



Marvelous Motion

Newton's Laws of Force & Motion

This lesson is recommended for grades 3 through 8.

Goal: This lesson will provide the students the opportunities to discover how forces affect the motion of an object. The students will be introduced to Newton's 3 Laws of Motion, and with guidance, will apply these laws during their investigation.

Academic Standards/Benchmarks: Physical Science, Scientific Inquiry, Measurement, and Data Analysis and Probability (based on the Ohio model)

Indicator:

Describe the forces that directly affect objects and their motion. (grade 3)

3. Identify/contact/noncontact forces that affect motion of an object (e.g., gravity, magnetism and collision).
4. Predict the changes when an object experiences a force (e.g., a push or pull, weight and friction).

Develop, design and safely conduct scientific investigations and communicate the results.

6. Communicate scientific findings to others through a variety of methods (e.g., pictures, written, oral and recorded observations). (grade 3)
3. Develop, design and conduct safe, simple investigations or experiments to answer questions. (grade 4)
6. Explain why results of an experiment are sometimes different (e.g., because of unexpected differences in what is being investigated, unrealized differences in what is being investigated, unrealized differences in the methods used or in the circumstances in which the investigation was carried out, and because of errors in observations). (grade 5)

Explain that there are differing sets of procedures for guiding scientific investigation and procedures are determined by the nature of the investigation, safety considerations and appropriate tools.

- 2., 4., 1. Choose the appropriate tools or instruments and use relevant safety procedures to complete scientific investigations. (grades 6,7, and 8)

In some cases, describe the motion of objects and conceptually describe the effects of forces on an object. (grade 8)

2. Explain that motion describes the change in the position of an object (characterized by a speed and direction) as time changes.

Use Measurement Techniques and Tools. (grade 3)

5. Estimate and measure length, weight and volume (capacity), using metric and U.S. customary units, accurate to the nearest $\frac{1}{2}$ or $\frac{1}{4}$ units as appropriate.

Data Analysis and Probability Standard (grade 3)

1. Collect and organize data from an experiment, such as recording and classifying observations or measurements, in response to a question posed.

Objectives:

- Describe the relationship between the weight of an object and a force.
- Define the terms force and hypothesis.
- Correctly apply Newton's Laws, with teacher guidance, to their science investigations.
- Describe the ways a force can affect the motion of an object.
- Demonstrate that forces act in pairs.

Note: It is the responsibility of the district/school to determine which students participate in our programs. This includes, but is not limited to, the district/school identifying students with allergies, those with potential to allergies, and to identify students with special needs who may require personalized accommodations. Prior notification is necessary to develop proper considerations.