

Name \_\_\_\_\_

Date \_\_\_\_\_

## Week 8 Science - Force and Motion

### Friction

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 and Data Box to my email ([pakem@pwcs.edu](mailto:pakem@pwcs.edu)) or to 717-881-1980. You will watch a short video about Force and Motion by clicking on the link below (this is the video from last week-pay special attention to the section on **friction**):

<http://studyjams.scholastic.com/studyjams/jams/science/forces-and-motion/force-and-motion.htm>

#### Let's start with a review of terms.

**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.

**Friction** is a force that slows things down or can even make them stop. **Motion** is a change in position. 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 1<sup>st</sup> 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 2<sup>nd</sup> 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 3<sup>rd</sup> Law** states that for every action, there is an equal and opposite reaction.

### Let's Experiment!

For the experiment this week, you will test how friction affects a moving toy car by using different materials and timing how long it takes the car to travel down a ramp. Read the following and gather the required materials. If you don't have what I listed, you can substitute the item for something similar you have at your house.

1. You will need to make an 18 inch – 24 inch **ramp** out of any material you have at home-for example, it can be a board, a lid of a large container, a large piece of cardboard. Place one end of the ramp on a stack of three chapter **books**.
2. You will also need three different materials long enough to cover a strip on your ramp. I suggest using **foil, plastic wrap** and something rough like a piece of **cloth** (or carpet or burlap).
3. You will also need a **toy car**, marble or a small ball. You will also need a clock or **watch** that can measure seconds.
4. You will place the materials on the ramp and let your toy car (or marble or small ball) roll down the ramp while timing it to find out which material slows your car down the most.
5. You will repeat the experiment using the materials three times and record the time in the Data Box and calculate the averages. Don't forget to fill in your conclusion!

### 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 items **in bold** above) and **complete the right side of the experiment form** below. If the experiment doesn't work the first time, just keep on practicing -it will work!!

# Experiment Form

<p><b>Title</b></p> <p>Write a good title for this experiment. The title tells what you are trying to find out by doing the experiment.</p>	<p><b>Title</b></p> <p>The Effect of Friction on Moving Objects</p>
<p><b>Hypothesis</b></p> <p>This is your prediction of what you think will happen during your experiment.</p> <p>Write your hypothesis as an "if," "then" statement. <b>For example</b>, If a car rolls on the surfaces of foil, plastic and cloth, then the car will move slowest on the_____.</p> <p><b>(You will write your own hypothesis that shows the materials you decide to use.)</b></p>	<p><b>Hypothesis</b></p>
<p><b>Materials</b></p> <p>This is a complete, numbered list of all the things you will need to complete the experiment.</p>	<p><b>Materials</b></p>
<p><b>Procedure</b></p> <p>List the steps in order to complete this experiment from start to end.</p>	<p><b>Procedure</b> (Steps -list them using numbers)</p>
<p><b>Data</b></p>	<p><b>Data</b></p> <p>Record your data in the Data Box below .</p>
<p><b>Conclusion</b></p> <p>Complete the conclusion after you have conducted the experiment.</p> <p>Was your hypothesis correct? <b>Write about what happened based on your own data</b></p>	<p><b>Conclusion</b></p>

## Data Box

Record how long it took your car to travel down each material (don't forget to list the materials you used in the left hand column). 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.

MATERIAL	Trial 1	Trial 2	Trial 3	Average