Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

Calculating volume and surface area of cuboids, triangular prisms and cylinders, and applying these to capacity, packaging and material problems. Sour

REVISE
.wales

F1.17 — Volume & surface area of prisms & cylinders

Spec 3.6.3 — Unit 1 (calculator allowed)

Calculating volume and surface area of cuboids, triangular prisms and cylinders, and applying these to capacity, packaging and material problems. Sourced from legacy WJEC GCSE Mathematics-Numeracy Foundation papers (3300U10/U20) and accessible content from Intermediate papers (3300U30/U40), organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~2 hours 8 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (85 marks across 27 questions).*

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification.

Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — method marks are awarded for clear setup.

A calculator is allowed on every question in this pack (Unit 1 is the calculator-allowed paper).

Volume & surface area of prisms & cylinders — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 1: calculator-allowed.

Volume of prisms 3.6.3

- Find the volume of a cuboid from its dimensions.
- Find the volume of a triangular or other prism.
- Use 1 cm^3 = 1 ml to convert volume to capacity.

Cylinders 3.6.3

- Find the volume of a cylinder using $V = \pi r^2 h$.
- Find the curved surface area using $2\pi r h$.
- Find total surface area including the two circular ends.

Surface area 3.6.3

- Find the surface area of a cuboid from its dimensions.
- Find the surface area of a triangular prism.
- Decide which faces to include for open or closed solids.

Exam strategy 3.6

- Identify radius vs diameter on a cylinder diagram.
- State formula, substitute, then evaluate.
- Round only at the final step; quote units cm^3 or cm^2.

Crib sheet »

Volume & surface area of prisms & cylinders in one page

Quick-reference notes — revisit before each question. Don't use during the questions.

Cuboid volume

$$V = \text{length} \times \text{width} \times \text{height}$$

Cube: V = side³.

Units: cm³, m³.

Prism volume

$$V = \text{area of cross-section} \times \text{length}$$

Cross-section is the shape repeated along the prism.

Triangular prism: V = ½ b h × L.

Cylinder volume

$$V = \pi r^2 h$$

r = radius (half of diameter), h = height.

Use the π key on the calculator.

Cuboid surface area

$$SA = 2(lw + lh + wh)$$

Six rectangular faces, in three matching pairs.

Cylinder surface area

$$SA = 2\pi r h + 2\pi r^2$$

Curved side + two circular ends.

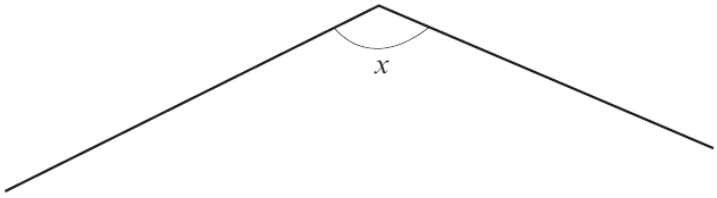
Open cylinder: drop one or both circles.

Common traps

- Using diameter instead of radius in π r² h.
- Forgetting one face on a surface area.
- Mixing cm and m in one calculation.

Examiner only

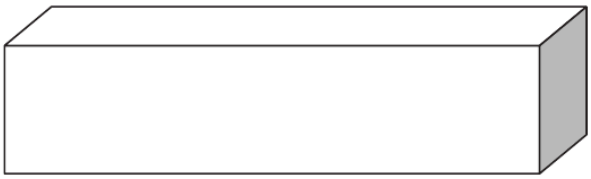
4. *(a)*



What type of angle is x in the diagram above?
Circle your answer. [1]

right angle reflex obtuse acute

(b)

