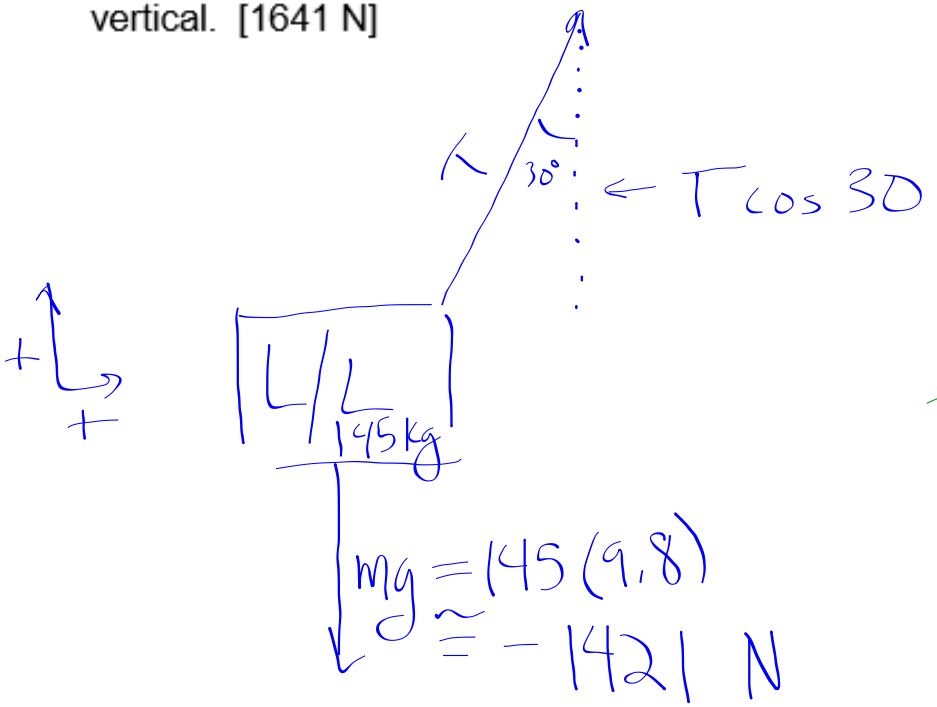
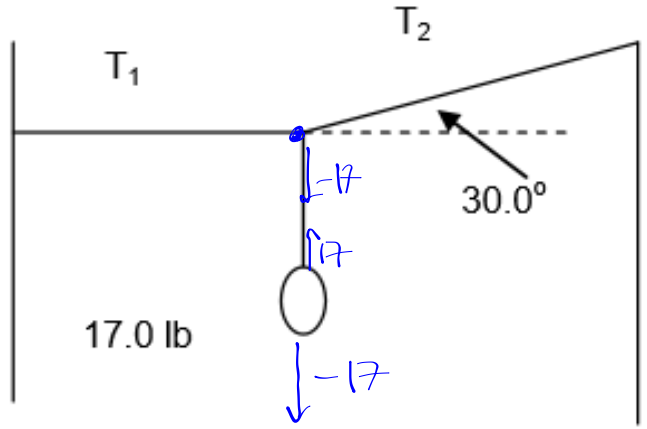
2. Luke Skywalker must swing Princess Leia across a large chasm in order to escape the Storm Troopers. If Luke and Leia's combined mass is 145.0 kg, calculate the tension in the rope just before Luke and Leia start their swing, when the pair makes an angle of 30.00 degrees with the vertical. [1641 N]

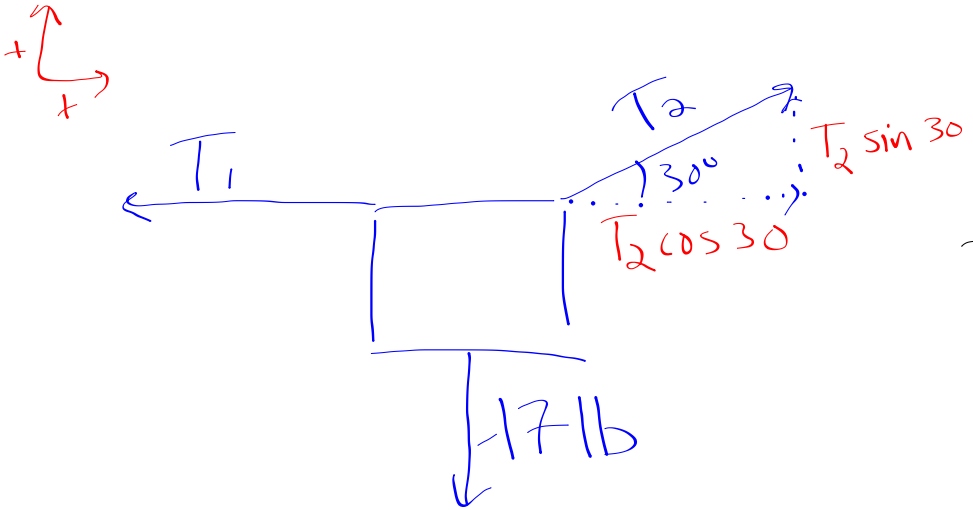


$\Sigma F_y = 0$

$T \cos 30 + -1421 = 0$

4. To keep fresh veggies cool on summer nights, two adjacent apartment occupants set up the system shown, suspending the goodies between the two apartment buildings. What tension will be in the two ropes when the weight of vegetables is 17.0 pounds? [T_1 = 29.4 lb; T_2 = 34.0 lb]





