Unit 1: Forces and Interactions: Pushes & Pulls

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

Unit Overview

In this unit, students are introduced to pushes and pulls and how those affect the motion of objects. Students observe and investigate the effects of what happens when the strength or direction of those pushes and pulls are changed.

Enduring Understandings

It takes energy to change the motion of objects.
Energy change is understood in terms of force.
Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Essential Questions

How do forces influence motion?
How can the principles of motion be used?
How does the weight of an object influence motion?
How does friction affect a moving object?
What is the effect of a push or pull when applied to an object?

Learning Objectives

Plan and conduct simple investigations/tests to determine how changing the speed and direction of an object can affect its motion.
Identify pushes and pulls as the way things move.
Gather evidence to support ideas about the causes of motion.
Explain the difference between pushes and pulls through demonstration and/or verbally.
Use simple nonstandard units to measure the distances that two different objects travel when pushed or pulled.
When using two objects, compare them using a measurable attribute, such as weight, to see which object has “more of” or “less of” the attribute.
Use the Design Process to make a ramp.
Talk about how the steepness of a ramp impacts speed.
Practice identifying cause and effect concepts throughout the unit.
Career Exploration - Explore the career of a roller coaster designer and other science related jobs.

Standards: Content

SCI.K-PS2-1	Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
SCI.K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
SCI.K-PS2-2	Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.
SCI.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.

Standards: Interdisciplinary

Assessment Evidence

Formative	Teacher observations, Class discussions, Lab Activities, Key concepts and vocabulary quizzes, Science Starter's/Do Nows, Open Ended Responses, Modeling, Simulations, Innovators Monthly Research, Vocabulary Responses, Exit Questions, Interactive Digital Assessments embedded in Exploring Science Digital Book
Summative	In correlation with the NGSS, students must demonstrate the following as summative assessments: K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. Other summative assessments will include but are not limited to: projects, summative tests, lab skills demonstrations, and vocabulary quizzes.
Alternative & Benchmark	Alternative - Read to the student and chart oral responses. Word banks, sentence frames, oral responses, graphic organizers, observations, portfolios of student work, orally administered assessments, and anecdotal notes. Benchmark - Teacher generated unit assessments, projects/labs, checkpoint assessments, teacher observations
Assessment Evidence Resource	

Instructional Resources

Smartboard, Computers, Websites and digital interactives/models, Multi-media presentations, Video Streaming, Brain Pop, Middle School Science, Generation Genius Digital Curriculum, Amplify Digital Curriculum, Microsoft 365, Primary and Secondary Source Documents, Assorted lab materials, markers, crayons, glue sticks, scissors, Common objects to help create a working "Mousetrap" type cause and effect maze. Mouse Trap: board game, books, dominoes, marbles, K'nex toy building pieces, Tinker Toys, matchbox cars, race tracks, blocks, balls, Slinky, bowls, water, cups, paper towel tubes, toilet paper tubes, wedges for seesaw motion, objects to create ramps, buckets.
Simple Machines Simple Machines by Deborah Hodge.
How Do You Lift a Lion? by Robert E. Wells.
Pull, Lift, and Lower: A Book About Pulleys by Michael Dahl

Instructional Resource List

Curricular Mandates

Below are the curricular requirements as defined in NJ Administrative Code and Statute

	Amistad		Diversity, Equity, and Inclusion
	Holocaust		LGBT and Disabilities (Grades 6-12)
	Climate Change		Asian American & Pacific Islander

Social Emotional Learning (SEL) Competencies

NJ Social and Emotional Learning Competencies & Sub-Competencies

	Self-Awareness		Relationship Skills
	Responsible Decision-Making		Social Awareness
	Self-Management		

21st Century Skills & Themes

	Global and Cultural Awareness		Technology Literacy		Planning and Budgeting
	Creativity and Innovation		Financial Institutions		Risk Management and Insurance

	Information and Media Literacy		Digital Citizenship		Economic and Government Influences
	Critical Thinking and Problem Solving		Credit Profile	X	Career Awareness and Planning
	Civic Financial Responsibility		Financial Psychology		