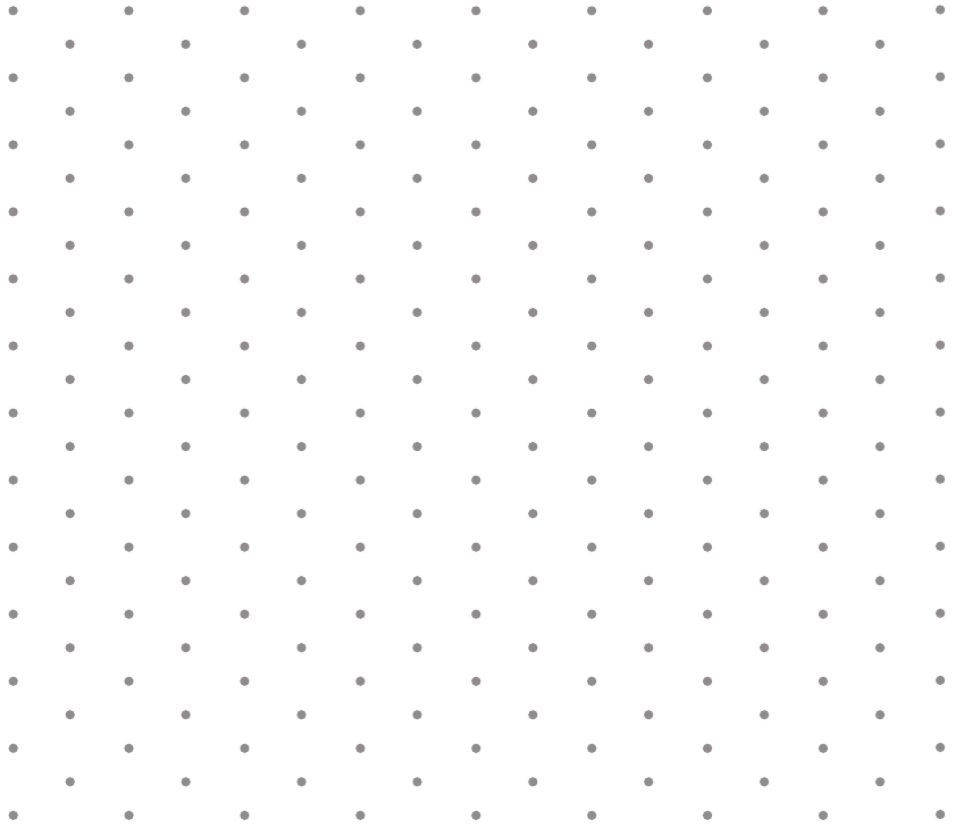


What is the special name of the shape drawn above?
Circle your answer. [1]

sphere cube cone cuboid cylinder

Examiner only

5. *(a)* Draw an isometric representation of a cuboid measuring 6 cm by 4 cm by 3 cm.
Use the grid below. [2]



(b) Calculate the volume of the cuboid.
Give the units of your answer. [3]

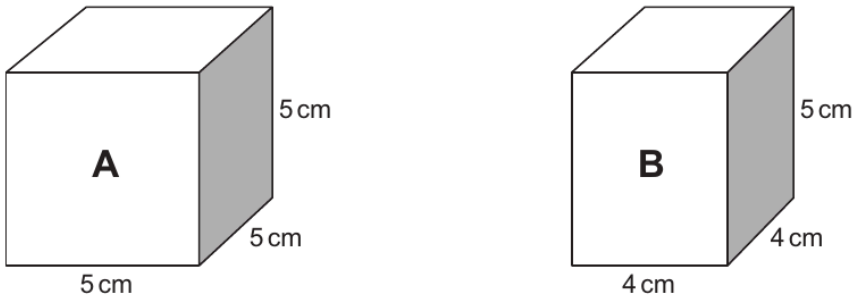
.....

.....

.....

Examiner only

18. Cube **A** and cuboid **B** are shown below.



Diagrams not drawn to scale

Express the volume of **B** as a percentage of the volume of **A**.
You must show all your working. [4]

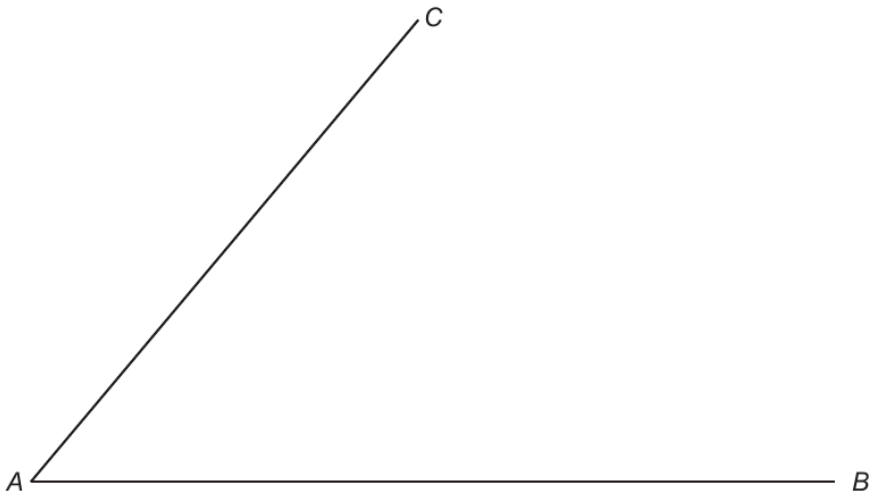
Examiner only

11. Two straight lines, *AB* and *AC*, are shown below.

The point *P* is

- equidistant from line *AB* and line *AC*,
- 6 cm from point *B*,
- **more** than 10 cm from point *A*.

