PHYS101.15
QUIZ#1- CHAPTER 1
DATE: 8/3/09

Name: Key Id#:

The position x of a particle is given by $x = B\,t + \frac{C}{B} t^2$, where x is in meters and t is in seconds. What is the dimension of C?

$[x] = L$

$[t] = T$

Left hand side is L

right hand side should also be L

$\Rightarrow \quad Bt = [B]\,T = L \Rightarrow \boxed{[B] = \frac{L}{T}}$

$\frac{C}{B} t^2 = \frac{[C]}{[B]} T^2 = L \Rightarrow \frac{[C]}{\frac{L}{T}} T^2 = L$

$\Rightarrow [C]\,\frac{T^3}{L} = L \Rightarrow \boxed{[C] = L^2 T^{-3}}$

PHYS101.13
QUIZ#1- CHAPTER 1
DATE: 10/3/09

Name: Key Id#:

What is the mass in kilogram of an aluminum cylinder of density 2.70 g/cm^3, a radius of 3.40 cm, and a height of 2.10 m?

mass = density × volume $\Rightarrow m = \rho V$

$$\rho = 2.7 \frac{g}{cm^3} = 2.7 \frac{g}{cm^3} \times \left(\frac{1\ kg}{1000\ g}\right)\left(\frac{100\ cm}{1\ m}\right)^3$$

$$= \frac{2.7 \times 100^3}{1000} = 2700\ kg/m^3$$

$$V = \pi R^2 h = \pi \times (3.4\ cm)^2 \left(\frac{1m}{100cm}\right)^2 \times 2.1\ m$$

$$= \pi \frac{(3.4)^2 \times 2.1}{100^2}\ m^3 = 7.63 \times 10^{-3}\ m^3$$

$$\Rightarrow m = 2700 \frac{kg}{m^3} \times 7.63 \times 10^{-3}\ m^3 = \boxed{20.6\ kg}$$

PHYS101.14
QUIZ#1- CHAPTER 1
DATE: 10/3/09

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The speed of sound in air is about 340 m/s.
(a) Express this speed in miles per hour (mi/h). (1 mile = 1.61 km).
(b) Express this in millimeters per nanosecond[1 ns = 10^{-9} s].

a) $$340\ m/s = 340\ \frac{m}{s} \times \left(\frac{3600\ s}{1\ h}\right) \times \left(\frac{1\ Km}{1000\ m}\right) \times \left(\frac{1\ mil}{1.61\ Km}\right)$$

$$= \frac{340 \times 3600 \times 1}{1000 \times 1.61} = \boxed{760\ mil/hour}$$

b) $$340\ \frac{m}{s} = 340\ \frac{m}{s} \times \left(\frac{1000\ milli}{1\ m}\right) \times \left(\frac{10^{-9}\ s}{1\ ns}\right)$$

$$= 340 \times 1000 \times 10^{-9} = \boxed{3.40 \times 10^{-4}\ milli/ns}$$