Volume of Prisms and Pyramids | MFM2P

Today, we are going to start talking about the **volume** of 3-dimensional objects.

Volume is.... the 3D space occupied by an object

units: m^3, in^3, ft^3, etc...

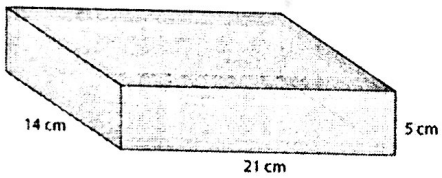
One certain type of 3-dimensinal objects are called prisms. A **prism** is.... a 3D shape with two identical, parallel sides (top & bottom)

KEY IDEA: To find the area of **any prism**...

Volume of a prism = Area of base × height

Consider the following 4 prisms. We will find their volumes.

a) A rectangular prism

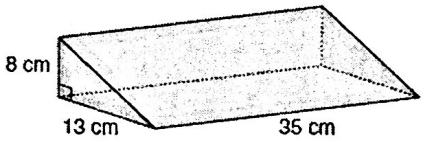


$V = l \times w \times h$

$= 14 \times 21 \times 5$

$= 1470\ cm^3$

b) A triangular prism

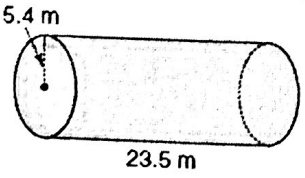


$V = \frac{b \times h}{2} \times l$

$= \frac{13 \times 8}{2} \times 35$

$= 1820\ cm^3$

c) A circular prism (cylinder)

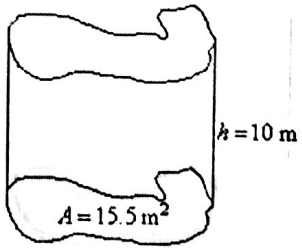


$V = \pi r^2 h$

$= 3.14 \times 5.4^2 \times 23.5$

$= 2151.7\ m^3$

d) A prism with an irregular base



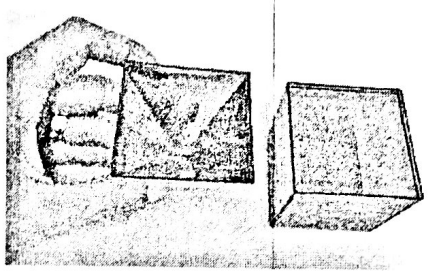
$V = A_{base} \times h$

$= 15.5 \times 10$

$= 155\ m^3$

Volume of Prisms and Pyramids | MFM2P

Volume of a Pyramid: In this demonstration, we are going to derive how to find the volume of a pyramid. Mr. Smith will scoop grains using a pyramid scoop, into a prism container.



The pyramid and prism have the same base area, and height.

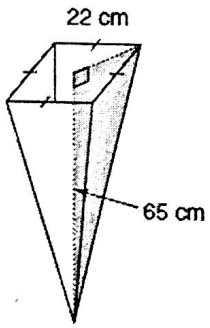
Predict: How many scoops do you think it will take to fill up the prism?

Observe: How many scoops did it actually take? 3 scoops

Conclusion: The volume of a pyramid is one third the volume of a prism.

Examples: Find the volume of the following pyramids with Mr. Smith

a)

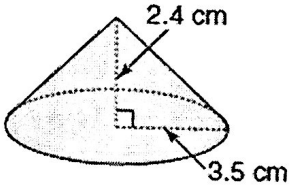


$V = b^2 h \div 3$

$= 22^2 \times 65 \div 3$

$\div 10,486.7 \text{ cm}^3$

b)

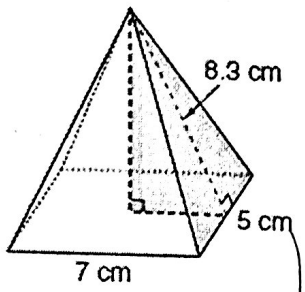


$V = \pi r^2 h \div 3$

$= 3.14 \times 3.5^2 \times 2.4 \div 3$

$= 30.8 \text{ cm}^3$

c) Sometimes, we can't measure the height of a pyramid directly. In these cases, we can use the Pythagorean Theorem and their slant height.



$h^2 = 8.3^2 - 3.5^2$

$= 68.89 - 12.25$

$= \sqrt{56.64}$

$h \div 7.5 \text{ cm}$

$V = l \times w \times h \div 3$

$= 7 \times 5 \times 7.5 \div 3$

$= 87.5 \text{ cm}^3$