Show clearly the position of point *P*. [3]



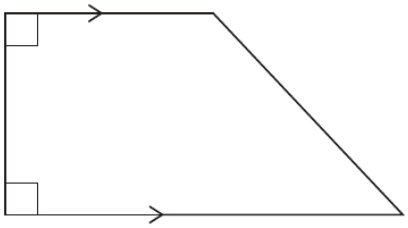
12. *(a)* Share £720 in the ratio 2 : 7. [2]

(b) Calculate the value of the reciprocal of 0·2. [2]

Examiner only

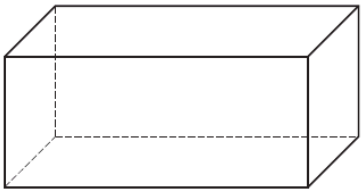
7. Circle the correct answer for each question below.

(a) What is the special name of the shape below? [1]



pentagon rhombus trapezium rectangle kite

(b) What is the special name of the 3D shape below? [1]



cube cuboid cylinder cone sphere

(c) What type of angle is an angle of 181°? [1]

an acute angle | an obtuse angle | a straight line | a right angle | a reflex angle

(d) Which shape has rotational symmetry of order 2? [1]

parallelogram | square | equilateral triangle | isosceles triangle | scalene triangle

Examiner only

15. Solve the following simultaneous equations using an algebraic (not graphical) method.

$$5x + 3y = 11$$
$$2x - 7y = 29$$

You must show all your working. [4]

Examiner only

9. *In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

Two friends are making cuboids out of centimetre cubes.
Gareth's cuboid is shown below.

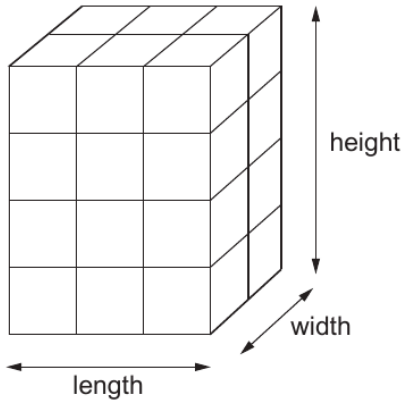


Diagram not drawn to scale

Ivy makes a different cuboid. Her cuboid has:

- the same length as Gareth's cuboid,
- a width six times the width of Gareth's cuboid,
- a height five times the height of Gareth's cuboid.

What is the volume of Ivy's cuboid?
You must show all your working. [3 + 2 OCW]

Examiner only

2. Circle the correct answer to complete each of the following statements.

(a) $\frac{1}{3}$ of $\frac{1}{3}$ is equal to [1]

$\frac{2}{3}$ $\frac{2}{6}$ $\frac{1}{6}$ $\frac{1}{9}$ $\frac{2}{9}$

(b) $0{\cdot}02 \times 0{\cdot}8$ is equal to [1]

0·016 0·16 1·6 0·4 4

(c) 1·5% can be written as [1]

$1{\cdot}5^{100}$ 0·15 0·015 0·105 $1{\cdot}5^{10}$

3. *(a)* Calculate the value of $\frac{2}{5} \times \frac{1}{4}$.

Give your answer in its simplest form. [1]

(b) Calculate the value of $3^3 \div 2^2$.

Give your answer as a decimal. [2]

Examiner only

13. A cuboid measures 5 cm by 3 cm by 2 cm.

Calculate the volume of the cuboid.
Give your answer in cm^3. [2]

Volume = ... cm^3

14. A number n is added to the square root of 81.
The answer is equal to 7 squared.

What is the value of n? [3]

n = ...

Examiner only

8. Melin is a company that packages flour for sale in supermarkets.
It packages the flour in cylindrical bags.
The area of the cross-section of each of these bags is $25\,cm^2$.

(a) Write down an expression, in terms of π, for **the radius of the base** of each of these bags. [2]

(b) Each bag has a volume of $500\,cm^3$.

