1 - 10

a) 10 Kg mass

Weight = mg

where g is acceleration of gravity

$g = 9.81\ m/s^2$

~~Weight = 10 (9.81) = 9.~~

Weight = $10\ Kg \cdot 9.81\ \frac{m}{s^2}$

$= 98.1\ Kg.\frac{m}{s^2}$

$= 98.1\ N$

b) mass = $0.5\ g = 0.5 \times 10^{-3}\ Kg$

Weight = $0.5 \times 10^{-3}\ Kg \cdot 9.81\ \frac{m}{s^2}$

$= 4.905 \times 10^{-3}\ N$

$= 4.91\ mN$

c) mass = $4.5\ Mg = 4.5 \times 10^6\ g = 4.5 \times 10^3\ Kg$

Weight = $4.5\ Kg \cdot 9.81\ m/s^2 \times 10^3$

$= 44.1 \times 10^3\ N$

$= 44.1\ kN$

1-8

Convert 55 mi/h to kilometers per hour

$$55\ \frac{mi}{h} = 55\ \frac{(5280\ ft)}{h}$$

$$= \frac{55\ (5280)\ (0.3048\ m)}{h}$$

$$= \frac{55(5280)(0.3048)(10^{-3}\ Km)}{h}$$

$$= 88.513\ \frac{Km}{h}$$

$$= 88.5\ \frac{Km}{h}$$

Convert to m/s:

$$\frac{88.5\ (10^3\ m)}{(60 \times 60\ s)} = 24.58333\ m/s$$

$$= 24.6\ m/s$$

1 – 19

Eqn 1-2 : $F = G \frac{m_1 m_2}{r^2}$

LHS : $F = ma$

$= Kg \cdot \frac{m}{s^2}$ aKa newton

R.HS : G has units of $\frac{m^3}{Kg \cdot s^2}$

we have $\frac{m^3}{Kg \cdot s^2} \cdot \frac{Kg \cdot Kg}{m^2} = Kg \cdot \frac{m}{s^2}$

Yes we have dimensional homogeneity.

Part 2 :

$$F = 66.73 \times 10^{-12} \frac{m^3}{Kg \cdot s^2} \cdot \frac{(200\,Kg)^2}{(0.6\,m)^2}$$

$$= 741444444.44 \times 10^{-12}\ Kg \frac{m}{s^2}$$

$$= 7.41 \times 10^6 \times 10^{-12}\ N$$

$$= 7.41 \times 10^{-6}\ N$$

$$= 7.41\ \mu N$$