Jan 19, 2012

Dimensional Analysis:

$$\begin{pmatrix}\text{Known}\\ \text{Quantity}\end{pmatrix} \times \begin{pmatrix}\text{conversion}\\ \text{factor(s)}\end{pmatrix} = \begin{pmatrix}\text{Answer}\\ \text{Sought}\end{pmatrix}$$

units!!!

3 sig figs!

Jimmy's pop quiz:

Q1: (1.) 4355 lb/5days (*)

(3) 1 lb = 453.59 g

(2) Ball's mass: 0.0113 g/ball

How many balls will the plant make in 1 day?

$$\frac{4355\ \text{lb}}{5\ \text{days}} \div 5\ \text{days} = \frac{\text{balls}}{\text{day}}$$

Answer

$$\frac{\text{lbs}}{\text{day}} = 871\ \text{lbs/day}$$

calculator (34962556.64)

$$871\ \frac{\text{lbs}}{\text{day}} \times \frac{453.59\ \text{g}}{1\ \text{lbs}} \times \frac{1\ \text{ball}}{0.0113\ \text{g}} = 3.50\times10^{7}\ \frac{\text{balls}}{\text{day}}$$

conversion factor — conversion factor

2. % elongation = $(1.033 - 1.000) \times 100$

$= 3.3\ \%$

Don't use this when figuring out sig fig.

$$\begin{array}{r} 1.033 \\ -\ 1.000 \\ \hline 0.033 \end{array}$$

uncertainty

2 sig figs.

(Digress) →

uncertainty

$3.429 - 2.3 = 1.1$

Calculator answer = 1.129

$$\begin{array}{r} 3.429 \\ -\ 2.3 \\ \hline 1.129 \end{array}$$

uncertainty

uncertainty

uncertainty

2. tensile strength =

$$\frac{(0.500\ \text{kg})(9.80\ \frac{\text{N}}{\text{kg}})}{(4.90\times10^{-3}\ \text{cm}^2)(10^{-4}\ \frac{\text{m}^2}{\text{cm}^2})}$$

(0.500 kg: 3 sig fig; 9.80 N/kg: 3 sig fig; 4.90×10^{-3} cm²: 3 sig fig; 10^{-4} (1×10^{-4}) m²/cm²)

$$= 1.00\times10^{7}\ \frac{\text{N}}{\text{m}^2}$$

3. (a) $E = 3.00\times10^{2}\ \frac{\text{lb}}{\text{in}^2} \div 0.0050 = 6.0\times10^{4}\ \frac{\text{lb}}{\text{in}^2}$

(3.00×10^{2}: 3 sig fig; 0.0050: 2 sig fig)

(b) 1 Pascals (Pa) = $1\ \frac{\text{N}}{\text{m}^2}$

1 in = 2.54 cm 100 cm = 1 m

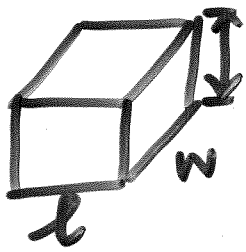
1 N = 0.225 lbs.

$$6.0\times10^{4}\ \frac{\text{lb}}{\text{in}^2}\times\frac{1\ \text{N}}{0.225\ \text{lb}}\times\frac{1\ \text{in}}{2.54\ \text{cm}}\times\frac{1\ \text{in}}{2.54\ \text{cm}}\times\frac{100\ \text{cm}}{1\ \text{m}}\times\frac{100\ \text{cm}}{1\ \text{m}} = \boxed{\frac{\text{N}}{\text{m}^2}}$$

(in²: in × in)

$$= 4.1\times10^{8}\ \frac{\text{N}}{\text{m}^2} = 4.1\times10^{8}\ \text{Pa}$$

4. Cube



$V = l \times w \times h = \_\_\_\_ \ m^3$

Convert to meter first then calc. Volume

$$13\ cm \times \left(\frac{1\ m}{100\ cm} \right) = 0.13\ m$$

$$V = (0.13)^3 = 2.2 \times 10^{-3}\ m^3$$

5. $$3\ km \times \frac{1000\ m}{1\ km} = 3 \times 10^3\ m$$

You need to do this pop-quiz in 5 minute!