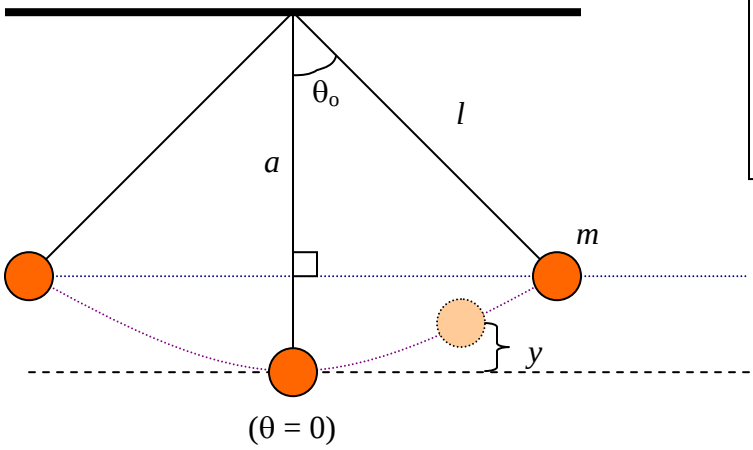
Swinging Pendulum



$a(\theta) = l\cos\theta$

$y = l - a(\theta) = l - l\cos\theta = l(1-\cos\theta)$

➔ $y_o = l(1-\cos\theta_o)$

$y = l(1-\cos\theta)$

y_o $(v_i = 0)$

$y = 0$ $(U = 0)$

a) What is the tangential speed of mass *m* as a function of *y*?

$E_i = E_f$

$\frac{1}{2}mv_i^2 + mgy_o = \frac{1}{2}mv^2 + mgy$

$0 + mgy_o = \frac{1}{2}mv^2 + mgy$

$v = \sqrt{2g(y_o - y)}$

b) What is the tangential speed of mass *m* as a function of θ?

$v = \sqrt{2g([l(1-\cos\theta_o)] - [l(1-\cos\theta)])}$

$v = \sqrt{2gl(1-\cos\theta_o - 1 + \cos\theta)}$

$v = \sqrt{2gl(\cos\theta - \cos\theta_o)}$

c) What is the tangential speed of mass *m* at θ = 0?

$v = \sqrt{2gl(1-\cos\theta_o)}$