Grade 8
Module K Dimensions
Forces, Motion and Fields

New Jersey State Learning Standards

Established	2016-17
Revised	2017-18
Revised	2018-19
Revised	2019-20
Revised	2020-21
Revised	2022-23

Marking Period	Unit Title	Recommended Instructional Days
2 (and beginning of MP3)	**Forces, Motion and Fields**	**40 Days**

NJSLS - Science: *Title*	NJSLS - Science: *Performance Expectations*	Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-S within Unit
Motion and Stability: Forces and Interactions	**MS-PS2-1.** Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.* **MS-PS2-2.** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. **MS-PS2-3.** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-4.** Construct and present arguments using evidence to support the claim that	**Essential Question/s:** 1. What causes motion? 2. What changes an object's motion? 3. How do unbalanced forces and balanced forces affect the motion of an object? 4. How are mass and acceleration related? 5. How do force pairs interact? 6. What factors affect the physical interactions between objects? 7. What happens to the strength of a field as we move farther away from its source or if the size of the source changes? **Activity Description**: ❖ Unit Phenomenon: Can you explain it? ❖ Hands on Lab: Observing Everyday Forces ❖ Take It Further: Roller Coaster Restraints ❖ Hands on Lab: Investigate Falling Objects: Mass ❖ Hands on Lab: Investigate Friction

	gravitational interactions are attractive and depend on the masses of interacting objects. **MS-PS2-5.** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. **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.	❖ Hands on Lab: Testing packing material ❖ You Solve It: How can you design a safer road? ❖ Hands on Lab: Investigate Falling Objects: Air Resistance ❖ Hands on Lab: Investigate Motion ❖ Hands on Lab: Analyze the Magnetic Force Part 1: Distance and the Magnetic Force ❖ Hands on Lab: Analyze the Magnetic Force Part 2: Magnet Strength and Magnetic Force ❖ Virtual Lab: Sliding Downhill ❖ Virtual Lab: What Factors Affect Gravitational Attraction? ❖ Virtual Lab: How Can Static Electric Charges Affect Each Other? ❖ Lab Safety: Safety in the Lab ❖ Lab Safety: Measuring in the Lab: Using metric rulers, spring scales, graduated cylinders, thermometers (refer to Lab Safety Handbook) ❖ Lab Safety: Lab Techniques: Transferring Liquids, Detecting Odors Safely, Heating Substances in a Test Tube, Pouring Liquids from a Reagent Bottle (refer to Lab Safety Handbook)

	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.	**Lab and engineering activities will incorporate these skills:** ● Planning and Organization ● Critical Thinking ● Communication in a group ● Decision Making ● Reflection on activity and participation **Spotlight on scientists and their accomplishments** Ex. Sir Francis Bacon - Scientific Method Edward Bouchet- Physicist Human Impacts on Earth The Earth's magnetic field protects us from solar radiation. HMH: Book K Unit 2 Lesson 3- Fields **<u>Interdisciplinary Connections: Content: (NJSLS#)</u>** **<u>Connections to Math</u>:** ● Work with signed numbers and interpret expressions ● Uses ratio and rate reasoning to solve real-world and mathematical problems **(6.RP.A.3)** ● Reason abstractly and quantitatively. **(MP.2)** ● Use variables to represent two quantities in a real-world that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other
FOUNDATION **Disciplinary:** ***Core Idea***	**FOUNDATION** **Disciplinary:** ***Statement***	
PS2.A: Forces and Motion	For any pair of interacting objects, the force exerted by the first object by the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). (MS-PS2-1)	

PS2.B: Types of Interactions	The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. (MS-PS2-2) All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and	quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables and relate these to the equation. **(6.EE.C.9)** ● Summarize numerical data sets in relation to their context **(6.SP.B.5)** **<u>Connections to Language Arts</u>:** ● Write arguments focused on discipline specific content **(WHST.6-8.1)** ● Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (flowchart, diagram, model, graph or table) **(RST.6-8.7)** ● Conduct short research projects to answer questions, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration **(WHST.6-8.7)** ● Cite specific textual evidence to support analysis of science and technical tests. **(RST.6-8.1)** ● Follow precisely a multistep procedure when carrying out experiments. **(RST.6-8.3)**

MS-ETS1-2 Developing Possible Solutions	on the distances between the interacting objects. (MS-PS2-3) 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. Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively). (MS-PS2-5) Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)	

FOUNDATION **Science and Engineering Practices:** ***Core Idea***	**FOUNDATION** **Science and Engineering Practices:** ***Statement***	
Asking Questions and DefiningProblems	Asking questions and defining problems in grades 6–8 builds from grades K–5 experiences and progresses to specifying relationships between variables and clarifying arguments and models.	
Constructing Explanations and Designing Solutions	Constructing explanations and designing solutions in 6–8 builds from grades K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.	
Engaging in argument from evidence	Engaging in argument from evidence in 6–8 builds from grades K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed	

	world.	
FOUNDATION **Crosscutting Concepts:** ***Core Idea***	**FOUNDATION** **Crosscutting Concepts:** ***Statement***	
Cause and Effect	Cause and effect relationships may be used to predict phenomena in natural or designed systems.(MS-PS2-3), (MS-PS2-5)	
Systems and System Models	Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy and matter flows within systems.(MS-PS2-1) (MS-PS2-4)	
Stability and Change	Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales. (MS-PS2-2)	
Connections to Nature of		

