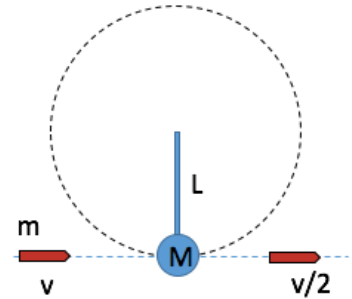
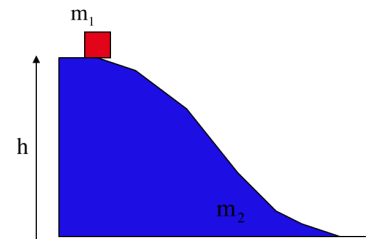


Momentum/impulse class problem set

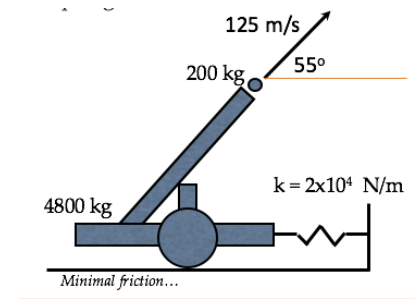
1. A bullet of mass m and speed v passes completely through a pendulum bob of mass M as shown in the figure to the right. The bullet emerges with a speed of $v/2$. The pendulum bob is suspended by a stiff rod of length L and negligible mass. What is the minimum value of v such that the bob will barely swing through a complete vertical circle? (Problem 6.56)



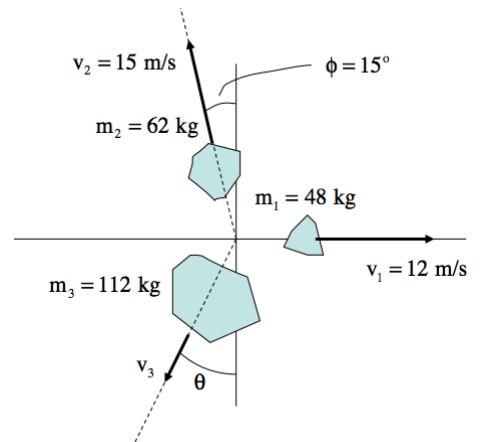
2. A small, 0.5 kg block starts from rest and slides down a frictionless, curved incline of mass 3 kg that is, itself, free to move frictionlessly over a tabletop (not shown). When the block leaves the incline, it is moving with velocity 4 m/s.
- What's the velocity of the wedge when the block reaches the ground?
 - What's the height of the wedge?



3. A cannon fires a cannonball as shown. Given the information in the picture:
- determine the recoil speed of the cannon (hint: what's the velocity of the system before the cannon is fired?)
 - determine the maximum extension of the spring
 - determine the maximum force exerted on the carriage by the spring (not a momentum question, just good review!)



4. A firecracker initially at rest explodes into three pieces as shown. What is the unknown velocity and angle?



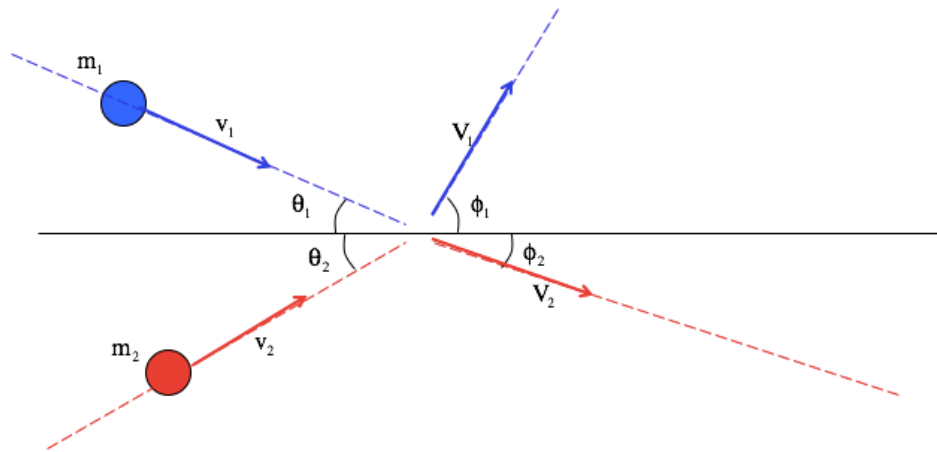
One more on back if you want a real challenge!

5. For the following situation as shown,

- a. Write down but do not solve the equation(s) you would need to find the unknown values. How would you go about trying to solve this system of equations?

Given : $m_1, m_2, v_1, v_2, \theta_1, \theta_2, \phi_1, \phi_2$

Find : V_1 and V_2



- b. For the same situation as shown above, given $m_1, m_2, v_1, v_2, \theta_1, \theta_2, v_1$ and ϕ_1 , write down but do not solve the equation(s) you would need to find v_2 and ϕ_2 . How would you go about trying to solve this system of equations?