Online Motion Simulations Lab   Name _____

The first simulation is for firing a toy dart gun. Watch the simulation and answer the questions.
Go to   http://www.physicsclassroom.com/mmedia/energy/dg.html

KE PE$_g$ PE$_s$ TME

Height = 1.0 m

Speed = 0.0 m/s
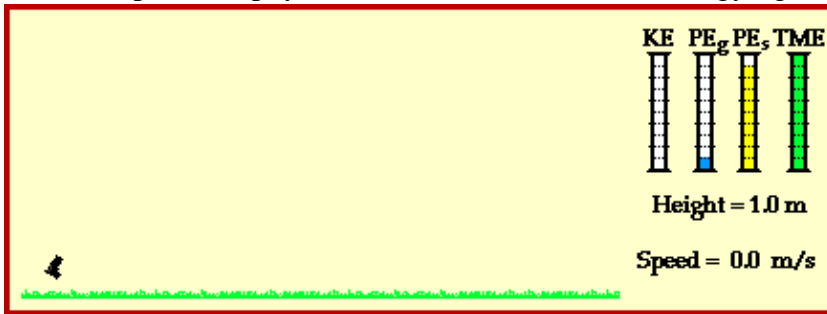
KE = kinetic energy

PE$_g$ = gravitational potential energy

PE$_S$ = Potential energy of the spring
        in the dart gun

TME = Total mechanical energy

1. Before the gun fires what type(s) of energy is there?

2. Where does the kinetic energy come from?

3. When is kinetic energy at its highest?

4. When is the speed at its highest?

5. When is height the greatest?

6. When is gravitational potential energy at its lowest?

7. When is kinetic energy at its lowest?

8. When is gravitational potential energy at its highest?

9. When is speed the lowest?

10. Describe the shape of the flight path of the dart.

The second simulation is of a roller coaster.
Go to   http://www.funderstanding.com/k12/coaster/

STATUS IDLE   SPEED   0.0   TIME   0.0

hill 1   ?   speed   ?   gravity   ?

hill 2   ?   mass   ?   friction   ?

loop   ?   reset

1. Push the play button. Describe what happens.

2. To make things easier to understand, let's pretend there is no friction. Move the friction slider all the way to the left and describe what happens.

3. We can adjust the height of the various pieces of this simulation. Make hill 2 smaller by moving the slider to the left. Push play. What effect does it have?

4. Make hill 2 bigger than hill 1. What effect does it have? Why?

5. Make hill 2 smaller than hill 1 again. Now decrease the height of the loop until it is lower than hill1. Describe what happens.

6. Using the stop button, find the speed
   a. at the bottom of hill 1
   c. at the bottom of hill 2

   b. at the top of hill 2
   d. after the loop

   What pattern do you see?

7. Now increase the mass of the cart using the slider. Using the stop button, find the speed
   a. at the bottom of hill 1
   c. at the bottom of hill 2

   b. at the top of hill 2
   d. after the loop

   What pattern do you see?

8. Now decrease gravity. Using the stop button, find the speed
   a. at the bottom of hill 1
   c. at the bottom of hill 2

   b. at the top of hill 2
   d. after the loop

   What pattern do you see?

9. Turn the friction back up. Using the stop button, find the speed
   a. at the bottom of hill 1
   c. at the bottom of hill 2

   b. at the top of hill 2
   d. after the loop

   What pattern do you see?