

MAP4C1 Unit 2: Geometry

2.3 Volume and Surface Area

Learning Goals: I am learning to...

- Determine the volume and surface area of a simple object
- Apply volume and surface area to a real-world scenario



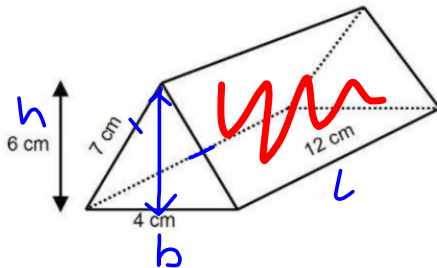
Reminder:

- **Volume** is... *the amount of space taken up by an object (e.g. m³, cm³)*
- **Surface Area** is... *the area of all sides around the shape (e.g. m², in²)*

Part A: Volume and Surface Area of a Prism

Example 1: Given the following prism.

- a) Determine the amount of chocolate that can fit inside this Toblerone package. Round to one decimal place.
- b) Determine the surface area of the wrapper needed to cover the chocolate. Round to one decimal place.



a) Volume:

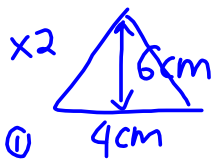
$$V = \frac{1}{2} b l h$$

$$= \frac{1}{2} (4)(12)(6)$$

$$= 144 \text{ cm}^3$$

∴ you can fit 144 cm³ in a package of Toblerone.

b) Surface Area:



①

$$A = \frac{1}{2} b h$$

$$= \frac{1}{2} (4)(6)$$

$$= 12 \text{ cm}^2$$

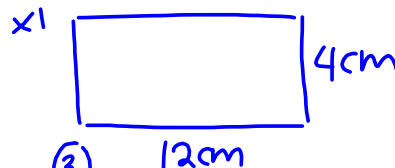


②

$$A = l w$$

$$= 12(7)$$

$$= 84 \text{ cm}^2$$



③

$$A = l w$$

$$= 12(4)$$

$$= 48 \text{ cm}^2$$

$$SA = 2A_1 + 2A_2 + A_3$$

$$= 2(12) + 2(84) + 48$$

$$= 24 + 168 + 48$$

$$= 240 \text{ cm}^2$$

∴ you will need 240 cm² of wrapping

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Part B: Volume and Surface Area of a Cylinder

Example 2: Cineplex has just redesigned their jumbo popcorn containers. The container is 2 ft high and holds 1.5 m³ of popcorn.

a) What is the diameter of the container to the nearest centimetre?

$$V = 1.5 \text{ m}^3$$

① Convert ft → m
1 ft = 0.3048 m

$$2 \text{ ft} \times \frac{0.3048 \text{ m}}{1 \text{ ft}} = 0.6096 \text{ m}$$

② $V = \pi r^2 h$
 $\frac{1.5}{0.6096 \pi} = \frac{\pi r^2 (0.6096)}{0.6096 \pi}$
 $0.7832 = r^2$

→ $\sqrt{0.7832} = r$
 $0.885 = r$
 $d = 2r$
 $= 2(0.885)$
 $= 1.77 \text{ m}$



③ convert m → cm
 $1.77 \text{ m} \times \frac{100 \text{ cm}}{1 \text{ m}}$
 $= 177 \text{ cm}$

∴ The diameter is 177 cm.

b) What is the surface area of the popcorn bucket? Round to one decimal place.

Note: There is no top (only side & base)

base: $A_1 = \pi r^2$
 $= \pi (0.885)^2$
 $= 2.46 \text{ m}^2$

side: $A_2 = 2\pi r h$
 $= 2\pi (0.885)(0.6096)$
 $= 3.39 \text{ m}^2$

Total SA = $A_1 + A_2$
 $= 2.46 + 3.39$
 $= 5.9 \text{ m}^2$

∴ The SA of the bucket is 5.9 m²