Science **Scientific Knowledge is Based on Empirical Evidence**	Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS2-2), (MS-PS2-4)	
Social and Emotional Learning: ***Competencies***	**Social and Emotional Learning:** ***Sub-Competencies***	
Responsible Decision-Making Relationship Skills Self-Management Social Awareness	● Develop, implement, and model effective problem-solving and critical thinking skills ● Utilize positive communication and social skills to interact effectively with others ● Recognize the skills needed to establish and and achieve personal and educational goals ● Demonstrate an understanding of the need for mutual respect when viewpoints differ. ● Demonstrate an awareness of the expectations for	

Self Awareness	social interactions in a variety of ways. ● Recognize the importance of self-confidence in handling daily tasks and challenges.	

Assessments (Formative) ***To show evidence of meeting the standard/s, students will successfully engage within:***	**Assessments (Summative)** ***To show evidence of meeting the standard/s, students will successfully complete:***
Formative Assessments: ● Diagnostic tests used to modify teaching and learning activities to improve student attainment	**Benchmarks:** ● District Assessment **Summative Assessments:** ● End of unit/chapter tests/lesson quizzes and lab safety skills test

Differentiated Student Access to Content:
Teaching and Learning *Resources/Materials*

Core Resources	**Alternate Core Resources** *IEP/504/At-Risk/ESL*	**ELL Core Resources**	**Gifted & Talented Core Resources**
● **Interactive Worktext** ● **Equipment Kits** ● **Online Simulations** ● **IXL Science** ● **Evidence Notebook**	● Multilingual Glossary ● Sciencesaurus ● Online Science Tools (Scientific Calculator, Graphing) ● BrainPopEspanol	● Multilingual Glossary ● Sciencesaurus ● Online Science Tools (Scientific Calculator, Graphing) ● Brain Pop ELL	● Online Simulations ● CK 12 ● Virtual Labs ● Webquests ● PHET

• **Lab Safety Handbook** • **CK 12** • **Virtual Labs** • **Hands on Labs** • **Online Science Tools** • **(Scientific Calculator, Graphing)** • **BrainPop Science**			• Video-Based Projects • Take It Further • You Solve It ! • Unit Performance Tasks • Unit Projects • Online Science Tools (Scientific Calculator, Graphing) • BrainPop Science • IXL Science

Supplemental Resources

Technology:

- **8.1.8.A.1, 8.1.8.A. 2, 8.1.8.A.3, 8.1.8.A. 4, 8.1.8.A. 5**

Other: Career Education

- CRP4 Communicate clearly and effectively and with reason.
- CRP6 Demonstrate creativity and innovation
- CRP7 Employ valid and reliable research strategies
- CRP11 Use technology to enhance productivity

Differentiated Student Access to Content:
Recommended Strategies & Techniques

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**
• **Large group instruction** • **Small group instruction** • **Think Pair Share** • **Peer editing** • **Cooperative group work** • **Multimedia presentations** • **Manipulatives** • **Choice Boards/Learning Menus**	• Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.	• Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an online bilingual dictionary, and modified assessment and/or rubric.	• Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect student to related talent development opportunities.

NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	**Disciplinary Concept: 1.Career Awareness and Planning, 2.Creativity and Innovation, 3.Critical Thinking and Problem Solving, 4.Global and Cultural Awareness 5. Digital Citizenship 6. Information and Media Literacy 7. Technology Literacy**	
	Core Ideas:	**1. There are a variety of resources available to help navigate the career planning process.** **2. Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.** **3. Multiple solutions often exist to solve a problem.** **4. Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.** **5. Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.** **6. Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated.** **7. Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others**
	Performance Expectation/s:	**1. 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.** **2. 9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).** **3. 9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global**

		problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2). **4. 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.** **5. 9.4.8.DC.1: Analyze the resource citations in online materials for proper use.** **5. 9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).** **6. 9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations.** **7. 9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).** **7. 9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).**
	Career Readiness, Life Literacies, & Key Skills Practices	
	• **Act as a responsible and contributing community member and employee.** • **Demonstrate creativity and innovation.** • **Utilize critical thinking to make sense of problems and persevere in solving them.** • **Consider the environmental, social and economic impacts of decisions.** • **Use technology to enhance productivity, increase collaboration and communicate effectively.** • **Work productively in teams while using cultural/global competence.**	

New Jersey Legislative Statutes and Administrative Code (place an "X" before each law/statute if/when present within the curriculum map)									
X	Amistad Law: *N.J.S.A. 18A 52:16A-88*		Holocaust Law: *N.J.S.A. 18A:35-28*	X	LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*	X	Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*	X	Standards in Action: *Climate Change*