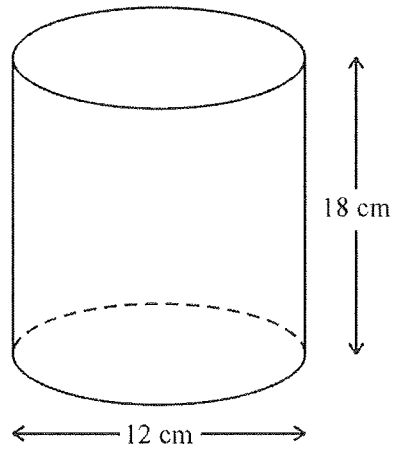


Diagram **NOT** accurately drawn

The diagram shows a solid cylinder.

The cylinder has a diameter of 12 cm and a height of 18 cm.

Calculate the **total** surface area of the cylinder.

Give your answer correct to 3 significant figures.

Cylinder SA = 2 circles + rectangle *length = circumference*

$$\begin{aligned} &= 2 \times \pi r^2 + \pi d \times h \\ &= 2 \times \pi \times 6^2 + \pi \times 12 \times 18 \\ &= 226.1946711 + 678.5840132 \\ &= 904.7786842 \end{aligned}$$

3 significant figures  $\rightarrow$  905 cm<sup>2</sup>

.....905..... cm<sup>2</sup>  
(Total 4 marks)

7.

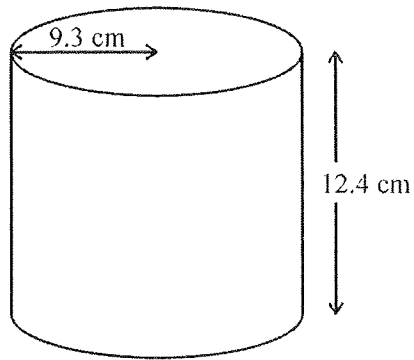


Diagram NOT accurately drawn

The diagram shows a solid cylinder.  
The radius of the cylinder is 9.3 cm.  
Its height is 12.4 cm.

Calculate the **total** surface area of the cylinder.  
Give your answer correct to 3 significant figures.

$$\begin{aligned} \text{SA of a cylinder} &= 2 \times \text{circle} + \text{rectangle} \\ &= 2 \times \pi r^2 + \pi d \times h \\ &= 2 \times \pi \times 9.3^2 + \pi \times 18.6 \times 12.4 \\ &= 543.4326972 + 724.5769296 \\ &= 1268.009627 \end{aligned}$$

$$3 \text{ sig fig} \rightarrow 1270 \text{ cm}^2$$

1270 cm<sup>2</sup>  
(Total 4 marks)

8.

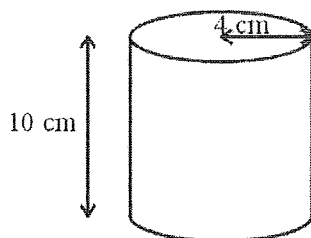


Diagram NOT accurately drawn

The diagram shows a cylinder with a height of 10 cm and a radius of 4 cm.

- (a) Calculate the volume of the cylinder.  
Give your answer correct to 3 significant figures.

$$\begin{aligned}\text{Volume} &= \text{cross-section} \times \text{height} \\ &= \pi r^2 \times h \\ &= \pi \times 4^2 \times 10 \\ &= 502.6548246\end{aligned}$$

$$3 \text{ sig fig} \rightarrow 503 \text{ cm}^3$$

$$\underline{\underline{503 \text{ cm}^3}}$$

(3)

The cylinder is solid.

- (b) Calculate the **total** surface area of the cylinder.  
Give your answer correct to 3 significant figures.

$$\begin{aligned}\text{SA} &= 2 \times \text{circle} + \text{rectangle} \\ &= 2 \times \pi r^2 + \pi d \times h \\ &= 2 \times \pi \times 4^2 + \pi \times 8 \times 10 \\ &= 100.5309649 + 251.3274123 \\ &= 351.8583772\end{aligned}$$

$$3 \text{ sig fig} \rightarrow 352 \text{ cm}^2$$

$$\underline{\underline{352 \text{ cm}^2}}$$

(3)

(Total 6 marks)