Math 9 – Unit 4: Measurement Name: _____

Lesson 4.2: Rectangular and Triangular Prisms and Cylinders Date: _____

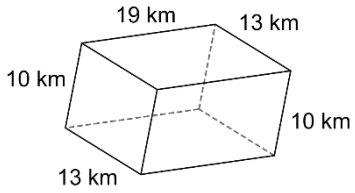
Learning Goal: We are learning to calculate the surface area and volume for common 3D shapes.

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"

A NET IS THE OUTSIDE OF A 3D SOLID.

For each new solid shape, draw the net, then calculate the surface area and the volume.

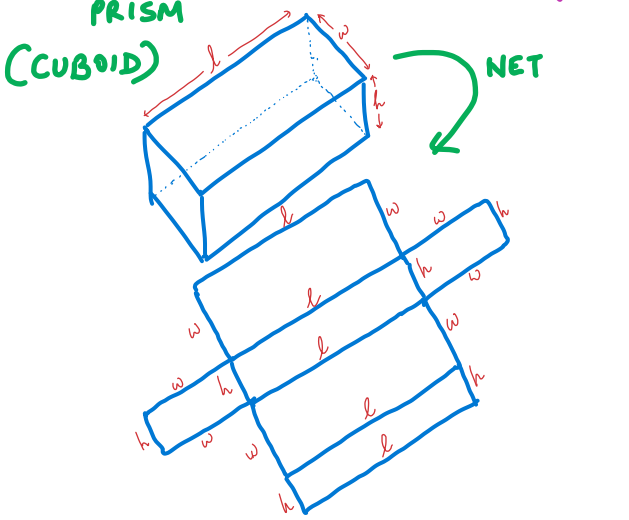
1.



$S.A. = 2\ell w + 2wh + 2\ell h$

$V = \ell wh$

RECTANGULAR PRISM (CUBOID) → It has 6 rectangular faces.



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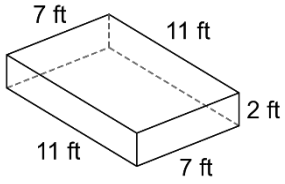


SURFACE AREA (S.A.)
(TOTAL AREA OF ALL 2D FACES THAT MAKE THE 3D SOLID)

$S.A. = \ell w + \ell h + \ell w + \ell h + hw + hw$

$S.A. = 2\ell w + 2\ell h + 2wh$

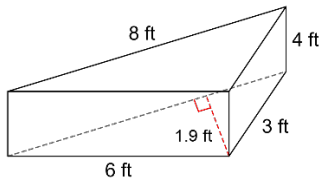
$S.A. = 2(\ell w + \ell h + wh)$

VOLUME (V)
(THE SPACE INSIDE THE OUTSIDE COVER OF THE SOLID)

$V = (\text{Area of Rectangular base})\text{height}$

$V = (\ell w)h = \ell wh$

3.



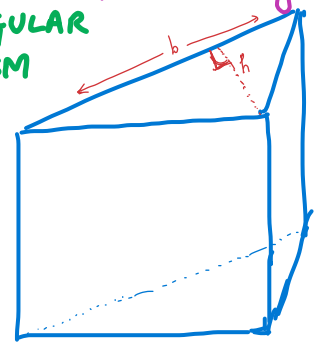
* REFER TO THE NET ON THE RIGHT TO VISUALIZE

$S.A. = 3\square + 2\Delta$

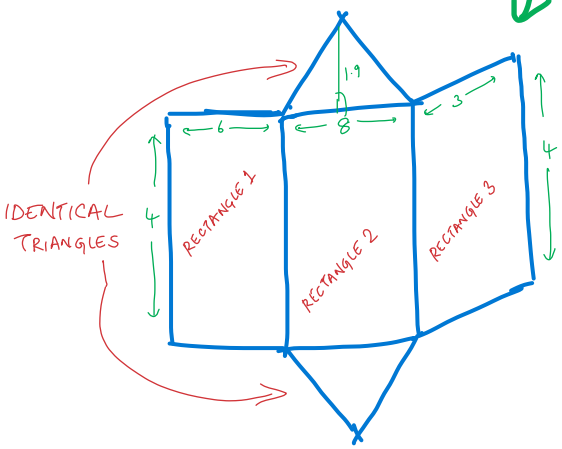
$V = \frac{lbh}{2}$

TRIANGULAR PRISM

It has 2 identical triangular faces and 3 rectangular faces.



NET



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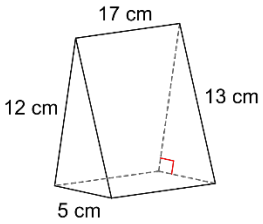


SURFACE AREA

= AREA (RECTANGLE 1) + AREA (RECTANGLE 2) + AREA (RECTANGLE 3) + 2 (AREA OF THE TRIANGLE)

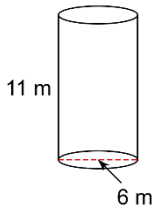
S.A. = AREA of $3\square$ + AREA of 2 identical Δ

VOLUME

= (AREA of Δ BASE) (LENGTH OF PRISM (or height))

$V = \left(\frac{bh}{2}\right)l = \frac{lbh}{2}$

5.

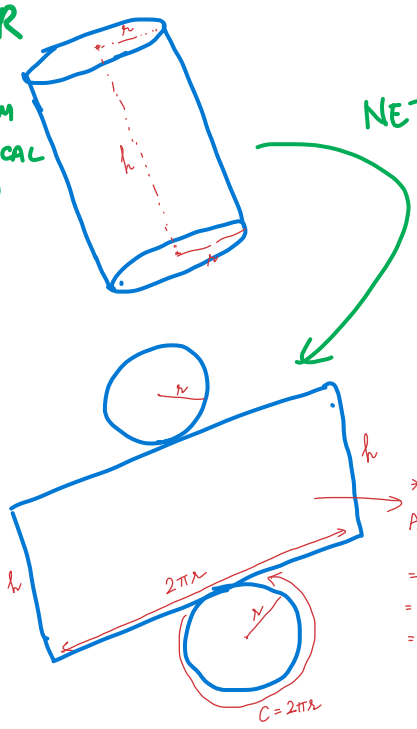


$$S.A. = 2\pi r^2 + 2\pi rh$$

$$V = \pi r^2 h$$

CYLINDER

(VISUALIZE AS A CIRCULAR PRISM WITH TWO IDENTICAL CIRCLE BASES)



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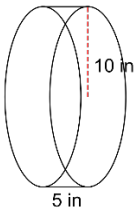

SURFACE AREA

= AREA OF 2 IDENTICAL CIRCLES + AREA OF THE RECTANGLE (which is the curved surface)

$$S.A. = 2(\pi r^2) + (2\pi r)h$$

$$S.A. = 2\pi r^2 + 2\pi rh$$

$$S.A. = 2\pi r(r + h)$$

VOLUME = (AREA OF CIRCULAR BASE)(LENGTH (or height) of CYLINDER)

$$V = (\pi r^2)h = \pi r^2 h$$

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?

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

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)