Kingsway Regional School District

Committed to Excellence

Course Name: Honors Algebra-based Physics	
Prerequisite(s): N/A	**Grade Level(s): Grade** 9
Department: Science Department	**Credits:** 1.0
BOE Adoption Date: September 2014	**Revision Dates:** September 2022

Course Description and Outcomes

Students will explore academic algebra based physics through a collaborative and lab/inquiry based environment, developing critical thinking and problems solving skills as well as developing their algebra skills when applied to physics. These life skills are essential to make them informed, productive contributors to society in the 21st century. Students who have mastered 8th grade science and are concurrently taking Algebra 1 or Geometry will engage in engineering practices and apply crosscutting concepts to deepen their understanding of forces, energy and their effect on matter. Units, which will be explored, are forces and motions, fundamental forces and Kepler laws, energy, physics of the geosphere, wave properties, electromagnetic radiation, and electricity and magnetism.

Proficiencies and Pacing Guide:

Course Title: Honors Algebra-based Physics

Unit Title:	**Months & Number of Weeks**	**Relevant Content Standards**	**Learning Goals:**	**Learning Objectives (Identify the DOK Level):**
Unit 1: Forces and Motion	9 weeks September-–mid-November (weeks 1-9) Note: temporary change (length) may occur to adjust for learning loss	**Subject Area:** • NJSLS-S.HS-PS2-1 • NJSLS-S.HS-PS2-2 • NJSLS-S.HS-PS2-3 • NJSLS-S.HS-ETS1-2 • NJSLS-S.HS-ETS1-3 **DCI:** NJSLS-S.PS2.A Forces & Motion NJSLS-S.ETS1.A Defining and Delimiting Engineering Problems NJSLS-S.ETS1.C Optimizing the Design Solution NJSLS-S.ETS1.B Developing Possible Solutions **Interdisciplinary:** **Literacy** • NJSLS-S.RST.11-12.7 • NJSLS-S.RST.11-12.9 • NJSLS-S.WHST.11-12.9 **Mathematics** • NJSLS-S.MP.2 • NJSLS-S.MP.4 • NJSLS-S.HSN-Q.A.1 • NJSLS-S.HSN-Q.A.2 • NJSLS-S.HSN-Q.A.3 • NJSLS-S.HSA-SSE.A.1 • NJSLS-S.HSA-SSE.B.3 • NJSLS-S.HSA-CED.A.1 • NJSLS-S.HSA-CED.A.2 • NJSLS-S.HSA-CED.A.4 • NJSLS-S.HSF-IF.C.7 • NJSLS-S.HSS-IS.A.1	• Students will be able to explain force is a vector quantity and how that nature effects the relationship between force mass and acceleration • Students will be able to use the relationships between force, mass and acceleration to predict how changes in one variable will effect a second variable if the third is kept constant in one or two dimensions. • Students will understand that momentum is a vector quantity and a function of an object's mass and velocity and predict the net effect of a collision by one object on another in a closed system in one or two dimensions. • Students will understand the factors involved in the collision of moving bodies (elastic and inelastic) and be able to make design improvements for safer outcomes of collisions based upon calculations, experimentation and engineering.	• PS2.A Given a graph of position or velocity as a function of time students will be able to recognize in what time intervals the position, velocity and acceleration of an object are positive, negative, or zero and sketch a graph of each quantity as a function of time and Represent forces in diagrams or mathematically using appropriately labeled vectors with magnitude, direction, and units during the analysis of a situation and they will be able to understand and apply the relationship between the net force exerted on an object, its inertial mass, and its acceleration to a variety of situations. • HS-PS2-1 Students will be able to 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 Students will be able to 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 Students will be able to apply scientific and engineering

Unit Title:	Months & Number of Weeks	Relevant Content Standards	Learning Goals:	Learning Objectives (Identify the DOK Level):
		Technology • NJSLS.8.2.12.ED.3 • NJSLS.8.1.12.IC.1 • NJSLS.8.1.12.AP.7 • NJSLS.8.2.12.ITH.1 • NJSLS.8.2.12.ETW.4 • NJSLS.8.2.12.ITH.3 • NJSLS-S.8.2.12.D.1 **NJ PFL** • NJSLS.9.2.12.CAP.4 **NJ CTE** • NJSLS-S.9.3.ST.1 • NJSLS-S.9.3.ST.6 • NJSLS-S.9.3.ST.ET.1 • NJSLS-S.9.3.ST.ET.2 • NJSLS-S.9.3.ST.ET.4 • NJSLS-S.9.3.ST.ET.5 • NJSLS-S.9.3.ST.SM.1 • NJSLS-S.9.3.ST.SM.2 • NJSLS-S.9.3.ST.SM.3 **NJ Career Ready Practices** • NJSLS-CLKS.1 • NJSLS-CLKS.2 • NJSLS-CLKS.4 • NJSLS-CLKS.5 • NJSLS-CLKS.6 • NJSLS-CLKS.7 • NJSLS-CLKS.8 • NJSLS-CLKS.9 • NJSLS-CLKS.11 • NJSLS-CLKS.12		ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision • HS-ETS1-2 Students will be able to design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering • HS-ETS1-3 Students will be able to evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts
Unit 2: Fundamental Forces & Kepler's Laws	5 weeks Mid-November – December	**Subject Area:** • NJSLS-HS-PS2-4 • NJSLS-HS-ESS1-4 **DCI**	• Students will understand that gravitational forces exist between any two objects and are directly related to the masses of the objects	• PS2.B Students will be able to make predictions about the sign and relative quantity of net charge of objects or systems after various

