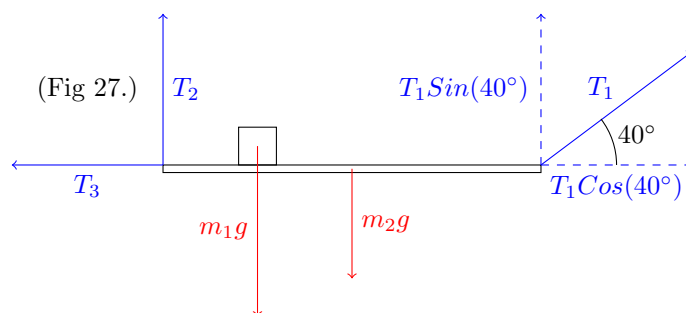


# Chapter 8 Homework

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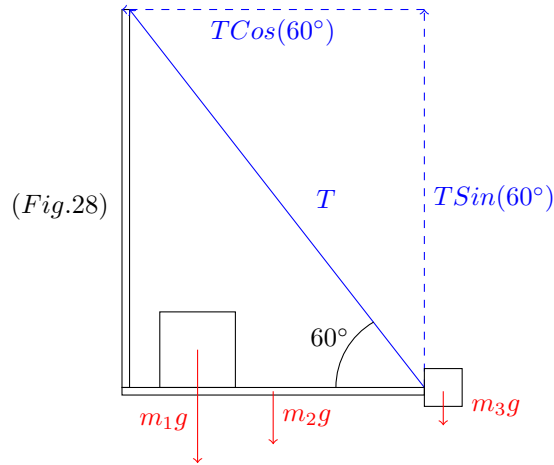


- 1 **27.** A uniform plank of length  $2.00m$  and mass  $30.0kg$  is supported by three ropes. Find the tension in each rope when a  $700N$  person is  $0.500m$  from the left end.

$$2T_1 \sin(40) + (0)T_2 = (0.5)(700) + (30)(9.81) \Rightarrow T_1 = \frac{0.5 * 700 + (30)(9.81)}{2\sin(40)} = \underline{501N}$$

$$T_1 \perp + T_2 \perp = m_1g + m_2g \Rightarrow T_2 = m_1g + m_2g - T_1 \sin(40) = (30)(9.81) + 700 - (501 \sin(40)) = \underline{672N}$$

$$T_3 \parallel = T_1 \parallel = 501N \cos(40) = \underline{384N}$$



- 2 28. A hungry bear weighing  $700N$  walks out on a beam in an attempt to retrieve a basket of goodies hanging at the end of the beam. The beam is uniform, weighs  $200N$ , is  $6m$  long, and it is supported by a wire at an angle of  $60^\circ$ . The basket weighs  $80N$ .

- a. Draw a force diagram for the beam.
- b. When the bear is at  $1m$ , find the tension in the wire supporting the beam and the components of the force exerted by the wall on the left end of the beam.
- c. If the wire can withstand a maximum tension of  $900N$ , what is the maximum distance the bear can walk before the wire breaks?

$$r_T T \perp = r_1 m_1 g + r_2 m_2 g + r_3 m_3 g \Rightarrow r_T T \sin(60) = (700N)(1m) + (3m)(200N) + (6m)(80N)$$

$$(6m)(T)(\sin 60) = 1780N \Rightarrow T = \frac{1780N}{(6m)(\sin 60)} = \underline{343N}$$

$$r_T T \perp = r_1 m_1 g + r_2 m_2 g + r_3 m_3 g \Rightarrow r_1 m_1 g = r_T T \perp - r_2 m_2 g - r_3 m_3 g$$

$$r_1 = \frac{(r_T T \perp) - (r_2 m_2 g) - (r_3 m_3 g)}{m_1 g} = \frac{(6m * 900N \sin(60)) - (3m * 200N) - (6m * 80N)}{700N} = \underline{5.14m}$$