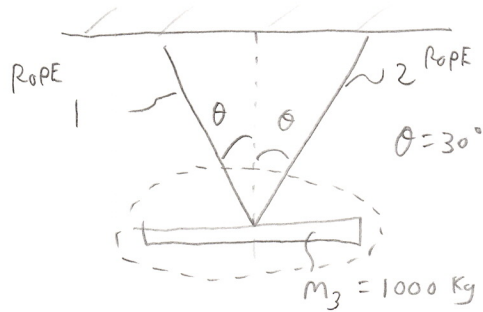
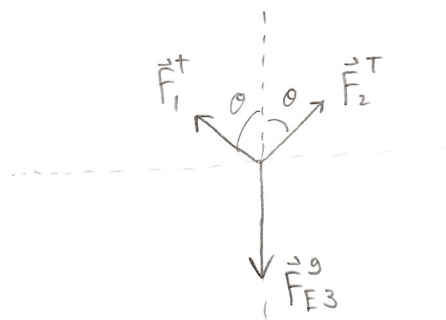


P 5.4



FBD m_3



$$\sum F_x = m_3 a_x^0$$

$$-|F_1^T| \sin \theta + |F_2^T| \sin \theta = 0$$

$$|F_1^T| = |F_2^T| \equiv |F^T|$$

$$\sum F_y = m_3 a_y^0$$

$$|F_1^T| \cos \theta + |F_2^T| \cos \theta - |F_{E3}^g| = 0$$

$$|F^T| \cos \theta + |F^T| \cos \theta - m_3 g = 0$$

$$2|F^T| \cos \theta = m_3 g$$

$$|F^T| = \frac{m_3 g}{2 \cos \theta}$$

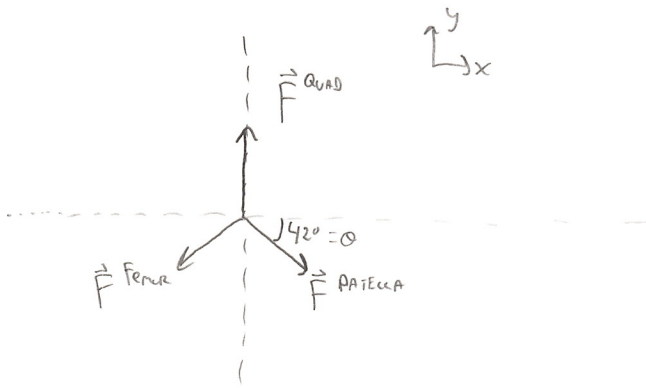
$$= \frac{(1000)(9.8)}{2(\cos(30^\circ))} \text{ N}$$

$$|F^T| \approx 5658 \text{ N}$$

$|F^T| > 5600 \text{ N}$ SO ROPES WILL BREAK.

P 5.5 |

FBD 1 (KNEE CAP)



$$\sum F_x = m a_x = 0$$

$$-F_x^{Femur} + |F^{Patella}| \cos \theta = 0$$

$$F_x^{Femur} = |F^{Patella}| \cos \theta$$

$$= 60 \cos 42^\circ \text{ N}$$

$$F_x^{Femur} \approx -44.6 \text{ N}$$

$$\sum F_y = m a_y = 0$$

$$|F^{Quad}| - F_y^{Femur} - |F^{Patella}| \sin \theta = 0$$

$$F_y^{Femur} = |F^{Quad}| - |F^{Patella}| \sin \theta$$

$$= (60 - 60 \sin 42^\circ) \text{ N}$$

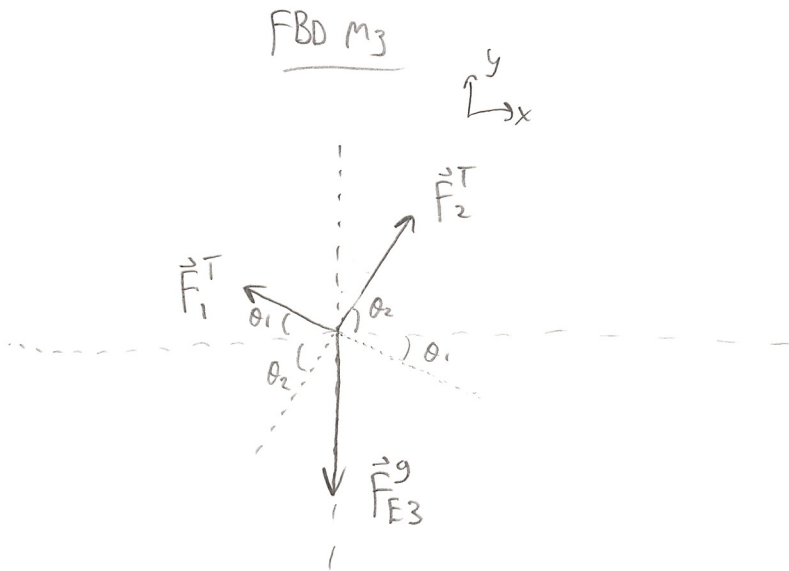
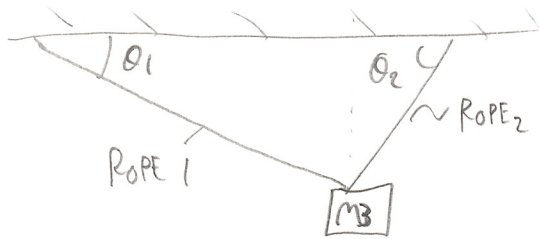
$$F_y^{Femur} \approx -19.85 \text{ N}$$

$$\vec{F}^{Femur} = \langle -44.6, 19.9 \rangle \text{ N}$$

$$|\vec{F}^{Femur}| = \sqrt{(44.6)^2 + (19.9)^2}$$

$$|\vec{F}^{Femur}| \approx 49 \text{ N} \quad \text{OR} \quad 50 \text{ N}$$

HANSINS CHANDELIER



$$\sum F_x = m_3 a_x = 0$$

$$-|\vec{F}_1^T| \cos \theta_1 + |\vec{F}_2^T| \cos \theta_2 = 0$$

$$\sum F_y = m_3 a_y = 0$$

$$|\vec{F}_1^T| \sin \theta_1 + |\vec{F}_2^T| \sin \theta_2 - |\vec{F}_{E3}^g| = 0$$

$$|\vec{F}_1^T| \sin \theta_1 + |\vec{F}_2^T| \sin \theta_2 - m_3 g = 0$$

$$|\vec{F}_2^T| = \frac{|\vec{F}_1^T| \cos \theta_1}{\cos \theta_2}$$

2 EQNS
2 UNKNOWN

$$|\vec{F}_1^T| \sin \theta_1 + \frac{|\vec{F}_1^T| \cos \theta_1 \cdot \sin \theta_2}{\cos \theta_2} = m_3 g$$

$$|\vec{F}_1^T| = \frac{m_3 g}{\sin \theta_1 + \cos \theta_1 \tan \theta_2}$$