Unit Title:	Months & Number of Weeks	Relevant Content Standards	Learning Goals:	Learning Objectives (Identify the DOK Level):
	(weeks 10-14) Note: temporary change (length) may occur to adjust for learning loss	• NJSLS-PS2.B: Types of Interactions • NJSLS-ESS1.B: Earth and the Solar System **Interdisciplinary:** ***Mathematics*** • NJSLS-HSN-Q.A.3 • NJSLS-HSA-SSE.A.1 • NJSLS-HSA-SSE.B.3 • NJSLS-MP.2 • NJSLS-MP.4 • NJSLS-HSN-Q.A.1 • NJSLS-HSN-Q.A.2 • NJSLS-HSA-CED.A.2 • NJSLS-HSA-CED.A.4 **Technology** • NJSLS.8.2.12.ED.3 • NJSLS.8.2.12.ED.4 • NJSLS.8.1.12.IC.1 • NJSLS.8.1.12.AP.9 • NJSLS.8.1.12.AP.7 • NJSLS.8.2.12.ITH.1 • NJSLS.8.2.12.ETW.4 • NJSLS.8.2.12.ITH.3 • NJSLS-S.8.2.12.NT.2 **NJ PFL** • NJSLS.9.2.12.CAP.4 **NJ CTE** • NJSLS-S.9.3.ST.1 • NJSLS-S.9.3.ST.6 • NJSLS-S.9.3.ST.ET.1 • NJSLS-S.9.3.ST.ET.2 • NJSLS-S.9.3.ST.ET.4 • NJSLS-S.9.3.ST.ET.5 • NJSLS-S.9.3.ST.SM.1	and inversely related to the square of the distance between them. (2 weeks) • Students will be able to predict the effect on the electrostatic force between two charges from changes in those charges or the distance between them. (1 week) • Students will understand that planets orbit the sun in an elliptical orbit and will be able to make predictions about motion of orbiting objects related to their period or distance. (2 weeks)	charging processes. Construct an explanation of a model of electric charge, and make a qualitative prediction about the distribution of positive and negative electric charges within neutral systems as they undergo various processes. • HS-PS2-4 Students will be able to use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. • HS-ESS1-4 Students will be able to use mathematical or computational representations to predict the motion of orbiting objects in the solar system

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		• NJSLS-S.9.3.ST.SM.2 • NJSLS-S.9.3.ST.SM.3 **NJ Career Ready Practices** • NJSLS-CLKS1 • NJSLS-CLKS2 • NJSLS-CLKS4 • NJSLS-CLKS5 • NJSLS-CLKS6 • NJSLS-CLKS7 • NJSLS-CLKS8 • NJSLS-CLKS9 • NJSLS-CLKS11 • NJSLS-CLKS12		
Unit 3: Energy	6 weeks-January–early February(weeks 15-20) Note: temporary change (length) may occur to adjust for learning loss	NJSLS-S: • NJSLS-S.HS-PS3-2 • NJSLS-S.HS-PS3-1 • NJSLS-S.HS-PS3-3 • NJSLS-S.HS-ETS1-1 • NJSLS-S.HS-ETS1-2 • NJSLS-S.HS-ETS1-3 • NJSLS-S.HS-ETS1-4 **DCI:** • NJSLS-S.PS3.A: • NJSLS-S.PS3.B: • NJSLS-S.PS3.D: • NJSLS-S.ETS1.A: • NJSLS-S.ETS1.B: • NJSLS-S.ETS1.C: **Technology** • NJSLS.8.2.12.ED.3 • NJSLS.8.2.12.ED.4 • NJSLS.8.1.12.IC.1 • NJSLS.8.1.12.AP.9 • NJSLS.8.1.12.AP.7 • NJSLS.8.2.12.ITH.1	• Students will be able to demonstrate through models that energy is conserved and be able to use mathematical expressions to quantify the transfer of energy from one form to another. • Students will be able to apply their understanding of energy transfer and conservation by explaining how the change in one component of a system effects one (or more) other components of the system. • Students will be able to design or analyze the usefulness or effectiveness of a device that converts one form of energy to another.	• PS3.A & PS3.B Students will be able to identify and quantify the various types of energies within a system of objects in a well-defined state, such as elastic potential energy, gravitational potential energy, kinetic energy, and thermal energy and represent how these energies may change over time. Calculate changes in kinetic energy and gravitational potential energy of a system using representations of that system. • HS-PS3-2 Students will be able to 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-PS3-1 Students will be able to