$$\Sigma F_x = 0$$

$$T_1 + T_2 \cos 30 = 0$$

$$\Sigma F_y = 0$$

$$T_2 \sin 30 + -17\ lb = 0$$

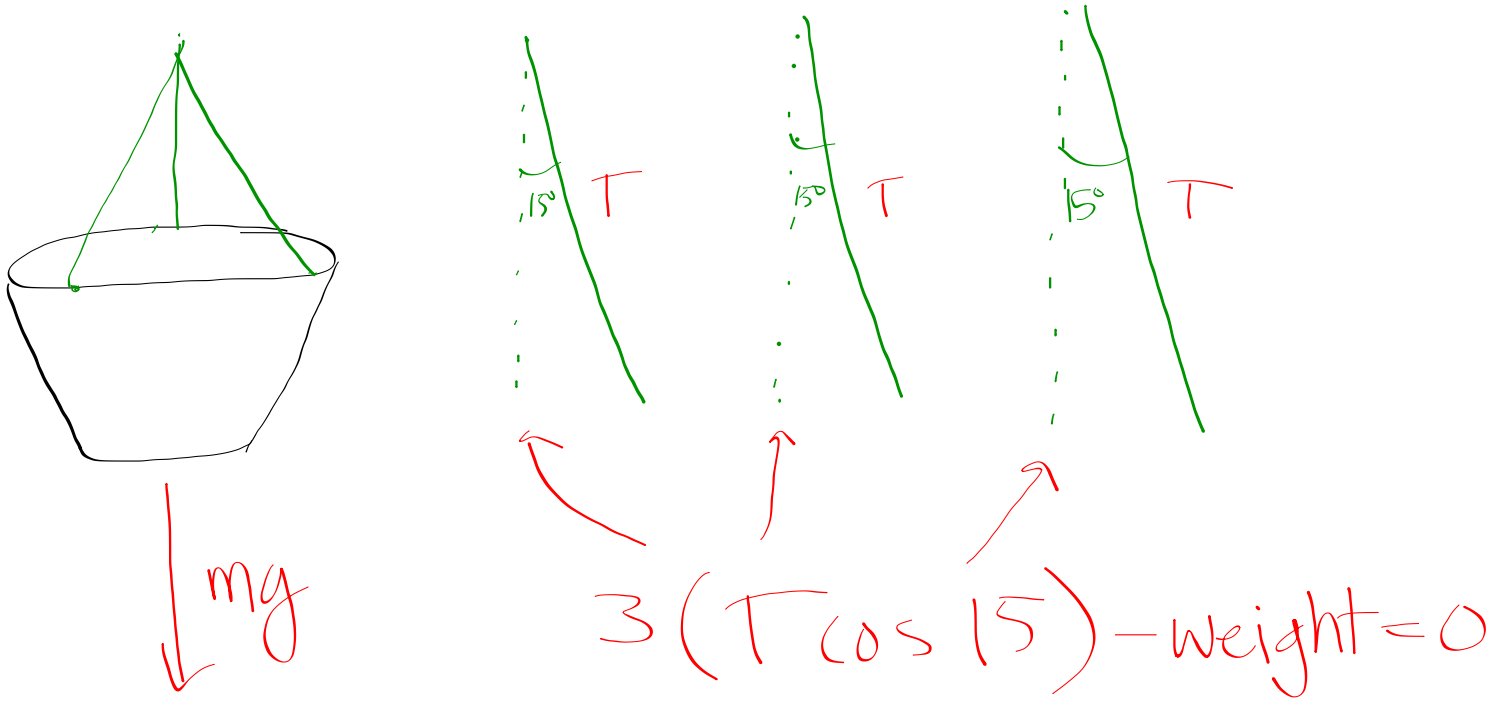
$$T_2 = \frac{17}{\sin 30} = 34\ lb$$

$$T_1 = -T_2 \cos 30$$

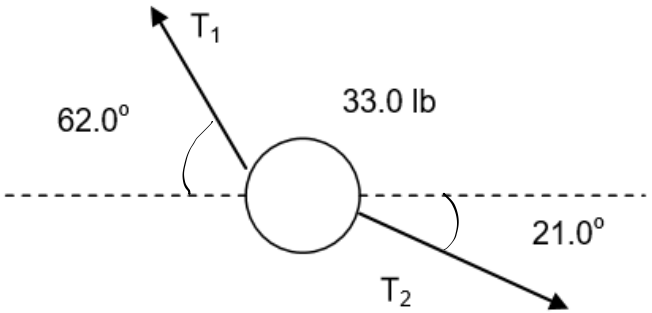
$$T_1 = -34 \cos 30$$

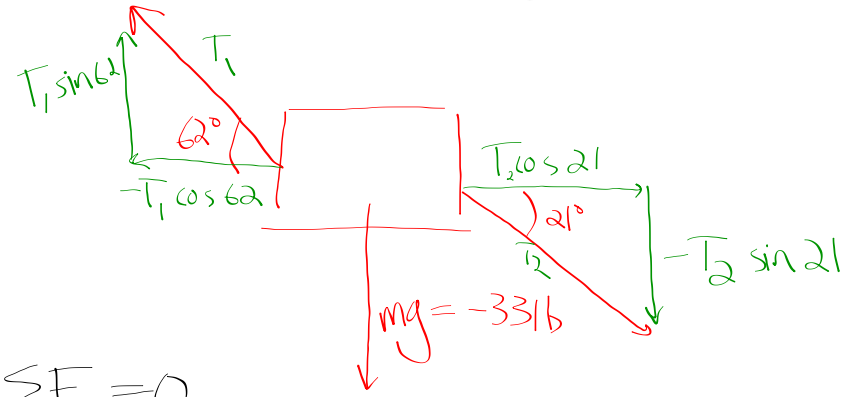
$$T_1 = -29.4\ lb$$

1. A flower pot of mass 4.20 kg is hung above a window by three ropes, each making an angle of 15.0 degrees with the vertical. What is the tension in each rope supporting the flower pot? [14.2 N]



5. Find T_1 and T_2. [T_2 = 23.6 lb, T_1 = 47.0 lb]





$\Sigma F_x = 0$

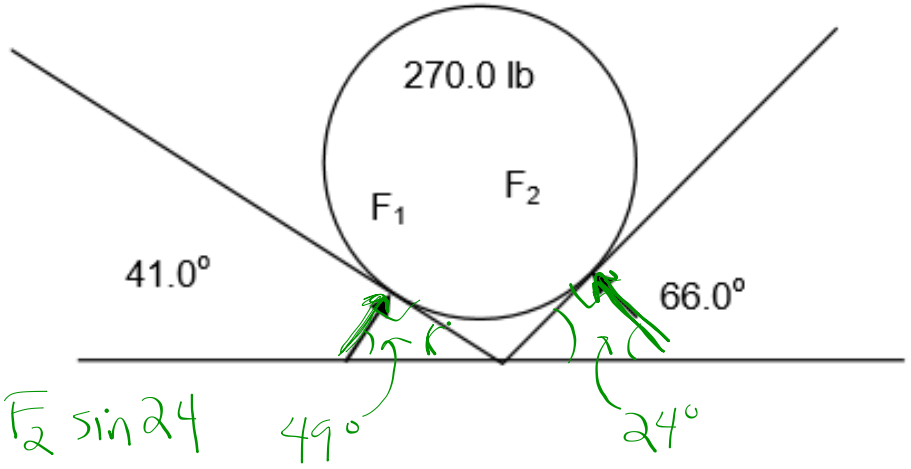
$-T_1 \cos 62 + T_2 \cos 21 = 0$; $T_2 = \frac{T_1 \cos 62}{\cos 21}$

