



# COLLISION EXPERIMENT DATA SHEET



Name \_\_\_\_\_

**Objective:** To observe the effect of collision of objects of unequal masses.

**Procedure:**

1. Obtain a sheet of aluminum foil.
2. Make it a rectangle about 15 cm by 8 cm.
3. Record its mass.
4. Make the foil into the shape of a closed container, i.e. car.
5. Obtain 2 or 3 red grapes and place them in the container.
6. Tightly close the container.
7. Write a short essay on a separate piece of paper about the “car” and the “people” (grapes) in it.
8. Your “car” will be in a collision as instructed by your teacher.
9. Clean up after the accident.
10. On the same paper as your essay, write the results of the collision.
11. Write a conclusion for this experiment.

**Data:**

Mass of Car \_\_\_\_\_

Mass of Weight Used \_\_\_\_\_

Ratio of Weight / Car \_\_\_\_\_

**Calculations:**

1. Find the velocity of the weight when it hit your car.
  
2. The mass of a train to a car is about 4000:1. How did your “car” compare to the mass of the weight?

**Conclusion:**



Solve the Following Problems: (Show work on separate paper)

1. The weight ratio of a freight train to a car is 4000:1. Using this ratio, what weight of aluminum can would be crushed by a person weighing 150 lbs.?
2. Find the momentum of a 6500 ton train traveling at 40 mph. If a 2-ton car had the same momentum as the train, what would the velocity of the car be? How many times the speed of sound is this?
3. Trains are equipped with air brakes, which apply from the locomotive to the end of the train car by car. This process averages about 12 seconds plus 4 seconds for the engineer to apply the brakes. How far does the train travel if it is going 50 mph (74 ft/sec) before the brakes are applied and the train begins to slow down and stop?
4. A car of 4000 lbs is struck by a train traveling at 45 mph. If the train weight is 12,000 tons, what is the velocity of both train and car after impact? Assume the car becomes attached to the locomotive.
5. A motorist stops at a railroad crossing because the lights are flashing. The train is 500 feet away and going 45 mph. The motorist is in a hurry and after waiting 4 seconds decides to cross the tracks. If his car accelerates at  $5 \text{ ft/sec}^2$  and the distance he must travel to clear the track is 50 ft, is a 911 call necessary. (Support your answer mathematically.)

Formulas Needed:

Momentum = mass x velocity

Distance = velocity x time

Distance =  $1/2$  acceleration x (time)<sup>2</sup>

Speed of sound is 750 mph

To convert mph to ft/sec, multiply mph by 1.46.