(i) Currently the bags are filled with flour at a rate of $\frac{1}{4}$ of a bag per second.
Complete the following statement. [2]

Melin packages bags of flour at a rate of ..... cm^3 per minute.

(ii) A new cylindrical bag is designed to have the same capacity and to be more stable.

Melin decides to increase the area of the cross-section of its original bags by 100%.
Calculate the height of this new bag. [2]

END OF PAPER

Examiner only

11. A solid metal cylinder has a radius of 2·3 cm and a height of 5 cm.

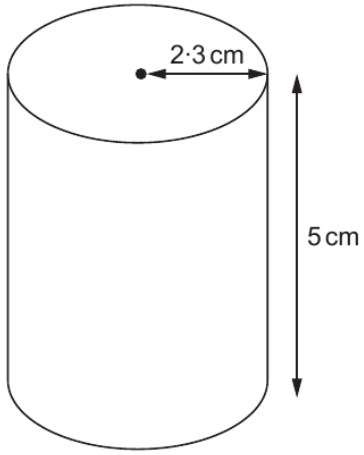


Diagram not drawn to scale

The mass of the cylinder is 423·1 g.

Find the density of the metal.
Give your answer in g/cm^3. [4]

Examiner only

13. (a) Solve the equation $3x - 10 = 17$. [2]

(b) Simplify $6f - 4g + 2f - 9g$. [2]

14. (a) Which of the following is nearest in mass to 5 kg?
Circle the correct answer. [1]

7 lb 11 lb 15 lb 19 lb 23 lb

(b) Which of the following is nearest in volume to 100 litres?
Circle the correct answer. [1]

100 pints 125 pints 150 pints 175 pints 200 pints

Examiner only

20. XY is a tangent to a circle, centre O, at the point A.
$\hat{AYO} = 54°$.

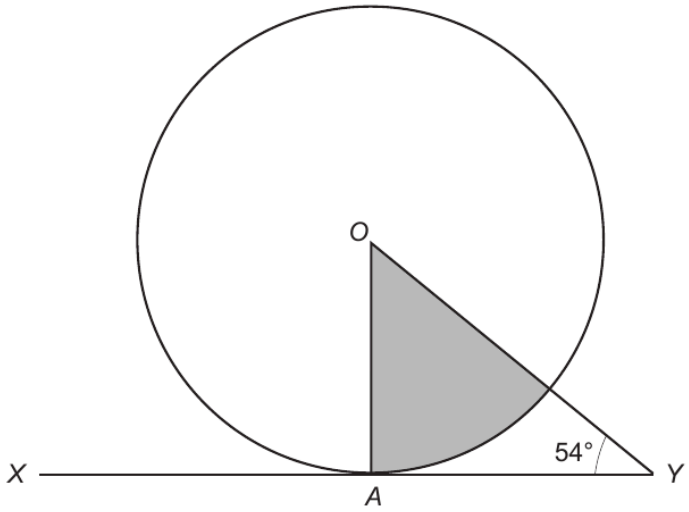


Diagram not drawn to scale

(a) What percentage of the whole circle is shaded?
You **must** show how you calculated your answer. [3]

(b) What tangent property of circles did you use in order to answer part (a)? [1]

END OF PAPER

Examiner only

1. (a) Write down the next two numbers in the following sequence. [2]

26, 24, 20, 14, ... , ...

(b) Find the value of $5x+2y$ when $x=-4$ and $y=9$. [2]

(c) Simplify the expression $5y+7m-3y-10m$. [2]

2. Write 0·41, $\frac{7}{20}$ and 45% in descending order.

You must show all your working. [3]

....

Greatest value ⟶ Smallest value

Examiner only

5. The map below shows part of South West Wales.

(a) Find the bearing of St Brides from Fishguard. [1]

..... °

(b) The distance by road from Haverfordwest to Milford Haven is 12 km.

(i) Estimate the distance by road from Haverfordwest to Fishguard. [1]

..... km

Examiner only

(ii) Owain has a **different** map that has a scale of 1 : 25000.

Owain measures the distance by road from Haverfordwest to Milford Haven on his map.
Complete Owain's statement below.

"On my map, the distance by road from Haverfordwest to Milford Haven is

represented by a length of ..... cm." [3]

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Examiner only

8. Elwyn ordered a solid garden ornament.

The ornament arrives in a box in the shape of a cuboid.
The box has length 15 cm, width 15 cm and height 30 cm.

