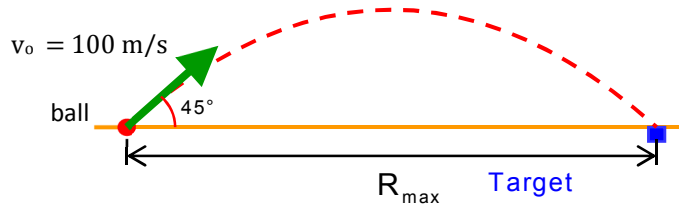


Mechanics II – QUESTION BANK 12 - QUESTIONS and SOLUTIONS

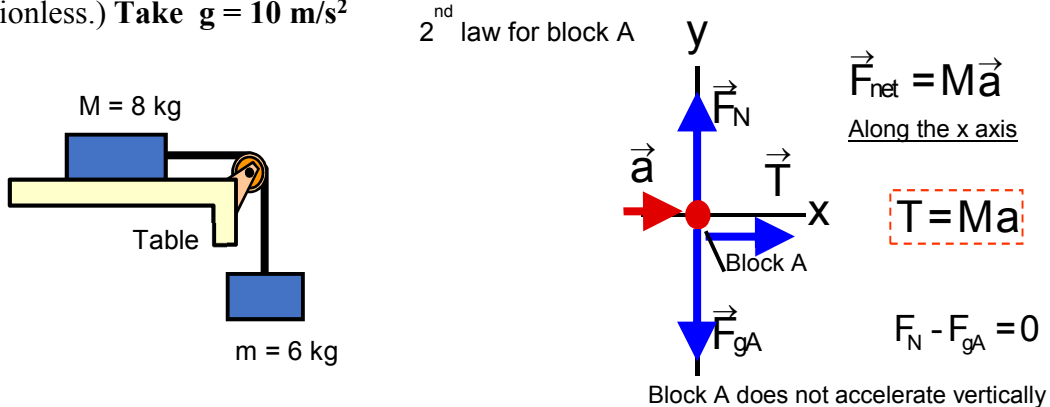
1. According to the givens, find the maximum range for the ball?



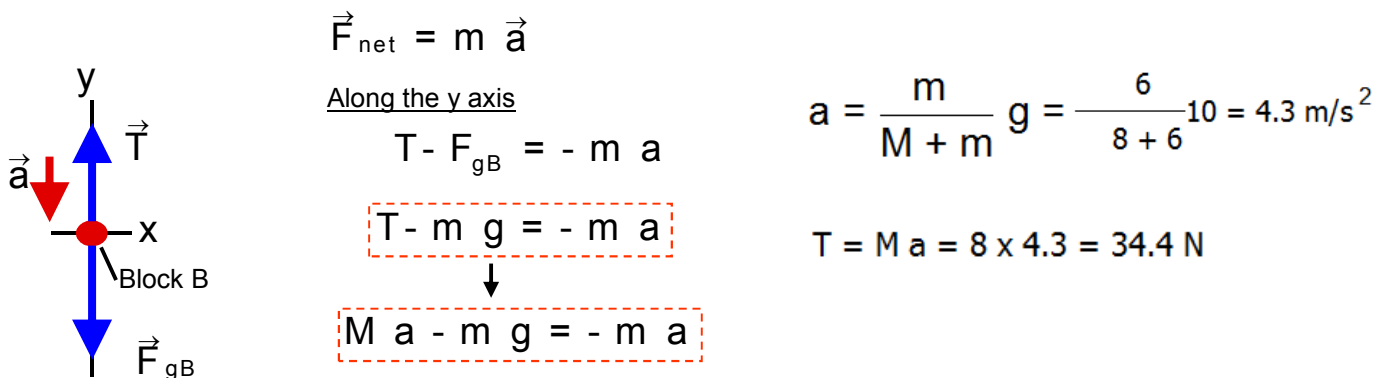
Solution:

$$R = (v_0^2) \sin 2\theta / g = 100^2 \sin(2 \times 45) / 10 = 1000 \text{ m}$$

2. What is the acceleration of block A and block B? What is the tension in the cord? (Surface is frictionless.) **Take $g = 10 \text{ m/s}^2$**



2nd law for block B



3. What are the tensions in the three ropes? Take $g = 10 \text{ m/s}^2$

Rope 3, $T_3 = M \times g = 10 \times 10 = 100 \text{ N}$

$$\vec{F}_{\text{net}} = m \vec{a} = 0$$

$$\vec{T}_1 + \vec{T}_2 + \vec{T}_3 = 0$$

Along the x axis

$$T_1 \times \cos 160^\circ + T_2 \times \cos 60^\circ + T_3 \times \cos 270^\circ = 0$$

$$T_1 \times (-0.94) + T_2 \times (0.5) + T_3 \times (0) = 0$$

$$T_1 \times (-0.94) = -T_2 \times (0.5) \quad T_1 = 0.53 T_2$$

Along the y axis

$$T_1 \times \sin 160^\circ + T_2 \times \sin 60^\circ + T_3 \times \sin 270^\circ = 0$$

$$T_1 \times (0.34) + T_2 \times (0.87) + T_3 \times (-1) = 0$$

$$0.53 T_2 \times (0.34) + T_2 \times (0.87) + (-T_3) = 0$$

$$0.18 T_2 + 0.87 T_2 = T_3 = 100$$

$$1.05 T_2 = 100$$

$$T_2 = 95.2 \text{ N}$$

$$T_1 = 0.53 T_2 = 0.53 \times 95.2 = 50.5 \text{ N}$$

