Math 9 – Unit 4: Measurement

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Lesson 4.2: Rectangular and Triangular Prisms and Cylinders

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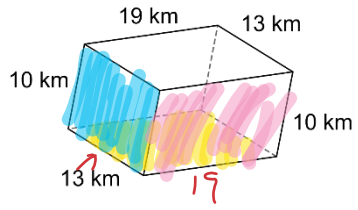
Learning Goal: We are learning to calculate the surface area and volume for common 3D shapes.

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.



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

$SA = 2\ell w + 2wh + 2\ell h$

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

$SA = 494 + 260 + 380$

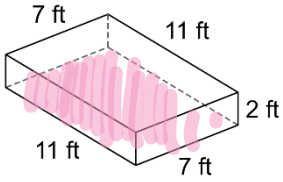
$SA = 1134\ km^2$

$V = \ell wh$

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

$V = 2470\ km^3$

2.



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

$SA = 2\ell w + 2wh + 2\ell h$

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

$SA = 154 + 28 + 44$

$SA = 226\ ft^2$

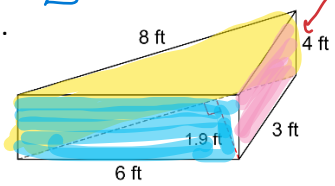
$V = \ell wh$

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

$V = 154\ ft^3$

$b=8 \quad h=1.9 \quad \ell=4$

3.



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

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

$$V=\frac{60.8}{2}$$

$$V=30.4\,ft^3$$

SA: 2 triangles + 3 rectangles

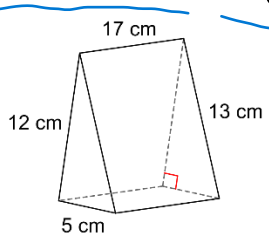
$$SA=\cancel{2}\left(\frac{bh}{2}\right)+(\ell w)+(\ell w)+(\ell w)$$

1st rect, 2nd rect, 3rd rect

$$SA=(8)(1.9)+(3)(4)+(6)(4)+(8)(4)$$

$$SA=15.2+12+24+32=83.2\,ft^2$$

4.



$b=5$

$h=12$

$\ell=17$

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

$$V=\frac{(5)(12)(17)}{2}$$

$$V=\frac{1020}{2}$$

$$V=510\,cm^3$$

$$SA=bh+(\ell w)+(\ell w)+(\ell w)$$

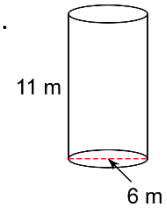
$$SA=(5)(12)+(5)(17)+(12)(17)+(13)(17)$$

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

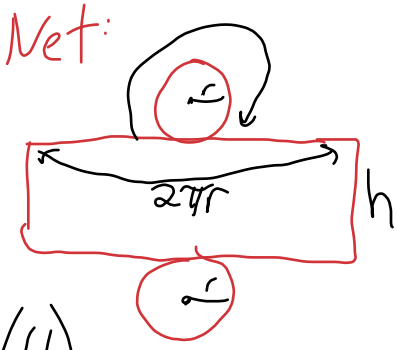
$$SA=570\,cm^2$$

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

5.



Net:



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

two circles rectangle

$r = 3$

$h = 11$

$SA = 2(3.14)(3^2) + 2(3.14)(3)(11)$

$A = lw$

$A = 2\pi rh$

$SA = 56.52 + 207.24$

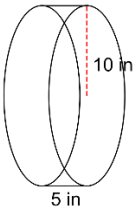
$SA = 263.76\ m^2$

$V = \pi r^2 h$

$V = (3.14)(3^2)(11)$

$V = 310.86\ m^3$

6.



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

$r = 10$

$h = 5$

$SA = 2(3.14)(10^2) + 2(3.14)(10)(5)$

$SA = 628 + 314$

$SA = 942\ in^2$

$V = \pi r^2 h$

$V = (3.14)(10^2)(5)$

$V = 1570\ in^3$

Use the appropriate formula to solve for the missing measurement.

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

V h l

$V = lwh$

$5940 = (33)w(15)$

$5940 = 495w$

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

$12 = w$

The width of the box is 12cm.

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 h=?

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

$439.83 = 2(3.14)(5)^2 + 2(3.14)(5)h$

$439.83 = 157 + 31.4h$

$-157 \quad -157$

$\frac{282.83}{31.4} = \frac{31.4h}{31.4}$

$9 = h$

The height of the cylinder is 9cm.

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)