The box only contains the ornament and packing.
The packing fits around the ornament and fills **all** the other space in the box.
When Elwyn opens the box, he is surprised at the volume of the packing in the box.
He says,

"$\frac{2}{3}$ of this box is filled with packing."

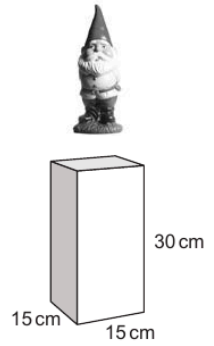

Diagram not drawn to scale

Use this information to calculate the volume of the garden ornament.
You must show all your working. [4]

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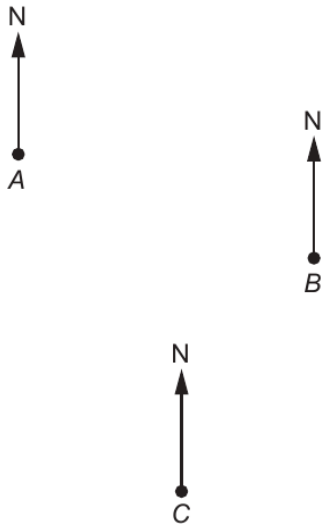
Examiner only

12. The diagram below shows the positions of three points *A*, *B* and *C* on a map.
The diagram is drawn to scale.



(a) Find the bearing of *B* from *A*. [1]

(b) Find the bearing of *A* from *C*. [1]

Examiner only

13. Here is a net of a cuboid.

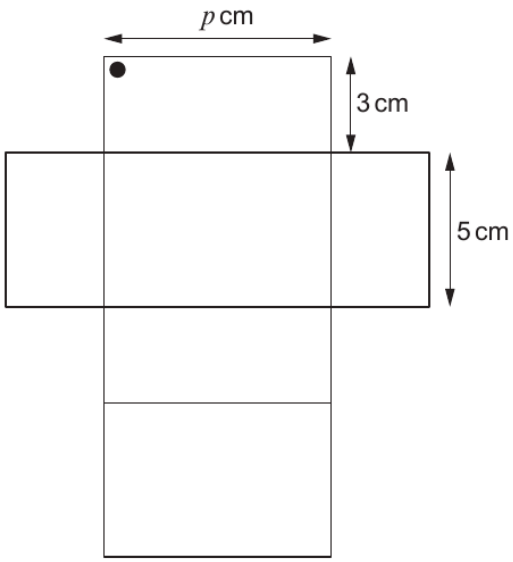


Diagram not drawn to scale

The net is folded to form a cuboid.

(a) The corner marked with ● meets two other corners on the net.
Mark these two other corners with ●. [2]

(b) The volume of the cuboid is 90 cm^3.
What is the value of p? [2]

