PHYS 211 Sample Final Question Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

A block of mass *M* = 5.4 kg, at rest on a horizontal frictionless table, is attached to a rigid support by a spring of constant *k* = 6000 N/m. A bullet of mass *m* = 9.5 g and velocity of magnitude 630 m/s strikes and is embedded in the block (Fig. [15-38](http://edugen.wiley.com/edugen/courses/crs4957/halliday9118/halliday9088c15/halliday9118/halliday9088c15/halliday9088c15xlinks.xform?id=halliday9088c15-fig-0038)). Assume that the compression of the spring is negligible until the bullet is embedded.



a. Describe what will happen.

b. Sketch Fig. II, above, which shows the embedded bullet & block, just after the collision.
c. Sketch Fig. III, above, where the spring is compressed and the bullet-block comes to rest.

d. Determine the speed of the block immediately after the collision. (Use the conservation of linear momentum between Fig. I and Fig. II)

e. Determine the amplitude of the resulting simple harmonic motion. (Use conservation of energy between Fig. II and Fig. III)