○ p 1
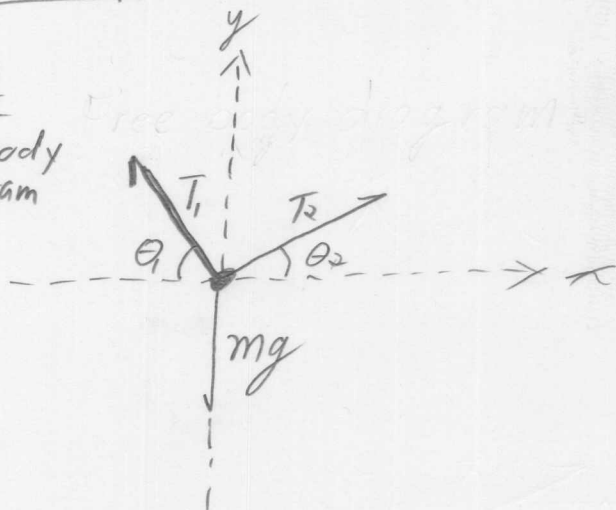Free body
diagram

GIVEN
$m = 26\ kg$
$\theta_1 = 71°$
$\theta_2 = 28°$

step 2: $\sum \vec{F} = m\vec{a} \rightarrow$ Break into x and y

x: $T_2 \cos\theta_2 - T_1 \cos\theta_1 = 0$ y: $T_1 \sin\theta_1 + T_2 \sin\theta_2 - mg = 0$

① $T_2 \cos\theta_2 = T_1 \cos\theta_1$ ② $T_2 \sin\theta_2 = mg - T_1 \sin\theta_1$

Divide ② by ①

$$\frac{T_2 \sin\theta_2}{T_2 \cos\theta_2} = \frac{mg - T_1 \sin\theta_1}{T_1 \cos\theta_1} \Rightarrow T_1 \cos\theta_1 \tan\theta_2 = mg - T_1 \sin\theta_1$$

$$T_1 (\cos\theta_1 \tan\theta_2 + \sin\theta_1) = mg$$

$$T_1 = \frac{mg}{\cos\theta_1 \frac{\sin\theta_2}{\cos\theta_2} + \sin\theta_1} = mg \frac{\cos\theta_2}{\cos\theta_1 \sin\theta_2 + \sin\theta_1 \cos\theta_2}$$

③ $$\boxed{T_1 = mg \frac{\cos\theta_2}{\sin(\theta_1 + \theta_2)}}$$

5-36 continued...

Combine ① and ③

$$T_2 \cancel{\cos\theta_2} = \left(mg \frac{\cancel{\cos\theta_2}}{\sin(\theta_1+\theta_2)}\right) \cos\theta_1$$

↓

T_1 from eq ③

$$\boxed{T_2 = mg \frac{\cos\theta_1}{\sin(\theta_1+\theta_2)}}$$

$$T_1 = (26)(9.8) \frac{\cos(28)}{\sin(28+71)} = \underline{227\,N}$$

$$T_2 = (26)(9.8) \frac{\cos(71)}{\sin(28+71)} = \underline{839\,N}$$