

- (1) Two pillars, as drawn in the diagram, must be planted and painted at an entrance gate.

The height (H) of the pillars above the ground is

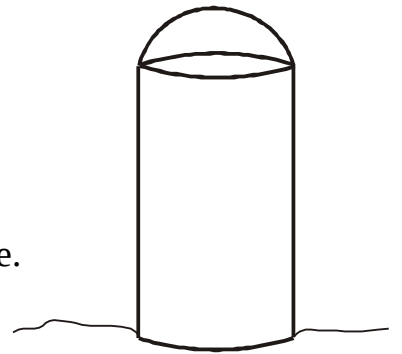
1,8 metres each. The diameter of each pillar is 25 cm.

Each pillar requires two coats of paint. Each litre of paint can cover an area of $3,2 \text{ m}^2$ with one coat.

The domes on the top of the pillar are in the shape of a semi-sphere.

Calculate the total number litres of paint required to paint the pillars with the two coats.

The total surface area can be rounded off to 1 decimal.



$$\text{Diameter} = 25 \text{ cm} \rightarrow \text{radius} = 12,5 \text{ cm} \rightarrow \text{radius} = 12,5 \text{ cm} \rightarrow \text{radius} = 0,125 \text{ m}$$

Total surface area to paint

= Round side of cylinder + Semi-sphere

$$= [(2\pi r) \times H] + \left[\frac{1}{2} \times 4\pi r^2 \right]$$

$$= [(2\pi \times 0,125) \times 1,8] + \left[\frac{1}{2} \times 4\pi(0,125)^2 \right]$$

$$= [1,413 \dots] + [0,098 \dots]$$

$$= 1,511 \dots \dots$$

$$\approx 1,5 \text{ m}^2 \text{ per pillar} \dots \dots$$

There are two pillars, each with two layers of paint $\rightarrow 1,5 \text{ m}^2 \times 4 = 6 \text{ m}^2$

$$\therefore \text{Number litres of paint needed} \rightarrow 6 \text{ m}^2 \div 3,2 = 1,875 \text{ litres}$$

- (2) A piece of cast iron, in the shape of a cube with side lengths 15 cm, is melted and then moulded into spherical balls. There must be exactly 1 125 balls moulded from the cube. Calculate the diameter of each spherical ball in mm.

$$\text{Volume of cast iron} = L^3 = 15^3 = 3\,375 \text{ cm}^3$$

$$\text{Volume of one ball} = \frac{3\,375}{1\,125} = 3 \text{ cm}^3$$

$$\text{Volume of one ball} = \frac{4}{3}\pi r^3 = 3 \text{ cm}^3$$

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$$\therefore 4\pi r^3 = 3 \times 3$$

$$\therefore r^3 = \frac{9}{4\pi}$$

$$\therefore r^3 = 0,716 \dots$$

$$\therefore r = \sqrt[3]{0,716 \dots}$$

$$\therefore r = 0,8947 \dots \text{ cm}$$

$$\therefore d = 1,7894 \dots \text{ cm}$$

$$\therefore d = 17,894 \dots \text{ mm}$$

$$\therefore d \approx 17,89 \text{ mm}$$