Ch. # 9
H.W. Solution

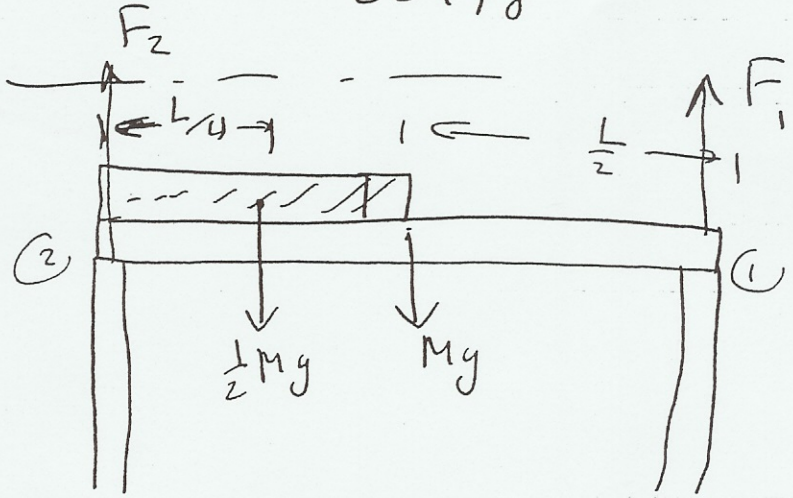
#4.

$$\tau = F d$$
$$= mg d$$

$$\therefore 1000 = 60 \times 9.8\, d$$

$$\text{or } d = \frac{1000}{60 \times 9.8} = 1.7\,m.$$

#8.



$$F_1 + F_2 = \frac{1}{2}Mg + Mg.$$
$$= \frac{3}{2}Mg = \frac{3}{2} \times 1000 \times 9.8$$

$$\text{or } F_1 + F_2 = 14700$$

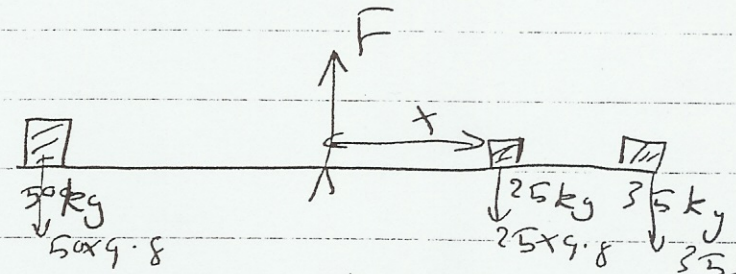
Take the Torque about the left support.

$$\therefore F_1 \times L = Mg \times \frac{L}{2} + \frac{1}{2}Mg \times \frac{L}{4}$$

$$\text{or } F_1 = \frac{5}{4}Mg$$
$$= \frac{5}{4} \times 1000 \times 9.8 = 12250\,N$$

$$\therefore F_2 = 14700 - 12250 = 2450\,N.$$

#18



The boy must be to the right of the rock.

Assume he is a distance x from the rock.

