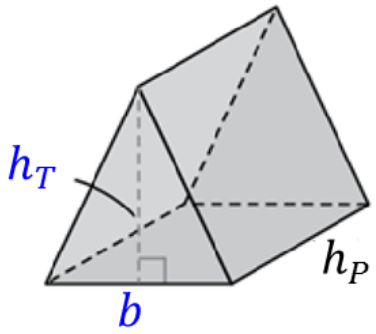
Objective: Find the volume of triangular prisms and cylinders.

Concept

Volume is a measure indicating the amount of space that an object occupies, or the capacity of a container.

The Volume of a Prism is calculated by multiplying the area of the prism's base and the prism's height. This concept can be written as the formula $\boldsymbol{V = B \cdot h}$ where $\boldsymbol{B}$ **is the area of the prism's base** and $\boldsymbol{h}$ **is the prism's height**.

The **Volume of a Triangular Prism** is calculated using the formula $\boldsymbol{V = B \cdot h}$ where $\boldsymbol{B}$ **is the area of the prism's triangular base** and $\boldsymbol{h}$ **is the prism's height**.



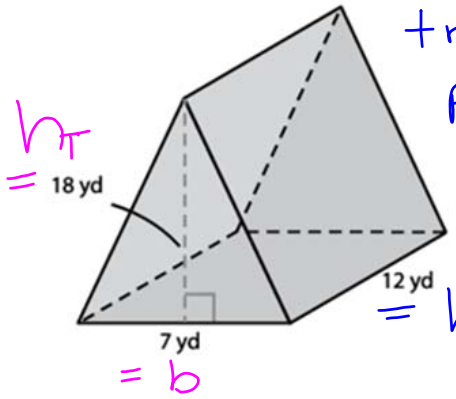
Triangular Prism

$$V = B \cdot h$$

$$V = \frac{1}{2} \cdot b \cdot h_T \cdot h_P$$

Objective: Find the volume of triangular prisms and cylinders.

Ex) Find the volume of the tent in cubic yards.



h_T = 18 yd

triangular prism → base is a triangle

12 yd = h_P

7 yd = b

① volume

$V = B \cdot h$

$V = \frac{1}{2} \cdot b \cdot h_T \cdot h_P$

$V = \frac{1}{2} \cdot 7yd \cdot 18yd \cdot 12yd$

$= 756\ yd^3$

② The volume of the tent is 756 cubic yards.

Objective: Find the volume of triangular prisms and cylinders.

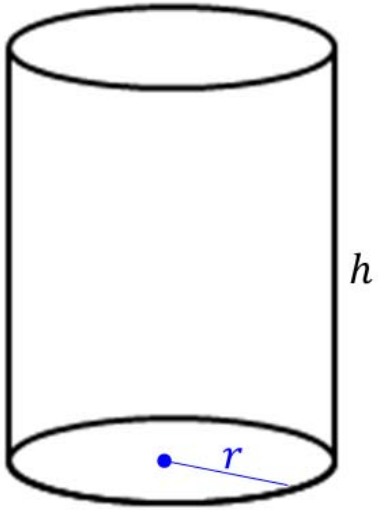
Concept

A **Cylinder** is like a prism but **with a circular base**. **The Volume of a Cylinder is calculated by multiplying the area of the cylinder's circular base and the cylinder's height.** This concept uses the same general volume formula as prisms: $\boldsymbol{V = B \cdot h}$ where $\boldsymbol{B}$ **is the area of the cylinder's base** and $\boldsymbol{h}$ **is the cylinder's height**.

Volume of a Cylinder = area of the circular base · height

$$V = B \cdot h$$

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



Objective: Find the volume of triangular prisms and cylinders.

Ex) Estimate the volume of the barrel in cubic inches. Write in terms of π and to the nearest tenth.

2 ft = 24 in = h

30 in = diameter

① best model is a cylinder

$V = B \cdot h$

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

② convert ft to in.