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Examiner only

4. During the 30 days in the month of September, Andras used 138 m^3 of gas.
The cost of this gas was 12p per kWh.

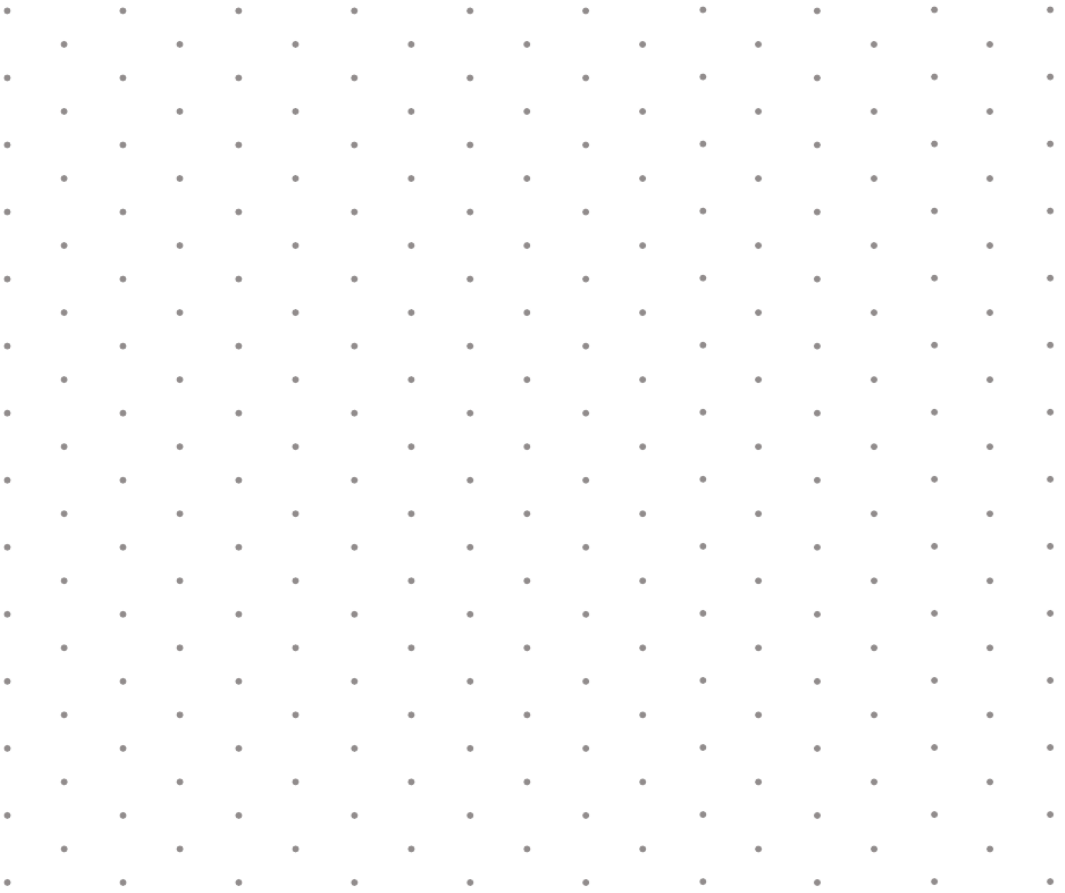
> The formula used to calculate the number of kWh for the gas used is as follows:
>
> Number of kWh = number of m^3 of gas × 39·5 × 1·02264 ÷ 3·6

The standing charge was 32p per day.
VAT at 5% was payable on the sum of the cost of the gas used and the standing charge.

Calculate Andras's gas bill for September.
You must show all your working. [7]

Examiner only

5. (a) Draw an isometric representation of a cuboid measuring 7 cm by 5 cm by 3 cm.
Use the grid below. [2]



(b) Calculate the volume of the cuboid.
You must give the units of your answer. [3]

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Examiner only

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Examiner only

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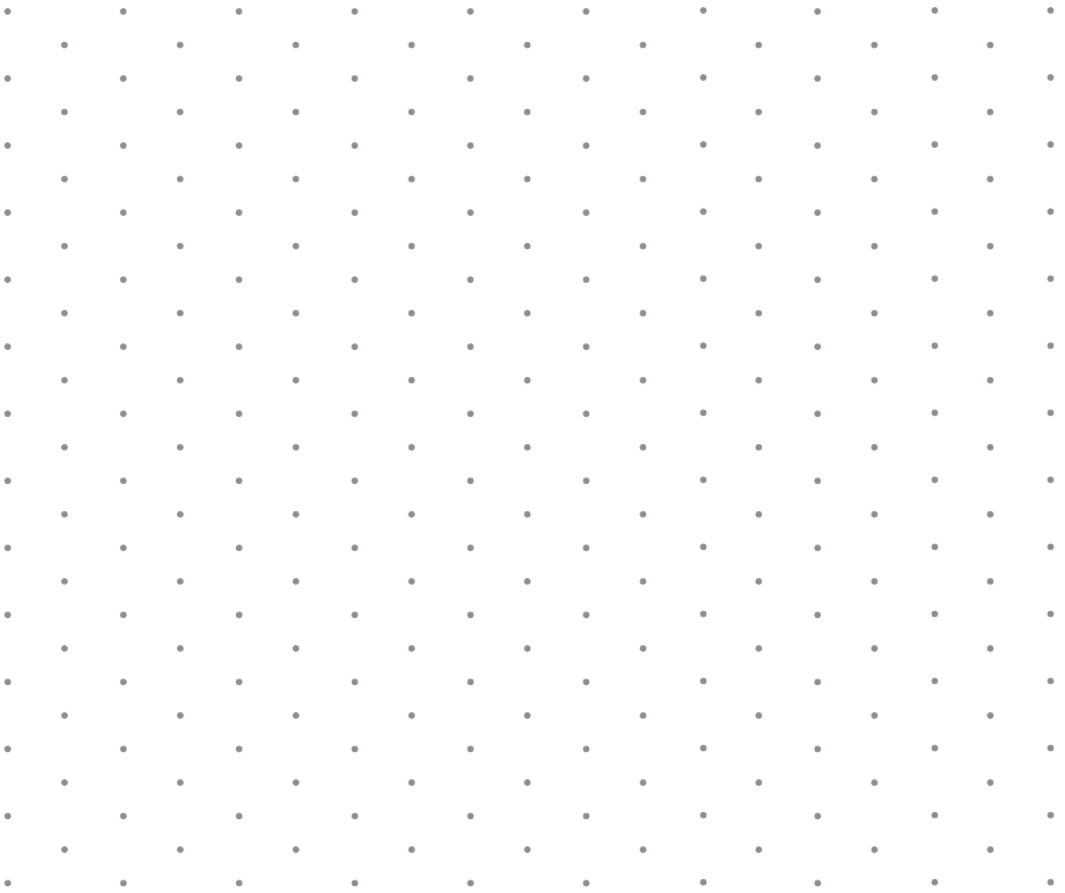

