VOCABULARY

prism

base

lateral edge

lateral face

height

volume

pyramid

perpendicular

4-6 Volume of Prisms and Pyramids

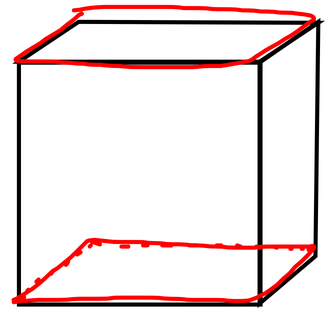
What happens when you stack several congruent shapes on top of each other?

same

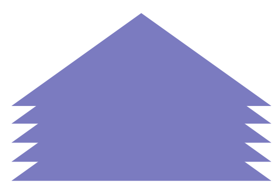
Solid figure with flat sides

A PRISM is a polyhedron that has 2 congruent parallel bases. A prism looks like a stack of congruent shapes.

same



When we stack several congruent shapes, they each have an area and a thickness.

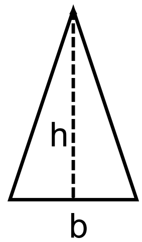


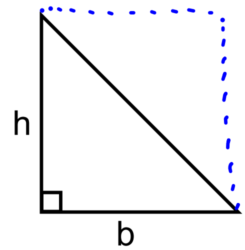
We can add the thicknesses to find the prism's VOLUME. amount of space inside a solid object

* Area of a triangle

$$A = \frac{bh}{2}$$

$$A = \frac{1}{2} b \cdot h$$

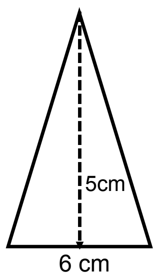




ex: Find the area of the following triangle

$x \cdot x = x^2$

$cm \cdot cm = cm^2$



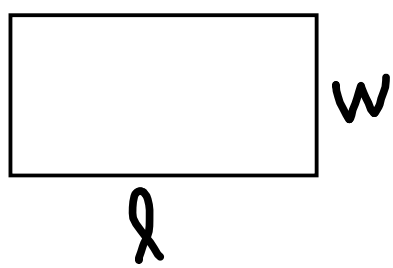
$$A = b \cdot h$$

$$A = \frac{6^{cm} \cdot 5^{cm}}{2}$$

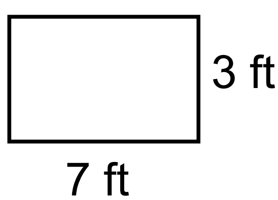
$$= \frac{30}{2} = \boxed{15\ cm^2}$$

Area of a rectangle

A = lw



Example: Find the area of the following rectangle



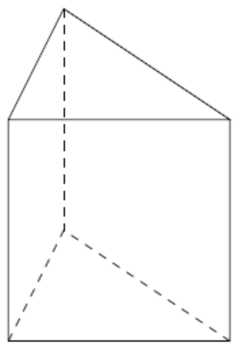
$$A = l \cdot w$$

$$= 7ft \cdot 3ft$$

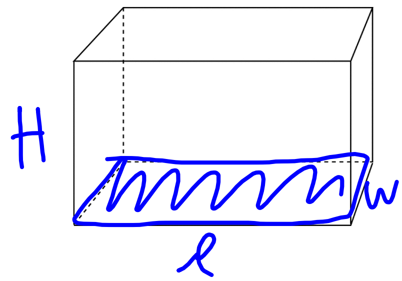
$$= \boxed{21\ ft^2}$$

How do YOU think we could find the volume of a prism?

Triangular Prism:



Rectangular Prism:

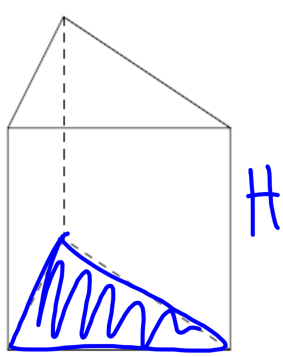


VOLUME of PRISM: A = area of base

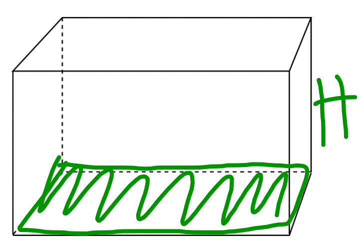
H = height of prism

V= AH

Triangular Prism:



Rectangular Prism:

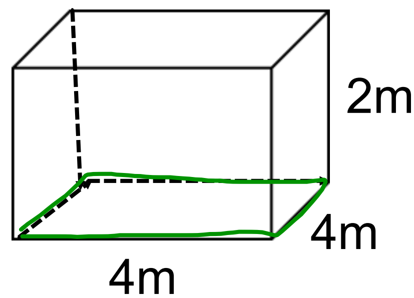


Find the Volume.

