The Old Tablecloth and Coins Tricks

At your lab station you will find several objects of varying mass. Take them back to your lab group table. Place a sheet of paper on the table and then place one of the objects on top of the piece of paper. Trace the outline of the object on the paper, remove the object, and then place another sheet of paper over the first one. Finally, place the object on top of the new sheet of paper, using the traced outline on the bottom sheet to position it.

ANSWER IN COMPLETE SENTENCES

1. Compare how much the object moves when the top paper is jerked away quickly versus slowly.

2. Repeat the above procedure for the remaining objects. What effect does the differing mass of the objects have, if any, on how far they move?

3. Stack six or more nickels on top of one another and then shoot a penny across the table at the bottom of the stack. Describe what happens.

4. Define **inertia**.

5. Discuss the two tricks you've done with your lab partners and develop workable explanations in terms of inertia. Write the explanations below **in your own words**.

The Hanging Mass Trick

Mr. Meador will conduct a demonstration showing that a sharp tug on a hanging mass will not pull it down, but a slow, steady tug will.

6. Why is it that a slow, continuous increase in the downward force breaks the string above the mass, but a sudden increase breaks the lower string?

7. We know that if an unbalanced force acts on an object, that object will have an acceleration. What value will that acceleration have if all the forces acting on the object are **completely balanced**, and thus the net force acting on the object is zero?

Earlier in the course, we developed the following equations to describe the motion of an object.

$$v_f = v_i + at \qquad d = v_i t + \frac{1}{2}at^2 \qquad v_f^2 = v_i^2 + 2ad$$

8. Rewrite the above three equations for the case when an object in motion has an acceleration of zero.

9. Looking at the three equations you just wrote, what will the motion of an object be like if no unbalanced force is acting on it?

10. The various tricks in this lab and your answers to questions 7 - 9 can be used to develop a statement of **Newton's First Law of Motion** - sometimes called **The Law of Inertia**. Write that law here.