3 Science Unit 3: Forces, Motion & Magnets (Invisible Forces)

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

Unit Overview

In this unit, students explore the forces all around them. They investigate the effects of balanced and unbalanced forces, the pushes and pulls of bridge structures, and the effects of friction on the motion of objects. Students also explore the power of magnetic forces and investigate firsthand how these forces can be used to help us in our everyday lives.

Standards

Scientific & Engineering Practices

- Students build a Hopper Popper to carry out an investigation about force and motion. They construct an explanation for which direction the forces act on the object, causing it to hop.
- Students define a problem - designing a bridge that will hold the most weight - and its constraints, it can only be made of paper. They collaborate with peers to design multiple solutions. They carry out investigations to test each of their prototypes, determine how to improve their design.
- Students use a model of a slide to carry out an investigation. They ask questions about different materials and weights and test their ideas to explore which combinations move the fastest down the slide. Students then complete a fair test to determine which material has the least friction. They engage in argument from evidence to share their findings.
- Students ask questions about magnets and develop and carry out investigations to observe the different properties of them.
- Students design a solution for a magnetic lock by developing a model.

Crosscutting Concepts

- Students recognize the cause and effect relationship between the forces acting on an object and the direction of its motion.
- Students explore the relationship between the structure and function of different bridge designs.
- Students consider the cause and effect relationship between a material's surface and the amount of friction it has.
- Students consider the cause and effect relationship between this distance of a magnet and the strength of the force.
- Students consider the cause and effect relationship between which direction two magnets are facing and if they will push or pull on one another.
- Students consider the cause and effect relationship between two magnets as a way to so

design solutions using the engineering process.

SCI.3-PS2-1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
SCI.3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
SCI.3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
SCI.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.
SCI.3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
SCI.3-PS2-3	Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
SCI.3-PS2-4	Define a simple design problem that can be solved by applying scientific ideas about magnets.

Materials

Core Materials:

- Mystery Science
    - How could you win a tug-of-war against a bunch of adults?
    - What makes bridges so strong?
    - How high can you swing on a flying trapeze?
    - What can magnets do?
    - How can you unlock a door using a magnet?
- Teacher Created Labs

Supplemental Materials:

- BrainPop resources
- NewsELA
- GRC Lessons
- TBSAID
- Nearpod Activities

Technology

Technology Literacy

• 9.4.5.TL.1: Compare the common uses of at least two different digital tools and identify the advantages and disadvantages of using each.

• 9.4.5.TL.2: Sort and filter data in a spreadsheet to analyze findings.

• 9.4.5.TL.3: Format a document using a word processing application to enhance text, change page formatting, and include appropriate images graphics, or symbols.

Technology - Engineering Design

• 8.2.5.ED.1: Explain the functions of a system and its subsystems.

• 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.

• 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.

Technology - Data & Analysis

• 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

• 8.1.5.DA.2: Compare the amount of storage space required for different types of data.

• 8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

• 8.1.5.DA.4: Organize and present climate change data visually to highlight relationships or support a claim.

• 8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Technology - Effects on the Natural World

• 8.2.5.ETW.2: Describe ways that various technologies are used to reduce improper use of resources.

• 8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.

• 8.2.5.ETW.4: Explain the impact that resources, such as energy and materials used to develop technology, have on the environment.

• 8.2.5.ETW.5: Identify the impact of a specific technology on the environment and determine what can be done to increase positive effects and to reduce any negative effects, such as climate change.

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
- Newsela leveled reading passages

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
- Newsela leveled reading passages

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
- Newsela leveled reading passages

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
- Newsela leveled reading passage

Gifted & Talented

- Independent projects
- STEM Projects
- Leveled Reading with Newsela

Interdisciplinary Connections

Connections to NJSLS - English Language Arts

• RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-1), (3-LS3-2)

• RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS3- 1), (3-LS3-2)

• W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-1), (3-LS3-2) • SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS3-1), (3-LS3-2)

• RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1)

• SL.3.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)

Connections to NJSLS - Mathematics

• MP.2 Reason abstractly and quantitatively. (3-LS3-1), (3-LS3-2)

• MP.4 Model with mathematics. (3-LS3-1), (3-LS3-2)

• 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS3-1), (3-LS3-2)

• 3.NBT Number and Operations in Base Ten (3-LS1-1)

• 3.NF Number and Operations—Fractions (3-LS1-1)

Career Readiness, Life Literacies, and Key Skills

Critical Thinking and Problem Solving:

• 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

• 9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).

• 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. • 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global

Career Ready Practices

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