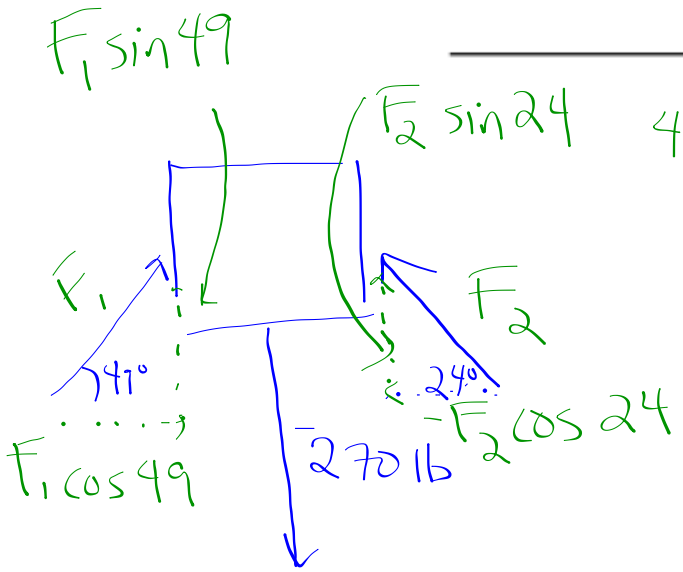
$\Sigma F_y = 0$

$T_1 \sin 62 + -T_2 \sin 21 - 33\,lb = 0$

$T_1 \sin 62 + -\left(\frac{T_1 \cos 62}{\cos 21}\right) \sin 21 - 33 = 0$

6. The 270.0 lb ball rests in a V-shaped, frictionless crevice. Find F_1 and F_2. [F_1 = 258 lb, F_2 = 185 lb]

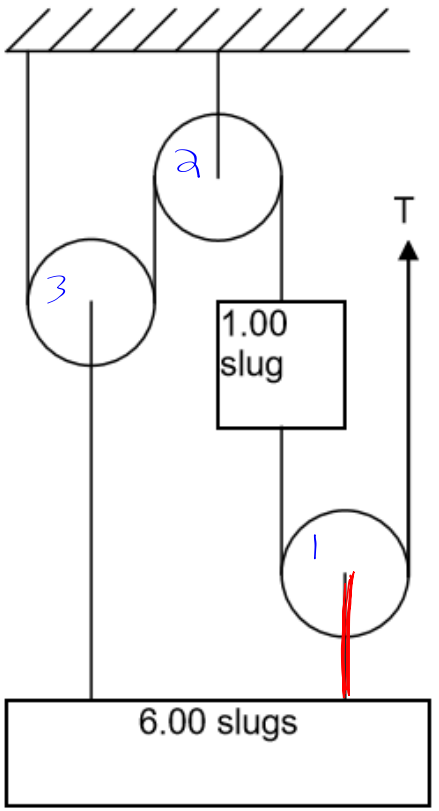


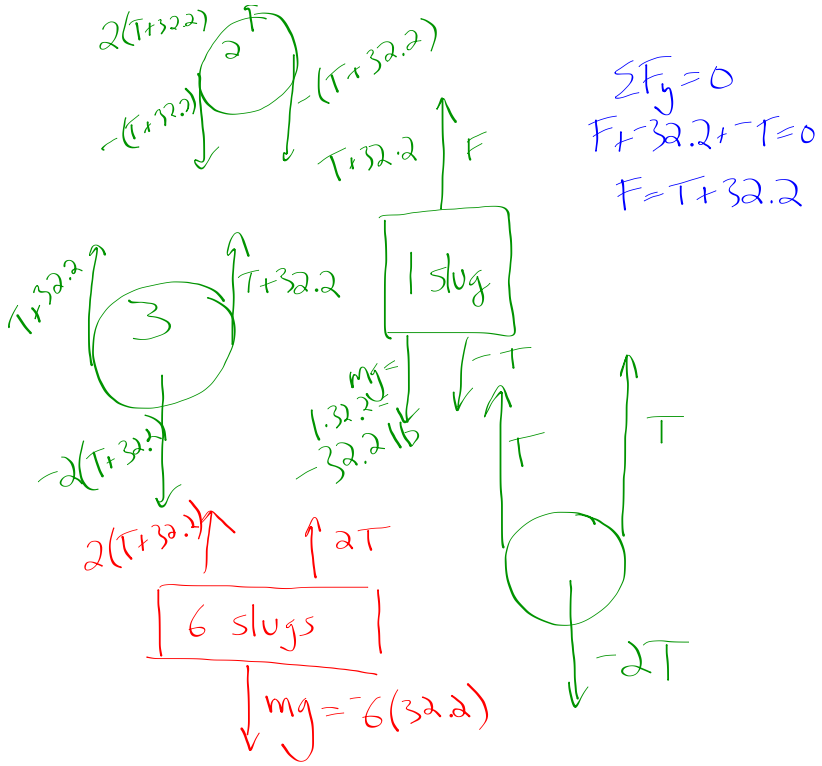


$$\sum F_x = 0$$
$$F_1 \cos 49 + -F_2 \cos 24 = 0$$

$$\sum F_y = 0$$
$$F_1 \sin 49 + F_2 \sin 24 + -270\text{ lb} = 0$$

c)





