

Saint John's Outdoor University Field Trip Overview

Science of Sledding

Objective: Students will use a fun winter activity to investigate the properties of motion. Students will investigate how an object's motion (student sliding down a hill) is affected by forces (friction from snow, type of sled, push from other student) and how those forces can change the speed or direction of motion. Students will also observe how change in force can produce change in motion.

Lesson outline:

- Forces, Sledding, and Creating an Experiment Discussion – Define force, independent versus dependent variables, and discuss the study question and hypothesis.
- Sledding Hill – Setup – Divide into teams and discuss safety on the hill.
- Sledding Experiment – 3 trials of differences forces: gravity alone, push on the ground, and push from another student.
- Sledding Closing
 - What is a force?
 - Forces acting on sled (gravity and friction)
 - Scientific Experiment Procedure

Key points:

- Learn what forces affect an object's speed through experimentation.
- Explore the correct way to create and execute a scientific experiment.
- An object's speed is the distance it moves over a certain amount of time (Miles/Hour) (Feet/Second) (Inches/Day)
- Initial Force (like a push) may increase an object's speed
- Friction is a force that reduces an object's speed
- A scientific experiment is done to test to see if a hypothesis is correct
- A hypothesis is an educated guess based on past experience
- $\text{FORCE} = (\text{Mass}) (\text{Acceleration})$

Minnesota K-12 Academic Standards addressed during activities:

Strand	Code	Benchmark
SCIENCE		
2. Physical Science	5.2.2.1.1	Give examples of simple machines and demonstrate how they change the input and output of forces and motion.
	5.2.2.1.2	Identify the force that starts something moving or changes its speed or direction of motion.
	5.2.2.1.3	Demonstrate that a greater force on an object can produce a greater change in motion.