Static Equilibrium

#1.

$\vec{F}_{net_y} = 0$

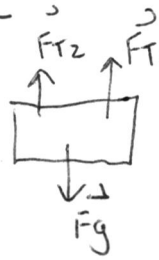
$\therefore F_T = F_g$

$= mg$

$\doteq 49\,N$

$F_{T_1} = F_{T_2} \doteq 49\,N$ (same rope)

#2.



$\vec{F}_{net_y} = 0$

$F_{T_2} + F_{T_4} = F_g$

$2F_T = F_g$

$F_T \doteq 24.5\,N$

$F_{T_2} = F_{T_4}$ since symmetry call them F_T

But $F_{T_1} = F_{T_2}$ (same rope)

$F_{T_3} = F_{T_4}$ (same rope)

$\therefore F_{T_1} = F_{T_2} = F_{T_3} = F_{T_4} \doteq 24.5\,N \doteq 24\,N$

#3. $F_{T_1} = F_{T_2} = F_{T_3}$ (same rope)

$\vec{F}_{net_y} = 0$

$\therefore F_{T_3} = F_g$

$= mg$

$F_{T_3} \doteq 49\,N$

#4. $F_{T_1} = F_{T_2} = F_{T_3} = F_{T_4}$ (same rope)

$\vec{F}_{net_y} = 0$

$F_{T_1} = mg$

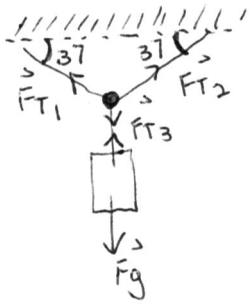
$= 49\,N$

$\vec{F}_{net_y} = 0$

$F_{T_4} = mg$

$= 49\,N$

#5.



FBD Block

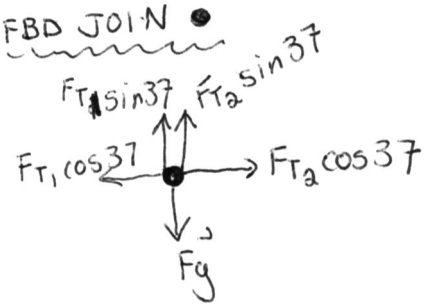
$\vec{F}_{net_y} = 0$

$\therefore F_{T_3} = F_g$

$F_{T_3} = mg$

$= 49\,N$

FBD JOIN ●



since F_{T_1} & F_{T_2} are symmetrical (same angle)

$F_{T_1} = F_{T_2}$ call them F_T

$\vec{F}_{net_y} = 0$

$\therefore 2F_T \sin 37 = F_g$ & or F_{T_3} (they are same proven in FBD of block)

$\therefore F_T \doteq 40.7\,N$

$\therefore F_{T_1} = F_{T_2} \doteq 41\,N$

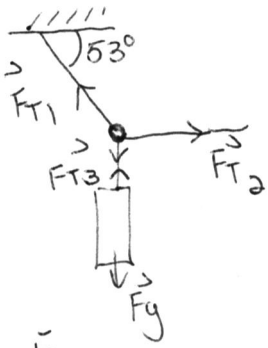
$F_{T_3} = 49\,N$

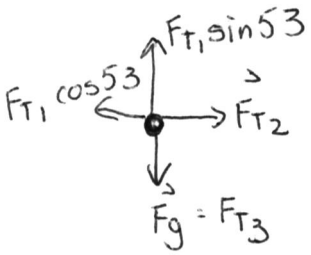
#6. Done in class

#7, 8, 9 next page

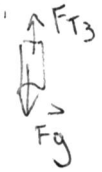
Analyze in x & y directions
FBD around •

#7.





