

Honors Physics Lab - Inelastic Collisions - Mr. Ward - 03-01-04

Name

Period



PROCEDURE:

1. Start your computer and open Data Studio and the file "Collisions".
2. Number the two carts m_1 and m_2 on the masking tape. Find the mass of each cart and RECORD it in the data table.
3. Number the three bars m_3 , m_4 , and m_5 on masking tape. Find the mass of each bar and RECORD it in the data table.
4. Notice there is a silver letter 'M' on one end of each cart. This is the magnetic end. Place the two carts, empty, with the 'non-M' end facing each other on the track. Gently push one toward the other and watch them stick together. If you push them too hard, the cars may bounce off each other and the Velcro pieces may catch and release. This is to be avoided in this lab. If the carts do not stick, the collision is not totally inelastic.
5. Place one cart so it is about 30 cm from the left motion sensor. This will be the **incident**.
6. Place the other cart so it is about 90 cm from the left motion sensor. This will be the **stationary** target car.
7. Click Start and push the incident car toward the target car. After the cars have coupled, click Stop. Catch the coupled cars before they hit the right sensor.
8. Click on the Channel 1 & 2 legend. Click on the smart cursor. Move the cursor to the last red data point before the collision. RECORD the velocity. Move the cursor out of the way. You don't have to turn it off.
9. You do not need to record the velocity of the incident car after the collision. Since the two cars are coupled, we will use the velocity of the target car.
10. Click on the Channel 3 & 4 legend. Click on the smart cursor. Move the cursor to the last data point before the collision. RECORD the velocity.
11. Now move the smart cursor to the first data point after the collision is over. RECORD the velocity as positive because it is moving to the right. Ignore the negative sign. Move the cursor out of the way. You don't have to turn it off. Make three runs.
12. Next repeat steps 5-11 for an empty incident car colliding with a stationary two-passenger target car. Make three runs.
13. Next repeat steps 5-11 for a two-passenger incident car colliding with a one-passenger target car moving away from the incident car. Make three runs.
14. Next repeat steps 5-11 for a one-passenger incident car colliding with an empty stationary target car moving toward the incident car. Make three runs.
15. Next repeat steps 5-11 for a two-passenger incident car colliding with an empty target car moving away from the incident car. Make three runs.

RESULTS TABLE for Inelastic Collisions

Trial 1 – empty cart hitting stationary empty cart

Run	p_{1i} (kg m/s)	p_{2i} (kg m/s)	p_f (kg m/s)			% error
1						
2						
3						

Trial 2 – empty cart hitting stationary two-passenger cart

Run	p_{1i} (kg m/s)	p_{2i} (kg m/s)	p_f (kg m/s)			% error
1						
2						
3						

Trial 3 – two-passenger cart hitting one-passenger cart moving away

Run	p_{1i} (kg m/s)	p_{2i} (kg m/s)	p_f (kg m/s)			% error
1						
2						
3						

Trial 4 – one-passenger cart hitting empty cart moving toward

Run	p_{1i} (kg m/s)	p_{2i} (kg m/s)	p_f (kg m/s)			% error
1						
2						
3						

Trial 5 – two-passenger cart hitting empty cart moving away

Run	p_{1i} (kg m/s)	p_{2i} (kg m/s)	p_f (kg m/s)			% error
1						
2						
3						

What did you learn? What is the rule you discovered? Use the blank column(s) above as needed. Put in proper heading(s) and fill in results.