MEMORANDUM

Name: ..... Class: .....

Date: .....

MARK ____ / 48

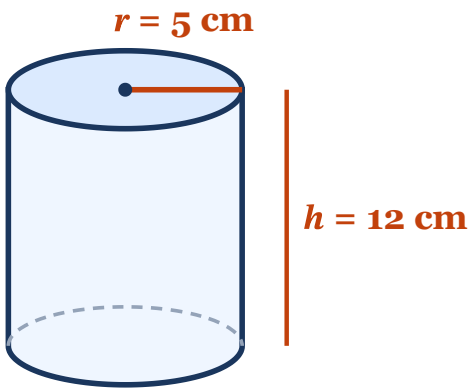
Answer all questions. Show all your working — marks are awarded for method as well as the final answer. **Teacher copy: accept any correct equivalent method.**

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1 A cube has a volume of 216 cm^3. Determine the length of one edge, and hence the total surface area of the cube. **(4)**

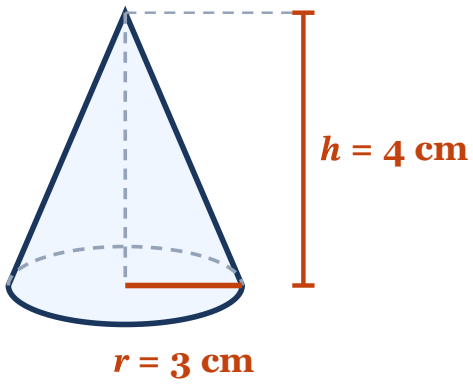
> edge $= \sqrt[3]{216} =$ **6 cm** *(2)*
> A cube has 6 square faces, so SA $= 6 \times 6^2$ *(1)*
> $=$ **216 cm^2** *(1)* ✓✓✓✓ (4)

2 The diagram below shows a cylinder. Calculate its volume. ($\pi \approx 3{,}14$) **(3)**



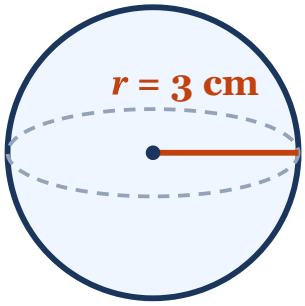
> $3{,}14 \times 25 \times 12 =$ **942 cm^3** ✓✓✓ (3)

3 The diagram below shows a cone. Calculate its volume. ($\pi \approx 3{,}14$) **(3)**



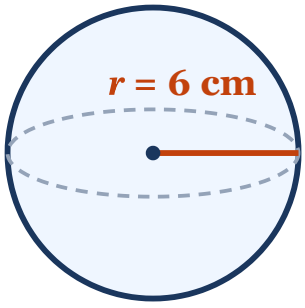
$\frac{1}{3} \times 3{,}14 \times 9 \times 4 = \mathbf{37{,}68\ cm^3}$ ✓✓✓ (3)

4 Calculate the volume of the sphere in the diagram below. ($\pi \approx 3{,}14$) **(3)**



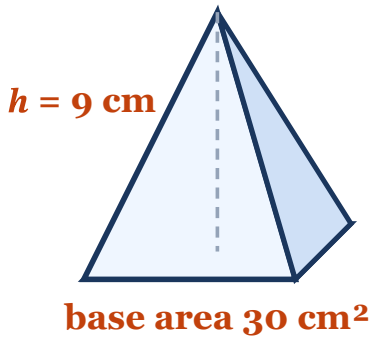
$\frac{4}{3} \times 3{,}14 \times 27 = \mathbf{113{,}04\ cm^3}$ ✓✓✓ (3)

