Pg 244: 1:2 / 248: 20, 22 / Pg 254: 70

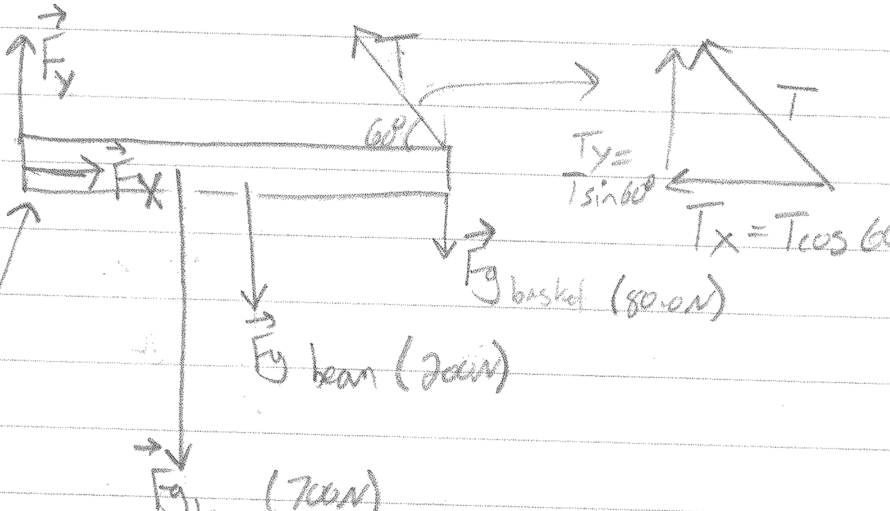
1) $\tau = \vec{F} \cdot d \rightarrow \vec{F} = \frac{\tau}{d}$

$\hookrightarrow \vec{F} = \frac{40\,Nm}{.300\,m} = 133\,N$

2) $\tau = \vec{F} \cdot d\cos\theta = 80.0N \cdot .012m \cdot \cos(48°)$

$\tau = .642\ N \cdot m$ CCW

20) a.



b) pivot point = left end

$\hookrightarrow$ can solve for Tension as follows $\quad T_y = T\sin 60°$

$\Sigma T_y = 0N = (Fg_{bear} \cdot 1.0m) + (Fg_{beam} \cdot 3.0m) + (Fg_{basket} \cdot 6m) = (T\sin 60 \cdot 6m)$

$\hookrightarrow T = \frac{(Fg_{bear} \cdot 1.0m) + (Fg_{beam} \cdot 3.0m) + (Fg_{basket} \cdot 6m)}{(\sin 60 \cdot 6m)}$

$\hookrightarrow T = \frac{(700N \cdot 1.0m) + (200N \cdot 3.0m) + (80.0N \cdot 6m)}{(\sin 60 \cdot 6m)}$

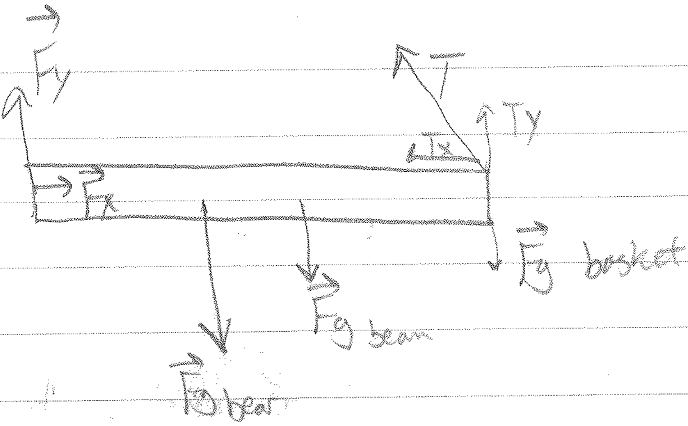
$\vec{T} = 343\ N$

- for x @ pivot $\quad \vec{F}x = Tx = T\cos 60° \rightarrow \vec{F}x = 343\cos(60°) = 171.5N$
- for y @ pivot $\quad \Sigma F_y = 0N \rightarrow (F_y + T_y) = (\overset{Fg_{bear}}{700N} + \overset{Fg_{beam}}{200N} + \overset{Fg_{basket}}{80.0N})$

