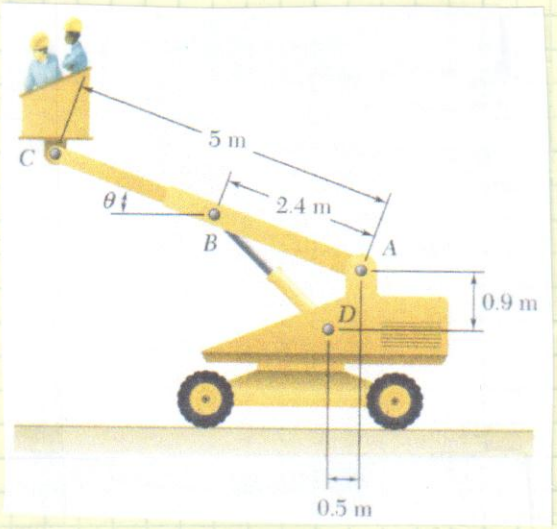
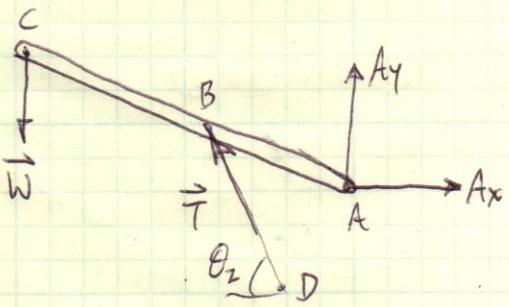
PROB. 6.153



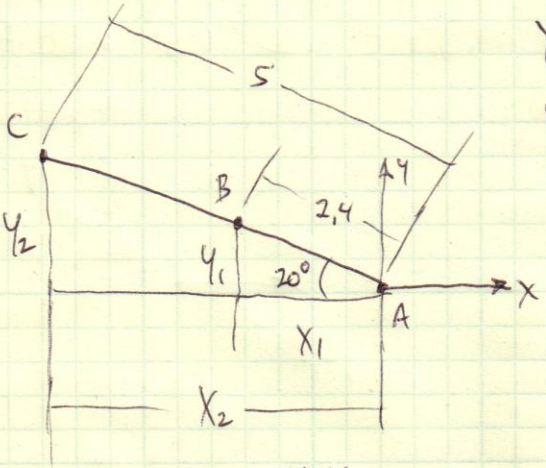
FIND FORCES AT A + B.

FBD



LOCATE POINTS:

A(0,0), D(-0.5, -0.9)^m



$X_1 = -2.4\cos 20^\circ = -2.255^m$

$Y_1 = 2.4 \cdot \sin 20^\circ = 0.8208$

B(-2.255, 0.8208)^m

$X_2 = -5.0 \cdot \cos 20^\circ = -4.698^m$

$Y_2 = 5.0 \cdot \sin 20^\circ = 1.71^m$

C(-4.698, 1.71)^m

DEFINE $\vec{T}$: $d_x = X_B - X_D = (-2.255) - (-0.5) = -1.755^m$

$d_y = Y_B - Y_D = 0.8208 - (-0.9) = 1.721^m$

$d = \sqrt{1.755^2 + 1.721^2} = 2.458^m$

$\vec{T} = \left(\frac{-1.755}{2.458} \cdot T\right)\hat{i} + \left(\frac{1.721}{2.458} \cdot T\right)\hat{j} = (-0.714T)\hat{i} + (0.7002T)\hat{j}^N$

$mg = (200^{kg})(9.81 \frac{m}{s^2}) = 1962^N$

$\vec{W} = (-1962)\hat{\jmath}^N$

$\Sigma F_x = 0: \; A_x - 0.714T = 0$

$\Sigma F_y = 0: \; A_y + 0.7002T - 1962 = 0$

$\Sigma M_A = 0:$

$\vec{r}_{BA} = (-2.255)\hat{\imath} + (0.8208)\hat{\jmath}^m$

$$\vec{r}_{BA} \times \vec{T} = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ -2.255 & 0.8208 & 0 \\ -0.714T & 0.7002T & 0 \end{vmatrix}$$

$= [(-2.255)(0.7002T) - (0.8208)(-0.714T)]\hat{k} = (-0.9929T)\hat{k}$

$-0.9929T + (1962^N)(4.698^m) = 0$

$\boxed{T = 9283^N}$

$\boxed{A_x = 0.714(9283) = 6628^N \rightarrow}$

$\boxed{A_y = 1962 - 0.7002(9283) = -4538^N \downarrow}$