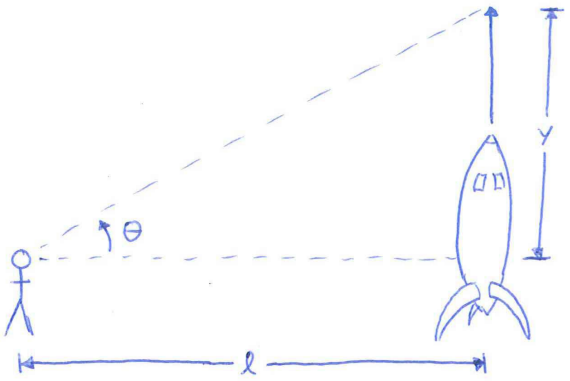
You are standing 100m away from a rocket ship that is taking off. If the height of the rocket ship follows the equation:

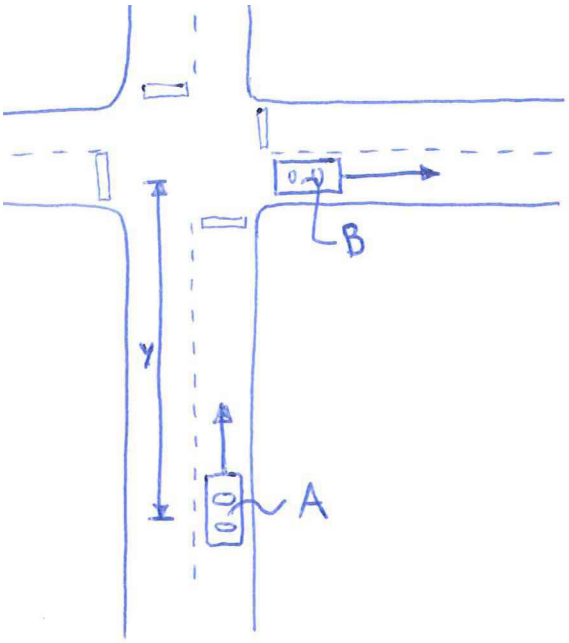
$$y = y_o + v_o t + \frac{1}{2} a t^2$$



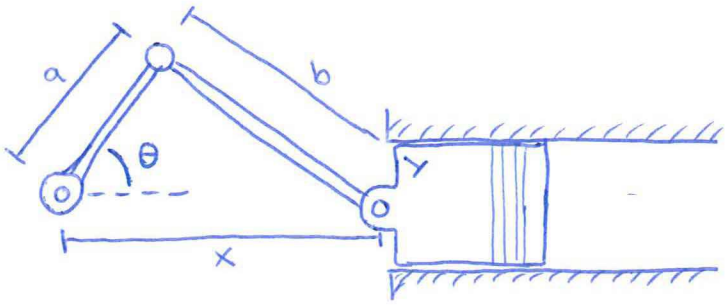
where: y_o is the initial height (y_o = 0 m),
v_o is the initial velocity (v_o = 0 m/s),
t is the time and
a is the acceleration of the rocket (a = 50 m/s^2).

What is the velocity (dy/dt) of the rocket when 2 seconds have passed since it took off the ground? What is the rate of change that you have to rotate your head to track the rocket ship (i.e. dθ/dt)?

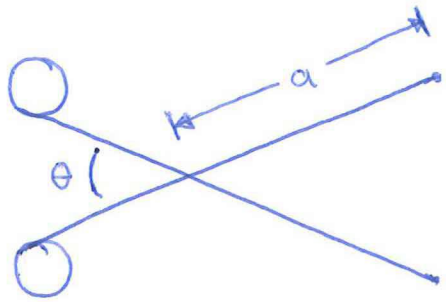
Car A drives North at 10 m/s and car B drives East at 20 m/s. Cars A and B start in the orientation as shown in the figure when y = 100m. How fast will car A be travelling away from car B (how fast will they be moving apart) when y = 50 m?



A simplified car piston is shown in the figure. Determine the velocity of the piston (i.e. dx/dt) as a function of a, b, x, θ and dθ/dt.



If a pair of scissors (a = 10 cm) close at a rate of 30 degrees/sec, how fast are the tips of the scissors coming together when θ = 30 degrees?



If i throw a rock into a pond ripple will emit from where the rock landed in the water. How much will the area be increasing as a function of the radius (r) and the velocity of the wave (dr/dt)?