Physics Honors

Unit 1: Energy & Electromagnetic Radiation

Standards & Indicators:

NJSLS Science:

- HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.
- HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
- HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).
- HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
- HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.
- HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
- HS-PS4-2. Evaluate questions about the advantages of using a digital transmission and storage of information.
- HS-PS4-3. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.
- HS-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.
- HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Science and Engineering Practices(SEP)

- Ask Questions and Define Problems
- Develop and Use Models
- Plan and Carry Out Investigations
- Analyze and Interpret Data
- Use Mathematics and Computational Thinking
- Construct Explanations and Design Solutions
- Engage in Argument from Evidence
- Obtain, Evaluate, and Communicate Information

Disciplinary Core Ideas (DCI)

- Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.
- At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy.
- These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as a combination of energy associated with the motion of particles and energy

associated with the configuration (relative position of the particles). In some cases the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space.

- Conservation of energy means that the total change of energy in any system is always equal to the total energy transferred into or out of the system.
- Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems.
- Mathematical expressions, which quantify how the stored energy in a system depends on its configuration (e.g. relative positions of charged particles, compression of a spring) and how kinetic energy depends on mass and speed, allow the concept of conservation of energy to be used to predict and describe system behavior.
- The availability of energy limits what can occur in any system.
- When two objects interacting through a field change relative position, the energy stored in the field is changed.
- The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is passing.
- Information can be digitized (e.g., a picture stored as the values of an array of pixels); in this form, it can be stored reliably in computer memory and sent over long distances as a series of wave pulses
- Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. The wave model is useful for explaining many features of electromagnetic radiation, and the particle model explains other features.
- When light or longer wavelength electromagnetic radiation is absorbed in matter, it is generally converted into thermal energy (heat). Shorter wavelength electromagnetic radiation (ultraviolet, X-rays, gamma rays) can ionize atoms and cause damage to living cells.
- Photoelectric materials emit electrons when they absorb light of a high-enough frequency.

Crosscutting Concepts (CCC)

Cause and Effect Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. Systems can be designed to cause a desired effect. Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

Systems and System Models- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.

Energy and Matter- Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.	Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for	Digital tools differ in features, capacities, and styles. Knowledge

	accomplishing a specified task (e.g., W.11-12.6.).	of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.

Central Idea/Enduring Understanding:

- Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.
- The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is passing.

Essential/Guiding Question:

How does a microwave heat food?

How do humans use machines to transfer energy out of Earth's systems and into our communities?

Content:

- Forms of Energy
- Frequency and Wavelength
- Magnetic Field and Currents

Skills(Objectives):

- Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
- Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current
- Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media

Interdisciplinary Connections:

- Further developing communication skills through critical reading
- Developing real world appreciation for foundational learning
- **ELA NJSLS**
  - SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
  - RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

- Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
- **Math NJSLS**
  - Model with mathematics.
  - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays

Stage 2: Assessment Evidence

Performance Task(s):	**Other Evidence:**
• Pivot Interactives Activity on waves and wave motion.	• Self assessment • Logbook • Test • Quizzes • Labs

Stage 3: Learning Plan

Learning Opportunities/Strategies:	**Resources:**
• Cooperative learning activities • Online learning websites • Internet research • Student driven activities	• Khan Academy • Direct Measurement Videos • Pivot Interactives • Google Classroom • Various STEM Software. • LGBT and Disabilities Resources: • LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth • LGBTQ+ Books DEI Resources: • Learning for Justice • GLSEN Educator Resources • Supporting LGBTQIA Youth Resource List • Respect Ability: Fighting Stigmas, Advancing Opportunities • NJDOE Diversity, Equity & Inclusion Educational Resources • Diversity Calendar

Differentiation

*Please note: Teachers who have students with 504 plans that require curricular accommodations are to refer to Struggling and/or Special Needs Section for differentiation

High-Achieving Students	**On Grade Level Students**	**Struggling Students**	**Special Needs/ELL**
• On Grade Level Activities plus Expanded Problem Sets • Eligibility for AP Physics 2nd Semester	• Designing and Performing Experiments Data Analysis • Graphical Analysis • Topic Based Discussions &	• Designing and Performing Experiments Data Analysis • Graphical Analysis	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several

● Additional Investigations ● Mentoring Other Students	Problem Solving ● Applications and Assessments	● Topic Based Discussions & Problem Solving ● Applications and Assessments ● One on one coaching opportunities during study halls and after school tutoring ● Working with a student mentor	channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are not limited to, the following:: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries

Unit 2: Collisions, Momentum, and Forces

Standards & Indicators:

NJSLS Science:

- HS-PS2-1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
- HS-PS2-2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
- HS-PS2-3. Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