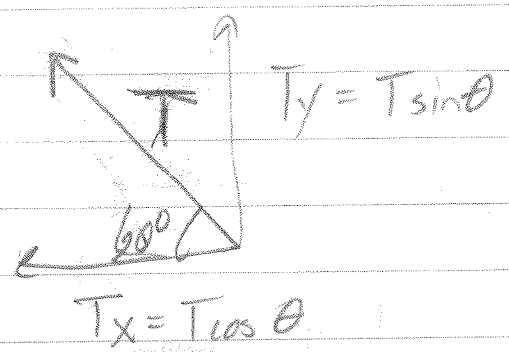
$\hookrightarrow F_y = (700N + 200N + 80.0N) - 343\sin 60°$

$F_y = 683N$

20 c.)



c.) T = 900N



So using $\Sigma\tau_{\text{left end}} = 0\ N\cdot m$

$0\ N\cdot m = T\sin\theta\cdot d - ((F_{g_{bear}}\cdot d) + (F_{g_{beam}}\cdot d) + (F_{g_{basket}}\cdot d))$

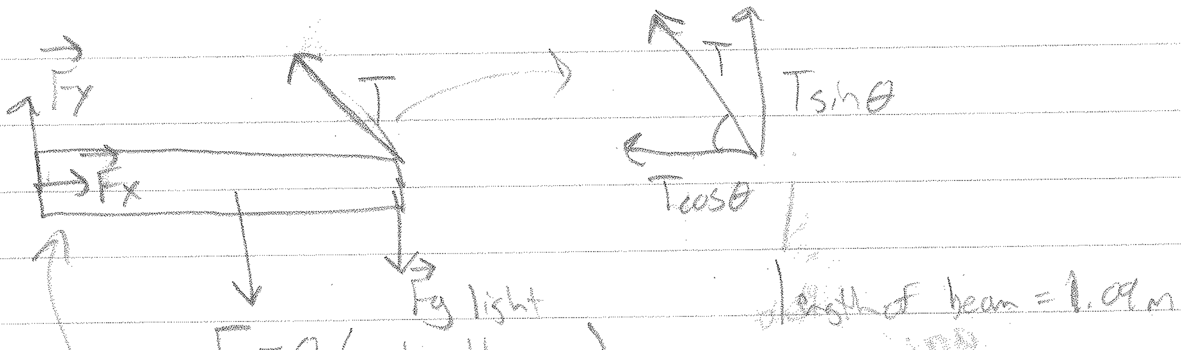
~~[illegible] (700N·d) + (200N·3m) + (80N·6m))~~

$(900N\sin 60.0°\cdot 6m) = ((700N\cdot d) + (200N\cdot 3m) + (80N\cdot 6m))$

$d = 5.14m$

Pg 248 22 (length of beam = 1.09m

a)



$\vec{F_g} = 0$ (negligible mass)

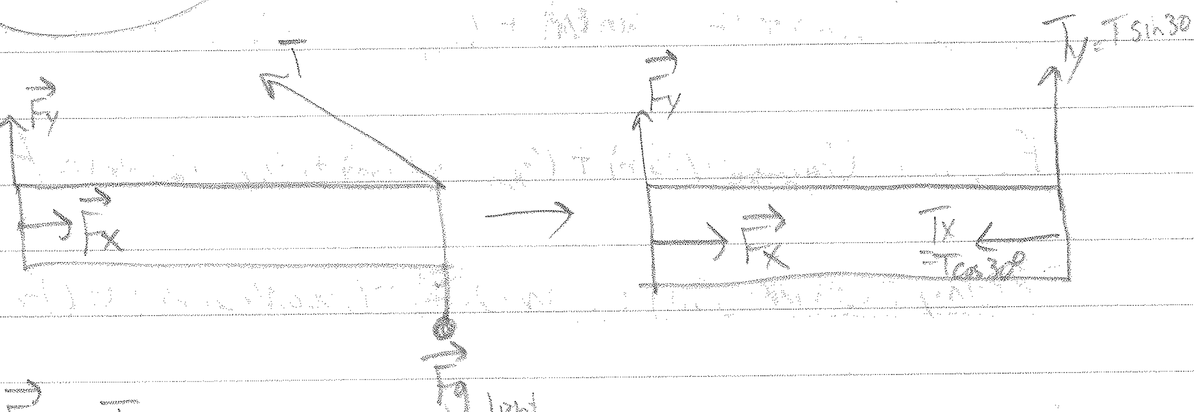
$\Sigma\tau$ @ pivot $= 0Nm = (T\sin\theta \cdot d) - (F_{g\,light} \cdot d)$

