1. A 30g bullet, traveling at 300m/s, is shot through a block of wood that is 10 cm thick and a mass of 570g. If the bullet exits the block at 100m/s find.
   a) Momentum of the bullet before the collision
   b) Momentum of the bullet after the collision
   c) The speed of the block of wood after the collision
   d) The amount of kinetic energy lost by the bullet
   e) The amount of kinetic energy gained by the block of wood
   f) Is this an elastic collision? Explain your answer.
   g) Find the average force exerted on the bullet by block of would if the bullet took 0.1 sec to pass through wood.

2. A 3.0kg cart moving at 5.0m/s crashes into a 2.0kg cart initially at rest. The collision is cushioned by an ideal spring with a force constant of 1500 N/m with a normal length of 25cm.
   a) Find the velocities of the both carts after the collision.
   b) Find the velocity of the carts at minimum separation.
   c) Find the kinetic energy of the system before the collision and at minimum separation. Account for the differences.
   d) Find the minimum separation between the two carts.
   e) Find the force exerted by the spring on the carts at minimum separation.

3. The military is launching a new spy satellite of mass 1000kg. The satellite will take surveillance photographs along the equator, passing over any given country once every 10 hours.
   a) Find the altitude of the satellite above the surface of the Earth.
   b) Find the orbital speed of the satellite.
   c) Find the amount of energy required to place the satellite in orbit. (assume no air resistance) if the satellite is launched from Cape Canaveral located 28.4 degrees north.
   d) Find Kepler's constant of the Earth-satellite system using your results found above. Compare this to the accepted values for the moon. Do they agree?

4. Find the velocity one would need to push 2.0kg block in order to make it to the top of the curved part of the track. The radius curve is 1.0m.