8 Science Unit 3: Forces & Motion

Content Area: **Science**
Course(s):
Time Period: **Marking Period 4**
Length: **14 Weeks**
Status: **Published**

Unit Overview

Forces

Modern go-carts are equipped with safety features to prevent injuries. In developing those safety features, engineers must think about collision forces and their effects. Students learn about forces, mass, speed, velocity, and acceleration to understand the best ways to keep riders safe.

Non-contact Forces

To get off the ground, a drone must defy gravity. Drones typically have four propellers, and they operate via electromagnetism. Students learn about gravitational forces, electric forces, magnetic forces, and electromagnetism to understand how drones work.

Kinetic & Potential Energy

A "Rube Goldberg machine" is any complex machine that involves a chain reaction of mechanisms. Learn the different types of energy, as well the ways energy can transfer and transform, to understand how a Rube Goldberg machine works.

Thermal Energy

Take on the role of a designer for a company that makes camping gear. Using your understanding of thermal energy, heat transfer, and physical properties, determine the best materials for a thermos to be used in the desert. Build and test models of your designs.

Standards

Science and Engineering Practices

- Analyzing and Interpreting Data
- Asking Questions and Defining Problems
- Constructing Explanations and Designing Solutions
- Developing and Using Models
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information
- Planning and Carrying Out Investigations
- Using Mathematics and Computational Thinking

Crosscutting Concepts

- Cause and Effect
- Patterns
- Scale, Proportion, and Quantity
- Stability and Change
- Structure and Function
- Stems and System Models

MS-LS1-1	Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
MS-LS1-2	Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
MS-LS1-3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
MS-LS3-1	Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
MS-LS3-2	Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
MS-LS4-5	Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Materials

Core Materials:

- TCI Forces & Motion Text and Online Resources
    - Forces
    - Non-contact Forces
    - Kinetic & Potential Energy
    - Thermal Energy
- Teacher Created Labs

Supplemental Materials:

- Gizmos
- BrainPop resources
- GRC Lessons
- Nearpod Activities

Technology

8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
8.2.8.ED.3	Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Evidence of Learning/Assessment

Formative Assessment

- Teacher Observation
- Quizzes
- Exit Tickets
- Labs

Summative Assessment

- Unit Tests
- 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

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

Climate Change

- All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms.

8.EE.B	Understand the connections between proportional relationships, lines, and linear equations
RI.CR.8.1	Cite a range of textual evidence and make clear and relevant connections (including informational text features such as charts, graphs, and diagrams) that strongly support an analysis of multiple aspects of what an informational text says explicitly, as well as inferences drawn from the text.
RI.CI.8.2	Determine a central idea of an informational text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
RI.AA.8.7	Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.
RI.CT.8.8	Analyze and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) two or more informational texts that provide conflicting information on the same topic and identify where the texts disagree on matters of fact or interpretation.
8.SP.A	Investigate patterns of association in bivariate data

Career Readiness, Life Literacies, and Key Skills

9.2.8.CAP.3	Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
9.1.8.CR.2	Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.4.8.DC.1	Analyze the resource citations in online materials for proper use.
9.2.8.CAP.19	Relate academic achievement, as represented by high school diplomas, college degrees, and industry credentials, to employability and to potential level.
9.4.8.IML.12	Use relevant tools to produce, publish, and deliver information supported with evidence

	for an authentic audience.
9.4.8.TL.1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.
9.4.8.TL.3	Select appropriate tools to organize and present information digitally.

Career Ready Practices

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP7. Employ valid and reliable research strategies.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.
- CRP12. Work productively in teams while using cultural global competence