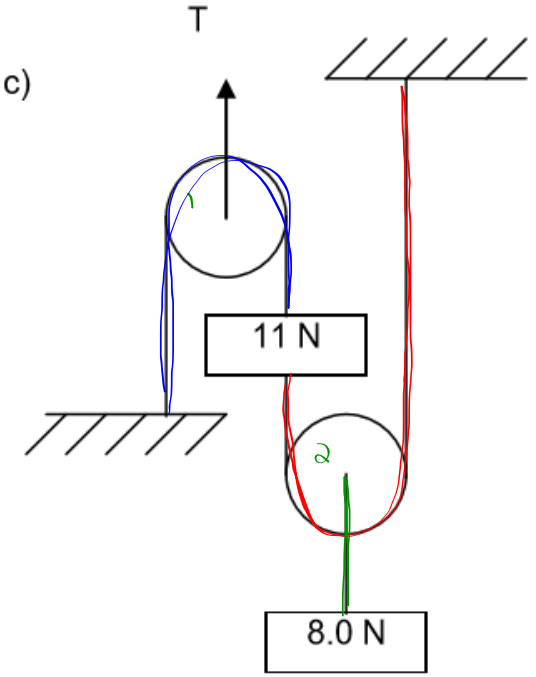
$$\Sigma F_y = 0$$

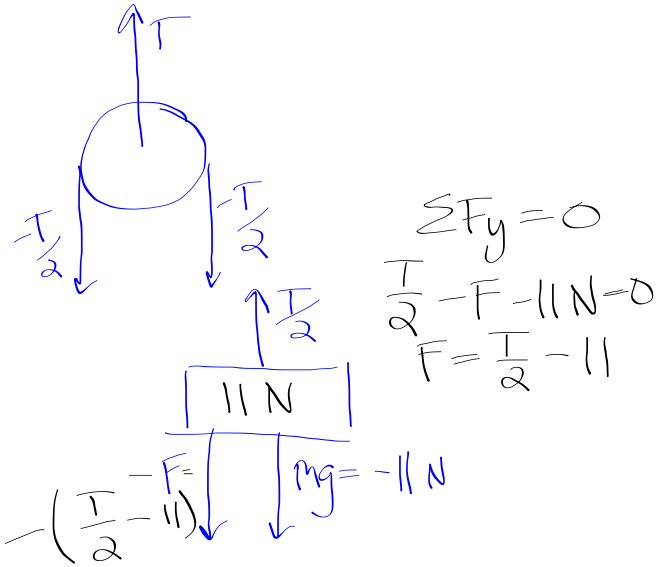
$$2T + 2(32.2) + 2T + -6(32.2) = 0$$

$$\frac{2T + 2T}{4} = \frac{4(32.2)}{4}$$

$$T = 32.2 \text{ lbs}$$

c)

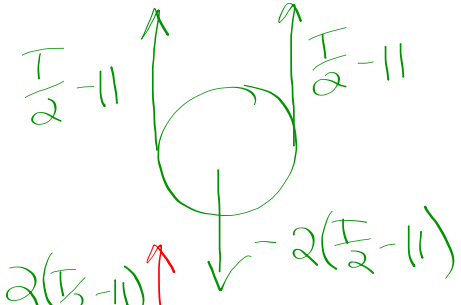




$\Sigma F_y = 0$

$\frac{T}{2} - F - 11\,N = 0$

$F = \frac{T}{2} - 11$



$\Sigma F_y = 0$

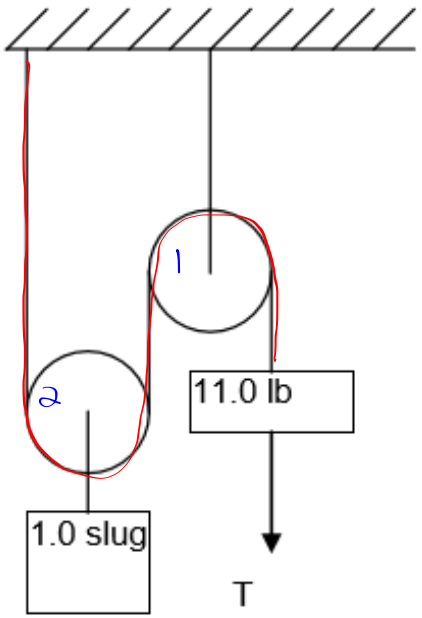
$2\left(\frac{T}{2} - 11\right) + -8 = 0$

$T - 22 + -8 = 0$

$T = 30\,N$

[a: 19.7 N, b: 5.1 lb; c: 30 N]

b)