Science and Engineering Practices(SEP)

- **Asking questions (for science) and defining problems -**Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. Ask questions that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information. Ask questions that arise from examining models or a theory, to clarify and/or seek additional information and relationships. Ask questions to determine relationships, including quantitative relationships, between independent and dependent variables. Ask questions to clarify and refine a model, an explanation, or an engineering problem. Evaluate a question to determine if it is testable and relevant. Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.
- **Develop and Use Models-**Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. Evaluate merits and limitations of two different models of the same proposed tool, process, mechanism or system in order to select or revise a model that best fits the evidence or design criteria. Design a test of a model to ascertain its reliability. Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system. Develop and/or use multiple types of models to provide mechanistic accounts and/or predict phenomena, and move flexibly between model types based on merits and limitations. Develop a complex model that allows for manipulation and testing of a proposed process or system. Develop

and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.

- **Use Mathematics and Computational Thinking-**Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. Create and/or revise a computational model or simulation of a phenomenon, designed device, process, or system. Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations. Apply techniques of algebra and functions to represent and solve scientific and engineering problems. Use simple limit cases to test mathematical expressions, computer programs, algorithms, or simulations of a process or system to see if a model “makes sense” by comparing the outcomes with what is known about the real world. Apply ratios, rates, percentages, and unit conversions in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m3, acre-feet, etc.).

Disciplinary Core Ideas (DCI)

- Newton’s second law accurately predicts changes in the motion of macroscopic objects. (HS-PS2-1)
- Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object. In any system, total momentum is always conserved. (HS-PS2-2)
- If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system. (HS-PS2-2),(HS-PS2-3)
- Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such away that one can tell if a given design meets them. (HS-ETS1-1)(secondary to HS-PS2-3) (secondary to HS-PS3-3)

Crosscutting Concepts (CCC)

Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them. Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. Classifications or explanations used at one scale may fail or need revision when information from smaller or larger scales is introduced; thus requiring improved investigations and experiments. Patterns of performance of designed systems can be analyzed and interpreted to reengineer and improve the system. Empirical evidence is needed to identify patterns.

Cause and Effect- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. Systems can be designed to cause a desired effect. Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

Career Readiness, Life Literacies and Key Skills

Standard	Performance Expectations	Core Ideas
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.	Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
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	accomplishing a specified task (e.g., W.11-12.6.).	different digital tools is helpful in selecting the best tool for a given task.
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9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.

Central Idea/Enduring Understanding:

- Newton's second law accurately predicts changes in the motion of macroscopic objects.
- Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object. In any system, total momentum is always conserved.
- If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system.

Essential/Guiding Question:

If a system of particles has zero kinetic energy, what can you say about the momentum of a system?

If a system has zero momentum, what can you say about the kinetic energy of the system?

Is the impulse produced by a larger force always larger than an impulse produced by a smaller force?

Content:

- Momentum
- Acceleration
- Newton's 2nd law

Skills(Objectives):

- Define momentum and how it relates to force.
- Apply Newton's second law.
- Explain basic principles of rocket propulsion.

Interdisciplinary Connections:

- Further developing communication skills through critical reading
- Developing real world appreciation for foundational learning
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  - Model with mathematics.
  - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays

Physics Honors

Stage 2: Assessment Evidence	
Performance Task(s): ● Pivot Interactives activity on momentum,	**Other Evidence:** ● Self assessment ● Logbook ● Test ● Quizzes ● Labs

Stage 3: Learning Plan	
Learning Opportunities/Strategies: ● Cooperative learning activities ● Online learning websites ● Internet research ● Student driven activities	**Resources:** ● Khan Academy ● Direct Measurement Videos ● Pivot Interactives ● Google Classroom ● Various STEM Software. LGBT and Disabilities Resources: ● LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth ● LGBTQ+ Books DEI Resources: ● Learning for Justice ● GLSEN Educator Resources ● Supporting LGBTQIA Youth Resource List ● Respect Ability: Fighting Stigmas, Advancing Opportunities ● NJDOE Diversity, Equity & Inclusion Educational Resources ● Diversity Calendar

Differentiation

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High-Achieving Students	On Grade Level Students	Struggling Students	Special Needs/ELL
● On Grade Level Activities plus Expanded Problem Sets ● Eligibility for AP Physics 2nd Semester ● Additional Investigations ● Mentoring Other Students	● Designing and Performing Experiments Data Analysis ● Graphical Analysis ● Topic Based Discussions & Problem Solving	● Designing and Performing Experiments Data Analysis ● Graphical Analysis ● Topic Based Discussions & Problem Solving	Any student requiring further accommodations and/or modifications will have them individually listed in their 504 Plan or IEP. These might include, but are not limited to: breaking assignments into smaller tasks, giving directions through several channels (auditory, visual, kinesthetic, model), and/or small group instruction for reading/writing ELL supports should include, but are

