



Inquiry Lab

TEACHER ENRICHMENT RESOURCE PACKET



Falling and Floating

Why does a bowling ball fall to the ground faster than a feather? How does a parachute work? Work through challenges to investigate concepts such as gravity, friction, air resistance and density.

Learning Objectives:

- Learn about objects from daily life that demonstrate different ways of falling and floating
- Explore how the combination of shapes and materials affects how students' projects fall and float
- Practice teamwork skills in collaborating on building projects

Think it.
Try it.
Explorit.

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Thank you for choosing Explorit Science Center's *Inquiry Lab* program to supplement your ongoing science curriculum. Whether you use the program to kick off a new unit, wrap up a nearly completed unit, or purely to excite and interest your students in the wonderful world of science, advance preparation and follow up with your students are critical to achieving the greatest educational benefit from this unique science experience.

Explorit provides two resources to help prepare you and your students for the *Inquiry Lab*. First, simple logistics of the program are detailed in the confirmation letter. Second, this Teacher Enrichment Resource Packet outlines appropriate science content and processes to help you:

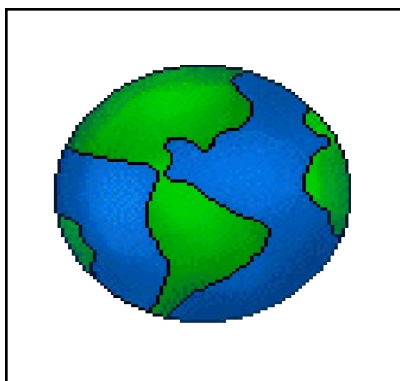
- successfully prepare your students prior to visiting Explorit;
- participate fully in the *Inquiry Lab* yourself; and
- follow-up with your students back in the classroom.

Falling and floating could not occur without the existence of gravity. Gravity is the natural phenomenon by which objects with mass attract one another. The most massive object that humans typically encounter is the earth, and because of the attractive force of gravity, it is toward the earth that humans fall or float.

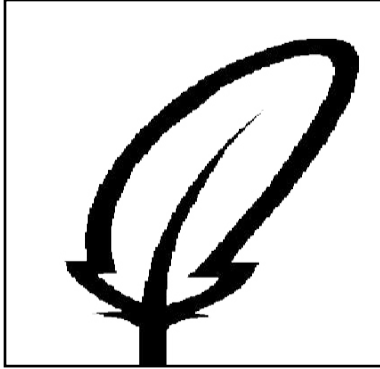
Legend has it that sixteenth century scientist Galileo dropped a heavy stone and a light stone off the Leaning Tower of Pisa to show that the two weights would fall at the same acceleration and reach the ground at the same time. In reality, this experiment could only happen within a vacuum, free from the force of air resistance. Air resistance is the force of air pushing against a falling object. It is what makes parachutes life-saving devices and what makes running against the wind so difficult. Air resistance is friction an object experiences against the movement of air. In daily life, the force of a falling object is always falling against the force of the air. Sometimes a falling object falls not through the air, but through a liquid. In these cases we can observe how the density of the object plays a role in how it will fall or if it will float. Density is the mass per unit volume of an object. A ball with less density than that of the liquid it is in will float to the top of the liquid.

Humans have been searching to understand the science behind falling objects for centuries. Physicists today continue to study how different shapes and materials fall in different situations.

Background Information "Falling and Floating"



Classroom Activity #1



Classroom Activity #2

Classroom Activity #3

ACTIVITY #1 Freefalling

Background: An object becomes "weightless" for a fraction of the time it is falling. Demonstrate how falling cancels out gravity.

Materials: Paper cups, water, pencil, bucket

Instructions: Fill a paper cup with water and poke a hole in the bottom with the pencil. Observe the water flowing out. Now repeat these steps, but drop the cup of water into a bucket (from various heights) before observing. What happens to the water?

Follow up: Discuss the idea of weightlessness.

ACTIVITY #2 Density Test

Background: An object's density determines if it will sink or float in water. Challenge students to predict which objects will float and which will sink. How does the water affect their fall?

Materials: Tub of water, bouncy balls, erasers, pingpong balls, small weights, and various other objects

Instructions: Drop the objects one at a time into the tub of water. Observe how the water changes the way the object falls and if the object sinks or floats.

Follow up: How does the shape of an object affect how it floats in a liquid? What about the weight?

ACTIVITY #3 Falling Feather

Background: Prove that Galileo was right! Create a vacuum to test how quickly objects of different weights fall.

Materials: See http://www.exploratorium.edu/snacks/falling_feather/index.html for instructions on how to build the vacuum.

Follow up: Discuss with students the properties of falling that explain their results.

Information written and compiled by Jessica Younker and Explorit Science Center Staff

Science Standards

CA STANDARDS

Physical Science (K-1a; 2-1abce;)

Life Science (K-3c)

Earth Science (5-4a)

Investigation and Experimentation (K-4abcde; 1-4abd; 2-4acg; 3-5bcde; 4-6abcd; 5-6bh; 6-7ae)

NATIONAL STANDARDS

K-4: A, B, E, G; 5-8: A.

Explorit Programs for Schools and Groups

At Explorit's Sites

Discovery Lessons & Inquiry Labs

Visit one or more of the Changing Exhibitions throughout the year

Nature Safaris & Labs

Fall and Spring visits to Explorit's outdoor spaces at Mace Ranch Park

Explorit in Your Classroom

Classroom Adventures

Science Investigations for Grades K-6

Young Scientist Series

Science investigations through multiple visits

For the Whole School

Health in Your World

Learn about keeping your body and the world healthy and safe

Science in Your World

The ultimate family science night

Science Assembly

A multi-media presentation for the whole school

Reservations required.

For information please call

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HOW TO CONTACT US



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