~~F = 50×9.8~~ Take the Torque about the ~~B~~ rock

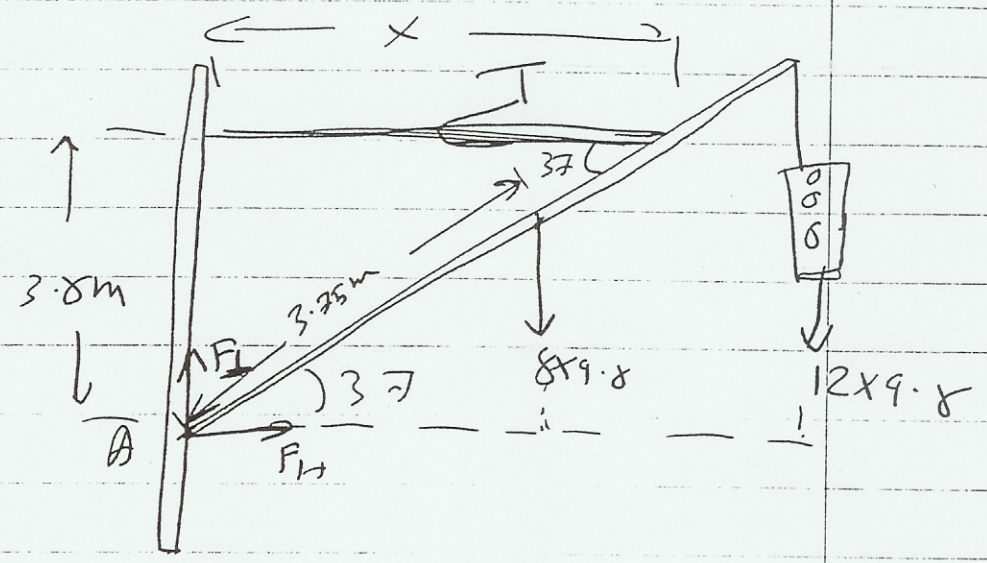
$\therefore 50\times 9.8\times 1.8 = 25\times 9.8\times + 35\times 9.8\times 1.8$

$\therefore 882 = 245x + 617$

$\therefore x = \frac{882 - 617}{245} = 1.08\,m$

~~#27.~~

#27



$\Sigma F = 0$

$\therefore \Sigma F_x = 0 \Rightarrow T = F_H$ ②

$\Sigma F_y = 0 \Rightarrow F_L = 8\times9.8 + 12\times9.8$

or $F_L = 196\,N$

The Torque about Point A $\Rightarrow$

$\therefore 8\times9.8\times3.75\cos37 + 12\times9.8\times7.5\cos37$

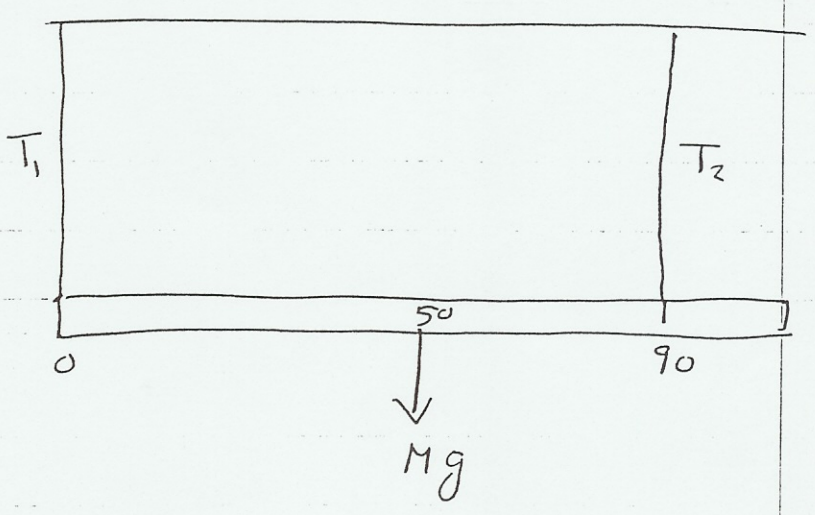
$= Tx = T\times3.8\cot37$

or $234.8 + 704.4 = T(3.8\times1.06)$

$\therefore T = 233.N$

$\therefore F_H = T = 233\,N.$

#30



$$T_1 + T_2 = Mg$$

Take the Torque about the left end of the ~~rotter~~ ruler (0 mark).

$$\therefore Mg \times 50 = T_2 \times 90$$

$$\text{or } T_2 = \frac{0.23 \times 9.8 \times 50}{90}$$

$$= 1.25 \text{ N}$$

$$\therefore T_2 = Mg - T_1$$

$$= .23 \times 9.8 - 1.25$$

$$= 1.0 \text{ N}$$