Prism $V = A \cdot H$

area of base

Height of Prism



$A = l \cdot w$

$= 4m \cdot 4m$

$= 16m^2$

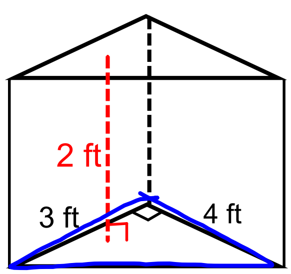
$V = A \cdot H$

$V = 16m^2 \cdot 2m$

$= \boxed{32\ m^3}$

$m \cdot m \cdot m = m^3$

Find the Volume.



4, 3

$A = \frac{b \cdot h}{2}$

$= \frac{3 \cdot 4}{2}$

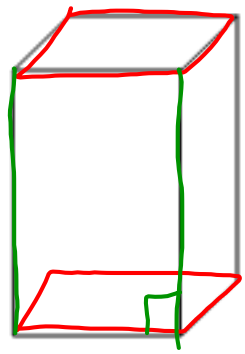
$= \frac{12}{2}$

$= 6$

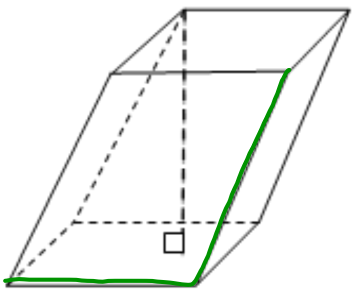
$V = A \cdot H$

$= 6 \cdot 2$

$= \boxed{12\ ft^3}$

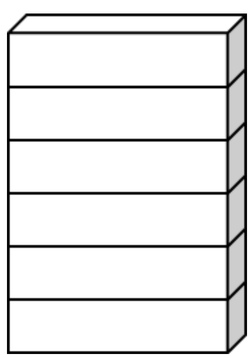


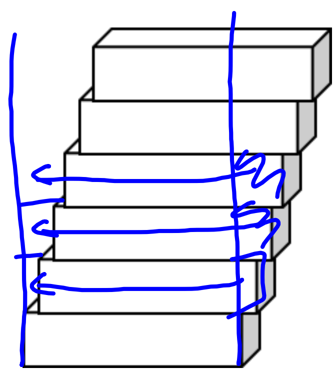
When the LATERAL EDGES are perpendicular to the bases, the prism is RIGHT.



When the LATERAL EDGES are not perpendicular to the bases, the prism is OBLIQUE.

Which has more volume?



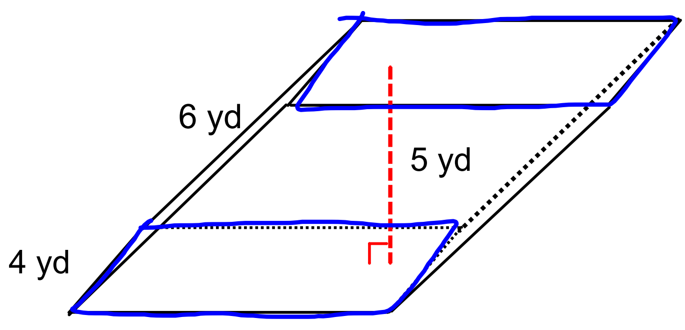


Why?

We've just used Cavalieri's Principle.

Cavalieri's Principle: given two solids included between parallel planes, if every plane cross section parallel to the given planes has the same area in both solids, then the volumes of the solids are equal.

