

Quiz #3

Name: Key

You must show your work to get full credit.

A plastic has a crushing pressure of 300 lb/in³. A cube side length 4in made from this plastic weights 1.75lb.

1. Give a formula for the weight, w , of a cube of side length s made from this plastic.

Weight is proportional to
side length cubed.

i.e. $w = c s^3$

when $s = 4$ in, $w = 1.75$

so $1.75 = c(4)^3$

$$c = \frac{1.75}{4^3} = .02734$$

$$w = \underline{.02734 s^3}$$

2. How large can a cube made from this plastic get before it crushes itself.

Size of biggest cube is 10,972 in

The pressure at the nose of the cube is

$$\frac{\text{weight}}{\text{area of nose}} = \frac{.02734 s^3}{s^2} = .02734 s.$$

The cube crushes its if this is 300 lb/in³.

that is $.02734 s = 300$

$$s = \frac{300}{.02734} = 10,972 \text{ in}$$

$\approx 914 \text{ feet.}$