6 A Property of Matter

Name_____

Lab A: The Inertial Balance

AP/Inquiry Physics

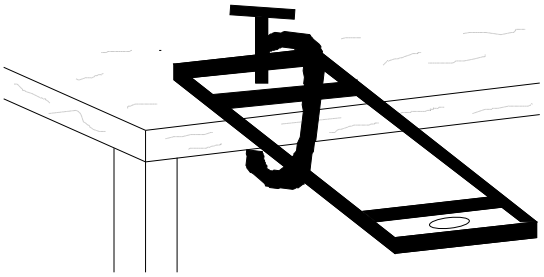
Introduction

When you step on a bathroom scale, you measure your weight. Many purchases we make, such as meat and vegetables, are made in terms of weight. Bridges specify the maximum weight they can support. Trucks are rated according to hauling weight limits. When a truck smashes into a building or through a wall or fence, what property of the truck causes the damage? (Speed is **not** a property of an object, merely a measure of its movement.) In this investigation, we will identify a property of matter which is sometimes confused with weight.

The Inertial Balance

Clamp the inertial balance to the table with the C clamp as shown in the figure below. **Place a protective piece of masonite between the balance and the table to prevent scratching.** Set the balance in oscillation by pulling it **horizontally** 5.0 centimeters to one side.

Count the number of complete oscillations (a swing from the starting position, through the resting position, and back to the starting position) occurring in fifteen seconds. (You may need to let the balance lightly strike a piece of paper in order to count the number of swings.) Repeat the exercise once more, and record your data in the table.



Next, load the balance with one piece of metal, securing it with the eyebolt keeper. (Pass the nut of the keeper through the hole in the platform and place the metal piece above the pan but below the collar on the eyebolt. Tighten the wing nut down onto the collar while the nut is pressed against the side of the hole so that the metal piece is held securely.)

Repeat the measurements you made in the previous section. Take two readings. Record your data in the table. Then load the balance with two pieces of metal and then three, repeating the measurements as before.

Trial	Number of Oscillations in 15.0 Seconds			
	Unloaded Balance	Balance w/ One Metal Piece	Balance w/ Two Metal Pieces	Balance w/ Three Metal Pieces
1				
2				
Average				

The Idea

ANSWER ALL QUESTIONS IN COMPLETE SENTENCES; REMEMBER "AFFECT" IS USUALLY A VERB WHILE "EFFECT" IS USUALLY A NOUN

1. What is the direction of the acceleration vector of a falling object?

2. What is needed to cause an object to accelerate?

3. What force causes the acceleration of a falling body?

4. The term that is used for force due to gravity on any object is **weight**. So the force due to gravity on you is your _____ .

5. Summarize the results of the lab. (How did the added objects affect the number of oscillations?)

6. What is the first explanation you can think of for this data?

7. What effect does gravity have on the motion of the inertial balance? Think about the direction of gravity and the direction the balance moved before answering. Explain your answer completely.

8. Given your answer to question 7, what effect does **weight** then have on the motion of the inertial balance? Explain your answer completely.

9. Your answers to questions 7 and 8 may have invalidated your initial response to question 6. If your answer to question 6 is no longer valid, give the correct explanation below: