SAFETY FIRST ENGINEERING INSTRUCTIONS

Let's create a model collision scenario. First, find two inanimate (non-living) objects in your home to use in the model. Identify one object as Object A and the second as Object B. Identify a third inanimate object, Object C, to be involved in the collision. Your job as an engineer is to protect Object C in the collision.

Take 10-15 minutes to design your collision model. You will conduct three trials.

- The first trial should involve no constraints for Object C. This trial should determine the effects of the collision when no safety precautions are taken.
- In the second trial, you will add a constraint to Object C to reduce its momentum during the collision.
- In the third and final trial, you will optimize the constraints on Object C to reduce its momentum further.

Procedure

I. Summary

1. First, record your name, the title of your model, the date, and your hour.
2. What is your goal?
3. List the materials used throughout the experiment.
4. Record the procedure you will use to design and construct the collision.

II. Trial #1

1. What is your claim (hypothesis) of what will occur during Trial #1's collision?
2. List the materials you are using in Trial #1. What major areas do you feel need safety improvements?
3. Based on your assumption of net force on your models, do you believe there will be a greater net force on Object A, Object B, or do you believe the net force on both will be equal?
4. Do you anticipate there to be motion on Object C? If so, in which direction?
5. Record a video as you run Trial #1 (or take before & after pictures of your model).
6. Record data in the table in Section V of this handout, and explain what happened. Was your hypothesis correct?

III. Trial #2

1. Include a list of safety measure(s) you will use for Trial #2 and what major areas you feel need safety improvements.
2. Do you anticipate there to be motion on Object C? If so, in which direction?
3. Record a video as you run Trial #2 (or take before & after pictures of your model).
4. How do you know the safety measures you added worked?
5. Record data in the table in Section V of this handout, and explain what happened. Was your hypothesis correct?

IV. Trial #3

1. Include a list of safety measure(s) you will use for Trial #3 and what major areas you feel need safety improvements.
2. Do you anticipate there to be motion on Object C? If so, in which direction?
3. Record a video as you run Trial #3 (or take before & after pictures of your model).
4. Record data in the table in Section V of this handout, and explain what happened. Was your hypothesis correct?
5. How do you know the safety measure you added worked?

V. Data Analysis & Summary

1. In the data table, record the time elapsed from the initial launch to when movement ended after the collision. (Make sure the launch starts at the same location.)
2. Measure the object's initial and final measurements through quantitative data (numerical) or qualitative data (using your five senses) results comparing Object C before and after the collision.

Trials	Time (Seconds)	Object C's Initial Measurement	Object C's Final Measurement	Did the object's measurement change? If so, how do you know?
1				
2				
3				

1. How does increasing the mass of your protective container affect the force when the objects collide?
2. Based on your final model, how do you know your final safety precautions aided in reducing the reaction expected without it?
3. Write three facts about forces and energy that you learned about through this unit.