

Name _____

Date _____

Week 7 Science - Force and Motion

Inertia and Gravity Experiment

This week, you will review what you learned during the Force and Motion Unit and conduct an experiment. After you complete the experiment, send a copy of the Experiment Form, Data Box and Graph to my email freedyak@pwcs.edu or my cell phone 571-488-5046.

1) Watch a short [video](#) on force and motion.

2) **Let's review some important vocabulary:**

- **Energy** is the ability to do work. In order to do work, a force must be applied.
- A **force** can be a push or a pull that causes an object to move, change direction or stop. A force strong enough creates motion.
- **Motion** is a change in position (remember when we put our hands in different places and described where it was). If there is no force, there is no motion. Energy can be potential or kinetic.
- **Potential energy** is stored energy. A stretched rubber band is an example of potential energy.
- **Kinetic energy** is energy of motion. A roller coaster going down a hill is an example of kinetic energy.
- **Gravity** is the force of objects pulling on each other. Objects pull down toward the surface of the Earth because Earth's mass is greater than the object.
- **Inertia** is the ability of an object to resist movement or change direction. Objects will not move unless a force is applied.
- **Acceleration** is any change in velocity (remember that velocity tells the speed and the direction an object is moving).

Newton's Laws

Newton's 1st Law states that an object in motion will stay in motion unless a force acts on it and an object at rest will remain at rest unless a force acts on it (the law of inertia).

Newton's 2nd Law states that there is a relationship between force, mass and acceleration.

Force = Mass x Acceleration. The greater the mass, the more force it will take to accelerate (move) it.

Newton's 3rd Law states that for every action, there is an equal and opposite reaction.

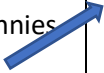
Let's Experiment!

For the experiment this week, you will test Newton's 1st Law (and a bit of his 2nd and 3rd laws, as well) using pennies, containers in three different sizes, and a piece of cardboard. You will test whether the size of the opening affects the number of pennies that fall into the container by putting a 4 inch x 7 inch piece of cardboard on top of the container, stacking 10 pennies in the center of the cardboard and then quickly pulling the cardboard out from underneath the pennies to see how many fall into the container.


Let's get started!

First, read and complete the Experiment Form (most of it has been filled in for you). **Then**, gather your materials (see below) and follow the procedures (see below) to conduct the experiment. If the experiment doesn't work the first time, just keep on practicing pulling the cardboard out straight and quickly and -it will work!!

Experiment Form

Title	Title
Write a good title for this experiment in the form of a question. The title tells what you are trying to find out by doing the experiment.	Does the size of the opening on a container effect how many pennies will fall into it?
Hypothesis	Hypothesis
This is your prediction of what you think will happen during your experiment. Write your hypothesis as an "if," "then" statement. For example , If the opening size of the container increases, then __?__ pennies will fall into the container. 	
Materials	Materials
This is a complete, numbered list of all the things you will need to complete the experiment	6 oz. container with small opening 14 oz. container with medium opening 30 oz container with large opening 10 pennies 4in. x 7in. piece of cardboard (use a cereal box) Scissors Ruler
Procedure	Procedure (Steps)
List the steps in order to complete this experiment from start to end.	1.Cut a piece of cardboard that is 4 in. x 7 in. 2.Place the cardboard on top of the small container. 3.Stack 10 pennies on the center of the cardboard. Make sure they are in the center. 4.Use your thumb and index finger to quickly pull the cardboard straight out from under the pennies. 5.Record how many pennies fell into the container in the Data Box . Repeat this 2 more times. Calculate the average (see note below if you forget how to do this). 6.Repeat steps 2-5 using the medium and large containers. 7.Complete the bar graph labeling the Y axis by 2's (first line is 2, next 4, and so on). Then draw and shade in bars that show the average for each container.

Data	Data Record your data in the Data Box below and complete the graph. I have labeled your X and Y axis and have given your graph a title. You will add numbers on the Y axis and bars.
Conclusion Complete the conclusion after you have conducted the experiment. Was your hypothesis correct? Write about what happened based on your own data. Use your knowledge of Newton's 1 st Law to explain your conclusion.	Conclusion



Data Box

Record how many pennies fell into each container. Don't forget to repeat each trial three times and calculate the average. **To calculate the average**, add up all the trials (how many pennies fell) for each container. Divide your total by 3 and that answer is your average.

	Trial 1	Trial 2	Trial 3	Average
Small Container				
Medium Container				
Large Container				

Title: Number of Pennies

Number of Pennies



Small

Medium

Large

Size of Opening