

Unit 3 - Volume

3.2A Volume Intro

Base (of a prism): the face of a prism that defines that prism

ex. rectangular prism $\rightarrow$ base = rectangle
 triangular prism $\rightarrow$ base = triangle
 circular prism $\rightarrow$ base = circle

Height (of a prism): the perpendicular (90° to the base) distance between the two bases of the prism

Volume:

- amount of space (3D) an object occupies
- amount of space inside the object

Volume of Prism = base area $\times$ height

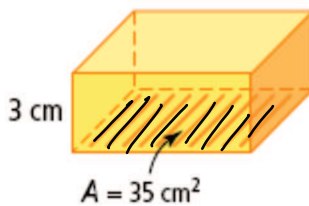
$$V = A_B \times h$$

* measured in cubic units

Example 1: Volume of a Prism

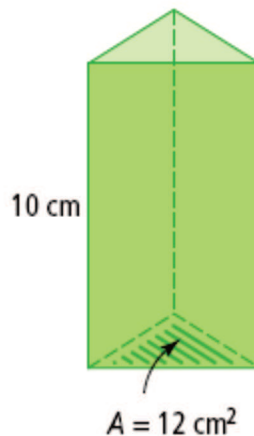
Determine the volume of each right prism or cylinder.

a)



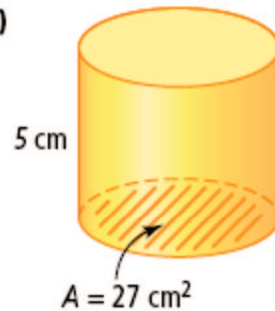
$$\begin{aligned} V &= A_B \times h \\ &= 35 \times 3 \leftarrow \\ &= \boxed{105 \text{ cm}^3} \end{aligned}$$

b)



$$\begin{aligned} V &= A_B \times h \\ &= 12 \times 10 \leftarrow \\ &= \boxed{120 \text{ cm}^3} \end{aligned}$$

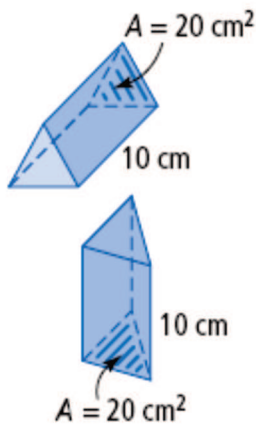
c)



$$\begin{aligned} V &= A_B \times h \\ &= 27 \times 5 \leftarrow \\ &= \boxed{135 \text{ cm}^3} \end{aligned}$$

Example 2: Changing the Orientation

Do the two triangular prisms shown below have the same volume?

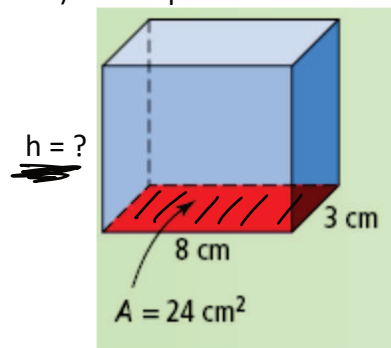


Yes, same volume.

$$\begin{aligned} V &= A_B \times h \\ &= 20 \times 10 \\ &= \boxed{200 \text{ cm}^3} \end{aligned}$$

Example 3: Using volume to find base area or height

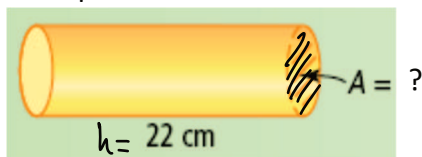
- a) If the prism shown has a volume of 168 cm^3 , calculate its height.



$$\begin{aligned} V &= A_B \times h \\ 168 &= 24 h \\ \frac{168}{24} &= \frac{24}{24} h \\ h &= \boxed{7 \text{ cm}} \end{aligned}$$

$$h = \frac{V}{A_B}$$

- b) If the prism shown has a volume of 880 cm^3 , calculate its base area.



$$\begin{aligned} V &= A_B \times h \\ 880 &= A_B \times 22 \\ \frac{880}{22} &= \frac{A_B \times 22}{22} \\ A_B &= \boxed{40 \text{ cm}^2} \end{aligned}$$