

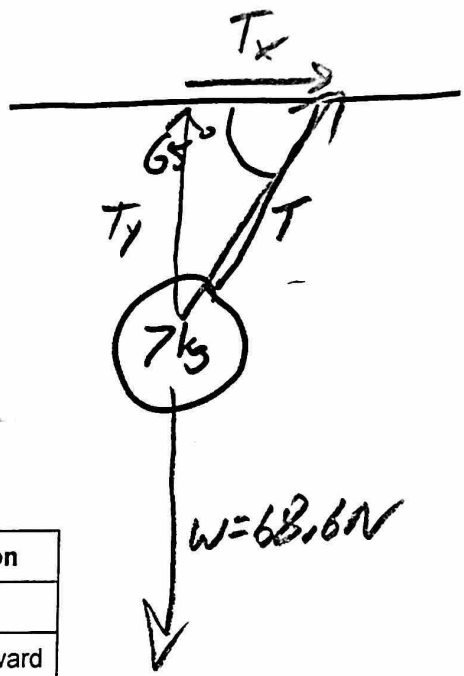
3. An object is hanging by a rope from the ceiling of a train car. The rope makes a constant angle with the horizontal ceiling.

Y dimension

$$\Sigma F_y = ma = \text{sum of forces}$$

$$\Sigma F_y = 7\text{kg}(0) = T_y - 68.6\text{N}$$

$T_y = 68.6\text{N}$



Description	Magnitude	Units	Direction
Mass	7	kg	NA
Angle between rope and horizontal ceiling	65	degrees	below leftward
Weight of hanging object	68.6	N	
Vertical component of tension	68.6	N	
Tension	75.7	N	
Horizontal Component of tension	32	N	
Acceleration of Hanging Object	4.6	m/s <sup>2</sup>	Rightward

Trig Stuff

$$\sin 65^\circ = \frac{T_y}{T} \Rightarrow 0.906 = \frac{68.6\text{N}}{T} \Rightarrow T = 75.7\text{N}$$

$$\tan 65^\circ = \frac{T_y}{T_x} \Rightarrow 2.14 = \frac{68.6\text{N}}{T_x} \Rightarrow T_x = 32.0\text{N}$$

$$\Sigma F_x = 7\text{kg}(a) = 32.0\text{N} \Rightarrow a = 4.6\text{m/s}^2$$

X dimension

