Mar. 6C Gr.8: Gravity

Content Area: **Science**
Course(s):
Time Period: **March**
Length: **1 Weeks**
Status: **Published**

Unit Overview

The force of gravity may be weak, but not on our home planet. The gravitational attraction of the mass of the Earth keeps us grounded. This concept will teach you about the basics of gravity.

Enduring Understandings

Lesson Objectives

- Explain how gravity affects the motions of objects close to Earth.
- Model the relationship between acceleration due to gravity and the mass of an object.

Essential Questions

- **Overarching Question**
    - How can one explain and predict interactions between objects and within systems of objects?
- **Focus Question**
    - What underlying forces explain the variety of interactions observed?
- **Lesson Questions**
    - What is gravity and how does it work?
    - How does the force of gravity affect objects on Earth and in our solar system?
    - How does the acceleration due to gravity relate to the mass of an object and its distance from Earth?
- **Can You Explain?**
    - How does gravity affect objects of different mass close to Earth, and how does that effect change as an object moves farther from Earth?

Instructional Strategies & Learning Activities

Science 8th grade Periods 2,3,4

Scientific Method and Lab report rubric

Four Frictions -Static, fluid, rolling sliding

Newton's Laws of Motion

Model Rocket Project

Objective(s)

Students will review in great detail the scientific method and all the sections of the lab report rubric

Goal(s)

Students will observe and gather data in support of Newtons Laws of Motion while building, launching and recovering an Estes Wizard Model Rocket.

The scientific method is often considered passe but the validity of its sequential, linear thought which streamlines the discovery process while identifying conceptual bias is undeniable. We will have a discussion about each section of the rubric and write practice pieces to gain experience in each section.

Procedures

Students will participate in various demonstrations, experiments and simulations to investigate different frictions and Newton's Laws of Motion.

Students have been given a 21 page manual on the correct procedures and format to write a lab report. Additionally, online instructions and tech support is provided via the Estes Rocket site.

Assessment

class discussion
review of assignments
quizzes
tests
projects/ labs

Differentiation

<u>Change the Pace:</u>

pre-testing

curriculum compacting

tiered activities (start with more difficult activities and skip the easier ones)

independent study

learning centers (skip centers that student has mastered)

Change the Delivery/Content:

mini-lessons for small groups

use different resources (higher level books, higher level response questions, open ended questions/problems…)

curriculum compacting

independent study

open-ended questions

teacher conferences

reading journals

Change the Product:

choice boards or Tic Tack Toe menus

student choice options

game creation

technology-based products/presentations

Change the Process - Add Depth:

tiered activities

open-ended activities

higher-level questions

student experts

increase complexity, decrease structure

Change the Process - Add Breadth:

choice boards or Tic Tack Toe menus

interdisciplinary units

Integration of Career Readiness, Life Literacies and Key Skills

Students will work in small groups or partnerships to conduct investigations, build models or prototypes and present findings.

9.4.8.CI	Creativity and Innovation
	Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
	An individual's strengths, lifestyle goals, choices, and interests affect employment and income.
9.2.8.CAP.3	Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
9.4.8.CI.4	Explore the role of creativity and innovation in career pathways and industries.
9.4.8.CT	Critical Thinking and Problem-solving
	Multiple solutions often exist to solve a problem.
	An essential aspect of problem solving is being able to self-reflect on why possible solutions for solving problems were or were not successful.
	Sources of information are evaluated for accuracy and relevance when considering the use of information.
9.4.8.IML.7	Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose (e.g., 1.2.8.C2a, 1.4.8.CR2a, 2.1.8.CHSS/IV.8.AI.1, W.5.8, 6.1.8.GeoSV.3.a, 6.1.8.CivicsDP.4.b, 7.1.NH. IPRET.8).
9.4.8.IML.8	Apply deliberate and thoughtful search strategies to access high-quality information on climate change (e.g., 1.1.8.C1b).

Technology and Design Integration

Technology is fully integrated using Discovery Techbook.

DA	Data & Analysis
	People use digital devices and tools to automate the collection, use, and transformation of data. The manner in which data is collected and transformed is influenced by the type of digital device(s) available and the intended use of the data.
8.1.8.DA.1	Organize and transform data collected using computational tools to make it usable for a specific purpose.

Interdisciplinary Connections

LA.RST.6-8	Reading Science and Technical Subjects
LA.RI.8.1	Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
LA.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LA.RI.8.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.
LA.RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
LA.RST.6-8.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
LA.RST.6-8.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
LA.RI.8.7	Evaluate the advantages and disadvantages of using different mediums (e.g., print or digital text, video, multimedia) to present a particular topic or idea.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LA.RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
LA.RI.8.8	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.
LA.RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
LA.RI.8.10	By the end of the year read and comprehend literary nonfiction at grade level text-complexity or above, with scaffolding as needed.
LA.WHST.6-8	Writing History, Science and Technical Subjects
	Text Types and Purposes
LA.WHST.6-8.1	Write arguments focused on discipline-specific content.
LA.W.8.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.W.8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
LA.WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.6-8.4	Produce clear and coherent writing in which the development, organization, voice, and style are appropriate to task, purpose, and audience.
LA.WHST.6-8.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LA.WHST.6-8.6	Use technology, including the Internet, to produce and publish writing and present the

	relationships between information and ideas clearly and efficiently.
LA.WHST.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LA.WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LA.WHST.6-8.10	Write routinely over extended time frames (time for research, reflection, metacognition/self correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
LA.W.8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LA.SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.8.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