Unit Title:	Months & Number of Weeks	Relevant Content Standards	Learning Goals:	Learning Objectives (Identify the DOK Level):
		• NJSLS.8.2.12.ETW.4 • NJSLS.8.2.12.ITH.3 • NJSLS-S.8.2.12.NT.2 **NJ PFL** • NJSLS.9.2.12.CAP.4 **NJ CTE** • NJSLS-S.9.3.ST.1 • NJSLS-S.9.3.ST.6 • NJSLS-S.9.3.ST.ET.1 • NJSLS-S.9.3.ST.ET.2 • NJSLS-S.9.3.ST.ET.4 • NJSLS-S.9.3.ST.ET.5 • NJSLS-S.9.3.ST.SM.1 • NJSLS-S.9.3.ST.SM.2 • NJSLS-S.9.3.ST.SM.3 **NJ Career Ready Practices** • NJSLS-CLKS1 • NJSLS-CLKS2 • NJSLS-CLKS4 • NJSLS-CLKS5 • NJSLS-CLKS6 • NJSLS-CLKS7 • NJSLS-CLKS8 • NJSLS-CLKS9 • NJSLS-CLKS11 • NJSLS-CLKS12		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-PS3-3 Students will be able to design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy • HS-ETS1-1 Students will be able to analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. • HS-ETS-2 Students will be able to design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering • HS-ETS-3 Students will be able to evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. • HS-ETS-4 Students will be able to use a computer simulation to model the impact of proposed

Unit Title:	Months & Number of Weeks	Relevant Content Standards	Learning Goals:	Learning Objectives (Identify the DOK Level):
				solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
Unit 4: Wave Properties	6 weeks ~~E~~arly February-March (weeks 21-26) Note: temporary change (length) may occur to adjust for learning loss	**Subject Area:** • NJSLS-HS-PS4-1 **DCI** • NJSLS-PS4.A: Wave Properties **Interdisciplinary:** *Literacy* • NJSLS-RST.11-12.7 *Mathematics* • NJSLS-MP.2 • NJSLS-MP.4 • NJSLS-HSA-SSE.A.1 • NJSLS-HSA-SSE.B.3 • NJSLS-HSA-CED.A.4 **Technology** • NJSLS.8.2.12.ED.3 • NJSLS.8.2.12.ED.4 • NJSLS.8.1.12.IC.1 • NJSLS.8.1.12.AP.9 • NJSLS.8.1.12.AP.7 • NJSLS.8.2.12.ITH.1 • NJSLS.8.2.12.ETW.4 • NJSLS.8.2.12.ITH.3 • NJSLS-S.8.2.12.NT.2 **NJ PFL** • NJSLS.9.2.12.CAP.4 **NJ CTE** • NJSLS-S.9.3.ST.1 • NJSLS-S.9.3.ST.6 • NJSLS-S.9.3.ST.ET.1 • NJSLS-S.9.3.ST.ET.2 • NJSLS-S.9.3.ST.ET.4	• Students will be able to explain how frequency, wavelength and the speed of a wave are related and be able to mathematically predict how either changing one of those variables or traveling through a different medium will affect those variables.	• Students who understand the concepts are able to: • Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. • Use algebraic relationships to quantitatively describe relationships among the frequency, wavelength, and speed of waves traveling in various media.

