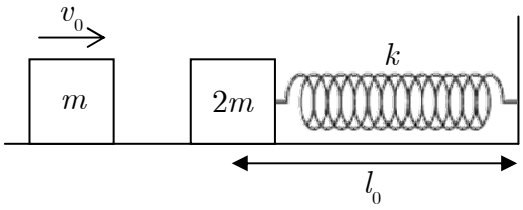
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Department of Physics

Physics 8.01T – Section L05 – Quiz 4

Name: _____ Table & Group Number: _____

A stationary block of mass *2m* lies on a frictionless table and is attached to a spring of natural length l_0 and spring constant k, with the spring at its equilibrium position. A block of mass m collides into the stationary block and sticks to it instantaneously. After the collision, the blocks undergo simple harmonic motion. The blocks are small enough to be modelled as particles.



Part A

Is the collision elastic or inelastic? Explain your answer.

Part B

What is the speed of the blocks immediately after the collision?

Part C

How much time elapses between the collision and the point at which the spring is maximally compressed? What is the shortest length of the spring?

Part D

What is the magnitude and direction of the total impulse exerted by the spring on the particles from a time just after the collision until the time the spring reaches its shortest length?

Part E

Now imagine that there is some friction between the *2m* block and the table. Would you expect the impulse exerted by the spring (your answer to part d) to be greater, smaller or to stay the same? (You do *not* need to carry out any calculations – just give an answer and a short explanation).