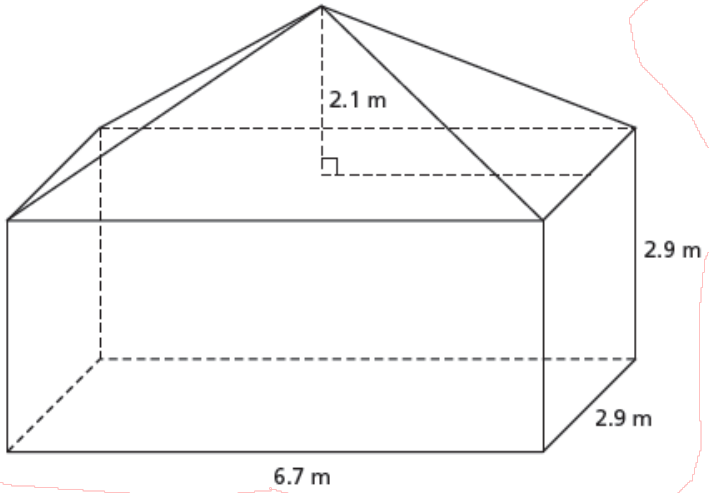
1.7 Solving Problems Involving Composite Objects

A *composite object* comprises two or more distinct objects.
To determine the volume of a composite object, identify the distinct objects, calculate the volume of each object, then add the volumes.

Example 1 Determining the Volume of a Composite Object

Determine the volume of this composite object to the nearest tenth of a cubic metre.



Rect. Prism :

$V = \ell \times w \times h$

$V = 6.7 \times 2.9 \times 2.9$

$V = 56.347 \text{ m}^3$

Rect. Pyramid

$V = \frac{1}{3}(\text{Area of Base})h$

$V = \frac{1}{3}(6.7 \times 2.9) \times 2.1$

$V = 13.601 \text{ m}^3$

Total Volume :

$56.347 + 13.601$

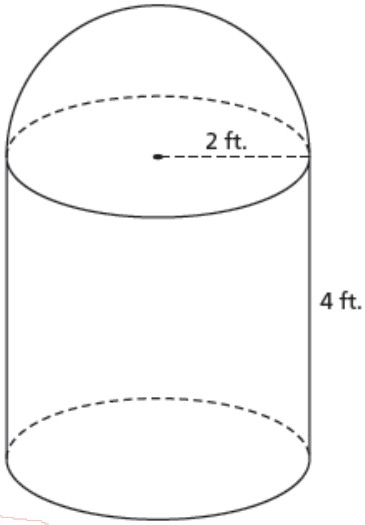
$= 69.948$

$= 69.9 \text{ m}^3$

To calculate the surface area of a composite object, the first step is to determine the faces that comprise the surface area. Then calculate the sum of the areas of these faces.

Example 2 Determining the Surface Area of a Composite Object

Determine the surface area of this composite object to the nearest square foot.



Cylinder Part:

$SA = \pi r^2 + 2\pi rh$

$SA = (3.14)(2)^2 + 2(3.14)(2)(4)$

$SA = 12.56 + 50.24$

$SA = 62.8 \text{ ft}^2$

Hemisphere Part:

$SA = 2\pi r^2$

$SA = 2(3.14)(2)^2$

$SA = 25.12 \text{ ft}^2$

Total Surface Area

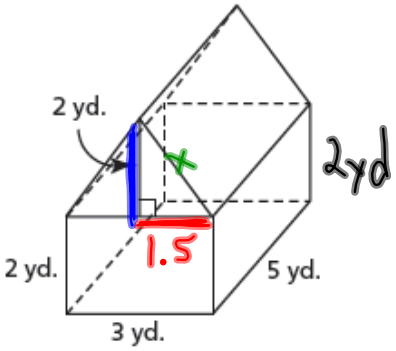
$62.8 + 25.12$

$= 87.92$

$= 88 \text{ ft}^2$

Example 3 Solving a Problem Related to a Composite Object

A cabane à sucre is a composite object formed by a rectangular prism with a right triangular prism as its roof. Determine the surface area of the cabane à sucre in square yards.



Rectangular Prism Part:

$SA = 2(2)(3) + 2(5)(2) + (3)(5)$

$SA = 12 + 20 + 15$

$SA = 47\ yd^2$

using Pythagorean Thm'

$x^2 = 2^2 + 1.5^2$

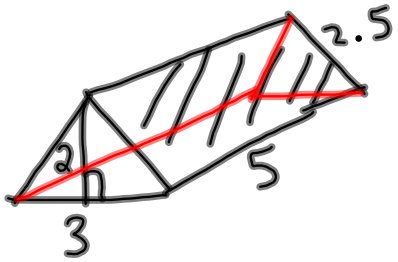
$x^2 = 4 + 2.25$

$x^2 = 6.25$

$x = \sqrt{6.25} = 2.5$

Triangular Prism Part:

$SA = 2\left(\frac{(3)(2)}{2}\right) + 2(5)(2.5)$



$SA = 6 + 25$

$SA = 31\ yd^2$

Total Surface Area $= 47 + 31 = 78\ yd^2$

We can now calculate the Surface area and Volumes of :

→ Prisms
→ cylinders
→ Pyramids
→ Cones
→ spheres and hemispheres
→ composite objects