Surface area, volume and measurement - Applications test

Name: _____ Date: _____

16 questions | 49 marks | 60 minutes

Choose suitable measurement models for packaging, paint, tanks and precision decisions.

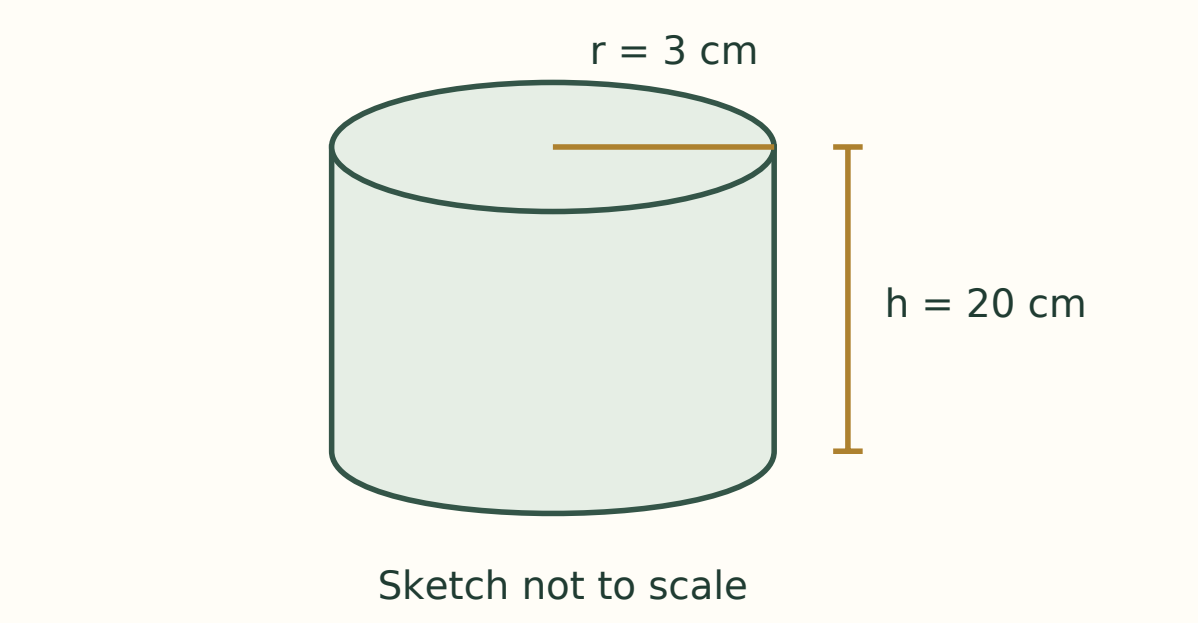
A scientific calculator may be used.

1. A maker wants to estimate the metal needed for a tank wall. Should the calculation use area or volume? State a suitable unit. [1 mark]

2. A model package needs 750 cm² of card. Convert this area to square metres. [2 marks]

3. A rectangular pond has internal dimensions 2 m by 1.2 m by 0.5 m. Find its full capacity in litres. [2 marks]

4. A cylindrical bottle has internal diameter 6 cm and height 20 cm. Estimate its capacity to the nearest millilitre. [3 marks]



5. A paper sleeve covers the curved face of a can with radius 3 cm and height 10 cm. Allow 5% extra area for overlap. Find the sleeve area to one decimal place. [3 marks]

6. A square post has cross-section side length 5 cm and length 240 cm. Paint only the four long faces, not the ends. Find the painted area in square metres. [3 marks]

7. A cylindrical tank has internal radius 0.75 m. Water must reach a depth of 0.8 m. It fills from empty at 30 L per minute. Find the filling time to one decimal place. [3 marks]

8. A closed cylinder has radius 1 m and height 2 m. All surfaces need two paint coats. Paint covers 6 m^2 per litre per coat and comes in 4 L tins. Find the least number of tins needed. [4 marks]

9. A calibrated tank holds 160 L. A measuring device reports 157 L. Find its percentage error. Give the unrounded percentage. [2 marks]

10. Two rulers record to the nearest 0.1 cm and the nearest 0.01 cm. Compare their maximum rounding errors. [3 marks]

11. A rectangular container must hold 8 L. Its internal base is 20 cm by 10 cm. Find the minimum internal height. [3 marks]

12. Each of 12 rectangular cartons has internal dimensions 24 cm by 15 cm by 10 cm. Find their combined capacity in litres and cubic metres. [3 marks]

13. A cylindrical container must hold at least 2000 cm^3. Its internal radius is 5 cm. Height can be chosen in 0.1 cm steps. Find the smallest suitable height. [3 marks]

14. A room is 4 m long, 3 m wide and 2.5 m high. Paint the four walls only. Door openings have a total area of 4 m². Find the wall area that needs paint. [3 marks]

15. Two closed package designs are available. A is a rectangular prism 6 cm by 5 cm by 4 cm. B is a cylinder with radius 2 cm and height 10 cm. Ignore thickness and joins. [6 marks]

Two closed package designs

Design	Shape	Dimensions
A	Rectangular prism	$6\text{ cm} \times 5\text{ cm} \times 4\text{ cm}$
B	Cylinder	radius 2 cm, height 10 cm

(a) Calculate the volume of each design. [2 marks]

(b) Calculate the surface area of each design. [2 marks]

(c) The package must hold at least 120 cm³. Which design meets this requirement using less material? Explain. [2 marks]

16. A rectangle is recorded as 10.0 cm long and 5.0 cm wide. Both readings are rounded to the nearest 0.1 cm. [5 marks]

(a) Calculate the area using the recorded readings. [1 mark]

(b) State the interval for each unrounded length. [2 marks]

(c) Use the intervals to give lower and upper bounds for the actual area. [2 marks]