



Pyramids, cones and spheres

About 55 minutes Calculator allowed 39 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

A1 Needed today [2 marks] **A2** From chapter 5 [2 marks]

A cylinder has volume $637\pi \text{ cm}^3$ and radius 7 cm. Find its height.

A solid cuboid measures 14 cm by 16 cm by 12 cm. It is made of a material with density 2.5 g/cm^3 . Find its mass in kilograms.

Answer

Answer

A3 From chapter 9 [2 marks] **A4** Key Stage 3 [2 marks]

A trapezium has parallel sides x cm and $(x + 4)$ cm, 9 cm apart. Its area is 63 cm^2 . Find x .

A spinner can land on A, B, C or D. $P(A) = 0.1$, $P(B) = 0.05$ and $P(C) = 0.45$. It is spun 400 times. How many times would you expect it to land on D?

Answer

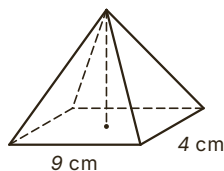
Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

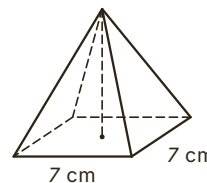
A pyramid has a rectangular base 9 cm by 4 cm and a vertical height of 10 cm. Work out its volume.



Hint Volume of a pyramid = $\frac{1}{3} \times \text{area of base} \times \text{height}$.

B1 [2 marks]

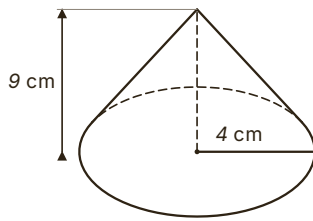
A pyramid has a square base of side 7 cm and a vertical height of 12 cm. Work out its volume.



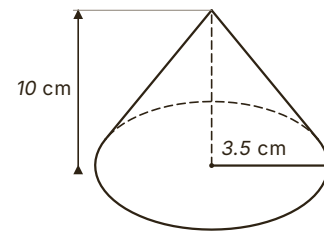
Answer

EXAMPLE 2

Work out the volume of the cone. Give your answer to 3 significant figures.



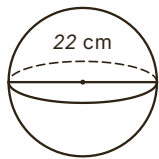
Hint Volume of a cone = $\frac{1}{3} \times \pi r^2 \times h$, a third of the cylinder.

B2 Work out the volume of the cone. Give your answer to 3 significant figures. [2 marks]

Answer

c Practice

- C1** A ball has a diameter of 22 cm. [3 marks]
Work out its surface area. Give your answer to 3 significant figures.

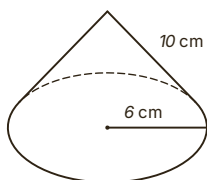


Answer

- C2** A sphere has a volume of 1000 cm³. Work out its radius. Give your answer to 1 decimal place. [3 marks]

Answer

- C3** A cone has a radius of 6 cm and a slant height of 10 cm. Work out its volume. Give your answer to 3 significant figures. [3 marks]



Not drawn accurately

Answer

- C4** A bowl is a hemisphere with an inside radius of 12 cm. How many litres does it hold? Give your answer to 3 significant figures. [3 marks]



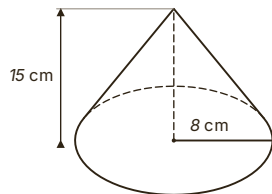
Answer

D Exam-style questions

- D1** A cone has radius 8 cm and vertical height 15 cm. Jo says, "The curved surface area is $\pi \times 8 \times 15 = 377 \text{ cm}^2$."

[3 marks]

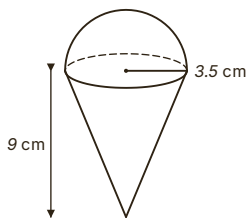
Show that Jo is wrong, and work out the correct curved surface area.



Not drawn accurately

Answer

- D2** A solid is a cone with a hemisphere on top, both of radius 3.5 cm. The cone is 9 cm tall.



Not drawn accurately

- (a)** Work out the volume of the solid. Give your answer to 3 significant figures. [4 marks]

Answer

- (b)** Work out its outside surface area. Give your answer to 3 significant figures. [4 marks]

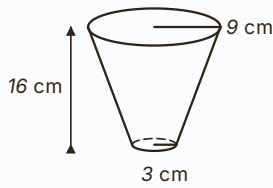
Answer

Total for D2: 8 marks

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** A bucket is a cone with its tip cut off. Its base radius is 3 cm, its top radius 9 cm [4 marks] and its height 16 cm. How many litres does it hold, to 3 significant figures?



Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Carry the sloping sides down until they meet: a big cone with a small cone cut off.
- Hint 2** The radius triples, so the whole cone is 3 times as tall as the small one: 8 cm and 24 cm.
- Hint 3** Bucket = $\frac{1}{3}\pi \times 9^2 \times 24 - \frac{1}{3}\pi \times 3^2 \times 8 = 624\pi \text{ cm}^3$.
Change cm^3 to litres.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

- I can work out the volume of a pyramid, a cone and a sphere. ☐ ☐ ☐
- I can use the slant height for a cone's curved surface, and work back from a volume. ☐ ☐ ☐
- I can work with solids made from more than one shape. ☐ ☐ ☐