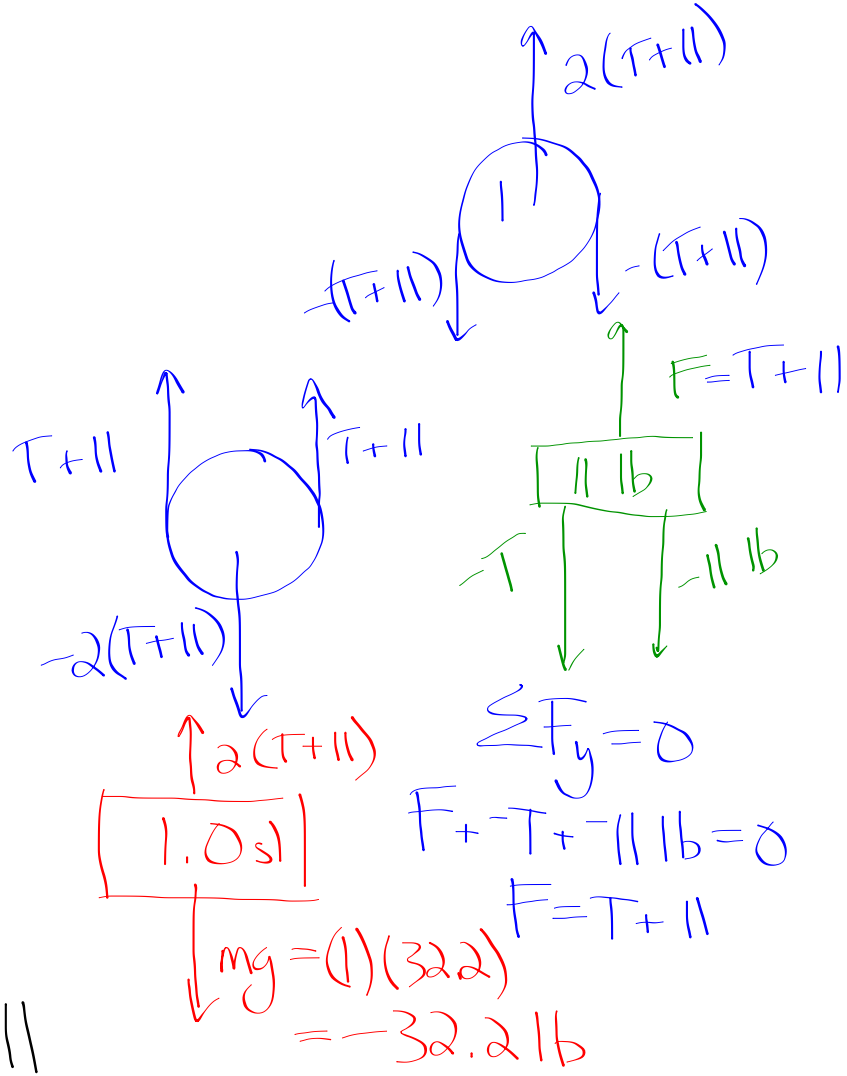


$\Sigma F_y = 0$

$2(T+11) + -32.2 = 0$

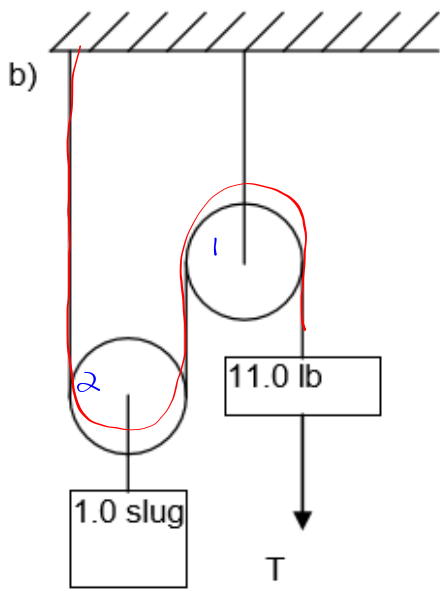
$T = \left(\frac{32.2}{2}\right) - 11$

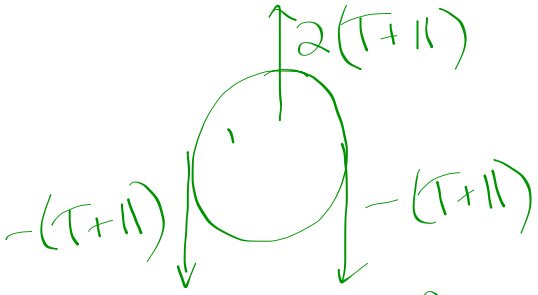
$T = 5.1$ lbs

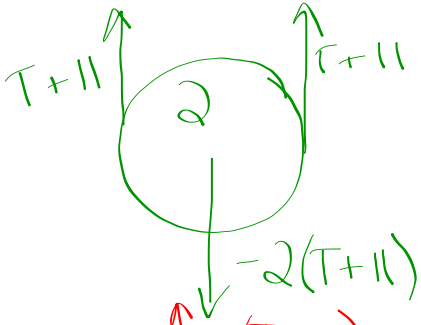


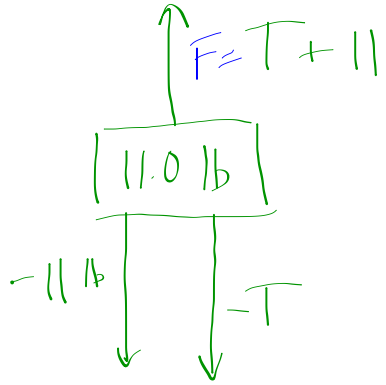
[a: 19.7 N, b: 5.1 lb; c: 30 N]

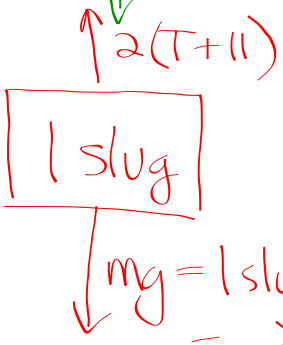
b)











$\Sigma F_y = 0$

$2(T+11) + -32.2 = 0$

$2T + 22 + -32.2 = 0$

$2T = 10.2$

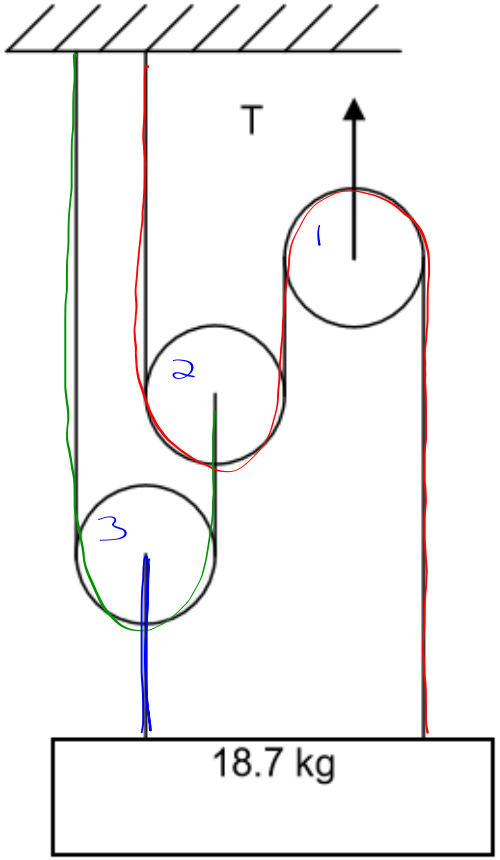
$T = 5.1$ lb

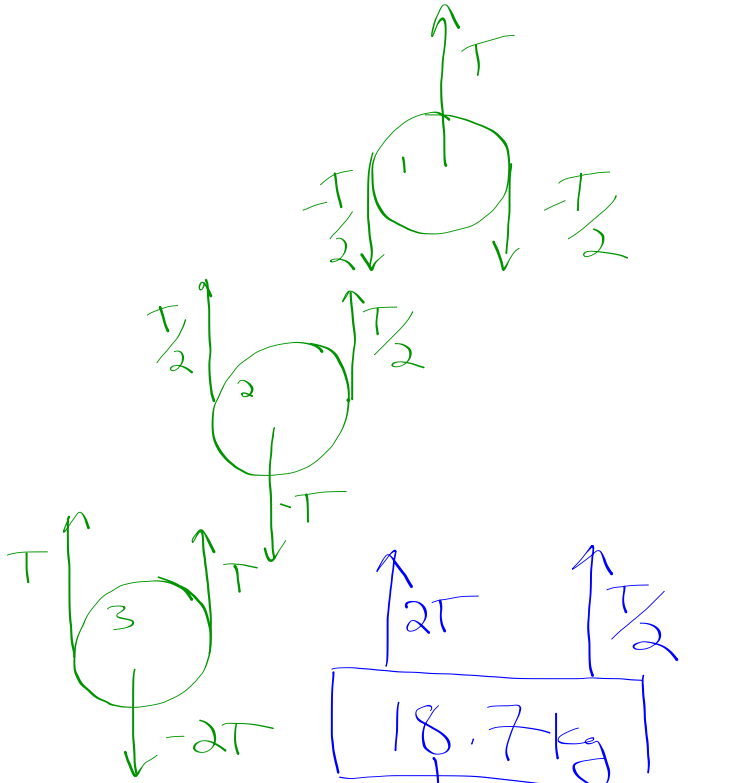
$\Sigma F_y = 0$

$F + -11 + -T = 0$

$F = T + 11$

b)



