NEWTON'S FIRST LAW

NAME_____HR_____

Activity One- The Air Force Marble Game

Materials
-Drinking straws
-Marble
-Notebooks

Procedure

1. Have one person sit on one side of the table (the long side) while the other sits on the other side facing the first person.
2. Set up the notebooks and books on the table so that there is a path about thirty centimeters wide that leads from you to your partner.
3. Place the marble so that it is at the center of the table.
4. On the count of three, each student tries to blow air through the straw in order to move the marble. The objective is to move the marble all the way across the table over your partner's edge. You can only use air to move and stop the marble—**no touching of any kind allowed**. First one to three wins.
5. Now, repeat the process with the steelie.

What is Newton's first law?

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Explain in terms of Newton's First Law of Motion why it was hard to get the marble rolling using only air and the straw.

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Explain in terms of Newton's First Law of Motion why the marble was hard to stop once it got rolling using only air and the straw.

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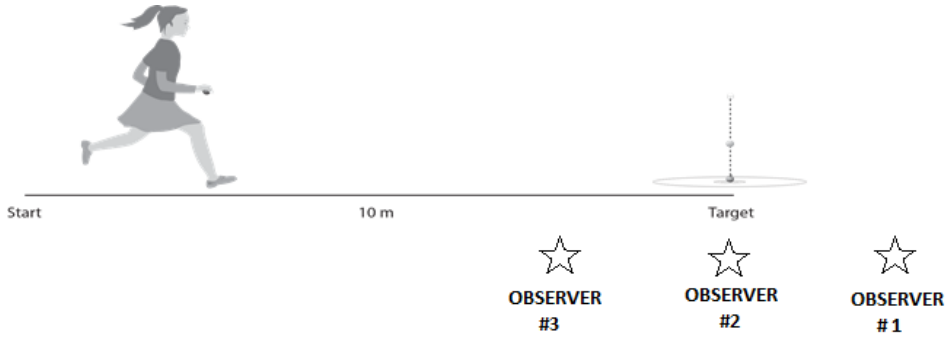
Activity #2: Inertia – Golf Bombs

In this experiment you will try to drop a golf 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 below, and be sure to explain 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.

MATERIALS: • one golf ball (or tennis ball) • target like a bulls-eye that is lightly taped to the floor

PROCEDURE:



1. 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.
2. Have three students stand alongside (but slightly back from) the running path to act as observers. One should stand just after the target #1, one at the target #2, and one before the target #3. Their objective is to determine exactly where the runner released the ball and where the ball strikes the ground.
3. Ask the runner to move toward the target as fast as she or he can and try to drop the ball so that it lands on the target. After running, you become observer #1. On the next trial, you are observer #2. On the next trial, you are observer #3. After being observer #3, you now go stand in line to make another run. Every student makes 2 attempts to hit the target.

Scientific question: How should you drop the golf ball in order to hit the target?

1] What is your hypothesis?

2] When a student missed the target, where did the ball usually land? (before the target or after?)

3] Make a diagram of where the ball was released and where it landed.

4] What would happen if a student ran at a slower speed? How would the drawing be different from the one above? Sketch it below.

5] What does this activity have to do with Newton's 1st law?

Activity #3: Knock My Block Off! NAME HR

SCIENTIFIC QUESTION: How does mass affect an object's inertia?

HYPOTHESIS: I think _____

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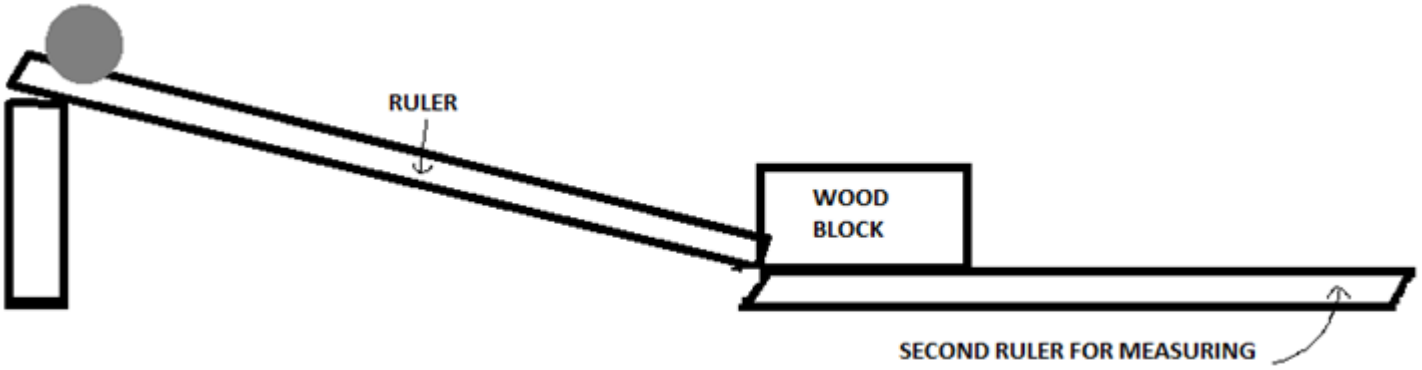
Using the picture below as a guide, design an experiment to test your hypothesis. Write the steps below:



NOTE: THESE RULERS ARE **NOT** END TO END. THE WOOD BLOCK IS **NOT ON TOP** OF THE RULER. THE WOOD **BLOCK WILL SLIDE ON THE TABLE**, NOT THE RULER.

1 _____

2 _____

3 _____

4 _____

5 _____

DATA: Create a table below that neatly organizes the numbers you collect in this experiment

1. What was the independent variable in this experiment?

2. What was the dependent variable in this experiment?

3. Name at least 3 controlled variables in this experiment.
   1
   2
   3

ARGUMENT WITH EVIDENCE: (2POINTS)

4. How does mass affect an object's inertia? Be sure to use data from your experiment to prove your claim.

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5. How will the voyager spacecraft still travel 38,000 miles per hour even after it runs out of fuel?

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6. Why don't moving objects on Earth continue on forever and ever?

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7. Why is it really easy to start making a snowman, but after a while it gets really hard? Explain using Newton's first law of motion

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