Lesson 4.2: Rectangular and Triangular Prisms and Cylinders
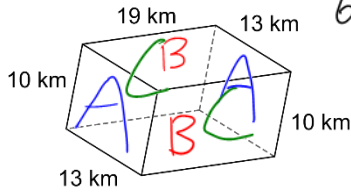
Learning Goal: We are learning to calculate the surface area and volume for common 3D shapes.

Surface Area: find the area of each 2D shape by itself, using yesterday's formulas, then add all of them together

Volume: always the "area of the base" × "the height"

For each figure, calculate the surface area and the volume.

1.

19 km   13 km   10 km   13 km   10 km   13 km

$\ell = 19$
$w = 13$
$h = 10$

6 rectangles

$SA = 2A + 2B + 2C$

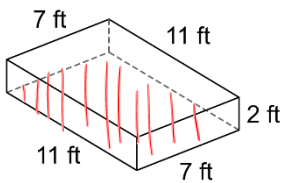$SA = 2(10 \times 13) + 2(13 \times 19) + 2(10 \times 19)$

$SA = 260 + 494 + 380$

$SA = 1134 \, Km^2$

$V = \ell w h$

$V = (19)(13)(10)$

$V = 2470 \, Km^3$

2.

7 ft   11 ft   2 ft   11 ft   7 ft

$\ell = 11$
$w = 7$
$h = 2$

$SA = 2A + 2B + 2C$

$SA = 2(11 \times 7) + 2(7 \times 2) + 2(11 \times 2)$

$SA = 154 + 28 + 44$

$SA = 226 \, ft^2$
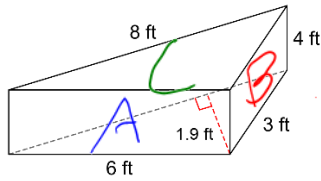
$V = \ell w h$

$V = (11)(7)(2)$

$V = 154 \, ft^3$

3.

8 ft   4 ft
A   C   B
1.9 ft   3 ft
6 ft

$A \begin{cases} b=8 \\ h=1.9 \end{cases}$

$\ell = 4$

↑ the distance between the triangles

$SA = 2\underset{\frac{bh}{2}}{\Delta} + \overset{lw}{A} + \overset{lw}{B} + \overset{lw}{C}$

$SA = 2\left(\frac{8 \times 1.9}{2}\right) + (6 \times 4) + (3 \times 4) + (8 \times 4)$

$SA = 15.2 + 24 + 12 + 32$

$SA = 83.2 \, ft^2$

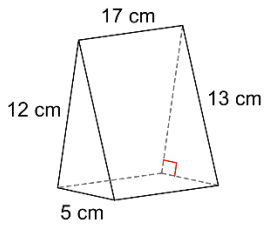$V = \frac{bh\ell}{2}$

$V = \frac{(8)(1.9)(4)}{2}$

$V = 30.4 \, ft^3$

4.

17 cm
12 cm   13 cm
5 cm

$b = 5$

$h = 12$

$\ell = 17$

$SA = 2\Delta + A + B + C$

$SA = 2\left(\frac{5 \times 12}{2}\right) + (5 \times 17) + (12 \times 17) + (13 \times 17)$
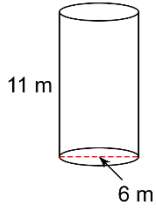
$SA = 60 + 85 + 204 + 221$

$SA = 570 \, cm^2$

$V = \frac{bh\ell}{2}$
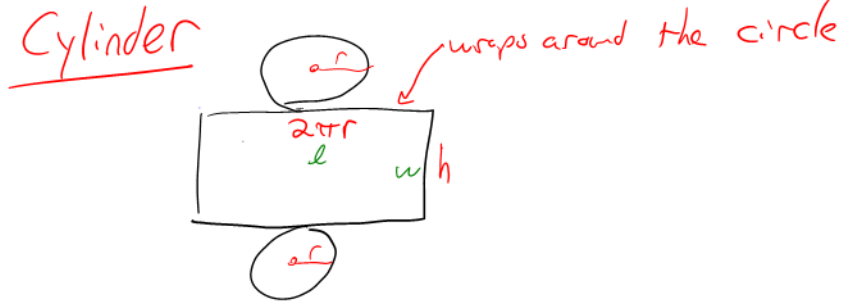
$V = \frac{5 \times 12 \times 17}{2}$

$V = 510 \, cm^3$

For each figure, draw the net, then calculate the surface area and the volume.

5.

11 m

6 m

Cylinder

$r = 3$

$h = 11$

wraps around the circle

$2\pi r$

ℓ

$w \mid h$

$SA = 2\pi r^2 + \underbrace{2\pi rh}_{\ell \quad w}$
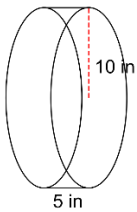
$SA = 2(3.14)(3)^2 + 2(3.14)(3)(11)$

$SA = 56.52 + 207.24$

$SA = 263.76 m^2$

$V = \pi r^2 h = (3.14)(3)^2(11)$

$= 310.86 m^3$

6.

10 in

5 in

Use the appropriate formula to solve for the missing measurement.

7. A rectangular prism has a volume of $5940cm^2$ with a height of $15cm$ and a length of $33cm$. What is the width of the box?

V h ℓ

$$V = \ell w h$$

$$5940 = (33)w(15)$$

$$\frac{5940}{495} = \frac{495w}{495}$$

$$12cm = w$$

8. A cylinder has a surface area of $439.82\ cm^2$ with a diameter of $10cm$. Determine the height of the cylinder.

SA $r=5$

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

$$439.82 = 2(3.14)(5)^2 + 2(3.14)(5)h$$

$$439.82 = 157 + 36.4h$$

$$-157 \qquad -157$$

$$\frac{282.82}{31.4} = \frac{31.4h}{31.4}$$

$$9_{cm} = h$$

Success Criteria:
- I can find the surface area of prisms and cylinders by adding up the areas of each side
- I can find the volume of prisms and cylinders by using the appropriate formula (area of the base × height)