
Physics of Sound



First-Grade Teacher Resource Guide

Table of Contents

Lesson summary	1
Vocabulary	1
Activity Page.....	2
Extension Activities.....	3
Education Standards	4

Physics of Sound and Motion: Lesson Summary and Vocabulary

Lesson Summary: The YSI *Physics of Sound and Motion* program provides a hands-on introduction to physics and a closer look at two of its major topics. Students participate in an instructor-led discussion on energy, matter, and other physics fundamentals before moving on to the specifics of sound and motion. During the Sound portion of the presentation, activities are used to qualify sound as a vibration and determine how it travels. Students work together to model molecules and waves, participate in experiments on sound traveling through different states of matter, and create a noisemaking device to take home. The Motion half of the program places an emphasis on flight. Students discuss the four fundamental forces of flight and Bernoulli's principle, creating first paper fliers and then stomp rockets to try different methods of propulsion through the air. For older groups, an emphasis is also placed on Newton's laws of motion, and how adding mass to their rocket can affect it. This program focuses on critical thinking and experimentation, encouraging students to join in the discovery process at every stage.

Vocabulary: Below are words and concepts that relate to the *Physics of Sound and Motion* program.

Drag: the "backward" force of flight; friction due to collisions with air molecules

Energy: the ability to do work; found in forms such as light, heat, and chemical storage

Force: a push or a pull

Gas: the least dense state of matter, where molecules move freely to fill all space provided

Gravity: the "downward" force of flight; the universal force attracting two objects with mass

Lift: the "upward" force of flight; an upward push due to differences in air pressure

Liquid: the state of matter where molecules can move, but stay close to each other

Matter: the basic structural component of the universe; everything physical

Molecules: small particles of matter

Motion: a change in position caused by a force

Physics: the field of science that deals with matter, energy, motion, and force

Solid: the densest state of matter, where molecules are fixed in place

Thrust: the "forward" force of flight; a force that propels a flying object

Vibrations: small movements back and forth; sound

Definitions based on www.dictionary.reference.com

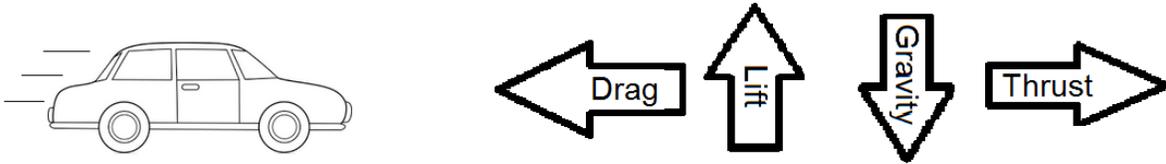
Physics of Sound and Motion

Activity Page

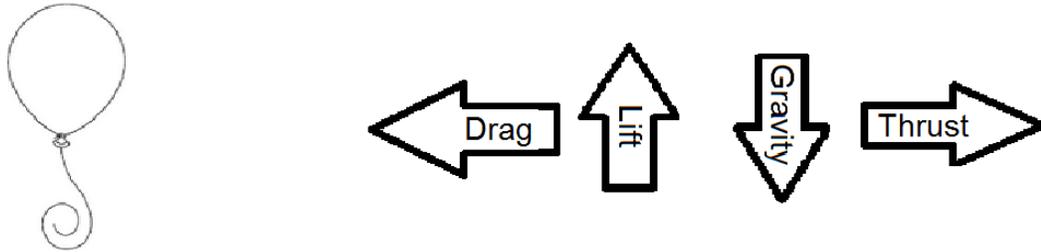
Four Forces

Directions: Circle the arrow showing which force is acting on the object.

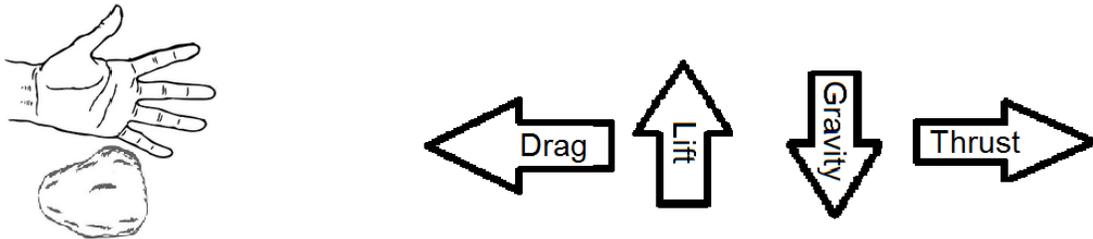
1. Which force is pushing the car?



