Conditions

Find the height of a prism with a base in the form of a sector with central angle equal to 25 degrees. Its volume is found to be 350 cubic inch and the height is four times the radius of the base.

Solution

The figure we have to discover is a part of cylinder.

The volume of cylinder is:

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

As a part of a cylinder, the volume of our prism relates to volume of the cylinder as 25/360 (the ratio between central angle of a sector and total angle of circle in base)

That's why the volume of such prism is:

$$V = \frac{\pi r^2 h \cdot 25}{360} = 350$$

As we know,

$$h = 4r$$

Hence

$$\frac{\pi r^2 \cdot 4r \cdot 25}{360} = 350$$

$$\pi r^2 \cdot 4r = 5040$$

$$r = \sqrt[3]{\frac{5040}{4\pi}}$$

$$h = 4r = 2\sqrt[3]{\frac{5040}{\pi}}$$

Answer: $h = 2\sqrt[3]{\frac{5040}{\pi}}$