K Science Unit 2: Pushes & Pulls (Force Olympics)

Content Area: **Science**
Course(s):
Time Period: **Marking Period 3**
Length: **9 Weeks**
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.

Standards

Science & Engineering Practices

- Students obtain information through observations of different machines. They use evidence from their observations to argue for their explanation of why machines make work easier. Students act out the “work words” of different machines
- Students obtain information through footage of different construction equipment being used in different ways. Student communicate about the information by discussing what each machine does using “work words”.
- Students carry out an investigation to determine how far back they should pull their model wrecking ball to knock down a wall, but not the houses behind it. They analyze the data collected in their investigation to discuss how the force of the wrecking ball changes when you change the strength and direction of its push.
- Students carry out an investigation by ‘bowling’ with solo cups (pins), a tennis ball (bowling ball), and pool noodles (bumpers). They explore the forces at work when one thing hits another, and how changing the size of the force affects the motion of an object.
- Students use a model of a mountain town, Tiny Town, to conduct an investigation of how to protect the town from a falling boulder. They design a solution to safely guide a boulder down the hill so it doesn’t hit the town and rolls into a dump truck. Using pushpin poles, students change the direction the boulder is rolling
- Students design a solution to help the book characters solve a problem. Then, they define a problem by choosing a chore they don’t like doing. Next, they design solution by sketching a machine that could help them. They compare their solutions with a partner

Crosscutting Concepts

- Students consider the effects that machines can have when completing a task.
- Students consider the cause and effect relationship between the movement of a machine and the work it can do.
- Students analyze the effect of changing the strength and direction of a wrecking ball’s push. They experiment with different heights to determine how the push, or force, is changed
- Students analyze the cause and effect relationship between the size of the force on an object and the direction or speed it goes.

- Students consider the cause and effect relationship between a force and an object's speed or direction
- Students consider the structure and function of existing materials and tools in order to create new uses for them in order to solve a problem.

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.
ETS1.A	Defining Engineering Problems

Materials

Core Materials:

- Mystery Science
  - What's the biggest excavator?
  - Why do builders need so many big machines?
  - How can you knock down a wall made of concrete?
  - How can you knock down the most bowling pins?
  - How can we protect a mountain town from falling rocks?
  - How could you invent a trap?

Supplemental Materials:

- BrainPop resources
- GRC Lessons
- TBSAID
- Nearpod Activities

Technology

Technology Literacy

• 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).

• 9.4.2.TL.2: Create a document using a word processing application.

• 9.4.2.TL.3: Enter information into a spreadsheet and sort the information.

• 9.4.2.TL.4: Navigate a virtual space to build context and describe the visual content.

• 9.4.2.TL.5: Describe the difference between real and virtual experiences.

• 9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

Technology - Data & Analysis

8.1.2.DA.1: Collect and present data, including climate change data, in various visual formats.

• 8.1.2.DA.3: Identify and describe patterns in data visualizations.

• 8.1.2.DA.4: Make predictions based on data using charts or graphs.

Technology - Effects on the Natural World

• 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology.

• 8.2.2.ETW.2: Identify the natural resources needed to create a product.

• 8.2.2.ETW.3: Describe or model the system used for recycling technology.

• 8.2.2.ETW.4: Explain how the disposal of or reusing a product affects the local and global

Evidence of Learning/Assessment

Formative Assessment

- Teacher Observation
- Quizzes
- Exit Tickets
- Labs

Summative Assessment

- Benchmark Tests
- Alternative Assessments: Performance Tasks & Projects

Accommodations & Modifications

Special Education

Follow IEP Plan which may contain some of the following examples…

- In class/pull out support with special ed teacher
- Additional time during intervention time
- Preferred seating
- Questions read aloud
- Extended time for completing tasks
- Graphic organizers
- Vocabulary support
- Mnemonic devices
- Songs/videos to reinforce concepts
- Study Guides
- Limit number of questions

- Scribe

504

Follow 504 Plan which may contain some of the following examples…

- In class/pull out support with special ed teacher
- Additional time during intervention time
- Preferred seating
- Questions read aloud
- Extended time for completing tasks
- Graphic organizers
- Vocabulary support
- Mnemonic devices
- Songs/videos to reinforce concepts
- Study Guides
- Limit number of questions
- Scribe

ELL

- Translation device/dictionary
- In class/pull out support with ESL teacher
- In class/pull out support with special ed teacher
- Additional time during intervention time
- Preferred seating
- Questions read aloud
- Extended time for completing tasks
- Graphic organizers
- Vocabulary support
- Mnemonic devices
- Songs/videos to reinforce concepts
- Study Guides
- Limit number of questions
- Scribe

At-risk of Failure

- Extra time during intervention
- In class/pull out support with special ed teacher
- Additional time during intervention time
- Preferred seating
- Questions read aloud
- Extended time for completing tasks
- Graphic organizers
- Vocabulary support
- Mnemonic devices
- Songs/videos to reinforce concepts
- Study Guides
- Limit number of questions
- Scribe

Gifted & Talented

- Independent projects
- STEM Projects

Interdisciplinary Connections

Connections to NJSLS - English Language Arts

- RI.K.1 With prompting and support, ask and answer questions about key details in a text. (K-PS2-2)
- W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS2-1)
- SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-PS2-2)

Connections to NJSLS - Mathematics

- MP.2 Reason abstractly and quantitatively. (K-PS2-1)
- K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-PS2-1)
- K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of/less of” the attribute, and describe the difference. (K-PS2-1)

Career Readiness, Life Literacies, and Key Skills

Critical Thinking and Problem Solving:

• 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).

• 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).

• 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Career Ready Practices

- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.