Mechanics Questions
Due October 13, 2008

Vocabulary Questions
1. Write definitions of the following terms:
   - Inertia
   - Momentum
   - Force
   - Energy

2. If a car rolls down a hill onto a flat road, why does it continue to roll (inertia, momentum, force, or energy)? Explain.

3. For a car coasting along an up-and-down stretch of road, what determines if it will make it up the next hill or roll back (inertia, momentum, force, or energy)? Explain.

4. Which of the four concepts best answers the question? (Answer one of Inertia, Momentum, Force, or Energy for each)
   - Which one of these is not a characteristic of an object, its position and motion; but rather is something that "happens to" an object?
   - Which of these is an inherent property of an object, regardless of how it's moving or where it is?
   - Which of these either given to another object or changed into another form (or some combination of those) so that the total amount always stays the same?
5. A frictionless roller coaster consisting of 10 cars, each holding 8 people, is traveling at 25 m/s when it approaches an uphill stretch. The hill begins at a grade of 5° and steepens to a final grade of 35°. The roller coaster coasts up the hill until it stops. How high does it reach?

   a. What kind of a problem is this? (Equations of motion, force, momentum, or energy) How do you know?

   b. Is there enough information to solve the problem? Is there information given in the problem that is NOT necessary for solving the problem? Explain.

   c. Solve the problem (if possible). If not enough information is given, then make up the information needed and solve it using that data.

6. A blue 1200 kg Ford Focus accelerates from rest to a final velocity of 30 m/s, in a time of 8.0 seconds. If the car contains two people and a dog, and if air resistance is a factor, find the average acceleration during this time and the distance traveled during this time.

   a. What kind of a problem is this? (Equations of motion, force, momentum, or energy) How do you know?

   b. Is there enough information to solve the problem? Is there information given in the problem that is NOT necessary for solving the problem? Explain.

   c. Solve the problem (if possible). If not enough information is given, then make up the information needed and solve it using that data.

7. A red Chevy Tahoe accelerates at a rate of 2.5 m/s² up a hill. If air resistance and friction exert a force of 1500 N against the vehicle, what is the net force on the vehicle?

   a. What kind of a problem is this? (Equations of motion, force, momentum, or energy) How do you know?

   b. Is there enough information to solve the problem? Is there information given in the problem that is NOT necessary for solving the problem? Explain.

   c. Solve the problem (if possible). If not enough information is given, then make up the information needed and solve it using that data.