$\hookrightarrow T\sin\theta \cdot d = F_{g\,light} \cdot d$

$\hookrightarrow T = \dfrac{m \cdot g \cdot 1.09m}{\sin\theta\, 1.09m} = \dfrac{(20.0kg \cdot 10m/s^2 \cdot 1.09m)}{(\sin\theta\, 1.09m)}$

$T = 400N$

b)



$\Sigma\vec{F_x} = \vec{F_x} - T_x = 0N$

$\hookrightarrow \vec{F_x} = T\cos 30°$

$\hookrightarrow \vec{F_x} = (400N \cos 30°) = 346N$

$\Sigma\vec{F_y} = (\vec{F_y} + \vec{T_y}) - \vec{F_g}\,light = 0N$

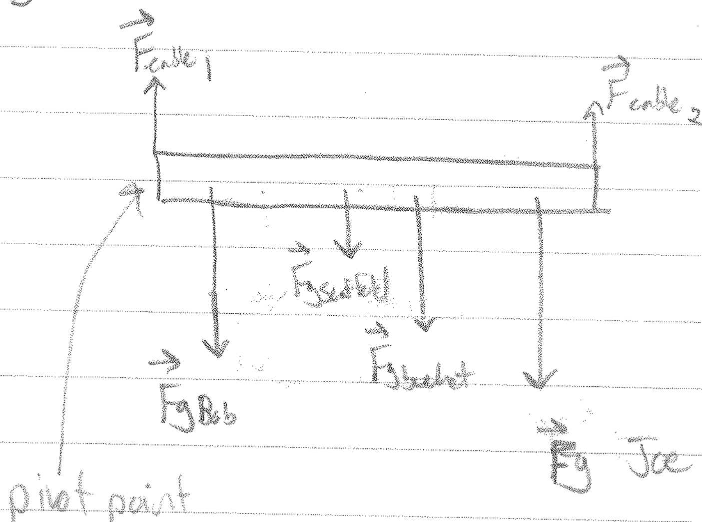
$\hookrightarrow F_y + T\sin\theta = m \cdot g$

$\hookrightarrow F_y = m \cdot g - T\sin\theta$

$\hookrightarrow F_y = (20.0kg \cdot 10m/s^2) - (400N \sin 30°)$

$F_y = 0N$

Pg 254: 70



~~$\Sigma F_y = 0N = (\vec{F}_{g_{Bob}} + \vec{F}_{g_{scaffold}} + \vec{F}_{g_{bucket}} + \vec{F}_{g_{Joe}}) - \vec{F}_{cable_2}$~~

~~$\vec{F}_{g_{Bob}} + \vec{F}_{g_{scaffold}} + \vec{F}_{g_{bucket}} + \vec{F}_{g_{Joe}} = \vec{F}$~~

$\Sigma \tau = (F_{g_{Bob}} \cdot 1.00m) + (F_{g_{scaffold}} \cdot 1.5m) + (F_{g_{bucket}} \cdot 2.00m) + (F_{g_{Joe}} \cdot 2.50m) - (F_{cable_2} \cdot 3.00m)$

$(F_{g_{Bob}} \cdot 1m) + (F_{g_{scaffold}} \cdot 1.5m) + (F_{g_{bucket}} \cdot 2.00m) + (F_{g_{Joe}} \cdot 2.50m) = (F_{cable_2} \cdot 3.00m)$

$$\frac{(750N \cdot 1m) + (345N \cdot 1.5m) + (500N \cdot 2.0m) + (1000N \cdot 2.50m)}{(3.00m)} = (F_{cable\,2})$$

$\vec{F}_{cable\ 2} = 1590N$

$\Sigma \vec{F}_y = 0N = (F_{g_{Bob}} + F_{g_{scaffold}} + F_{g_{bucket}} + F_{g_{Joe}}) - (\vec{F}_{cable_1} + \vec{F}_{cable_2})$

$(750N + 345N + 500N \cdot 1000N) - (F_{cable\,1} + 1590N) = 0N$

$\vec{F}_{cable} = 1005N$