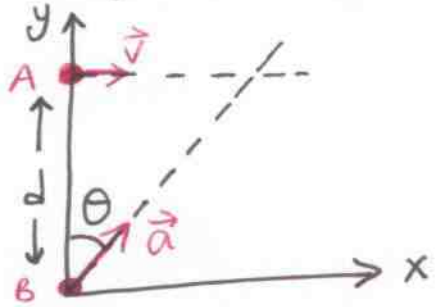
(Due Date: 31. 10. 2011)

# FALL 2011 - PHYS 111 - Homework 2

1) A particle A moves along the line $y = d$ (30 m) with a constant velocity $\vec{V}$ ($|\vec{v}| = 3.0$ m/s) directed parallel to the positive x-axis. A second particle B starts at the origin with zero speed and constant acceleration $\vec{a}$ ($|\vec{a}| = 0.4$ m/s$^2$) at the same instant that particle A passes the y-axis. What angle $\theta$ between $\vec{a}$ and the positive y-axis would result in a collision between two particles?




2) A particle moves in a plane according to

$$x = R \sin \omega t + \omega R t$$

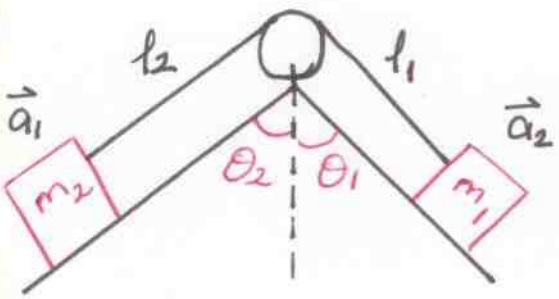
$$y = R \cos \omega t + R$$

where $\omega$ and $R$ are constants. This curve, called a cycloid, is the path traced out by a point on the rim of a wheel that rolls without slipping along the x-axis.

a) Sketch the path

b) Calculate the instantaneous velocity and acceleration when the particle is at its maximum and minimum value of y

3)




Consider the pulley and the string to be massless. There is no friction in the system. Then calculate the tension on the string and the acceleration of the second block.

$T = ?$ $\vec{a}_2 = ?$