**Science Lesson Plan**

**Age Level:** 5th grade

**Subject(s) Area:** Science

**Materials Needed:** pencils, notebook paper (1 per student), 2-3 carpet squares, 2-3 jump ropes, papers (crumpled, folded, and normal), student’s shoes, station directions

**S**tandards**:**

5.3.4. Identify the effects force and mass have on the motion of an object

5.3.5. Explain why gravity is called an attracting force.

**O**bjectives**:**

Students will **recognize** that gravity pulls objects down towards the center of the Earth.

Students will **recognize** that air resistance and friction can slow down or stop an object.

Students will **define** non-contact force, gravity, air resistance, and friction.

**Cognitive Level of Lesson (Bloom’s Taxonomy):** Remembering and Understanding

**L**earning Activities:

**Opening:**

* In science you have been learning about Force and motion.
* What is **Force**?
  + If force is applied to an object does it mean the object will move?
* What is **motion**?
* Today we are going to learn about forces that can slow, stop, or pull down an object’s motion
* Before reading today you are going to experiment with these three forces.
  + I will split kids into three groups of seven.
  + You will get a paper.

1. Get out a pencil.
2. Put your name and number on it
3. Divide the back into 3 sections and use one section for each station
   * You will get 5 minutes to experiment at each station so get to work quickly.
   * There are directions at each station to help you.

* Split groups and have helper pass out papers.
* As students work through stations the teacher will:
  + Keep track of the time & let students know when it is close to and time to switch
  + Ask students questions to help prompt answers
    - How is the carpet side different from the bottom side of the square?
  + Monitor student noise level and task behavior
  + Clarify directions if needed

**Friction – Station 1:**

* You must be quiet while performing this experiment or else you will have to return to your desk and find the information from your book.
* Friction is a force that slows things down.
* Directions:
  + On the floor you will find carpet squares and a jump rope.
  + Make sure the carpet square is upside down.
  + One student will sit on the carpet square holding the rope, while the other students will pull on the rope to move the seated student down the hall.
    1. How easy was this do?
    2. How many students did it take to move the rider?
  + Now repeat the experiment with the same student sitting but place the carpet square carpet side up.
    1. Was the square easier to move? How many students did it take this time?
    2. Why or Why not?
    3. Which experiment had more friction? How do you know this?
  + What is Friction?
  + What would happen if there was no friction on Earth?

**Air Resistance – Station 2:**

* You are working with air resistance.
* Air resistance slows down objects moving through the air.
* You can work in a whole group or with a partner or two.
* Directions:
  + On the table are many different pieces of paper.
  + The papers all started off looking the same.
  + Some of the papers have been crumpled, rolled, or folded, but all of the papers weigh the same weight.
  + Choose two papers and hold then at the same height.
  + Drop the papers at the same time.
    - What papers did you choose?
    - Which landed on the desk first? Why?
  + Repeat with different paper and record what happens on your paper.
  + What is air resistance?

**Gravity – Station 3:**

* At this station you are going to figure out what Gravity does.
* Some of you may already know. You may work as a whole group or in smaller groups.
* Directions:
  + Take your shoe. Hold it out and let go of it.
    - What happens to the shoe? Why?
  + Take your shoe and a partner’s. Hold them at the same height and let go at the same time.
    - Which shoe hit first? Why?
  + This time drop a shoe and a pencil from the same height.
    - Which hit first?
    - Does weight or size affect gravity?
  + Two people will compete.
    - Each person will hold a book in a flat hand out to the side with a straight arm
    - See who can hold the hold the book up the longest.
    - Is there more than one force at work? What directions are they going?
  + What is gravity?

**Whole Group:**

* After students rotate through 3 stations have them return to their desks.
* Have students keep out paper and pencil.
* Discuss station question answers and results.
* Demonstrate any experiments if students found answers that were not close to the book.
* If extra time watch:
  + <https://www.youtube.com/watch?v=MAqrWvkBoHk>
  + <https://www.youtube.com/watch?v=dSKb8_Y1aOY>

**Wrap up:**

* Was your thinking correct during the experiments? Were your ideas close to the answer?
* Review friction is a force that stops or slows things down. Air resistance is a force that slows things down in the air. Gravity is a force that pulls objects down toward the Earth.
* Have students put books away and turn papers in.
* Clear up stations and materials used.

**Required Vocabulary:**

* Force – a push or pull that causes an object to move
* Contact Force – force that acts between two surfaces that are touching
* Friction – contact force that can make a moving object slow down or stop
* Air Resistance – a type of friction that works against objects traveling through the air
  + The force of air that slows down an object
* Gravity – a force that pulls objects toward the center of Earth
* Non-contact Force – force that moves an object without touching it

**Differentiation:**

* Groups will be composed of a mix of students
* Students will be able to read the directions, listen to discussion, and try hands-on approach

**A**ssessment:

**Formative:**

* The teacher will listen to student discussions and talk to monitor understanding.
* The teacher will use the experiment observation notes to assess understanding that gravity pulls objects down while air resistance and friction slow objects down.

Reflection: