Motion, Forces and Energy (Upper-Elementary)

A Museum of Science Traveling Program
Description

Motion, Forces and Energy is a 60-minute presentation about kinetic and potential energy, the connection with forces and their application using tools like simple machines. It is designed to build on NGSS-based curricula.

NGSS: Next Generation Science Standards
Needs

We bring all materials and equipment, including a video projector and screen. Access to 110-volt electricity is required.
Space Requirements

The program can be presented in assembly-suitable spaces like gyms, multipurpose rooms, cafeterias, and auditoriums.
Goals: Forces

We demonstrate the basic concept of forces, with volunteers being pushed or pulled across the room on carts.
Goals: Newton’s Laws

We show how Newton’s Laws of Motion describe the behavior of forces, such as the action/reaction forces acting on a Sail Car.
Goals: Work and Energy

We show that **Work** is the application of a force over distance, and is measured with the concept of **Energy**.
Goals: Work and Energy

Several demonstrations show how energy can change forms, such as from Potential Energy to Kinetic Energy.
Finale

We always demonstrate simple machines like our giant lever, which incorporates an engineering challenge…
Finale

…to lift a teacher in the air!
Additional Content

In addition to these core goals, other concepts are taught with a variety of additional demonstrations.
Program Details

• Can only be booked for school groups during the school year.
• Only available for third- or fourth-grade students studying the program content.
Program Details

• Capacity is up to eight classes (200 students) of a single grade per session.
• Up to two consecutive sessions can be taught per day.
NGSS Connections

• 3-PS2-1. Provide evidence to explain the effect of multiple forces, including friction, on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object.
• 3-PS2-2. Make observations and/or measurements of an object’s motion to provide evidence that a pattern can be used to predict future motion.
• 3.3-5-ETS1-1. Define a simple design problem that reflects a need or a want. Include criteria for success and constraints on materials, time, or cost that a potential solution must meet.
NGSS Connections

• 3.3-5-ETS1-2. Generate several possible solutions to a given design problem. Compare each solution based on how well each is likely to meet the criteria and constraints of the design problem.

• 4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.

• 4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide.

• 4-PS3-4. Apply scientific principles of energy and motion to test and refine a device that converts kinetic energy to electrical energy or uses stored energy to cause motion or produce light or sound.
NGSS Scientific and Engineering Practices

- Asking questions and defining problems.
- Planning and carrying out investigations.
- Using mathematics and computational thinking.
- Developing and using models.
- Analyzing and interpreting data.
- Constructing explanations and designing solutions.
## 2019 – 2020 Prices

<table>
<thead>
<tr>
<th>Sessions per Day</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Session</td>
<td>$575</td>
</tr>
<tr>
<td>2 Sessions</td>
<td>$950</td>
</tr>
</tbody>
</table>

No mileage fees charged in New England in 2019-20 School Year.
Motion, Forces and Energy (Upper-Elementary)

For information/reservations:
mos.org/travelingprograms
travelingprograms@mos.org
617-589-0354