(b) Calculate the volume of the cuboid.
You must give the units of your answer. [3]

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Examiner only

14. The diagram below shows a water container.
It is formed from an open rectangular tank with a solid cylinder attached to its base inside the tank.

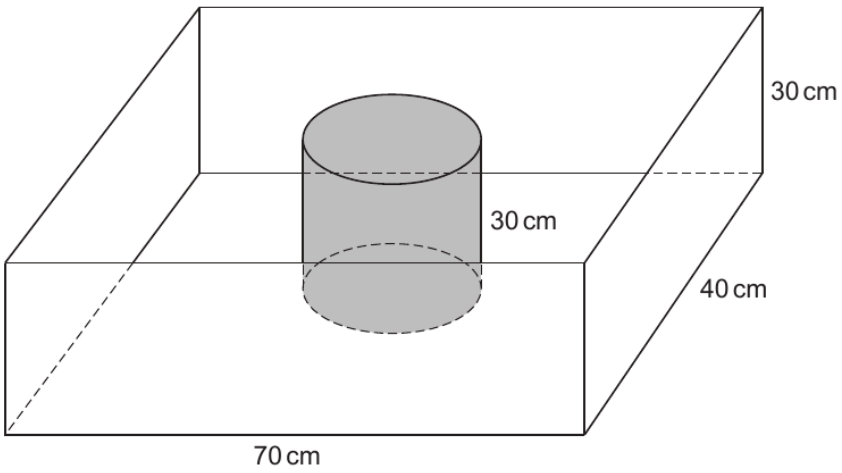


Diagram not drawn to scale

The base radius of the cylinder is 10 cm.
The height of the cylinder is 30 cm.

How many **litres** of water can the container hold?
You must show all your working. [6]

The container can hold ..... litres.

Examiner only

3. (a) Magic Johnson is one of the greatest basketball players of all time.

- He first played for the LA Lakers in 1979.
- His height is 206 cm.
- His salary in 1989 was $3 142 000.

(i) How many years ago did Magic Johnson first play for the LA Lakers? [1]

(ii) What is Magic Johnson's height in metres? [1]

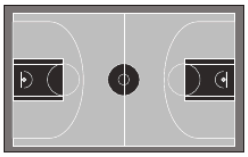
(iii) Write his salary of $3 142 000 in words. [1]

(b) Which of the following is the best description for the shape of a basketball?
Circle your answer. [1]

