

QUIZ#1- CHAPTER 1

DATE: 09/09/19

Name: \_\_\_\_\_

Key

Id#: \_\_\_\_\_

Sect.#: \_\_\_\_\_

1. A cubic box has a length of 0.2 miles. What is the volume of the box in  $\text{cm}^3$ ? (1 mile = 5280 feet, 1 meter = 3.28 feet).

Write the final answer in 3 significant figures.

$$\begin{aligned} \text{Volume} = L^3 &= (0.2 \text{ miles})^3 \left(\frac{5280 \text{ feet}}{1 \text{ mile}}\right)^3 \left(\frac{1 \text{ m}}{3.28 \text{ feet}}\right)^3 \left(\frac{100 \text{ cm}}{1 \text{ m}}\right)^3 \\ &= (0.2)^3 (5280)^3 \left(\frac{1}{3.28}\right)^3 (100)^3 \text{ m}^3 \\ \boxed{V = 3.34 \times 10^{13} \text{ cm}^3} \end{aligned}$$

2. The position  $x$  of a particle is given by  $x = Rt^3 + \frac{H}{R}t^2$  where  $x$  is in meters and  $t$  is in seconds. What is the dimension of  $H$ ?

$$[x] = [Rt^3] = [R] [t^3]$$

$$L = [R] T^3 \Rightarrow [R] = \frac{L}{T^3}$$

$$[x] = \frac{[H]}{[R]} [t^2] \Rightarrow L = \frac{[H]}{\frac{L}{T^3}} T^2$$

$$L = [H] \frac{T^5}{L} \Rightarrow \boxed{[H] = \frac{L^2}{T^5}}$$

QUIZ#1- CHAPTER 1

DATE: 10/09/18

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1. A piece of graphite rock has a mass of 15.5 g and a volume of 6.01 cm<sup>3</sup>. What is its density in kg/m<sup>3</sup>? Write the answer in scientific notation with 2 significant figures.

$$\text{density } \rho = \frac{\text{mass}}{\text{Volume}} = \frac{15.5 \text{ g}}{6.01 \text{ cm}^3} = \frac{15.5 \text{ g}}{6.01 \text{ cm}^3} \left( \frac{1 \text{ kg}}{1000 \text{ g}} \right) \left( \frac{100 \text{ cm}}{1 \text{ m}} \right)^3$$

$$= \frac{15.5 \times (100)^3}{6.01 \times 1000} \frac{\text{kg}}{\text{m}^3} = 2579 \text{ kg/m}^3$$

$$\rho = 2.6 \times 10^3 \text{ kg/m}^3$$

2. The acceleration of a particle is given by  $a = At - Bt^2$ ,  $t$  is in seconds. What are the dimensions of A and B?

$$[a] = [At] = [A] [t]$$

$$\frac{L}{T^2} = [A] T \Rightarrow [A] = \frac{L}{T^3}$$

$$[a] = [Bt^2] = [B] [t^2]$$

$$\frac{L}{T^2} = [B] T^2 \Rightarrow [B] = \frac{L}{T^4}$$

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1. The mass of a piece of card board is 20 g. Its length and width are 8.0 and 3.0 inches, respectively. If the thickness of the card board is 0.50 mm, what is the density of the card board in  $\text{kg/m}^3$ ? (1 inch = 2.54 cm)  
Write the answer in 4 significant figures.

$$\text{density } \rho = \frac{\text{mass}}{\text{Volume}} = \frac{20 \text{ g}}{(8 \text{ in})(3 \text{ in})(0.5 \text{ mm})}$$

$$\begin{aligned} \rho &= 20 \text{ g} \left( \frac{1 \text{ Kg}}{1000 \text{ g}} \right) \times \frac{1}{8 \text{ in}} \left( \frac{1 \text{ in}}{2.54 \text{ cm}} \right) \left( \frac{1}{3 \text{ in}} \left( \frac{1 \text{ in}}{2.54 \text{ cm}} \right) \right) \\ &\quad \times \frac{1}{0.5 \text{ mm}} \left( \frac{10 \text{ mm}}{1 \text{ cm}} \right) \times \left( \frac{100 \text{ cm}}{1 \text{ m}} \right)^3 \times \left( \frac{1000 \text{ mm}}{1 \text{ m}} \right)^3 \\ &= 20 \frac{10 \times (100)^3}{1000 \times 8 \times (2.54)^2 (0.5) \times 3} \text{ Kg/m}^3 \end{aligned}$$

$$\rho = 2583 \text{ Kg/m}^3$$

2. Pressure, P, is a physical quantity defined as:  $P = F / A$ , where F is force, and A is the area of the surface on which F is applied. Find the dimensions of P.

$$[P] = \frac{[F]}{[A]}$$

$$[F] = [m] [a]$$

$$= M \frac{L}{T^2}$$

$$[A] = L^2$$

$$[P] = \frac{ML}{T^2 L^2}$$

$$[P] = \frac{M}{LT^2}$$