

DO NOW

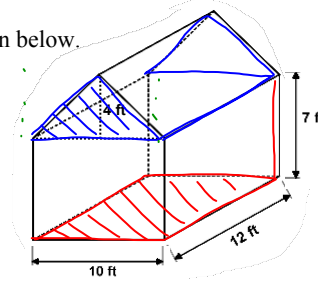
A chicken coop is in the shape of the prism shown below.

- a) Determine the volume, in cubic feet, of the coop. Show the calculations that lead to your answer.

$$\begin{aligned} V_{\text{rect}} &= Bh \\ &\downarrow \\ &= (10)(12)(7) \\ &= 840 \text{ ft}^3 \end{aligned}$$

$$\begin{aligned} V_{\text{triangle}} &= Bh \\ &= \frac{1}{2}(10)(4)(12) \\ &= 240 \text{ ft}^3 \end{aligned}$$

$$\begin{aligned} &840 + 240 \\ &\boxed{1,080 \text{ ft}^3} \end{aligned}$$

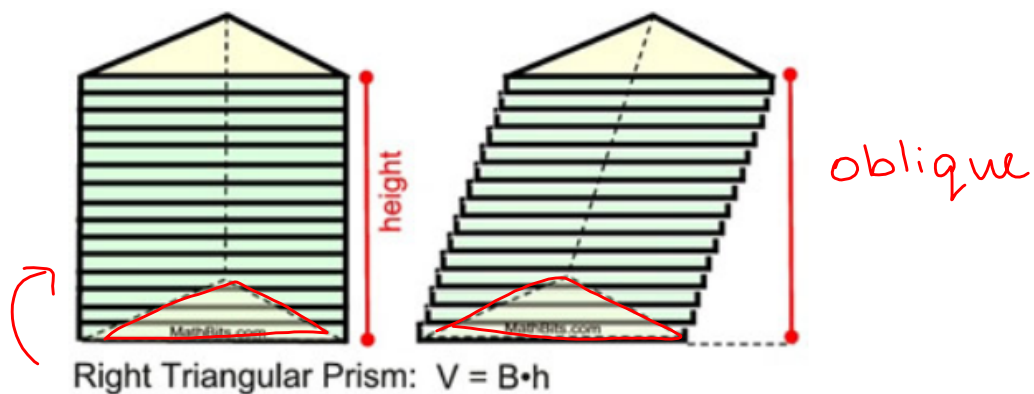


- b) If the entire volume of air must be moved out of the coop in an hour, how many cubic feet per minute must a fan move to accomplish this task?

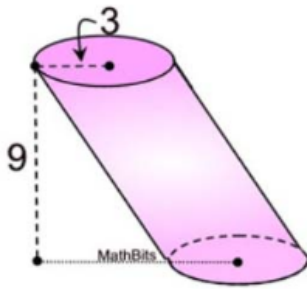
$$\frac{1,080 \text{ ft}^3}{60 \text{ min}} =$$

$$\boxed{18 \frac{\text{ft}^3}{\text{min}}}$$

Cavalieri's Principle: If the **cross-sections of two prisms have equal areas and equal heights**, then the two prisms have equal volumes.



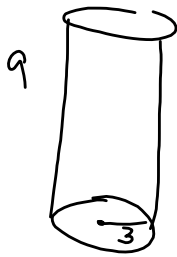
What is the volume of an oblique cylinder with a radius of 3 and a height of 9?



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

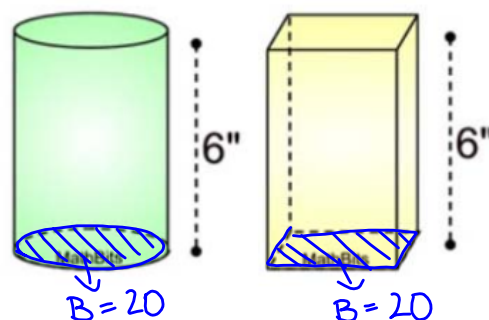
$$V = \pi (3)^2 (9)$$

$$V = 81\pi$$



Cavalieri's principle also applies when comparing solids with differing base shapes.

A right circular cylinder and a right rectangular prism are given.



If the area of the circular base is equal to the area of the rectangular base, volumes of these two solids will be **EQUAL**.

Two prisms have equal heights and equal volumes. The base of one is a pentagon and the base of the other is a square. If the area of the pentagonal base is 36 square inches, how many inches are in the length of each side of the square base?

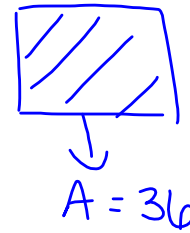
1) 6

2) 9



3) 24

4) 36



$V = Bh$

$V = Bh$

$$B = B$$

$$36$$

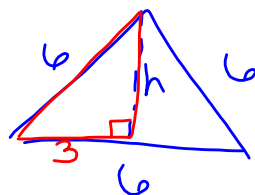
A prism has a base that is an equilateral triangle whose sides measure 6 inches each. The height of the prism is 8 inches. What is the volume of the prism, to the nearest cubic inch?

$$V = Bh$$

$$V = \frac{1}{2}(6)(\sqrt{27})(8)$$

$$V = 124.707\dots$$

$$125 \text{ in}^3$$

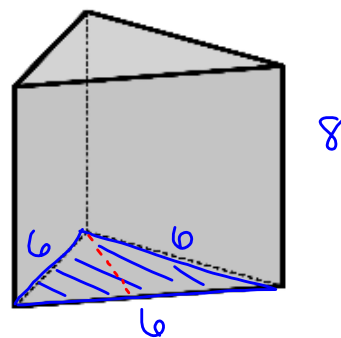


$$3^2 + h^2 = 6^2$$

$$9 + h^2 = 36$$

$$\sqrt{h^2} = \sqrt{27}$$

$$h = \sqrt{27}$$

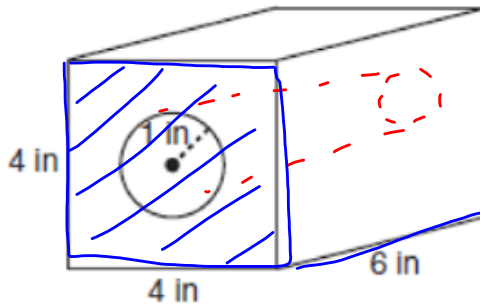


$$B = \frac{1}{2}bh$$

$$B = \frac{1}{2}(6)(\sqrt{27})$$

A solid metal prism has a rectangular base with sides of 4 inches and 6 inches, and a height of 4 inches. A hole in the shape of a cylinder, with a radius of 1 inch, is drilled through the entire length of the rectangular prism.

What is the approximate volume of the remaining solid, to the nearest cubic inch?



$$\begin{aligned}V &= Bh & V &= \pi r^2 h \\V &= (4)(4)(6) & V &= \pi(1)^2(6) \\V &= 96 \text{ in}^3 & V &= 6\pi \text{ in}^3\end{aligned}$$

$$96 - 6\pi$$

$$77.150$$

$$\boxed{77 \text{ in}^3}$$