1. Define the following terms:
   1. Mechanical Energy

***Mechanical energy is energy of motion; generally in the form of kinetic and potential energy.***

* 1. Kinetic Energy

***Kinetic energy is energy from the motion of an object.***

* 1. Potential Energy

***Potential energy is energy based on the location/position.***

1. Explain the concept of conservation of energy. How is this similar to conservation of momentum?

***Conservation of energy states that energy cannot be created nor destroyed; it merely changes from one form to another. If the total energy in the system stays the same, we say energy is conserved.***

1. Car A has mass *m* and travels at 60 km/hr. Car B has half the mass of Car A, but travels at 120 km/hr.
   1. Which car has more momentum?

***They have the same momentum!***

* 1. Which car has more kinetic energy?

***Car B has more kinetic energy!***

***and***

1. Suppose an automobile has a kinetic energy of 2000 J. If it moved with twice the speed, what will be its kinetic energy? Three times the speed?

***With twice the speed, it would have 4 times the kinetic energy; this is 8000 J!***

***With three times the speed, it would have 9 times the kinetic energy; this is 18,000 J!***

1. Most Earth satellites follow an oval shaped (elliptical) path rather than a circular path around the Earth. The potential energy increased when the satellite moves farther from the Earth. According to conservation of energy, in what location relative to the Earth does a satellite have the greatest speed?

***Earth satellites follow an elliptical path. If the potential energy increases the further it is from the Earth, then the kinetic energy increases the closer the satellite is to the Earth. So the satellite would have the greatest speed closest to the Earth.***

1. Does an automobile consume more fuel when its air conditioner is running? When the lights are turned on? When the radio is on while sitting idle at a stop light? Explain in terms of conservation of energy.

***Yes, an automobile will consume more fuel with its air conditioner on, with its radio on, and with its lights on. Any time a device in the car is requiring energy, it has to come from somewhere, so the energy ultimately comes from the fuel in the gas tank, which means that the engine must consume more fuel to power these other devices.***

1. If a boulder is raised above the ground such that its potential energy is 200 J and then it is dropped. What is its kinetic energy just before it hits the ground?

***If a boulder was raised so that it had 200 J of potential energy, then when it is dropped, it will have 200 J of kinetic energy right before it hits the ground.***

1. What will be the kinetic energy of an arrow shot from a bow having a potential energy of 50 J?

***The kinetic energy of an arrow shot from a bow having a potential energy of 50 J would also be 50 J.***

1. What is the potential energy of a 2500 kg wrecking ball that is lifted to a height of 35 meters?
2. What is the kinetic energy of a 0.10 kg pellet fired at 180 ?