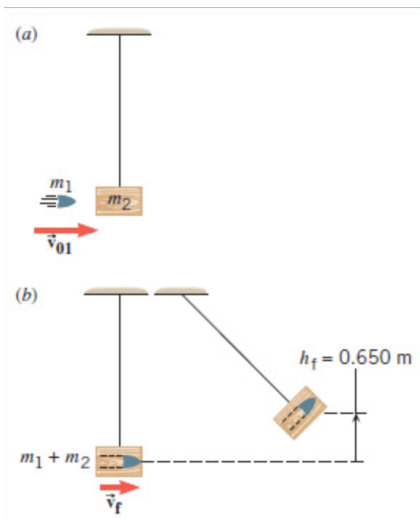


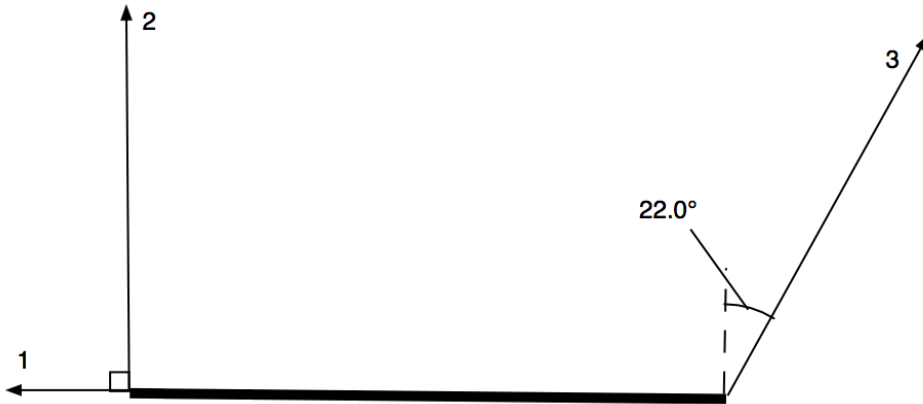
Physics 10154 - Exam #3C

Points will be deducted if you don't show your work (or if some parts are incorrect) even if you get the right answer. Clearly indicate your answer with a circle or box and remember to include correct units and significant figures.

1. (30 pts) A 13.0 gram bullet is fired into a 2.43-kg block of wood initially at rest, connected to a string as a pendulum bob. After the collision, the bullet becomes embedded in the block, and the block rises to a maximum height of 0.650 m as shown. Assume that frictional forces do -3.50 J of work during the bullet-block rising motion. What is the initial speed of the bullet before the collision?



2. (35 pts) A 925-N hiker is crossing a small horizontal bridge. The bridge is uniform and weighs 4210 N. The bridge has 3 numbered supporting ropes, as shown. The hiker stops $1/4$ of the way from the left end of the bridge. What is the magnitude of the force that each rope exerts on the bridge? Answer with 3 SF.



3. (35 pts) A 1.45-kg mass is attached to one end of a spring ($k = 1330 \text{ N/m}$) with the other end of the spring fixed in place. An applied force stretches the spring to a length of 22.0-cm from equilibrium, then releases the mass from rest to oscillate back and forth on a horizontal, frictionless surface.

- a) How much time does it take for the system to complete 25.0 oscillations?
- b) If $x = 0$ represents equilibrium, for what value of x is the mass moving with 75% of its maximum speed?
- c) For what value of x is the kinetic energy equal to 20% of the total mechanical energy?