	• Applications and Assessments	• Applications and Assessments • One on one coaching opportunities during study halls and after school tutoring • Working with a student mentor	not limited to, the following:: Extended time Provide visual aids Repeated directions Differentiate based on proficiency Provide word banks Allow for translators, dictionaries

Unit 3: Force, Orbits, and Gravity

Standards & Indicators:

NJSLS Science:

- HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
- HS-PS2-1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.
- HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

Science and Engineering Practices(SEP)

- **Planning and carrying out investigations-** Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled. Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts. Select appropriate tools to collect, record, analyze, and evaluate data.
- **Analyzing and interpreting data-**Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data. Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations. Evaluate the impact of new data on a working explanation and/or model of a proposed process or system. Analyze data to identify design features

or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

- **Constructing explanations and designing solutions-**Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories. Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables. Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects. Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion. Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade off considerations.

Disciplinary Core Ideas (DCI)

- Kepler's laws describe common features of the motions of orbiting objects, including their elliptical paths around the sun. Orbits may change due to the gravitational effects from, or collisions with, other objects in the solar system. (HS-ESS1-4)
- Newton's second law accurately predicts changes in the motion of macroscopic objects. (HS-PS2-1)
- Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.(HS-PS2-4)
- Forces at a distance are explained by fields (gravitational,electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields. (HS-PS2-4)

Crosscutting Concepts (CCC)

Scale, Proportion, and Quantity – In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change. The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. Some systems can only be studied indirectly as they are too small, too large, too fast, or too slow to observe directly. Patterns observable at one scale may not be observable or exist at other scales. Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.

Patterns-Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena

Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. Systems can be designed to do specific tasks. When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.

Structure and Function – The way an object is shaped or structured determines many of its properties and functions. Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. The functions and properties of natural and designed objects and systems can be inferred

from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

Career Readiness, Life Literacies and Key Skills

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9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.

Central Idea/Enduring Understanding:

Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.

Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.

Kepler's laws describe common features of the motions of orbiting objects, including their elliptical paths around the sun. Orbits may change due to the gravitational effects from, or collisions with, other objects in the solar system.

Essential/Guiding Question:

Why do objects move?

Does it take more energy to launch a rocket to a height or put a rocket into orbit at same height?

Content:

- Newton's Laws of Motion
- Keplar's Law
- Gravitational forces

Skills(Objectives):

- Describe Newton's universal law of gravitation.
- Describe Keplar's laws of orbital motion
- Calculate gravitational potential energy

Physics Honors

Interdisciplinary Connections:

- Further developing communication skills through critical reading
- Developing real world appreciation for foundational learning
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  - SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
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- **Math NJSLS**
  - Model with mathematics.
  - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays

Stage 2: Assessment Evidence

Performance Task(s):	Other Evidence:
• Pivot Interactives activity on Gravity-Rocket Launch	• Self assessment • • Logbook • Test • Quizzes • Labs

Stage 3: Learning Plan

Learning Opportunities/Strategies:	Resources:
• Cooperative learning activities • Online learning websites • Internet research • Student driven activities • Peer Reviews	• Khan Academy • Pivot Interactives • Google Classroom • Various STEM Software. LGBT and Disabilities Resources: • LGBTQ-Inclusive Lesson & Resources by Garden State Equality and Make it Better for Youth • LGBTQ+ Books DEI Resources: • Learning for Justice • GLSEN Educator Resources • Supporting LGBTQIA Youth Resource List • Respect Ability: Fighting Stigmas, Advancing Opportunities • NJDOE Diversity, Equity & Inclusion Educational Resources • Diversity Calendar

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Pacing Guide

Unit of Study	Resource	Standards
UNIT 1: Energy & Electromagnetic Radiation (30 days)	**CHAPTERS** 7: (15 Days) 8: (15 Days)	• HS-PS2-5. • HS-PS3-1. • HS-PS3-2. • HS-PS3-3. • HS-PS3-5. • HS-PS4-1. • HS-PS4-2. • HS-PS4-3. • HS-PS4-4. • HS-PS4-5.
UNIT 2: Collisions, Momentum, & Forces (30 Days)	**CHAPTERS** 5: (15 Days) 6: (15 Days)	• HS-PS2-1. • HS-PS2-2. • HS-PS2-3.
UNIT 3: Forces, Orbits, and Gravity (30 Days)	**CHAPTERS** 3: (15 Days) 4: (15 Days)	• HS-ESS1-4. • HS-PS2-1. • HS-PS2-4.