Name: Hour:

1 Roller Coaster Toll - Energy Perspective

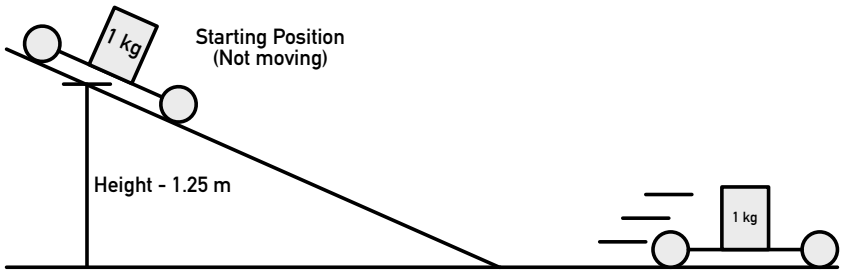

Figure 1: Diagram showing the starting position of a cart on a ramp. Assume the cart and mass together is 1 kg.

1.1 Potential Energy

Calculate the potential energy at the starting position.

To help you work through this worksheet, this one will be done as an example. When you do the others you should follow almost exactly the same procedure, getting the equation, writing out your reasoning, etc.

Equation: PE=mgh=(1 kg)(10 m/s^2)(1.25 m)=12.5 J

1.2 Kinetic Energy

What is the kinetic energy when the cart is rolling on the flat ground at the bottom of the ramp? Why is this the kinetic energy, what is your reasoning?

1.3 Final Velocity

Calculate the final velocity for the cart when it is rolling in the flat part.

1.4 Momentum

Calculate the momentum of the cart as it is rolling in the flat part.

1.5 Average Force

Calculate the average force on the cart as it is accelerating down the ramp. It takes 1.5 s for the cart to travel down the ramp.

2 Roller Coaster Toll - Average Velocity Perspective

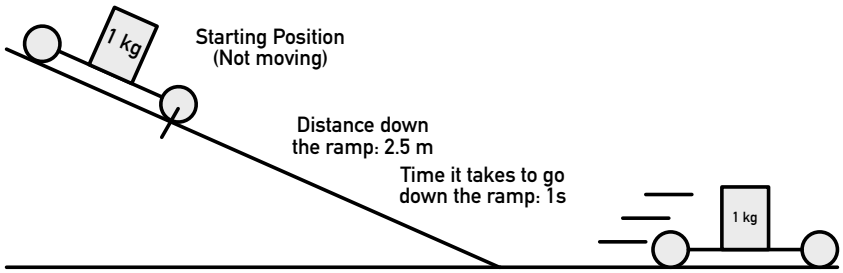

Figure 2: Diagram showing the starting position of a cart on a ramp. Assume the cart and mass together is 1 kg.

2.1 Velocity

Calculate the average velocity of the cart.

2.2 Acceleration

Calculate the average acceleration of the cart as it goes down the ramp.

2.3 Force

Calculate the average force on the cart as it goes down the ramp.

2.4 Momentum

Calculate the momentum (assuming your average velocity after it leaves the ramp).

2.5 Kinetic Energy

Calculate the kinetic energy for the cart when it is at the bottom of the ramp.

2.6 Reflection

How well do you think the average velocity represents the motion of the cart? Explain your answer.