

Investigation Three – Draggin’ Me Down

Standard IV Students will understand that objects near Earth are pulled toward Earth by Gravity.
Objective 1 Demonstrate that gravity is a force.
Intended Learning Outcomes <ol style="list-style-type: none">1. Use science process and thinking skills.2. Manifest scientific attitudes and interests3. Understand science concepts and principles4. Communicate effectively using science language and reasoning

Standard IV

Objective 1

Teacher Background

Gravity is a force that constantly exists between two objects. The one with greater mass appears to pull the other. Earth’s pull is strong and will affect an object rolling up or down a hill. Racing a car down a ramp from different levels will allow students to observe how gravity controls the speed of objects. The farther an object falls, the faster gravity will make it go. It will also travel a short distance until air resistance works to slow it down. If students try rolling the ball or car up a ramp, they will observe that gravity slows the object and then pulls it back to the earth.

Pre-Assessment/Invitation to Learn

1. Show a Windows on Science program about inclined planes and the movement of objects down different ramps demonstrating the motion of
2. Show a picture of a roller coaster. Discuss the excitement of riding on a roller coaster at the amusement park. As it travels downward, everyone screams with excitement at the speed and movement on the small track. Climbing up the steep hills slows the cars down and helps build the excitement for the next plunge. It leaves your heart pounding and excitement drumming in your ears as your stomach seems to fly out your screaming mouth. Thanks to gravity, a roller coaster is loads of fun!

Teacher tells students:

“During science today, you will become researchers for an incredible new roller coaster being designed called the Beamer Screamer. Your group needs to research gravity and be able to explain to the construction crew how gravity helps the ride be exciting or boring.”

Materials

- Scissors
- Shoe box with lid
- Toy car, marble, or small ball
- Measuring tape or yard stick.

Instructional Procedure

1. Divide children into small groups.
2. Have each group cut away most of one end and one side of the shoe box.
3. Cut two slots in the end that is left.
4. Cut the edges off the lid to make a ramp that will slide into the slots you made in the box.
5. Place the ramp into the lowest slot of the box. Place the car, marble, or small ball at the top of the ramp and release it.
6. Record your results. Time your car counting how long it takes to reach the finish line, and then measure its total length traveled.
7. Change the incline of the ramp in the box and repeat the activity.
8. Record the results again.
9. Move the ramp to the highest slot and continue experimentation, recording results.
10. Repeat the activity, this time rolling the ball up the ramp from different levels.
11. Discuss results as a class and generate principles about gravity.

Curriculum Extensions

Science –

- Change the type of car used on the ramp to see if speed or distance changes. (*ILO 1*)
- Locate a “Marble Game” toy from Discover Toys to put in a center and have students create their own marble maze. Observe how gravity affects the speed of the marbles (*ILO 1*)

Assessment Suggestion

- Response questions:
 1. What happens to the car when you release it on the lowest ramp?
 2. What happens to the car when released on the highest ramp?
 3. Describe the observations made using the vocabulary words gravity, speed, motion, distance, and force.

Resources

Books:

- *How Do You Lift a Lion?* by Robert E. Wells (Albert Whitman & Company)
- *The Way Things Work* by David Macauley (Dorling Kindersley)
- *Simple Machines* by Deborah Hodge (Ontario Science Center)
- *Machines – Spectacular Science Projects* by Janice VanCleave (John Wiley and Sons, Inc.)
- *Physics Lab in the Hardware Store* by Bob Friedhoffer (Franklin Watts)
- *Playground Physics – Simple Machines* by Bob DeWeese (Evan-Moor)
- *Science Experiments With Simple Machines* by Sally Nanivell-Aston (Franklin Watts)

Videos:

- Science Alliance #3, Machines

Laser Discs:

- Windows on Science, Primary Vol. e, Work and Machines Lessons 2-10

Web sites:

- <http://www.fi.edu/qu97/spotlight3/spotlight3.html>
- <http://www.ed.uri.edu/SMART96/ELEMSC/SMARTmachines/machine.html>
- <http://www.stemnet.nf.ca/CITE/machinessimple.htm>
- <http://mikids.com/Smachines.htm>
- <http://www.mos.org/sln/Leonardo/InventorsToolbox.html>
- <http://www.san-marino.k12.ca.us/~summer1/machines/simplemachines.html>
- <http://www.northcanton.sparcc.org/~greentown/simpmach.htm>