



Mission: How do layers help things slide?

Age: 5+
Materials: \$6

Time: 25 min
(Set-up: 10 min | Activity: 15 min | Clean-up: 5 min)

NGSS Alignment of Light and Bubbles Activity

The information below may not include every area that this activity can be linked to NGSS concepts

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Grade 2
 - Different properties are suited to different purposes.

PS2.A: Forces and Motion

- Grade 3-5
 - Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.
- Middle School
 - The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion.
 - All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared.

Performance Expectations

- 2-PS1-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
- 3-PS2-1: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- MS-PS2-2: Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.



Crosscutting Concepts

Cause and Effect

- Grade 3-5
 - Cause and effect relationships are routinely identified, tested, and used to explain change.
- Middle School
 - Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Stability and Change

- Grade 3-5
 - Change is measured in terms of differences over time and may occur at different rates.
- Middle School
 - Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales.

Engineering and Science Practices

Analyzing and Interpreting Data

- Grade 3-5
 - Analyze data to refine a problem statement or the design of a proposed object, tool, or process.
- Middle School
 - Analyze data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success.

Planning and Carrying Out Investigations

- Grade 3-5
 - Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.
 - Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
 - Make predictions about what would happen if a variable changes.
- Middle School
 - Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim
 - Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions.
 - Collect data about the performance of a proposed object, tool, process, or system under a range of conditions.