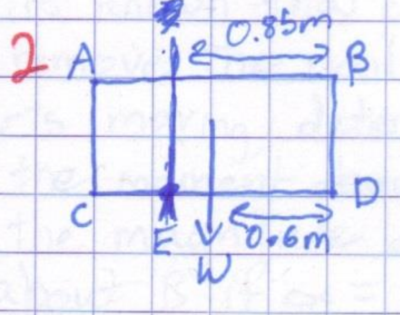
3.4 a) The moment produced by the weight $W = 80kg$ about E

b) Smallest force applied at B that creates a moment of equal magnitude and opposite sense about E

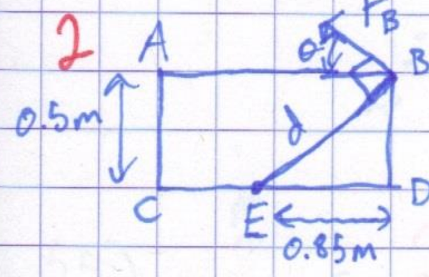


a) $W = mg = 80kg(9.81 m/s^2) = 784.8N$

$\circlearrowleft M_E = -Wd = -784.8N(0.85 - 0.6m)$

$\boxed{M_E = 196.2 Nm \circlearrowright}$

b) For the force B to be the smallest, resulting in a moment (M_E) about E, the line of action of force F_B must be perpendicular to the line connecting E to B. The sense of F_B must be such that it produces a CCW moment about E.



$d = \sqrt{(0.5m)^2 + (0.85m)^2} = 0.98615m$

$\Sigma M_E: \; 196.2Nm = F_B(0.98615m)$

$\boxed{F_B = 198.96N}$

$\theta = \tan^{-1}\left(\frac{0.85m}{0.5m}\right) \boxed{= 59.53°}$

$\therefore \boxed{F_B = 199.0N \;\angle\; 59.5°}$

3.26) Find M_A if $T_{BC} = 2.5kN$

$d_{BC} = \sqrt{(6m)^2 + (2.4m)^2 + (4m)^2} = 7.6m \;\therefore \vec{T}_{BC} = \frac{2.5kN}{7.6m}(-6m\vec{i} + 2.4m\vec{j} - 4m\vec{k})$

$M_A = \vec{r}_{B/A} \times \vec{T}_{BC}$ where $\vec{r}_{BA} = (6m)\vec{i}$

$M_A = (6m)\vec{i} \times \frac{2.5kN}{7.6}(-6\vec{i} + 2.4\vec{j} - 4\vec{k})$

$\boxed{M_A = (7.89 kNm)\vec{j} + (4.74 kNm)\vec{k}}$