PHYS 133
Ch. #1 H.W. Solution

#1.

a. 10 billion $= 10 \times 10^9 = 1 \times 10^{10}$ years

b. $1 \times 10^{10}\,\text{y} \times \frac{365\,\text{days}}{1\,\text{y}} \times \frac{24\,\text{h}}{1\,\text{d}} \times \frac{24}{1\,\text{dy}} \times \frac{1\,\text{h}}{360\,\text{s}}$

$=$

#3. a. $1{,}156{,}000 = 1.156 \times 10^6$

b. $218 = 2.18 \times 10^2$

c. $0.0068 = 6.8 \times 10^{-3}$

d. $27.635 = 2.7635 \times 10^1$

e. $0.21 = 2.1 \times 10^{-1}$

f. $22 = 2.2 \times 10^1$

#4. a. 142 → 3 S.F

b. 81.60 → 4 S.F

c. 7.63 → 3 S.F

d. 0.03 → 1 S.F

e. 0.086 → 2 S.F

f. 3236 → 4 S.F

g. 8700 Can be
2 S.F, or
3 S.F or
4 S.F

#10 Area of a circle

$= \pi R^2$, R = radius of the circle

$= 3.14 \times 2.8 \times 10^4 \times 2.8 \times 10^4$

$= 2.46176 \times 10^9$

$= 2.5 \times 10^9 \text{ cm}^2$

Note: The number of S.F in the result is the same as that of the radius = 2 S.F

The errors in the area is $0.1 \times 10^4 \text{ cm}^2$

#17. $1 \text{ in} = 2.54 \text{ cm} = 2.54 \times 10^{-2} \text{ m}$

a. $1.0 \times 10^{-10} \text{ m} \times \frac{1 \text{ in}}{2.54 \times 10^{-2} \text{ m}}$

$= \frac{1 \times 10^{-10}}{2.54 \times 10^{-2}} = \frac{1 \times 10^{-8}}{2.54} \text{ in}$

$= 0.3937 \times 10^{-8} \text{ in}$

$= 4.0 \times 10^{-9} \text{ in}$

b. The diameter of 1 atom $= 2 \times 10^{-10} \text{ m}$

$= 2 \times 10^{-8} \text{ cm}$

∴ The number of atoms in 1 cm

$= \frac{1 \text{ cm}}{2 \times 10^{-8}} = 0.5 \times 10^8 \text{ atoms}$

$= 5 \times 10^7 \text{ atoms}.$

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a. $km/h \rightarrow mi/h$

$$\frac{km}{h} \times \left(\frac{1\,mil}{1.6\,km}\right) = \frac{1\,mil}{1.6\,h}$$

$\therefore$ Conversion Factor $= \frac{1\,mile}{1.6\,km}$

b. $1\,m = 3.3\,ft$

$$\therefore \frac{1\,m}{s} \times \frac{3.3\,ft}{m}$$

$\therefore$ Conversion factor $= \frac{3.3\,ft}{1\,m}$

c. $1\,km = 1000\,m$

$1\,h = 3600\,sec.$

$$\therefore \frac{km}{h} \times \left\{\frac{1\,h}{3600\,sec} \times \frac{1000\,m}{1\,km}\right\}$$

$\therefore$ Conversion Factor is,

$$\frac{1}{3.6}\ \frac{h \cdot m}{km \cdot s}$$

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Assume the average age of human to be 60 years

Assum the human heart beats 1 beat/sec.

∴ The number of heart beats per life time is,

$$\frac{60\ \text{years}}{1\ \text{lifetime}} \times \frac{365\ \text{day}}{1\ \text{y}} \times \frac{24\ \text{h}}{1\ \text{day}} \times \frac{3600\ \text{sec}}{1\ \text{h}} \times \frac{1\ \text{beat}}{1\ \text{sec}}$$

$$= 1.89 \times 10^9 \ \frac{\text{beat}}{\text{lifetime}}$$

~~$= 2 \times 10^9$ beat/lifetime~~

$\simeq 10^9$ beat/lifetime