1.3. (a) $\frac{1.0\text{ ft} + 3.2\text{ ft}}{75.00\text{ m}} = \frac{4.2\text{ ft}}{75.00\text{ m}} \times \left(\frac{12\text{ in}}{\text{ft}} \times \frac{2.54\text{ cm}}{\text{in}} \times \frac{1\text{ m}}{100\text{ cm}}\right) = 0.017$

(b) $1\text{ mile} \times \frac{5280\text{ ft}}{1\text{ mile}} \times \frac{12\text{ inch}}{1\text{ ft}} \times \frac{2.54\text{ cm}}{1\text{ in}} \times \frac{1\text{ m}}{100\text{ cm}} = 1609.34\text{ m}$

and $1\text{ cm}^2 \times \left(\frac{1\text{ m}}{100\text{ cm}}\right)^2 = 10^{-4}\text{ m}^2$

so $\frac{\left(5185.7\text{ miles} \times \frac{1609.34\text{ m}}{1\text{ mile}}\right)\left(31{,}765.4\text{ cm}^2 \times \frac{10^{-4}\text{ m}^2}{\text{cm}^2}\right)}{1.0000\text{ m}^3} = 2.6510 \times 10^7$

(c) $\frac{36.2000\text{ ft}}{3.0007\text{ in} \times \frac{1\text{ ft}}{12\text{ in}}} = 144.77$

(d) $\frac{36.2000\text{ ft}}{3.0007\text{ in} \times \frac{1\text{ ft}}{12\text{ in}}} - 725.2 = 144.77 - 725.2 = -580.4$

1.4 (a) $F = ma \Rightarrow \text{g cm s}^{-2} = 1\text{ dyne}$

(b) $F = ma \Rightarrow \text{kg m s}^{-2} = 1\text{ N}$

(c) to convert from newtons to dynes,

$1\text{ N} = 1\text{ kg m s}^{-2} \times \left(\frac{1000\text{ g}}{\text{kg}} \times \frac{100\text{ cm}}{\text{m}}\right) = 10^5\text{ g cm s}^{-2} = 10^5\text{ dynes}$

1.7 (a) ok distance/time = velocity

(b) ok distance x time = ? but it's not forbidden

(c) forbidden in this class but in relativity, ok.

(d) same as above

(e) ok distance + velocity x time = distance + $\frac{\text{distance}}{\text{time}}$ x time

= distance + distance.

1.8 (a) $x(t) \not\propto x_0 + v + t \not\propto \text{m} + \text{m/s} + \text{s}$ dimensions are not ok.

(b) $x(t) \not\propto x_0 t + v \not\propto (\text{m})(\text{s}) + \text{m/s}$ dimensions are not ok

(c) $x(t) = x_0 + vt = \text{m} + (\text{m/s})\,\text{s}$ dimensions are ok

this makes sense, physically as well. It says that the position of an object at time t is dependent upon its initial position + velocity.

(d) $x(t) \not\propto x_0 vt \not\propto \text{m} \cdot \frac{\text{m}}{\text{s}} \cdot \text{s} \not\propto \text{m}^2$ dimensions are not ok.