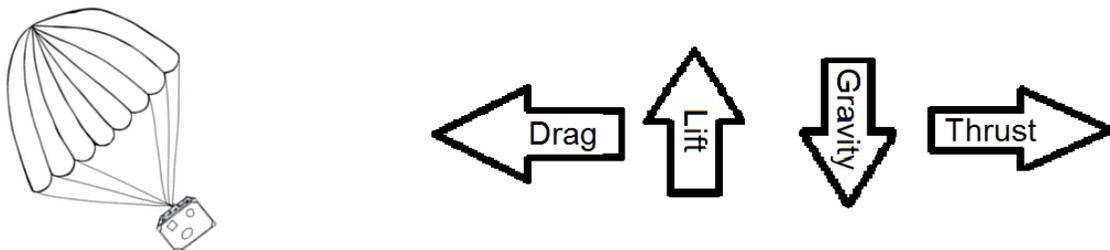
2. Which force is holding up the balloon?



3. Which force is moving the stone?



4. Which force is slowing down the parachute?



Physics of Sound and Motion: Extension Activities

The extension activities listed below are from RAFT (Resource Area For Teaching). RAFT educational content is available online (www.raftbayarea.org) at no cost and is aligned to California Science Standards and Next Generation Science Standards. Below is a selection of post-visit activities from RAFT to build on student learning about physics, sound, and motion.

[RAFT Idea: Sound String - Resource Area For Teaching - RAFT Bay Area](#)

Grades Covered: K through 6

Subjects Covered: Physical Science

Curriculum topics: Sound, Vibration, Sound Transfer

Description: Students can transmit sound using a simple device constructed from cups and string...

<http://www.raftbayarea.org/ideas/Sound%20String.pdf>

[RAFT Idea: Puff Rocket - Resource Area For Teaching - RAFT Bay Area](#)

Grades Covered: K through 12

Subjects Covered: Physical Science, Earth/Space Science

Curriculum topics: Forces, Motion, Gravity, Newton's Laws

Description: Hypothesize, experiment, collect data, and analyze forces and motion with a straw "rocket" and an easily made launcher. The stronger the force, the farther and higher the rocket flies!

<http://www.raftbayarea.org/ideas/Puff%20Rocket.pdf>

Physics of Sound and Motion: Education Standards

Our Physics of Sound and Motion program will contribute to students' ability to meet the California Science Content Standards, Common Core, and Next Generation Science Standards listed on the page below.

California Science Content Standards First Grade:

Physical Sciences: 1. Materials come in different forms (states), including solids, liquids, and gases. As a basis for understanding this concept:

- a. *Students know* that solids, liquids, and gases have different properties.

Investigation and Experimentation: 4. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- d. Describe the relative position of objects by using two references (e.g. above and next to, below and to the left of).
- e. Make new observations when discrepancies exist between two descriptions of the same object or phenomenon.

Excerpted from CA State Standards: <http://www.cde.ca.gov/>

Common Core First Grade:

Speaking and Listening Standards: Students will...

1. Participate in collaborative conversations with diverse partners about grade 1 topics with peers and adults in small and larger groups.
 - a. Follow agreed-upon rules for discussions.
 - b. Build on others' talk in conversations by responding to the comments of others through multiple exchanges.
 - c. Ask questions to clear up any confusion about the topics under discussion.
2. Ask and answer questions about key details from information presented orally.
3. Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.

Excerpted from Common Core Standards: <http://www.corestandards.org/>

Next Generation Science Standards First Grade:

Waves: Light and Sound

- **1-PS4-1:** Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
 - **Science and Engineering Practices:**
 - **Planning and Carrying Out Investigations:** Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.
 - Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1)
 - **Disciplinary core ideas:**
 - **PS4.A: Wave Properties:** Sound can make matter vibrate, and vibrating matter

Excerpted from NGSS: <http://www.nextgenscience.org/>

Animals and their Adaptations: Education Standards

can make sound. (1-PS4-1)

- **Crosscutting Concepts**

- **Cause and Effect:** Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1)

Engineering Design

- **K-2-ETS1-3:** Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

- **Science and Engineering Practices:**

- **Analyzing and Interpreting Data:** Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
- Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

- **Disciplinary core ideas:**

- **ETS1.C: Optimizing the Design Solution:** Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Excerpted from NGSS: <http://www.nextgenscience.org/>