Geometry, *You Can Do It !*
Volume; prism & pyramids

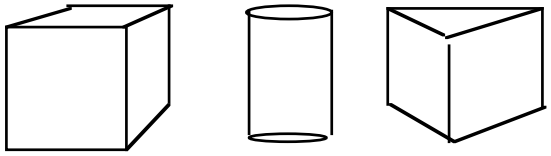
by Bill Hanlon

In the last few columns we found the areas of rectangles, parallelograms, triangles, trapezoids, and circles. We are going to use those formulas to find the **volume** of prisms and pyramids.

Volume - tells you how many cubes ( ) will fit inside a three dimensional shape.

Prism - is a three dimensional shape which has two parallel congruent bases. Simply put, they have the same top as bottom.

Examples



Prisms are distinguished by the polygons that form their bases. The first one is a rectangular prism, the middle is a circular prism, and the last one has a triangular base, therefore it's called a triangular prism.

Finding the volume is as easy as playing with blocks. If I arranged blocks in a 4 by 5 rectangular array, I could determine there are 20 blocks by multiplying those dimensions. What would happen if I put another 4 by 5 rectangular array of blocks on top of those? How many blocks would I have? What if I added another layer, how many blocks would I have?

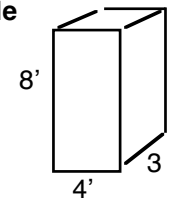
Hopefully, you noticed if the first layer or floor had 20 blocks, then adding a second layer would double the number of blocks. Adding a third tier would triple the number of blocks.

That would lead us to believe the number of blocks (cubes) could be determined by finding the area of the bottom (base), then multiply by the number of layers put on top (height).

That means those formulas for area we learned are essential for finding the volume. And the good news is if you know the area formulas, then all you have to do to find the volume is multiply the area of the base by the height.

Volume$_{\text{prism}}$ **= area of base x height**

Example



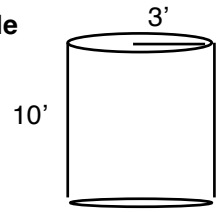
V = l w h

V = 4 x 3 x 8

= 96 cubic feet

The dimensions of the rectangular base are 4' by 3', the height of the prism is 8'. Multiplying the area of the base by the height gave us the volume.

Example



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

$$V = \pi 3^2 10$$

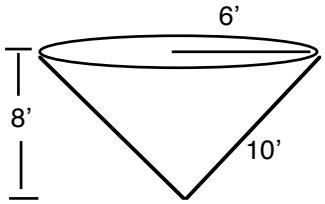
$$V = 90\pi \text{ cu. ft}$$

Notice, all I had to do was find the area of the base and multiply that result by the height. Piece of cake!

Finding the volume of a **pyramid** takes one additional step. We divide product of the area of the base and height by three.

$$\textbf{Volume}_{\text{pyramid}} = \frac{\textbf{area of base x height}}{3}$$

Example



$$V = \frac{\pi r^2 h}{3}$$

$$= \frac{\pi 6^2 8}{3}$$

$$V = 96\pi \text{ cu. ft.}$$

Now, isn't this fun - math is your life!

Geometry, *You Can Do It !*
Volume; prism & pyramids

by Bill Hanlon