$F_{T3} = F_g$
if you do FBD on block:



y: $F_{net_y} = 0$

$\therefore F_{T1}\sin 53 = F_g$

$F_{T1} = \frac{mg}{\sin 53}$

$\doteq 61.35\ N$

$F_{T1} \doteq 61\ N$

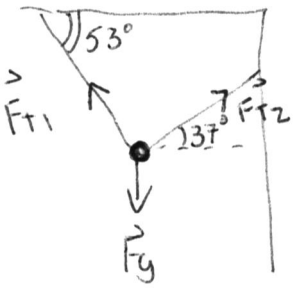
$F_{net_x} = 0$

x: $F_{T2} = F_{T1}\cos 53$

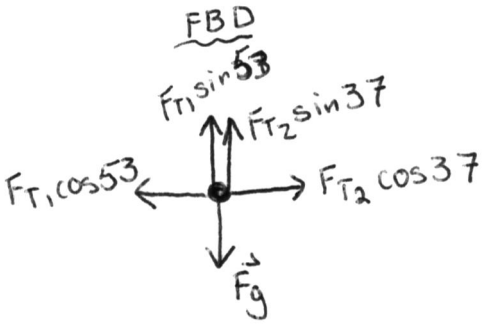
$= 61.35\cos 53$

$F_{T2} \doteq 37\ N$

#8



FBD



y: $\vec{F}_{net_y} = 0$

$F_g = F_{T1}\sin 53 + F_{T2}\sin 37$ (1)

x: $\vec{F}_{net_x} = 0$

$F_{T2}\cos 37 = F_{T1}\cos 53$

$F_{T2} = \frac{F_{T1}\cos 53}{\cos 37}$ (2)

sub (2) in (1) $\Rightarrow F_g = F_{T1}\sin 53 + \left(\frac{F_{T1}\cos 53}{\cos 37}\right)\sin 37$

factor out $F_{T1} \Rightarrow 49 = F_{T1}\left(\sin 53 + \left(\frac{\cos 53}{\cos 37}\right)\sin 37\right)$

$F_{T1} = 39.1\ N$ — sub in to find F_{T2}

$F_{T1} \doteq 39\ N$

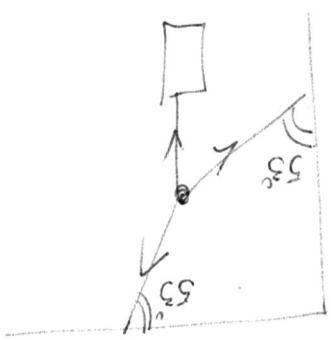
$\therefore F_{T2} \doteq 29N$

TX RESULT REPORT

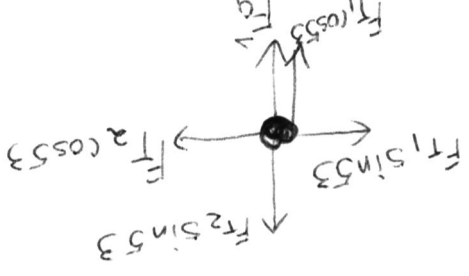
NAME :
TEL :
DATE :NOV.05.2013 20:44

SESSION	FUNCTION	NO.	DESTINATION STATION	DATE	TIME	PAGE	DURATION	MODE	RESULT
0064	TX	001	Sandy Home sjevans@rogers.com	NOV.05	20:42	000	-	E-MAIL	NG
			0102:[DNS] Cannot Connect						

#9.



Be careful of direction! (on F_T's components)



$\rightarrow$ x: $F_{net_x} = 0$

$F_{T_1}\sin 53 = F_{T_a}\cos 53$

$F_{T_1} = F_{T_a}\left(\frac{\cos 53}{\sin 53}\right)$ ③

$\uparrow$ y: $F_{net_y} = 0$

$F_{T_a}\sin 53 = F_{T_1}\cos 53 + F_g$ ①

sub ③ in ① $F_{T_a}\sin 53 = \left(F_{T_2}\frac{\cos 53}{\sin 53}\right)\cos 53 + 49$

$F_{T_2}\left(\sin 53 - \left(\frac{\cos 53}{\sin 53}\right)\cos 53\right) = 49$

$F_{T_a} \doteq 142\,N$

$F_{T_a} \doteq 1.4\times10^2\,N$

sub in to find F_{T_1}

$F_{T_1} \doteq 107\,N$

$F_{T_1} \doteq 1.1\times10^2\,N$