Sphere Cylinder Cuboid Cone Cube

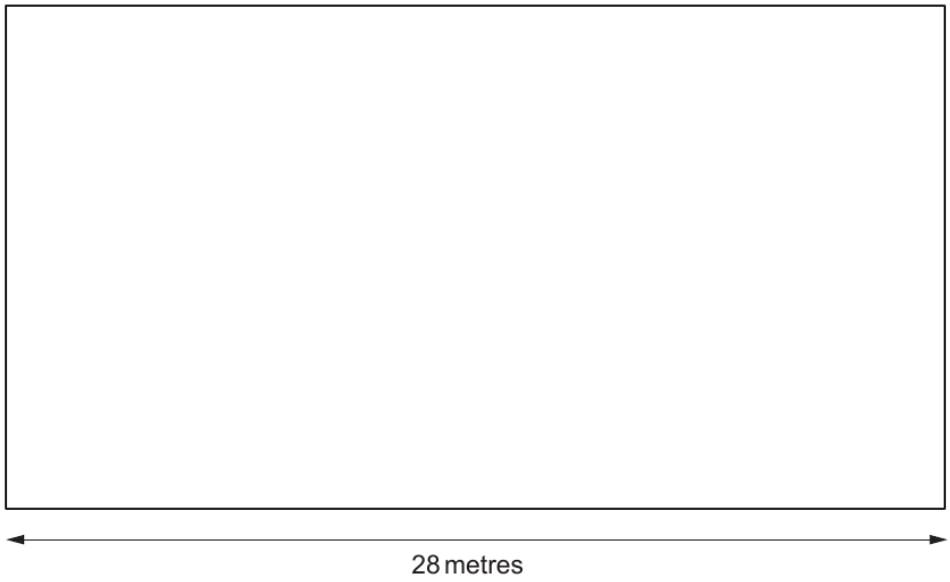
Examiner only

(c) A local basketball club trains on a basketball court each week.



The basketball court is rectangular.

The diagram below is **a scale drawing** of the basketball court.



The **actual length** of the basketball court is 28 metres.
Use the scale drawing to find the **actual width** of the basketball court. [3]

Actual width of the basketball court is ..... metres

Examiner only

(d) The diagram below represents the positions of three players on a basketball court.

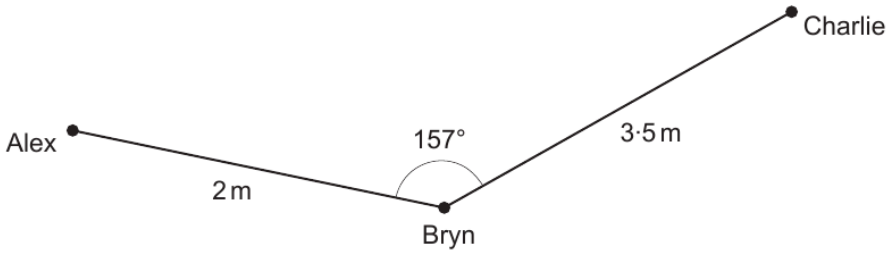


Diagram not drawn to scale

(i) Bryn faces Alex.
Bryn then turns clockwise to face Charlie.

Charlie thinks that Bryn has turned through an acute angle.
Do you agree?
Give a reason for your answer. [1]

Yes ☐ No ☐

.....

.....

(ii) In the space below, complete an **accurate scale drawing** to show Charlie's position.

The positions of Alex and Bryn are shown.

Use the scale: 1 cm represents 0·5 m. [2]

.....

Examiner only

4. PressiePacs is a company that designs and makes presentation boxes.

(a) Two designs, small and large, are shown below.
PressiePacs wants the large box to have **twice** the volume of the small box.

Small

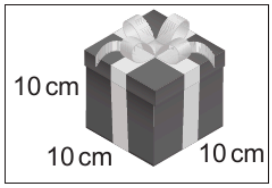
Large

Diagrams not drawn to scale

Calculate the height of the large box. [5]

(b) Customers can use this formula to calculate the cost of a presentation box:

Cost in £ = Surface area of the box in cm^2 ÷ 240



Calculate the cost of the **small** presentation box. [3]

Cost of the small presentation box is £ .....

Examiner only

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Diagrams not drawn to scale

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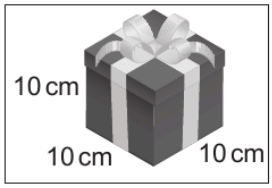

Calculate the cost of the **small** presentation box. [3]

Cost of the small presentation box is £ .....

Examiner only

17. The diagram shows a **solid** cylinder with radius 10 cm.
The total **surface area** of the solid cylinder is 1570·8 cm^2.

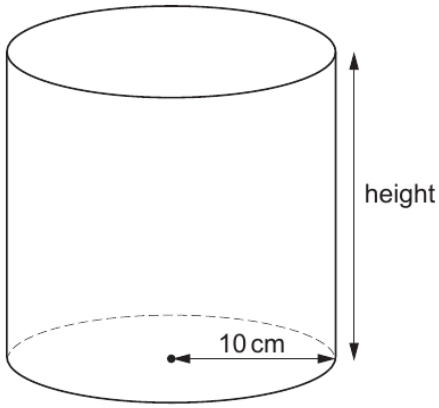

Diagram not drawn to scale

Find the height of the cylinder. [5]