Find the Volume



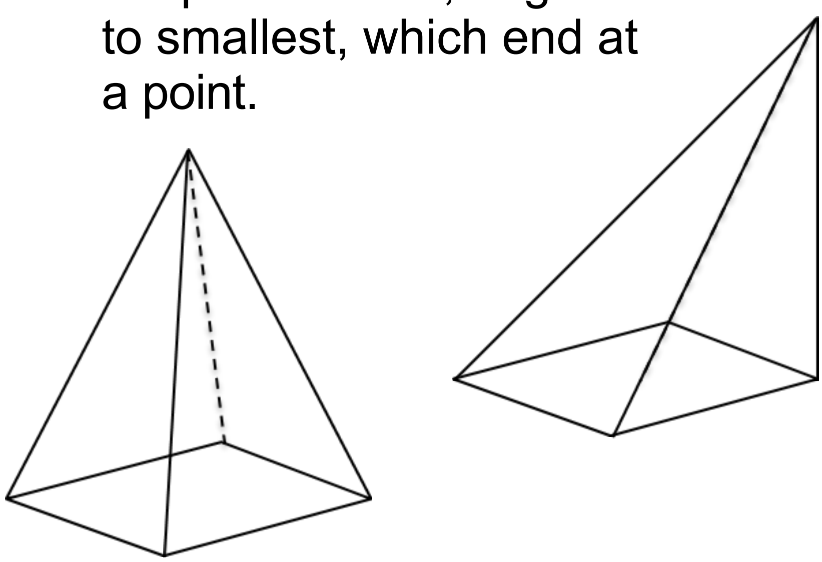
$V = A \cdot H$
$= 20 \cdot 5$
$= \boxed{100\ yd^3}$

$A = l \cdot w$
$= 5yd \cdot 4yd$
$= 20yd^2$

What if we stack similar shapes, largest to smallest?

same shape
diff size

A PYRAMID is similar shapes stacked, largest to smallest, which end at a point.



Volume Demonstration using plastic polyhedra set and water.

How do YOU think we could find the volume of a pyramid?

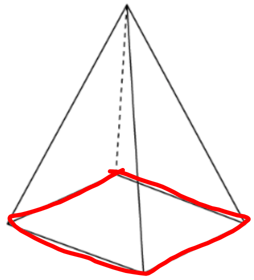
VOLUME of a PYRAMID

A = Area of Base

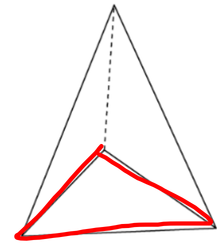
H = Height of Pyramid

$$V = \frac{AH}{3}$$

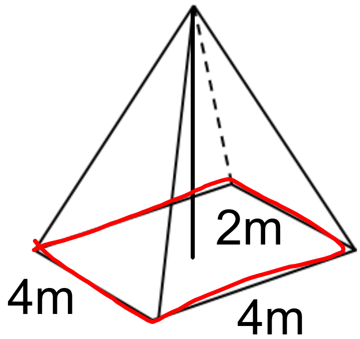
Rectangular Pyramid



Triangular Pyramid



Find the Volume.

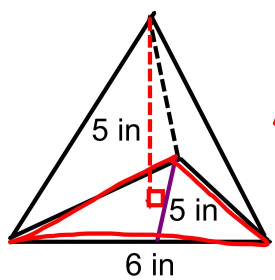


Pyramid $V = \frac{A \cdot H}{3}$

$A = l \cdot w$
$= 4 \cdot 4$
$= 16 m^2$

$V = \frac{16 \cdot 2}{3}$
$= \frac{32}{3}$
$= \boxed{10.6\ m^3}$

Find the volume (#14)



triange

$A = \frac{b \cdot h}{2}$
$= \frac{6 \cdot 5}{2}$
$= \frac{30}{2} = 15$

volume of pyramid

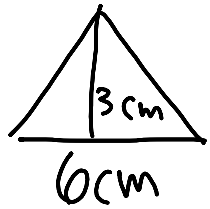
$V = \frac{A \cdot H}{3}$

$= \frac{15 \cdot 5}{3}$

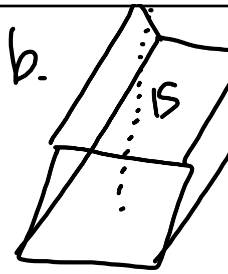
$= \frac{75}{3} = \boxed{25 in^3}$

10.

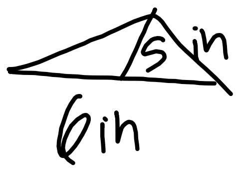
11.



16b.



14.



15.