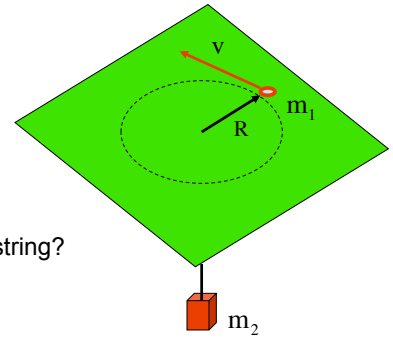
Problem 7.27

A .25 kg mass is tied to a string and allowed to revolve in a circle of r = l meter. A 1 kg mass hangs from the other end of the string.

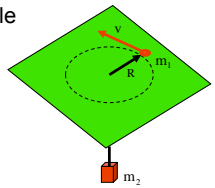


a.) What is the tension in the string?

b.) What is the horizontal force acting on the puck?

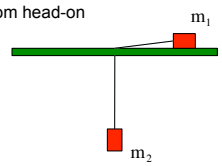
c.) What is the speed of the puck?

A .25 kg mass is tied to a string and allowed to revolve in a circle of l meter. A 1 kg mass hangs from the other end of the string.

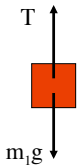


a.) What is the tension in the string?

viewed from head-on



f.b.d. on m_2

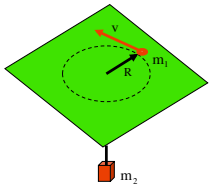


$$\sum F_y:$$

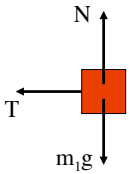
$$T - m_2g = m_2a_y$$

$$\Rightarrow \quad T = m_2g$$

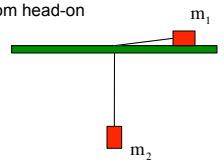
b, c.) What is the tension in the string and velocity?



moving mass viewed from head-on



viewed from head-on



(Assume the horizontal string is in parallel to the table!)

$$\sum F_{cs}:$$

$$T = m_1\frac{v^2}{R}$$

$$\Rightarrow \quad m_2g = m_1\frac{v^2}{R}$$

$$\Rightarrow \quad v = \sqrt{\frac{m_2gR}{m_1}}$$