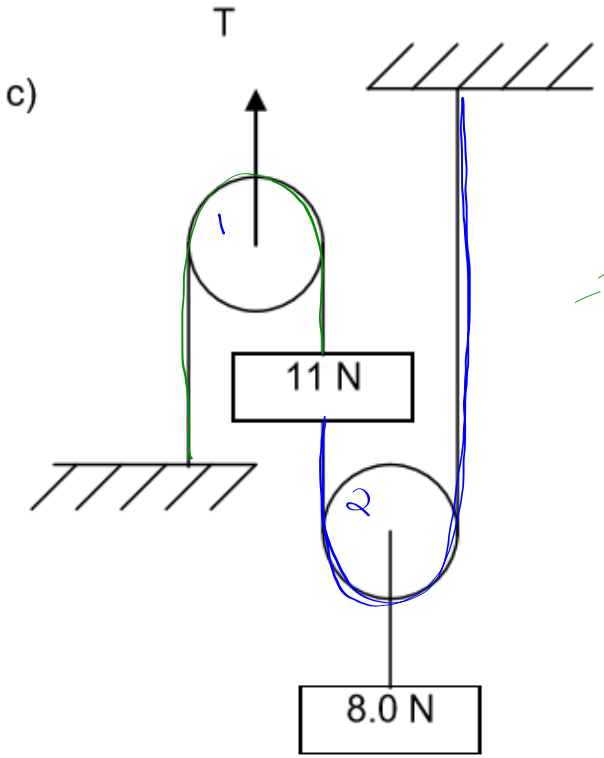


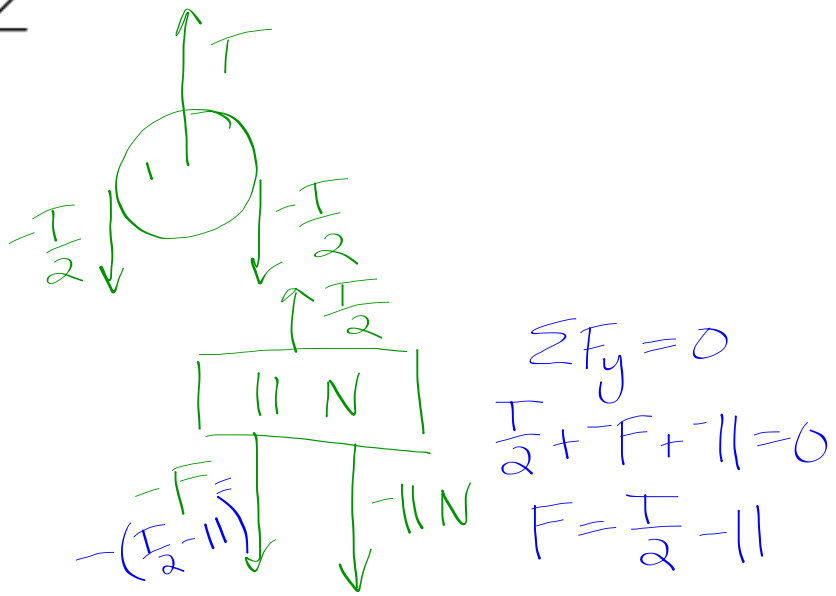
$\Sigma F_y = 0$

$2T + \frac{T}{2} + -183.26N = 0$

$\frac{5T}{2} = 183.26N$

$T = 73.3N$

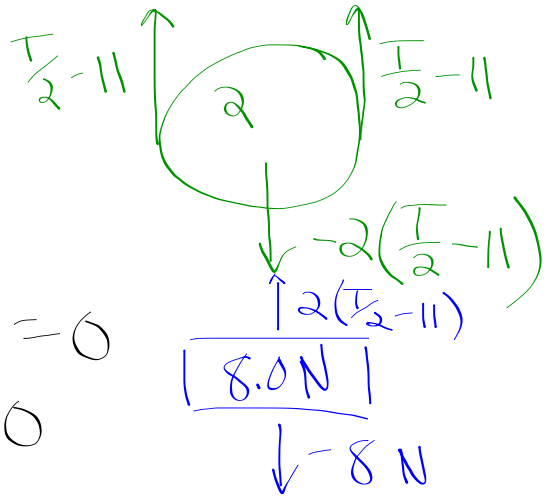




$\Sigma F_y = 0$

$\frac{T}{2} + -F + -11 = 0$

$F = \frac{T}{2} - 11$



$\Sigma F_y = 0$

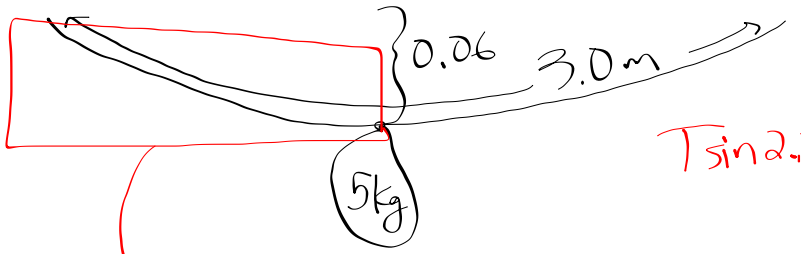
$2(\frac{T}{2}-11) + -8 = 0$

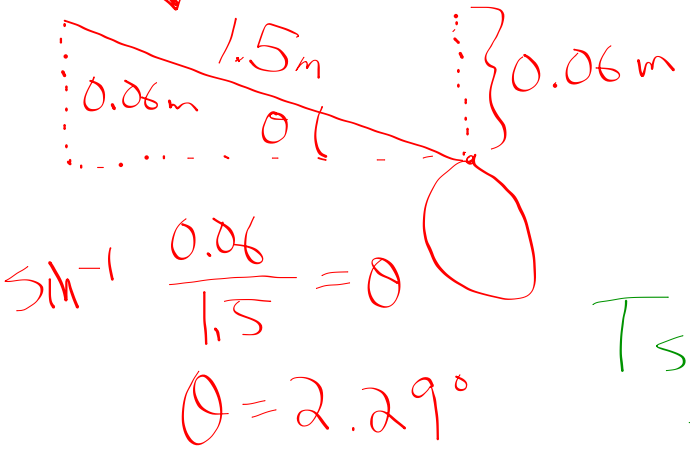
$T - 22 + -8 = 0$

$T = 30\,N$

3. While camping in Denali National Park in Alaska, a wise camper hangs his pack of food from a rope tied between two trees, to keep the