Differentiation

Struggling Students

1. Print and copy the Scientific Explanation before class. Have students use the printed document as they progress through the lesson. The Scientific Explanation handout is chunked. Chunking is an effective strategy to make the learning progression through the Scientific Explanation easier for students who are struggling.
2. Using the jigsaw method, assign different lesson questions to groups of students.

ELL

1. Allow Spanish-speaking students to use the Spanish version of the Scientific Explanation Student Sheet.
2. Bring in some props that would be appropriate for each reading passage; a toy car for "Speed Racers", some cardboard tubes for "I Can't Take All This Tension," and some construction blocks for "Bigger and Better." Let ELL and Struggling students use and interact with these items as they read the three reading passages.

Accelerated Students

1. Encourage students to develop their own questions as they explore the resources in the lesson.
2. Have students use their science notebooks, rather than the worksheets, to develop their Scientific Explanations.
3. Allow students to use Board Builder to develop their Scientific Explanations.

Differentiation in science can be accomplished in several ways. Once you have given a pre-test to students, you know what information has already been mastered and what they still need to work on. Next, you design activities, discussions, lectures, and so on to teach information to students. The best way is to have two or

three groups of students divided by ability level.

While you are instructing one group, the other groups are working on activities to further their knowledge of the concepts. For example, while you are helping one group learn the planet names in order, another group is researching climate, size, and distance from the moon of each planet. Then the groups switch, and you instruct the second group on another objective from the space unit. The first group practices writing the order of the planets and drawing a diagram of them.

Here are some ideas for the classroom when you are using differentiation in science:

- Create a tic-tac-toe board that lists different activities at different ability levels. When students aren't involved in direct instruction with you, they can work on activities from their tic-tac-toe board. These boards have nine squares, like a tic-tac-toe board; and each square lists an activity that corresponds with the science unit. For example, one solar system activity for advanced science students might be to create a power point presentation about eclipses. For beginning students, an activity might be to make a poster for one of the planets and include important data such as size, order from the sun, whether it has moons, and so on.

- Find websites on the current science unit that students can explore on their own.

- Allow students to work in small groups to create a project throughout the entire unit. For example, one group might create a solar system model to scale. Another group might write a play about the solar system. This is an activity these groups can work on while they are not working directly with you.

Differentiation in science gets students excited to learn because it challenges them to expand their knowledge and skills, instead of teaching the whole group concepts they have already mastered

Modifications & Accommodations

Refer to QSAC EXCEL SMALL SPED ACCOMMOCATIONS spreadsheet in this discipline.

Modifications and Accommodations used in this unit:

In addition to differentiated instruction, IEP's and 504 accommocations will be utilized.

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Benchmark Assessments

Benchmark Assessments are given periodically (e.g., at the end of every quarter or as frequently as once per month) throughout a school year to establish baseline achievement data and measure progress toward a standard or set of academic standards and goals.

Schoolwide Benchmark assessments:

Aimsweb benchmarks 3X a year

Linkit Benchmarks 3X a year

Additional Benchmarks used in this unit:

Pre and post assessments to measure growth.

Formative Assessments

Assessment allows both instructor and student to monitor progress towards achieving learning objectives, and can be approached in a variety of ways. **Formative assessment** refers to tools that identify misconceptions, struggles, and learning gaps along the way and assess how to close those gaps. It includes effective tools for helping to shape learning, and can even bolster students' abilities to take ownership of their learning when they understand that the goal is to improve learning, not apply final marks (Trumbull and Lash, 2013). It can include students assessing themselves, peers, or even the instructor, through writing, quizzes, conversation, and more. In short, formative assessment occurs throughout a class or course, and seeks to improve student achievement of learning objectives through approaches that can support specific student needs (Theal and Franklin, 2010, p. 151).

Formative Assessments used in this unit:

See assessments located in links above.

Summative Assessments

Summative assessments evaluate student learning, knowledge, proficiency, or success at the conclusion of an instructional period, like a unit, course, or program. Summative assessments are almost always formally graded and often heavily weighted (though they do not need to be). Summative assessment can be used to great effect in conjunction and alignment with formative assessment, and instructors can consider a variety of ways to combine these approaches.

Summative assessments for this unit:

See assessments located in links above.

Instructional Materials

See materials located in links above.

Discovery Techbook

Teacher made materials

Additional labs are available through NJCTL on-line curriculum

Standards

MS-PS2	Motion and Stability: Forces and Interactions
PS2.B	Types of Interactions
	Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun.