Name: _____ Period: _____ Due: ____ EN. ____

Newton's First Law of Motion Activities EN: ___

What is Newton's First Law of Motion?

Activity #1: Wacky Washers

To prepare for this experiment, stack 4 washers one on top of the other so that you form a tower of washers.

Aim one washer at the bottom of the stack of four washers and give it a good hard flick with your finger or hand. What happens?

Flick a stack of two washers into a stack of four washers. What happens?

Flick a stack of four washers into a stack of four washers. What happens?

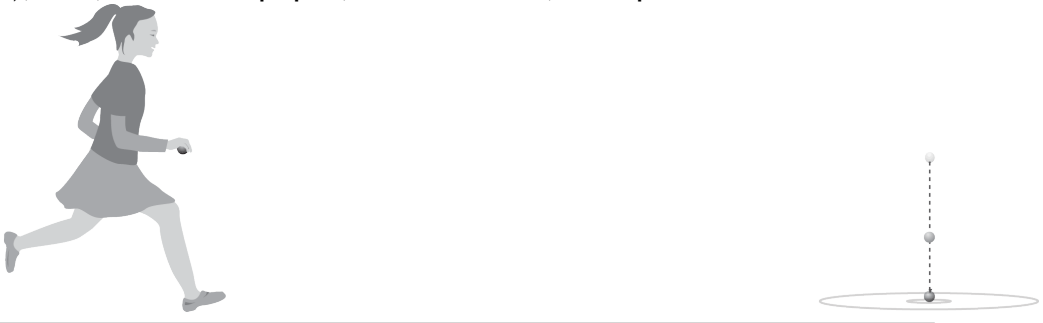
Explain your observations in terms of Newton's 1st Law.

Activity #2: Inertia – A Body in Motion

In this experiment you will try to drop a tennis ball on a target as you run past the target. Think it's easy? Before you begin, try to guess what will happen. Try to figure out when you will need to release the ball in order to hit the target. Write down your predictions. Give the reasons why you think you are correct. As you conduct this experiment, think of the challenges Air Force pilots had before the invention of the guided missiles that are used today. Pilots in World War II had to understand mathematics in order to drop bombs on targets while causing as little harm as possible to surrounding buildings and people. These are the same concepts that you will learn with this experiment.

Predictions and Reasons:

Materials You will need the following items for this experiment: • one tennis ball • clearly-marked target(s), i.e., notebook paper, a chalk mark, or tape



Procedure

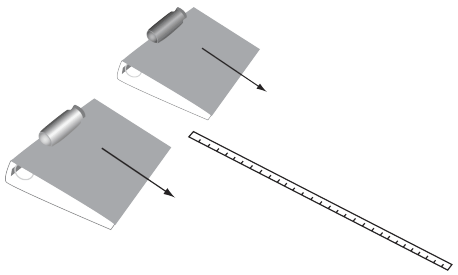
1. Place a target about 10-15 meters away from a starting line. Mark the starting line with chalk or tape
2. Hold the tennis ball and do not let your elbow leave your side as you run and drop the ball. Do not throw the ball. You should hold the ball from its sides so that you can release your grip as you let it drop. Remember to drop the ball and not throw it, otherwise you will change the intent of the experiment.
3. Have three students stand alongside (but slightly back from) the running path to act as observers. One should stand before the target, one at the target, and one just after the target. Their objective is to determine exactly where the runner released the ball and where the ball strikes the ground.
4. Ask the runner to sprint toward the target as fast as she or he can and try to drop the ball so that it lands on the target.
5. Next, have the observers make a diagram on their paper of where the ball was released and where it landed. Repeat the experiment until the ball hits the target.
6. Use the information in Step 5 to predict what would happen if a student ran at a slower speed.
7. Repeat Steps 4-5, using a different runner sprinting at a slower speed.
8. Use the information in the previous trials to predict what would happen at a walking speed.
9. For the last trial, ask a student to walk toward the target. Repeat Steps 4-5.
10. Write a summary of your results. Form conclusions based on the speed of each runner, the location of each ball's release, and the exact point where each ball landed.

Activity #3: And They're Off!

This experiment will teach you more about why Newton's First Law of Motion is also called the Law of Inertia. The method used in this experiment is very similar to one that Galileo conducted.

In this experiment you will discover how Newton's First Law works by conducting a race with two jars.

Materials You will need the following items for this experiment:
- two identical jars with lids (either plastic or glass jars)
- flour or sand , beans or other items
- two identical, empty three-ring binders (at least 2.5" in width)
- flour or sand to fill one of the jars to fill one of the jars
- a measuring tape



Procedure

1. Fill one jar with flour or sand. Pack it tightly.
2. 2. Fill the other jar with iron filings or small lead pellets. Again, fill it tightly.
3. 3. Put lids on both of the jars. Lids should be on tight.
4. Place both three-ring binders next to each other on a wooden or tile floor.
5. Place each jar on its side and release both from the top of the "ramps" at exactly the same time.
6. In the Table below, record how far each jar rolled. Do not measure the binder itself, just the distance from the end of the binder to where each jar actually stopped.
7. Repeat Steps 3-4 for each of the surfaces listed on the Table.
8. Fill in the Table with your results for each race.

Race	Surface	How far did the empty jar travel?	How far did the filled jar travel?
1	Wooden Floor		
2	Carpet		
3	Linoleum		
4	Tile Floor		
5	Other (_____)		

Examine your data to look for trends and record your observations . This will prepare you for the questions that follow. For example, determine if one jar always rolled farther than the other. Look to see which jar rolled farthest on a given surface. Try to figure out why you got the results you did for each jar on each surface.

Observations:

Think About It

1. Did the results depend on whether the jar was filled with flour/sand versus iron/lead? If so, in what way?

2. Did the results depend on the kind of surface you used? If so, in what way?

3. What can you say about a body's tendency to maintain its status quo – its inertia?