food away from the bears. If the 5.000-kg bag of food hangs from the center of a rope that is 3.000 m long, and the rope sags 6.000 cm in the middle, what is the tension in the rope? [610.5 N]

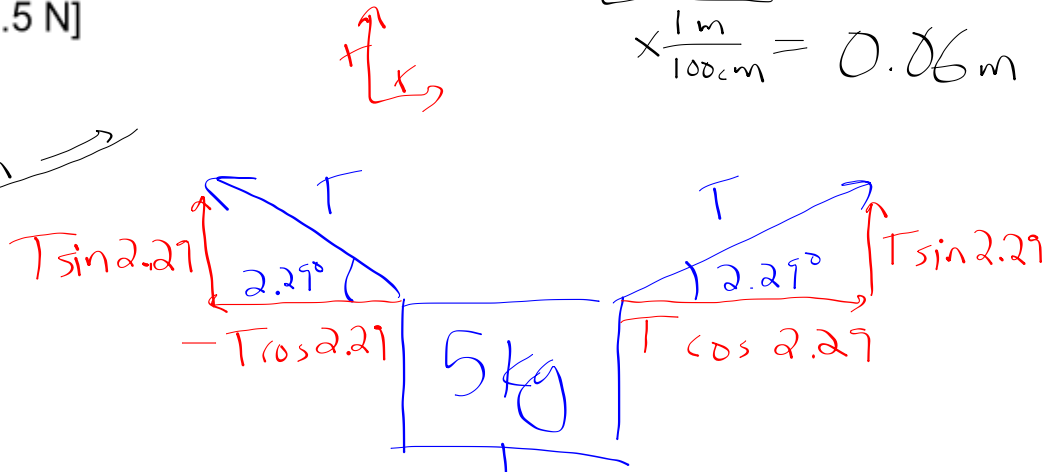
$\times \frac{1\text{ m}}{100\text{ cm}} = 0.06\text{ m}$





$\sin^{-1}\frac{0.06}{1.5} = \theta$

$\theta = 2.29°$



$\Sigma F_y = 0$

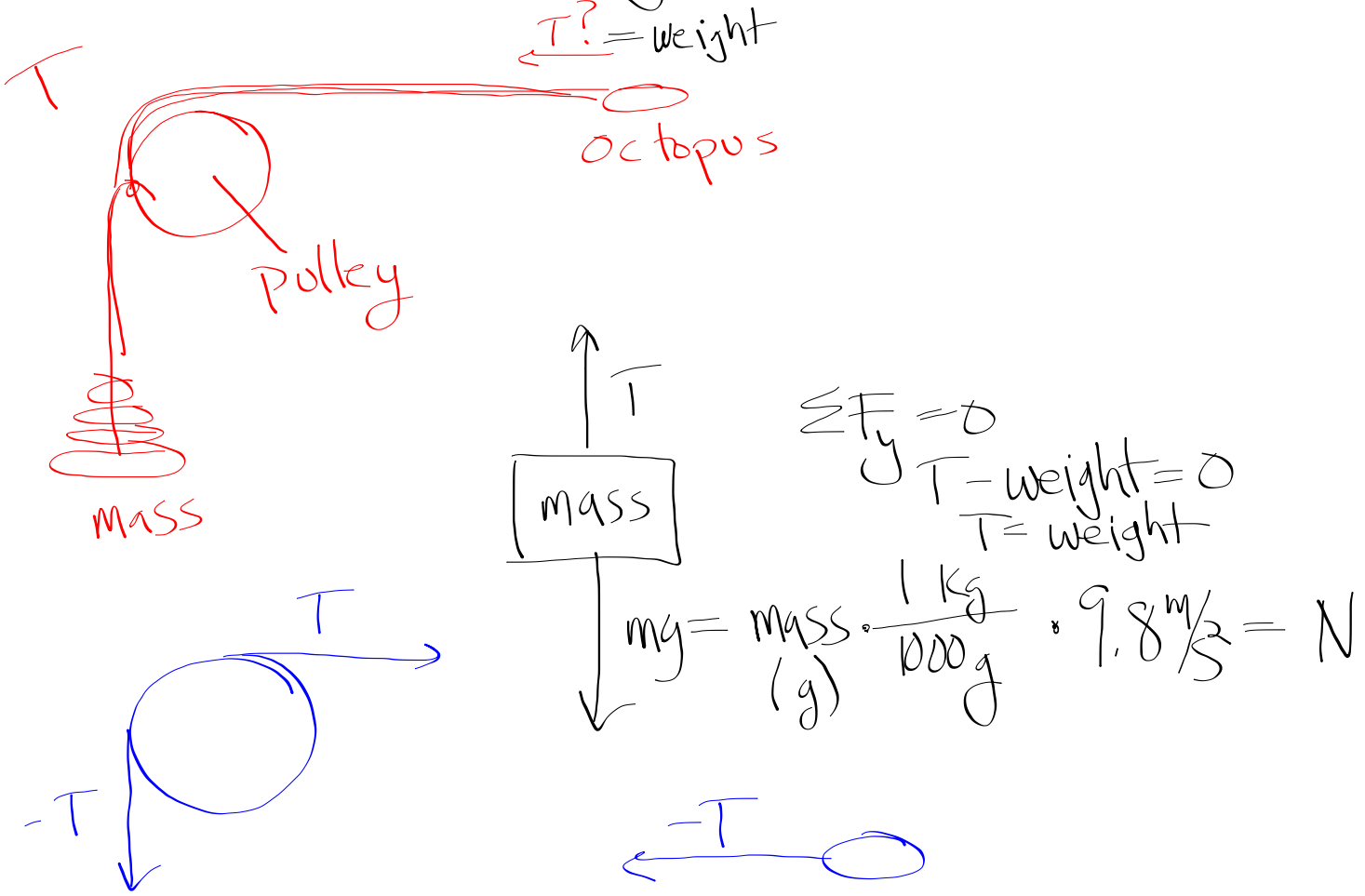
$mg = -(5)(9.8)$

$= -49\text{ N}$

$T\sin 2.29 + T\sin 2.29 + -49\text{N} = 0$

$T = \frac{49}{2(\sin 2.29)} = 613\text{N}$

Force tables are using masses to create force:



