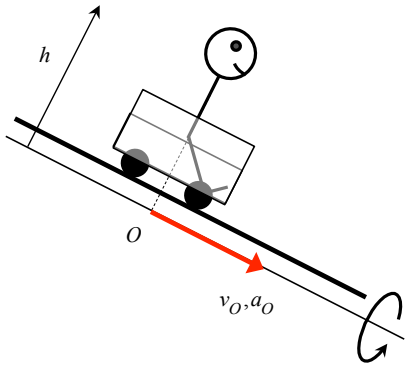
Homework H.2.I

Given: A passenger rides in a cart on a roller coaster track where point O directly under the cart on the track moves with a speed of v_O and a_O. At the time time, the cart is executing a "barrel roll" with the cart rotating about point O on the track with a constant rotation rate Ω.

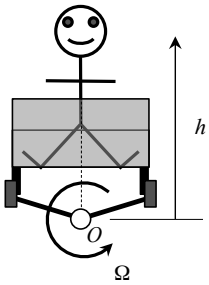
Find: For this problem:

(a) Determine the velocity and acceleration of the passenger's head, where the head is located at a distance h above point O on the track. Write your answer as a vector.

(b) What is the magnitude of acceleration and the rate of change of speed of the passenger's head?



SIDE view of cart/passenger



Front view of cart/passenger

Use the following parameters in your analysis: $v_O = 30$ ft/s, $a_O = 15$ ft/s^2, $h = 4$ ft and $\Omega = 2$ rad/s.