5 Calculate the surface area of the sphere in the diagram below. ($\pi \approx 3{,}14$) **(3)**



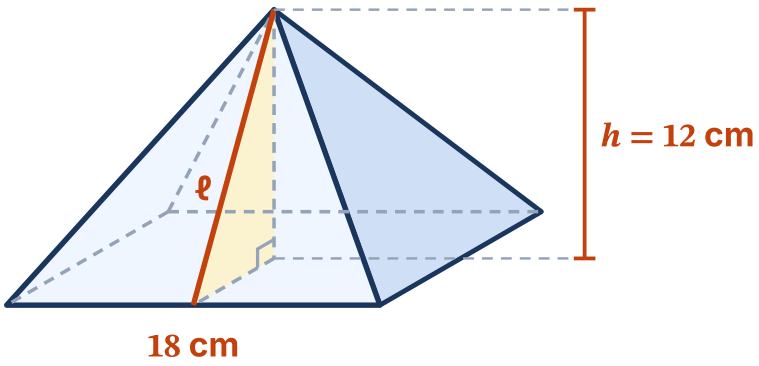
$4 \times 3{,}14 \times 36 = \mathbf{452{,}16\ cm^2}$ ✓✓✓ (3)

6 The diagram below shows a pyramid. Calculate its volume. **(3)**



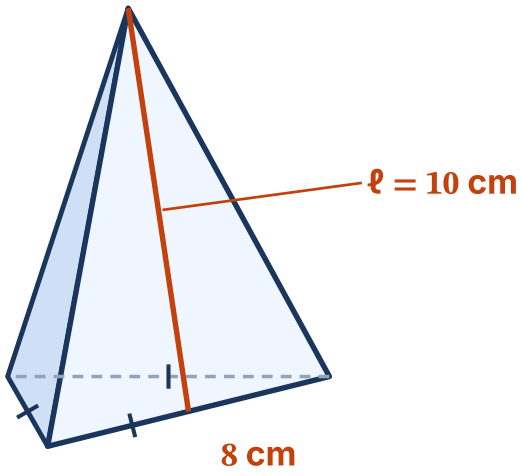
> ⅓ × 30 × 9 = **90 cm³** ✓✓✓ (3)

7 The diagram below shows a right pyramid with a square base of side 18 cm and a perpendicular height of 12 cm. Calculate the slant height ℓ and the total surface area of the pyramid. **(5)**



> Half the base edge = 9 cm; $\ell^2 = 12^2 + 9^2 = 225$, so **$\ell = 15$ cm** *(2)*
>
> Base = $18^2 = 324$ cm² *(1)*; four faces = $4 \times \frac{1}{2} \times 18 \times 15 = 540$ cm² *(1)*
>
> TSA = 324 + 540 = **864 cm²** *(1)* ✓✓✓✓✓ (5)

8 The diagram below shows a right pyramid whose base is an equilateral triangle with sides of 8 cm. The slant height of each sloping face is 10 cm. Calculate the total surface area of the pyramid. **(4)**



the base is an equilateral triangle

Height of the base triangle $= \sqrt{8^2 - 4^2} = \sqrt{48} \approx 6{,}93$ cm *(1)*

Base area $= \frac{1}{2} \times 8 \times \sqrt{48} \approx 27{,}71$ cm^2 *(1)*

Three faces $= 3 \times \frac{1}{2} \times 8 \times 10 = 120$ cm^2 *(1)*

TSA $\approx$ **147,71 cm^2** *(1)* ✓✓✓✓ **(4)**

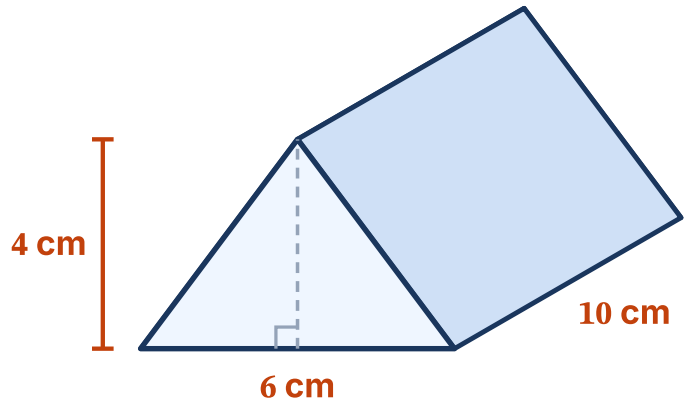
9 A solid's dimensions are all doubled. What happens to its volume? **(2)**

