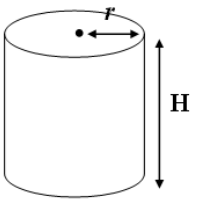
7.4 – SOLVING PROBLEMS INVOLVING PRISMS & CYLINDERS

General Formula for Volume = area of base × height of prisms and cylinder

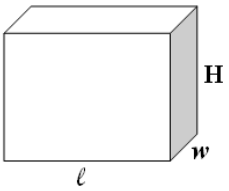
$V = A \times H$

Cylinder



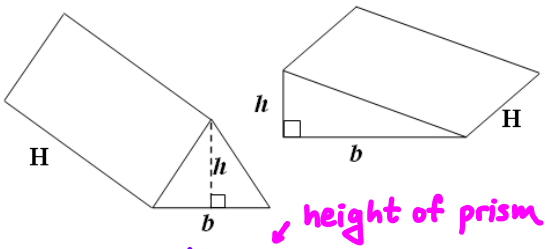
$V = \pi r^2 H$

Rectangular Prism



$V = \ell w H$

Triangular Prism



$V = \frac{1}{2} bhH$ ← height of prism

↑ height of triangle

Example 1:

Marcus is making a display of packages of Prism Chocolates in his candy shop. He will stack 64 packages to form a shape.

What is the volume of the display?

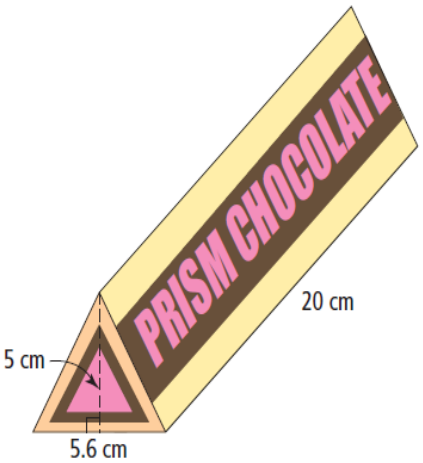
$V = \frac{1}{2} bhH$

$= \frac{1}{2}(5.6)(5)(20)$

$= 280\ cm^3$

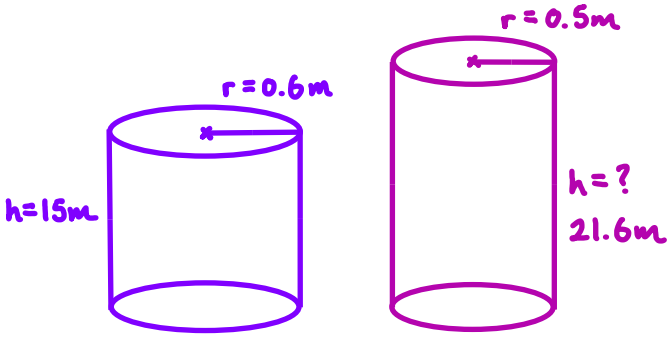
$280\ cm^3 \times 64$

$= 17920\ cm^3$



Example 2:

A cylinder with a radius of 0.6 m and a height of 15 m needs to be replaced with a cylinder of equal volume. However, the new cylinder has a radius of 0.5 m.
How high must the new cylinder be?



$V = \pi r^2 h$

$= \pi (0.6)^2 (15)$

$= 5.4\pi \text{ m}^3$

$5.4\pi = \pi (0.5)^2 h$

$5.4\pi = 0.25h\pi$

$5.4 = 0.25h$

$\div 0.25 \quad \div 0.25$

$21.6\text{m} = h$

Example 3:

Jim has designed rectangular culverts to carry water under a new highway. He estimates that the distance under the highway is 45 m. Determine the volume of concrete he needs to make the required number of culvert pieces. Give your answer to the nearest tenth of a cubic metre.

1. # of pieces needed:

$45\text{m} \div 15\text{m} = 3$ pieces

2. concrete block

$V = lwh$

$= 2 \times 2 \times 15 = 60\text{m}^3$

3. opening

$V = \pi r^2 h$

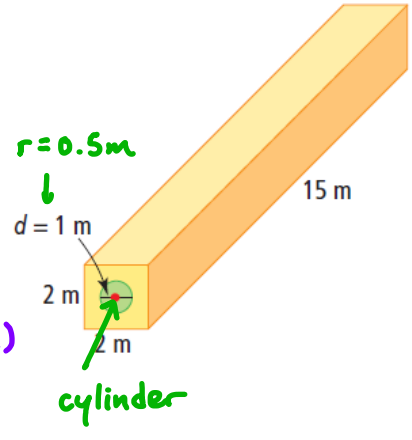
$= \pi (0.5)^2 (15) \doteq 11.78\text{m}^3$

4. difference (concrete needed)

$60 - 11.78 = 48.22\text{m}^3$

5 total needed

$48.22 \times 3 = 144.66\text{m}^3$



Assignment: p. 273 #4 – 8, 10, 11, 13, 16