

Problem 34

Mildred's Millinery Shop stores their hats in an regular hexagonal right prism box. If the height is 9 inches, and the length of each side is 4 inches. What is the volume of the box?

Answer

$$\boxed{432\sqrt{3} \text{ in}^3}$$

Explanation

Consider breaking up the hexagonal base into 6 equilateral triangles. Since the area of an equilateral triangle is $\frac{\sqrt{3}}{2}s^2$, The area of one of these triangles is $\frac{\sqrt{3}}{2}(4)^2 \Rightarrow 8\sqrt{3}$

Thus, The area of the base is: $6(8\sqrt{3}) \Rightarrow 48\sqrt{3}$

So, the volume is $V = B * h \Rightarrow V = (48\sqrt{3})(9)$

$$\Rightarrow V = 432\sqrt{3} \text{ in}^3$$