2019 7th Grade Science Unit 4

Content Area: **Science**
Course(s): **Science**
Time Period: **March**
Length: **46**
Status: **Published**

Unit Overview:

How can we predict the motion of an object?

Students use system and system models and stability and change to understanding ideas related to why some objects will keep moving and why objects fall to the ground. Students apply Newton's third law of motion to related forces to explain the motion of objects. Students also apply an engineering practice and concept to solve a problem caused when objects collide. The crosscutting concepts of system and system models and stability and change provide a framework for understanding the disciplinary core ideas. Students demonstrate proficiency in asking questions, planning and carrying out investigations, designing solutions, engaging in argument from evidence, developing and using models, and constructing explanations and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Enduring Understandings:

- Determine whether or not an object is in motion.
- Relate force to motion.
- Use Newtons Laws to explain, predict and demonstrate the motion of an object.

Essential Questions:

- How are force and motion related?
- How can Newtons Laws help predict the motion of an object?
- How do you know an object is in motion?
- What are Newtons Laws?
- What is force?
- What is motion?

Lesson Titles:

- Acceleration
- Distance and Displacement
- Force and Friction
- Graphing Motion

- Intro to Motion
- Newtons Laws
- Speed and Velocity

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Inter-Disciplinary Connections:

LA.RH.6-8.1	Cite specific textual evidence to support analysis of primary and secondary sources.
LA.RH.6-8.2	Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.
LA.RH.6-8.3	Identify key steps in a text's description of a process related to history/social studies (e.g., how a bill becomes law, how interest rates are raised or lowered).
LA.RH.6-8.4	Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.
LA.RH.6-8.5	Describe how a text presents information (e.g., sequentially, comparatively, causally).
LA.RH.6-8.7	Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.
LA.RH.6-8.8	Distinguish among fact, opinion, and reasoned judgment in a text.
LA.RH.6-8.9	Analyze the relationship between a primary and secondary source on the same topic.
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.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.6-8.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
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.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.WHST.6-8.1.B	Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
LA.WHST.6-8.1.C	Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
LA.WHST.6-8.1.D	Establish and maintain a formal/academic style, approach, and form.
LA.WHST.6-8.1.E	Provide a concluding statement or section that follows from and supports the argument presented.
LA.WHST.6-8.2.A	Introduce a topic and organize ideas, concepts, and information using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.
LA.WHST.6-8.2.B	Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
LA.WHST.6-8.2.C	Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
LA.WHST.6-8.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
LA.WHST.6-8.2.F	Provide a concluding statement or section that follows from and supports the information or explanation presented.
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.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
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.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- Acceleration Lab
- Acceleration Lab part 2: Graphing data
- Analyze data collected from lab experiments and informational texts.
- Apply knowledge of force, motion and Newtons Laws and its properties to conduct lab experiments.
- Bubble Gum lab
- Create Quizlet of unit vocabulary terms.
- Current Event Essays
- Design and Constructing Newtons Cradles
- Design, Construct and launch Rockets: Newtons Laws
- Determine whether results apply to all similar scenarios.
- Educational Game: Legends of Learning
- Escape the room
- Force and Motion Webquest

- Friction Lab
- Gimkit / Kahoot review game
- Goosechase: Newtons Laws
- Graphing Wolf motion Lab
- Guided Notes
- Introduce vocabulary used to describe force, motion and Newtons Laws
- Kinematics of Football: NFL motion video and discussion
- NewsELA: Four Forces on a Rocket
- Newtons Laws Demonstrations
- Newtons Laws Lab Stations
- PHET Simulations: Rocket Simulation
- Post lab questions
- Predict misconceptions regarding related and advanced concepts
- Speed and Velocity lab
- Tutoring during Academic Enrichment
- Use learned knowledge to predict the outcome of similar scenarios.
- Video Clips
- Worksheets

Modifications

- Tutoring during Academic Enrichment

Formative Assessment:

- Anticipatory Set
- Calculating Acceleration worksheet
- Calculating Net Force worksheet
- Calculating Speed and Velocity
- Closure
- Creating and interpreting motion graphs
- Force / Friction Quiz
- Friction EdPuzzle
- Graded HW assignments
- Legends of Learning
- Motion EdPuzzle
- Motion Quiz
- MPA review game (Jeopardy / GimKit)
- Quizlet Live

- Surveys
- Warm-Up
- Wolf Distance and Displacement worksheet

Summative Assessment:

- Acceleration lab post lab questions
- Alternate Assessment
- Benchmark
- Force, Friction and Newtons Laws Unit test
- Marking Period Assessment
- Monthly Current event
- Newtons Cradle Project
- Newtons Laws Lab Stations Post lab questions
- Rocket project
- Speed lab post lab questions

Benchmark Assessments

- Lab Practical
- Reading response
- Skills-based assessment
- Writing prompt

Alternative Assessments

- Case-based scenarios
- Concept maps
- Performance Tasks
- Portfolios
- Presentations
- Problem-based assignments
- Project-based assignments
- Reflective pieces

Resources & Materials:

- Four Forces on a Rocket informational text
- Friction Lab kit

- Household supplies for Newtons Laws lab stations.
- Lab safety equipment
- Meter Sticks / Rulers
- Middle school Chemistry, Chapter 10: Forces
- Middle school Chemistry, Chapter 9: Motion
- NewsELA
- Newtons Cradle example
- Newtons Cradle supply kit
- Online simulation: Rocket Launching
- Rocket Kits.
- Science in Motion demo kit
- Speed, Velocity and Acceleration lab kit
- Stopwatches
- Tape