



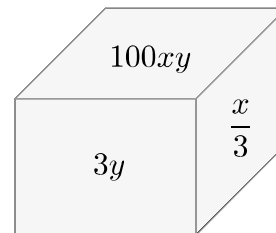
Problem of the Week

Problem D and Solution

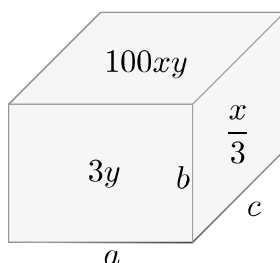
Unknown Volume

Problem

The side, front and top faces of a rectangular solid have areas of $\frac{x}{3}$, $3y$, and $100xy$ cm², respectively. Determine the volume of the rectangular solid in terms of x and y .

**Solution**

Since $3y$ and $\frac{x}{3}$ are surface areas, then x and y must be positive. Let the length, height and width of the rectangular solid be a , b , c , respectively.



To determine the volume we need to find the product abc .

Since the area of the side is $\frac{x}{3}$, then $bc = \frac{x}{3}$. (1)

Since the area of the front is $3y$, then $ab = 3y$. (2)

Since the area of the top is $100xy$, then $ac = 100xy$. (3)

Multiplying the left sides and multiplying the right sides of each of the equations (1), (2) and (3), we obtain:

$$\begin{aligned}(bc)(ab)(ac) &= \left(\frac{x}{3}\right)(3y)(100xy) \\ a^2b^2c^2 &= 100x^2y^2 \\ (abc)^2 &= (10xy)^2\end{aligned}$$

Taking the square root, $abc = 10xy$, since all quantities are positive.

But abc is the volume. Therefore the volume of the rectangular solid, in terms of x and y , is $10xy$ cm³.

