

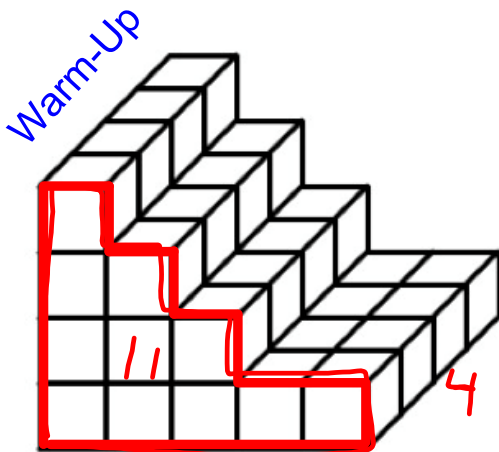


## Volume of Prisms and Cylinders

### Learning Target:

I can apply the volume formulas for prisms and cylinders to solve problems.

The dynamic exploration on p. 543 of the teacher e-book can be used to investigate the concept of volume and how to find the volume of a prism.



Find the following for this prism:

P

h

B

**Now find the surface area.**

**Remember:**  $SA = Ph + 2B$

How many total cubes are in this figure? This will be the total volume, since each cube is 1 cubic unit.

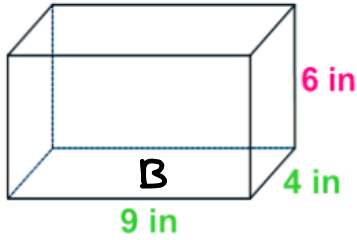
**VOLUME:** the number of cubic units contained in the interior of a solid.

To find the volume of a prism, multiply the area of one of the bases by the height of the prism.

$V = Bh$ , where B = the area of a base of the prism and h = height of the prism.

Find the volume of each prism.

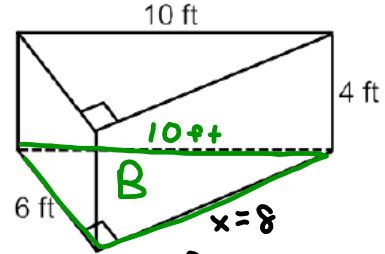
1.



\*  $B = 9 \cdot 4 = 36$   
 $h = 6$

$V = 36 \cdot 6$   
 $V = 216 \text{ in}^3$

2.



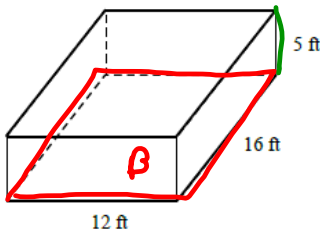
$B = \frac{6 \cdot 8}{2} = 24 \text{ ft}^2$

$h = 4$

$V = 24 \cdot 4 = 96 \text{ ft}^3$

$6^2 + x^2 = 10^2$   
 $36 + x^2 = 100$   
 $x^2 = 64$   
 $x = 8$

3. A cubic foot of dirt weighs 70 lbs. Mr. Lindahl is interested digging a swimming pool in his back yard with the following dimensions. How many pounds of dirt will he be removing?



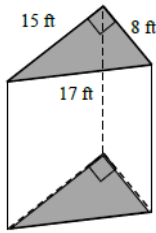
Weight =  $960 \cdot 70 = 67,200$  lbs

$B = 12 \cdot 16 = 192$

$h = 5$

$V = 192 \cdot 5 = 960 \text{ ft}^3$

4. The prism below has a volume of  $720 \text{ ft}^3$ . Find the height of the prism.



$$V = Bh$$

$$720 = 60h$$

$$12 = h$$

$$B = \frac{1}{2} \cdot 15 \cdot 8 = 60 \quad \text{12 ft}$$

$$h = ?$$

$$V = 720$$

The volume of a cylinder has the same formula as the volume of a prism,  $V = Bh$ . However, since the shape of the base of a cylinder is always the same we can be more specific with the formula.

What shape is the base of the ~~prism~~<sup>cylinder</sup> and what is the area of that shape?

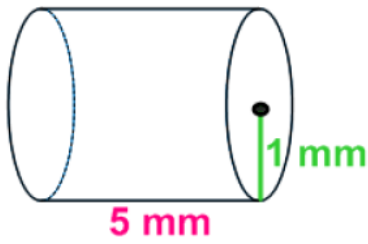
$$\text{circle, } A = \pi r^2$$

If you substitute the area of the base formula in for the  $B$  in  $V = Bh$  you get the volume formula for a cylinder. What is the volume formula for a cylinder?

To find the **volume of a cylinder**, multiply the area of the circle base by the height of the prism.

$$V = \pi r^2 h, \text{ where } r = \text{the radius of the circular base and } h = \text{height of the prism.}$$

5.



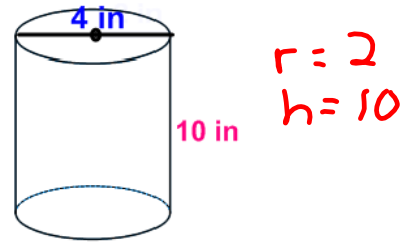
$$r = 1$$

$$h = 5$$

$$V = \pi (1)^2 (5)$$

$$V = 5\pi \text{ mm}^3$$

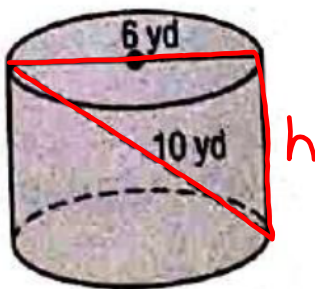
6.



$$V = \pi (2)^2 (10)$$

$$V = 40\pi \text{ in}^3$$

7. Find the volume of the cylinder below.



$$6^2 + h^2 = 10^2$$

$$36 + h^2 = 100$$

$$h^2 = 64$$

$$h = 8$$

$$r = 3$$

$$V = \pi (3)^2 (8)$$

$$V = 72\pi \text{ yd}^3$$

8. The volume of a cylinder is  $2160\pi \text{ ft}^3$  and has a height of 15 feet. Find the diameter of the cylinder's base.

$$V = 2160\pi$$

$$h = 15$$

$$r = ?$$

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

$$2160\pi = \pi r^2 \cdot 15$$

$$2160 = 15r^2$$

$$144 = r^2$$

$$12 = r$$

$$d = 12 \cdot 2 = 24 \text{ ft}$$

# Assignment: 11.2 Volume of Prisms and Cylinders Practice