It becomes **8 times** bigger (2^3). ✓✓ **(2)**

10 A solid's dimensions are all tripled. What happens to its surface area? **(2)**

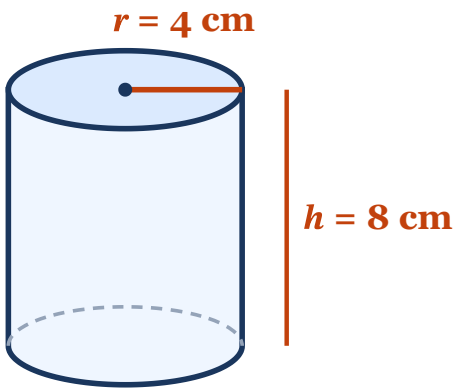
It becomes **9 times** bigger (3^2). ✓✓ **(2)**

11 The diagram below shows a triangular prism. Calculate its volume. (3)



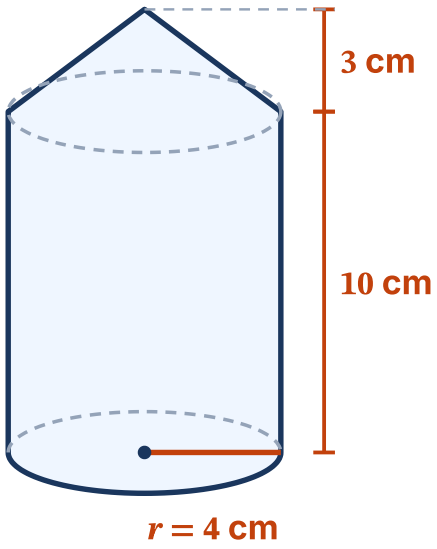
½ × 6 × 4 = 12 cm²; 12 × 10 = **120 cm³** ✓✓✓ (3)

12 Calculate the volume of the cylinder in the diagram below. (π ≈ 3,14) (3)



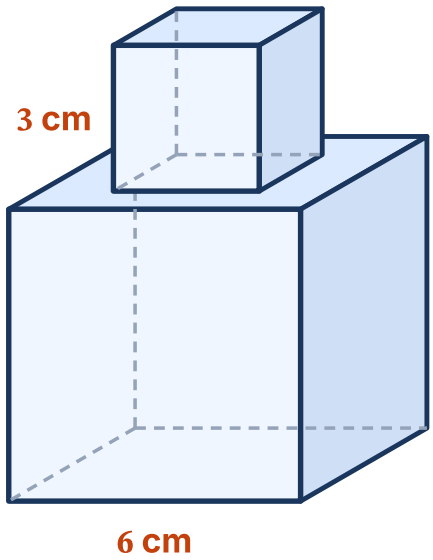
3,14 × 16 × 8 = **401,92 cm³** ✓✓✓ (3)

13 The solid in the diagram below is a cylinder of radius 4 cm and height 10 cm with a cone of height 3 cm on top. Calculate the volume and the total surface area of the solid, correct to TWO decimal places. **(6)**



$V = \pi(4)^2(10) + \frac{1}{3}\pi(4)^2(3) = 160\pi + 16\pi = 176\pi \approx$ **552,92 cm³** *(2)*
Slant height of the cone: $\ell = \sqrt{3^2 + 4^2} = 5$ cm *(1)*
TSA = base + curved wall + curved cone $= \pi(4)^2 + 2\pi(4)(10) + \pi(4)(5)$ *(1)*
$= 16\pi + 80\pi + 20\pi = 116\pi \approx$ **364,42 cm²** *(1)*
The circle where the cone meets the cylinder is sealed inside and is not counted *(1)* ✓✓✓✓✓ **(6)**

14 A cube with edges of 3 cm is glued to the centre of the top of a cube with edges of 6 cm, as in the diagram below. Calculate the total surface area of the solid. **(3)**



Large cube: $6 \times 6^2 = 216$ cm²; small cube: $6 \times 3^2 = 54$ cm² *(1)*
The joined 3 cm by 3 cm square is hidden on BOTH cubes: subtract $2 \times 9 = 18$ cm² *(1)*
TSA $= 216 + 54 - 18 =$ **252 cm²** *(1)* ✓✓✓ **(3)**

15 Which two solids have a ⅓ in their volume formula? **(1)**

> The **cone and the pyramid** ✓ (1)

TOTAL: 48 marks

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