

STATICS ENGR-221 NOTES & HELP

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CH.1 ENGINEERING MECHANICS - INTRO.

1.1

PROBLEM SOLVING

- 1) GIVEN:
- 2) SKETCH
- 3) STRATEGY - FIND:
- 4) PREDICT ANS.
- 5) SOLVE

SIGNIFICANT DIGITS - 3 S.D.

NEWTON'S LAW $\sum F = m \overset{kg}{a} = \frac{d(mv)}{dt}$

$$\sum F = 0$$

UNITS - SI (kg, m, N) - U.S (lb, ft, slugs)

SI, $a = \frac{F \leftarrow N}{m \leftarrow kg} \quad U.S \quad F = m \overset{slug}{a} \leftarrow \frac{ft}{s^2}$
 $\leftarrow \frac{m}{s^2} \quad \leftarrow kg \quad \leftarrow lbs \quad \leftarrow \frac{ft}{s^2}$

$$g = a_g = 9.8 \frac{m}{s^2} = 32.2 \frac{ft}{s^2}$$

$$m = \frac{F \leftarrow lb}{a \leftarrow 32.2 \frac{ft}{s^2}} \leftarrow slug$$

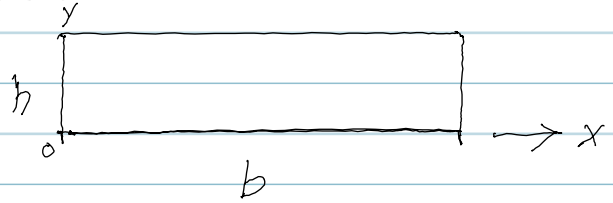
1.2 NEWTONIAN GRAVITATION

$$F = \frac{G m_E m}{r^2} = mg \quad a_g = \frac{G m_E}{r^2}$$

CH. 1 PROBLEMS - EXAMPLES

#1-19 GIVEN: $I = \frac{1}{3}bh^3$ $b=200\text{mm}$, $h=100\text{mm}$

SKETCH



FIND: $I_x = ?$ (in units of mm^4 , m^4 , in^4)

SOLUTION:

$$I_x = \frac{1}{3}bh^3$$

a) $I = \frac{1}{3}(200\text{mm})(100\text{mm})^3 = \underline{\underline{66.67 \cdot 10^6 \text{mm}^4}}$

b) $66.67 \cdot 10^6 \text{mm}^4 \left(\frac{1 \text{ m}}{1000 \text{ mm}} \right)^4 = \underline{\underline{66.67 \cdot 10^{-6} \text{m}^4}}$

c) $\frac{66.67 \cdot 10^{-6} \text{mm}^4}{66.667} \left(\frac{1 \text{ in}}{25.4 \text{ mm}} \right)^4 = \underline{\underline{160.02 \text{in}^4}}$