

Math 9 – Unit 5: Measurement

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Lesson #2: Rectangular and Triangular Prisms

Learning Goal: We are learning to calculate the surface area and volume for common 3D shapes and composite figures.

Some Strategies

- When looking at surface area
 - Draw the net or label each side of the shape with letters (so you don't forget any!)
 - Find the area of each 2D shape by itself, using yesterday's formulas, then add all of them together
- When looking at volume
 - Be careful what you pick as the base
 - Divide composite objects into smaller simple 3D shapes and find the volume of each, then add all of them together.

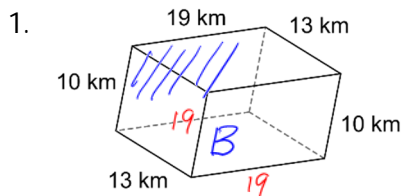
Important Formulas

Volume is always the "area of the base" \times "the height"

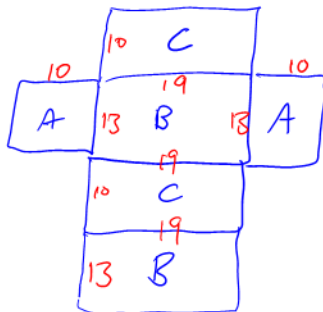
Volume of a rectangular prism: $V = lwh$

Volume of a triangular prism: $A = \frac{1}{2}bhl$ OR $A = \frac{bhl}{2}$

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

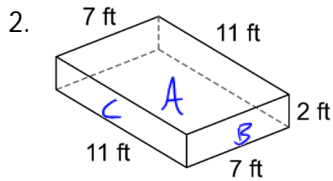


Net:



$$\begin{aligned} SA &= 2A + 2B + 2C \\ &= 2(10 \times 13) + 2(13 \times 19) + 2(10 \times 19) \\ &= 260 + 494 + 380 \\ &= 1134 \text{ km}^2 \end{aligned}$$

$$\begin{aligned} V &= lwh \\ V &= (10)(13)(19) \\ V &= 2470 \text{ km}^3 \end{aligned}$$



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

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

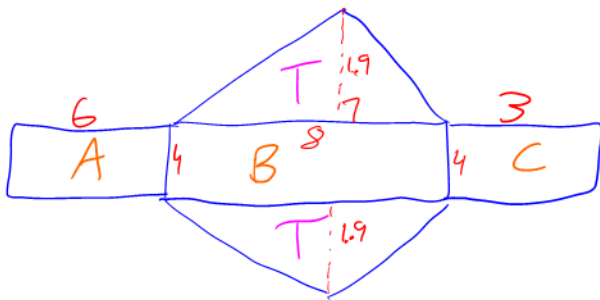
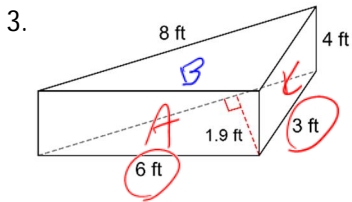
$$= 154 + 28 + 44$$

$$= 226 \text{ ft}^2$$

$$V = lwh$$

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

$$V = 154 \text{ ft}^3$$



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

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

$$SA = 15.2 + 24 + 32 + 12$$

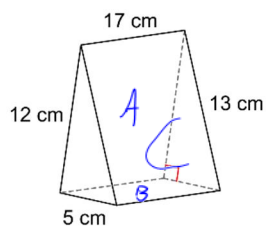
$$SA = 83.2 \text{ ft}^2$$

$$V = \left[\frac{bh}{2} \right] l \rightarrow \text{the distance between triangles}$$

$$V = \frac{8 \times 1.9 \times 4}{2}$$

$$V = 30.4 \text{ ft}^3$$

4.



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

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

$$SA = 60 + 204 + 85 + 221$$

$$SA = 570 \text{ cm}^2$$

$$V = \frac{bhl}{2}$$

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

$$V = 510 \text{ cm}^3$$

Use the appropriate formula to solve for the missing measurement.

5. A rectangular prism has a volume of 5940 cm^3 with a height of 15 cm and a length of 33 cm . What is the width of the box?

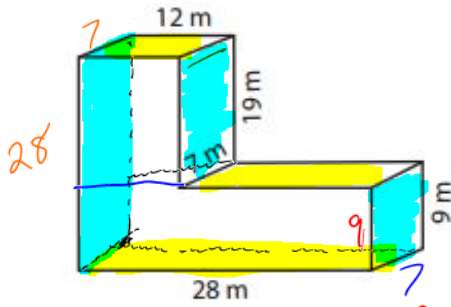
$$V = lwh$$

$$\frac{5940}{(33)(15)} = \frac{(33)(w)(15)}{(33)(15)}$$

$$12 = w$$

\therefore the width is
12 cm.

6. Calculate the surface area and the volume of the composite figure.



$$\begin{aligned} V \text{ of } A &= lwh \\ &= (12)(19)(7) \\ &= 1596 \text{ m}^3 \end{aligned}$$

\therefore The total
Volume is
 3360 m^3

$$\begin{array}{l|l} \text{Top + Bottom:} & \text{Left and Right} \\ SA = 2(28 \times 7) & SA = 2(28 \times 7) \\ = 392 & = 392 \end{array}$$

$$\begin{aligned} V \text{ of } B &= lwh \\ &= (28)(9)(7) \\ &= 1764 \text{ m}^3 \end{aligned}$$

Bottom Front + Back

$$\begin{aligned} SA &= 2(28 \times 9) \\ &= 504 \end{aligned}$$

Top Front and Back

$$\begin{aligned} SA &= 2(12 \times 19) \\ &= 456 \end{aligned}$$

\therefore The total surface area
is 1744 m^2

Success Criteria:

- I can find the surface area of prisms by adding up the areas of each side
- I can find the volume of prisms by using the appropriate formula (area of the base \times height)
- I can find the surface area of composite figures by breaking it down into smaller parts and finding the surface area of each part
- I can find the volume of composite figures by breaking it down into smaller parts and finding the volume of each part