

Name: \_\_\_\_\_

## Impulse, Momentum and Energy

**Design and conduct** an experiment to determine the relationship between the impulse applied to a Pasco cart and its resulting change in momentum.

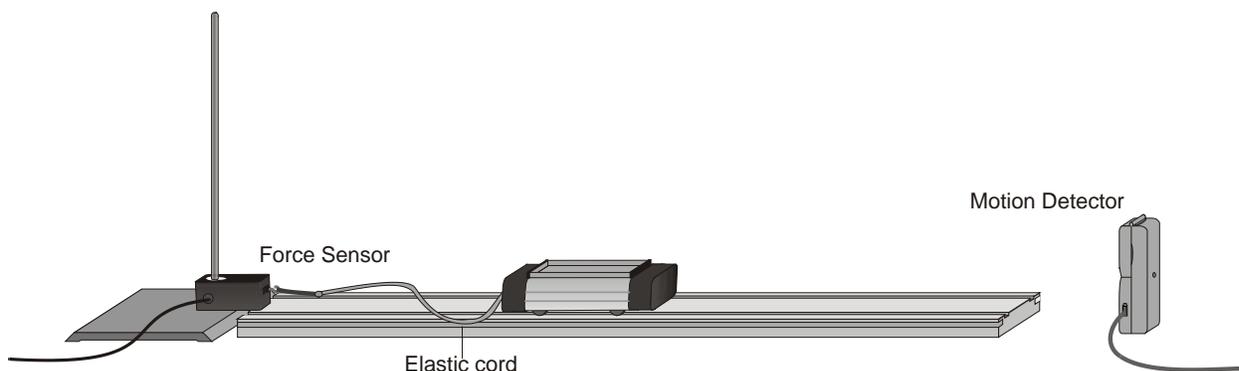
or

**Design and conduct** an experiment to determine changes in energy that occur when a Pasco cart is subjected to an impulse.

Begin by **PREDICTING** an outcome, then using the following **materials**, along with the suggested set-up illustrated below, develop a procedure for testing your prediction.

LabQuest interface  
Vernier Force Sensor  
Vernier Motion Detector  
Dynamics cart and track

Clamp  
Elastic cord  
String  
500-g mass



### THINGS TO CONSIDER:

- Experiment 1. What are the dependent and independent variables when exploring impulse? How can you calculate impulse given the sensors provided?
- Experiment 2. If you push the cart to get it started, what energy transformations occur as the cart is decelerated by the elastic cord and then reverses direction? How can you track these changes and compare them?
- Both experiments. What conditions are important to control in order to minimize error in your data collection?

## CONCLUSION:

- What evidence exists to support a universal statement regarding the relationship between impulse/momentum OR regarding energy transformations as a result of the impulse?
- Discuss any experimental error or surprising results. What alternative method could you develop to provide further proof of your conclusion?
- Extend and Apply. How would the outcome change if the elastic cord were removed and the cart were allowed to collide with and stick to another cart, and then move as one unit? Would you observe a different relationship between the impulse exerted on the cart and the resulting change in momentum? What about subsequent changes in energy due to this collision? How could you test your hypothesis?