$\Sigma F_y = 0$

$T - \text{weight} = 0$

$T = \text{weight}$

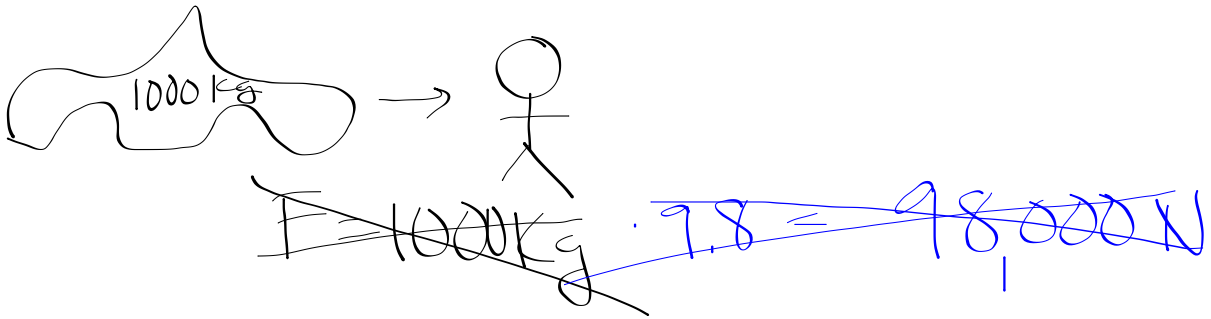
$mg = \text{mass}(g) \cdot \frac{1\ kg}{1000\ g} \cdot 9.8\ m/s^2 = N$

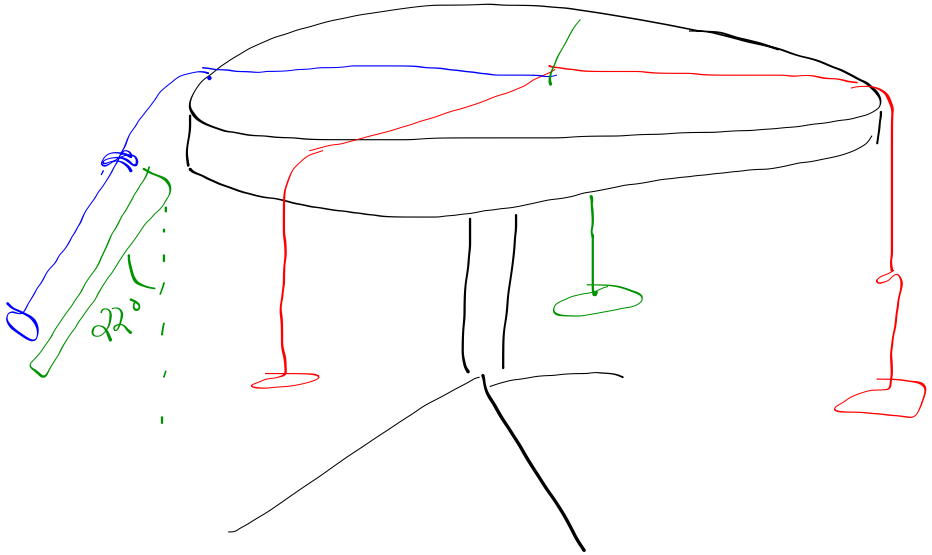
m_1 m_2 m_3 m_4

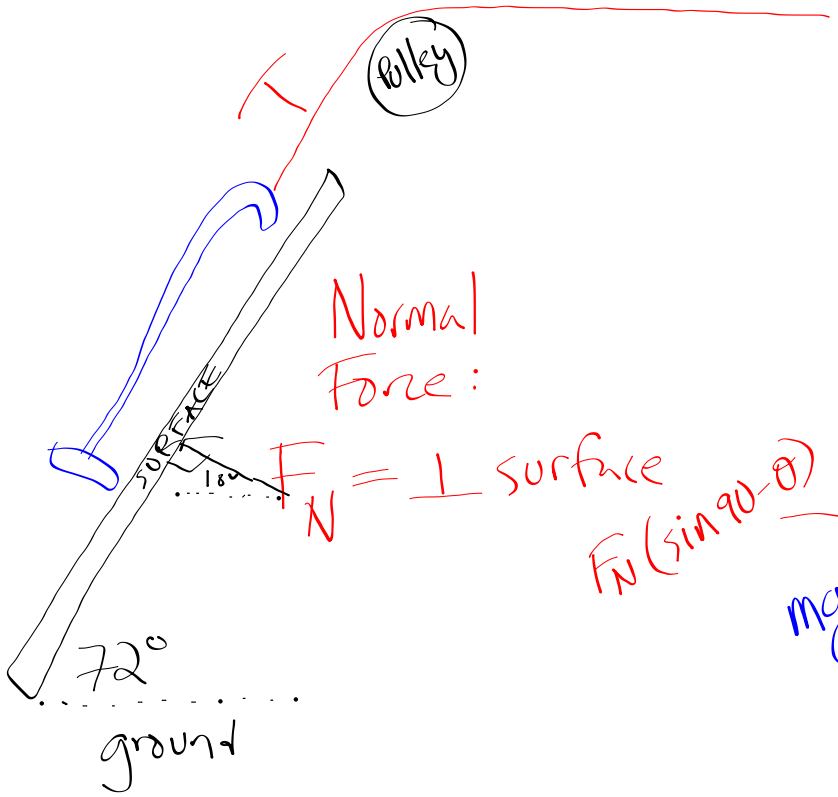
Known Known Known unknown

$9.8 m_1 + 9.8 m_2 + 9.8 m_3 = -9.8 m_4$

DON'T DO THIS




22°



Normal Force:

$F_N = 1$ surface