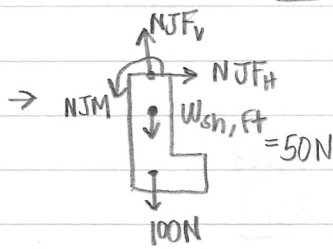
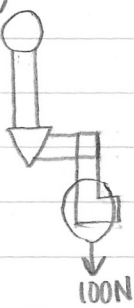


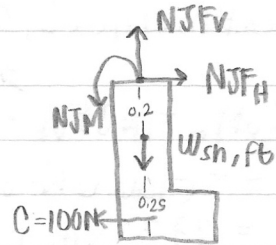
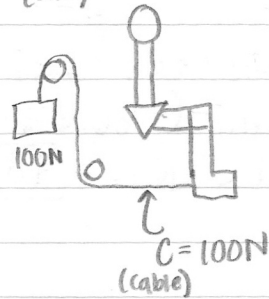
10-18

Knee flexion

(ex1)



(ex2)



$$\sum F_H = ma_H = 0$$

$$NJFH = 0 \rightarrow \text{no H Force}$$

$$\sum F_v = ma_v = 0$$

$$0 = NJF_{kv} + W_{sh,ft} + W$$

$$NJF_{kv} = +(+50N) + (+100N) = \boxed{150N} \rightarrow \text{assumed correctly}$$

(to do this task you would have to have sufficient muscles around the knee)

$$\sum M_{cm} = I_{cm} \alpha = 0$$

$$0 = NJM_k \rightarrow \text{no rotation}$$



$$\sum F_H = ma_H = 0$$

$$0 = NJFH_k + C$$

$$\boxed{100N} = NJFH_k \rightarrow \text{assumed correctly}$$

$$\sum F_v = ma_v = 0$$

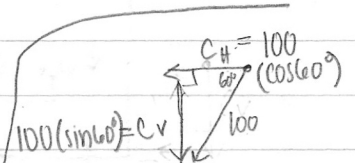
$$0 = NJF_{kv} + W_{sh,ft} \rightarrow \boxed{50N} = NJF_{kv} \rightarrow \text{assumed correctly}$$

$$\sum M_{cm} = I_{cm} \alpha = 0$$

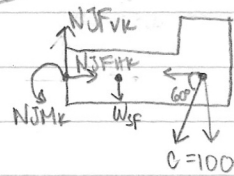
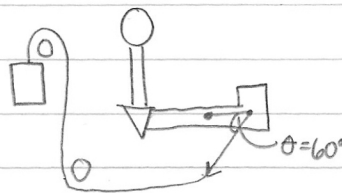
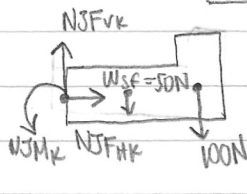
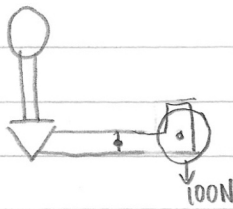
$$0 = NJM_k + (C \cdot l_d) + (NJFH_k \cdot l_d)$$

$$NJM_k = +(+100N \cdot 0.25m) + (+100N \cdot 2m) = 25Nm + 20Nm$$

$$NJM_k = \boxed{45Nm}$$



Knee extension



$$\sum F_H = ma_H = 0$$

$$0 = NJFH_k \rightarrow \text{no H Force}$$

$$\sum F_v = ma_v = 0$$

$$0 = NJF_{kv} + W_{sh,ft} + W$$

$$NJF_{kv} = 100N + 50N = \boxed{150N}$$

$$\sum M_{cm} = I_{cm} \alpha = 0$$

$$0 = NJM_k + (NJF_{kv} \cdot l_d) + (W \cdot l_d)$$

$$NJM_k = +(+150N \cdot 0.2m) + (+100N \cdot 0.25m)$$

$$NJM_k = 30Nm + 25Nm = \boxed{55Nm}$$

$$\sum F_H = ma_H = 0$$

$$0 = NJFH_k + C_H$$

$$NJFH_k = 100 (\cos 60^\circ) = \boxed{50N}$$

$$\sum F_v = ma_v = 0$$

$$0 = NJF_{kv} + W_{sf} + C_V$$

$$NJF_{kv} = (50N) + (+100 \sin 60^\circ) = 50N + 86.60N = \boxed{136.6N}$$

$$\sum M_{cm} = I_{cm} \alpha = 0$$

(knee extension, ex 2, cont.)

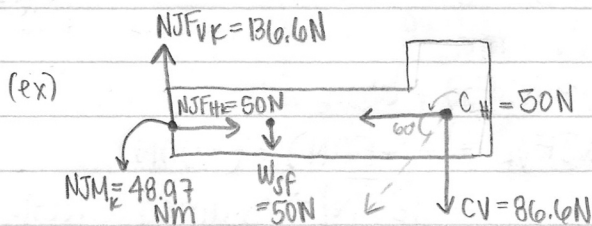
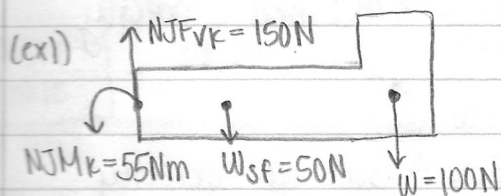
$$0 = NJM_k + (NJF_{vk} \cdot Id) + (C_v \cdot Id)$$

$$NJM_k = -(-136.6\text{ N} \cdot 0.2\text{ m}) - (-86.6\text{ N} \cdot 0.25\text{ m})$$

$$= 27.32\text{ Nm} + 21.65\text{ Nm} = \boxed{48.97\text{ Nm}}$$

in reality FBDS

knee extension



knee flexion