$\frac{2\text{ ft}}{1} \cdot \frac{12\text{ in}}{1\text{ ft}} = 24\text{ in}$

③ find radius, r

$r = \frac{\text{diameter}}{2} = \frac{30\text{ in}}{2} = 15\text{ in}$

④ volume

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

$V = \pi \cdot (15\text{ in})^2 \cdot 24\text{ in}$

$= \pi \cdot 225\text{ in}^2 \cdot 24\text{ in}$

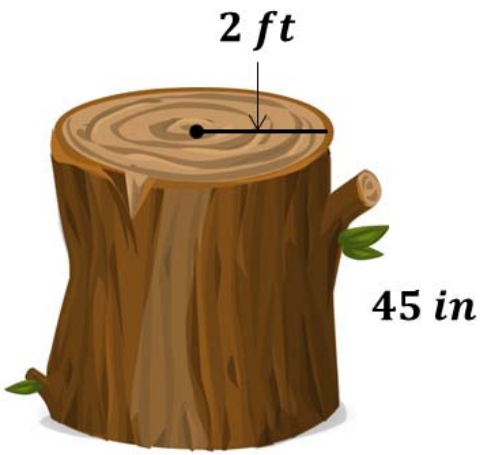
$\approx 16{,}964.6\text{ in}^3$

$= 5400\pi\text{ in}^3$ (in terms of π)

⑤ The volume of the barrel is about $16{,}964.6\text{ in}^3$ and is $5400\pi\text{ in}^3$.

Objective: Find the volume of triangular prisms and cylinders.

Practice) Estimate the volume of the log in cubic feet. Write in terms of π and to the nearest tenth.



1. $h = \frac{45\ in}{1} \cdot \frac{1\ ft}{12\ in} = 3.75\ ft$

2. $V = B \cdot h$

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

$= \pi (2\ ft)^2 \cdot 3.75\ ft$

$= \pi \cdot 4\ ft^2 \cdot 3.75\ ft$

$= 15\pi\ ft^3$

$\approx 47.1\ ft^3$

The estimated volume of the log is 15π cubic feet, which is about 47.1 cubic feet.

Objective: Find the volume of triangular prisms and cylinders.

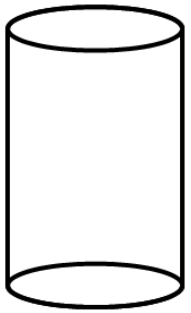
Ex) Find the volume of the cylindrical can with a base area of $25\pi\ in^2$ and a height equal to three times the radius. Write in terms of π and to the nearest tenth.

① Volume of cylinder

$V = B \cdot h$

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

height = 3 · radius



② find radius

$B = \pi r^2$

$\frac{25\pi}{\pi} = \frac{\pi \cdot r^2}{\pi}$

$25 = r^2$

$\sqrt{25} = \sqrt{r^2}$

$r = 5$ in

③ find height

$h = 3 \cdot r$

$h = 3 \cdot 5\text{in} = 15\text{in}$

④ volume

$V = B \cdot h$

$= 25\pi\ in^2 \cdot 15\text{in}$

$= 375\pi\ in^3$

$\approx 1178.1\ in^3$

⑤ The volume of the cylindrical can is 375π cubic inches which is about 1178.1 cubic inches.

Objective: Find the volume of triangular prisms and cylinders.

Practice) Mrs. Molina wants to save rain water in a cylindrical container, shown below, to water her plants.

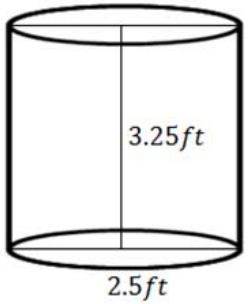
a) Estimate the volume of rain water the container will hold to the nearest cubic foot.

$r = 1.25\ ft, \qquad h = 3.25\ ft$

$V = \pi(1.25\ ft)^2(3.25\ ft)$

$V \approx 16 ft^3$

The container will hold about 16 cubic feet of rain water.



b) Estimate the rain water Mrs. Molina saved to the nearest gallon.

Note $1\ gallon = 0.134\ ft^3$. Convert to gallons:

Mrs. Molina saved about 119 gallons of rainwater.

$$\frac{16\ ft^3}{1} \cdot \frac{1 gallon}{0.134\ ft^3}$$

$$\frac{16}{0.134}\ gallons$$

$$\approx 119\ gallons$$

Objective: Find the volume of triangular prisms and cylinders.

Closure

Explain in words how to find the volume of any prism .

To find the volume of any prism, multiply the area of the base and the height.