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		• NJSLS-S.9.3.ST.ET.5 • NJSLS-S.9.3.ST.SM.1 • NJSLS-S.9.3.ST.SM.2 • NJSLS-S.9.3.ST.SM.3 **NJ Career Ready Practices** • NJSLS-CLKS1 • NJSLS-CLKS2 • NJSLS-CLKS4 • NJSLS-CLKS5 • NJSLS-CLKS6 • NJSLS-CLKS7 • NJSLS-CLKS8 • NJSLS-CLKS9 • NJSLS-CLKS11 • NJSLS-CLKS12		
Unit 5: Electromagnetic Radiation	7 weeks End March - mid May (weeks 27-33) Note: temporary change (length) may occur to adjust for learning loss	**Subject Area:** • NJSLS-HS-PS4-3 • NJSLS-HS-PS4-4 • NJSLS-HS-PS4-5 • NJSLS-HS-PS4-2 • NJSLS-HS-ETS1-1 • NJSLS-HS-ETS1-3 • NJSLS-HS-PS4-2 **DCI:** • NJSLS-PS4.A: Wave Properties • NJSLS-PS4.B: Electromagnetic Radiation • NJSLS-PS3.D: Energy in Chemical Processes • NJSLS-PS4.C: Information Technologies and Instrumentation • NJSLS-ETS1.A: Defining and Delimiting Engineering Problems	• Students will be able to evaluate the statement: the properties and behaviors of electromagnetic radiation can be explained by either the particle model or the wave model or both. • Students will understand that different frequencies of light have photons with differing amounts of energy and be able to evaluate the validity of claims about the effect of the energy on living tissue • Students will be able to explain how technical devices have exploited wave behavior and wave interactions to transmit and capture information and energy as well as analyze and evaluate the usefulness and practicality of those devices. • Students will be able to critically examine the advantages and	• Students who understand the concepts are able to: • Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described by either a wave model or a particle model and that for some situations one model is more useful than the other. • Evaluate experimental evidence that electromagnetic radiation can be described by either a wave model or a particle model and that for some situations one model is more useful than the other. • Use models (e.g., physical, mathematical, computer models) to simulate electromagnetic

Unit Title:	Months & Number of Weeks	Relevant Content Standards	Learning Goals:	Learning Objectives (Identify the DOK Level):
		• NJSLS-ETS1.B: Developing Possible Solutions **Interdisciplinary:** *Literacy* • NJSLS-RST.9-10.8 • NJSLS-RST.11-12.1 • NJSLS-RST.11-12.7 • NJSLS-RST.11-12.8 • NJSLS-RST.11-12.9 • NJSLS-WHST.11-12.2 • NJSLS-WHST.11-12.8 *Mathematics* • NJSLS-MP.2 • NJSLS-MP.4 • NJSLS-HSA-SSE.A.1 • NJSLS-HSA-SSE.B.3 • NJSLS-HSA.CED.A.4 **Technology** • NJSLS.8.2.12.ED.3 • NJSLS.8.2.12.ED.4 • NJSLS.8.1.12.IC.1 • NJSLS.8.1.12.AP.9 • NJSLS.8.1.12.AP.7 • NJSLS.8.2.12.ITH.1 • NJSLS.8.2.12.ETW.4 • NJSLS.8.2.12.ITH.3 • NJSLS-S.8.2.12.NT.2 **NJ PFL** • NJSLS.9.2.12.CAP.4 **NJ CTE** • NJSLS-S.9.3.ST.1 • NJSLS-S.9.3.ST.6 • NJSLS-S.9.3.ST.ET.1 • NJSLS-S.9.3.ST.ET.2 • NJSLS-S.9.3.ST.ET.4	disadvantages of the digital transmission and storage of information.	radiation systems and interactions—including energy, matter, and information flows—within and between systems at different scales. • Evaluate the validity and reliability of multiple claims in published materials about the effects that different frequencies of electromagnetic radiation have when absorbed by matter. • Evaluate the validity and reliability of claims that photons associated with different frequencies of light have different energies and that the damage to living tissue from electromagnetic radiation depends on the energy of the radiation. • Give qualitative descriptions of how photons associated with different frequencies of light have different energies and how the damage to living tissue from electromagnetic radiation depends on the energy of the radiation. • Suggest and predict cause-and-effect relationships for electromagnetic radiation systems when matter absorbs different frequencies of light by examining what is known about smaller scale mechanisms within the system.

Unit Title:	Months & Number of Weeks	Relevant Content Standards	Learning Goals:	Learning Objectives (Identify the DOK Level):
		• NJSLS-S.9.3.ST.ET.5 • NJSLS-S.9.3.ST.SM.1 • NJSLS-S.9.3.ST.SM.2 • NJSLS-S.9.3.ST.SM.3 **NJ Career Ready Practices** • NJSLS-CLKS1 • NJSLS-CLKS2 • NJSLS-CLKS4 • NJSLS-CLKS5 • NJSLS-CLKS6 • NJSLS-CLKS7 • NJSLS-CLKS8 • NJSLS-CLKS9 • NJSLS-CLKS11 • NJSLS-CLKS12		• Communicate qualitative 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. • Communicate technical information or ideas about technological devices that use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy in multiple formats (including orally, graphically, textually, and mathematically). • Analyze technological devices that use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy by specifying criteria and constraints for successful solutions. • Evaluate a solution offered by technological devices that use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. • Evaluate questions about the advantages of using digital

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				transmission and storage of information by challenging the premise of the advantages of digital transmission and storage of information, interpreting data, and considering the suitability of digital transmission and storage of information. • Consider advantages and disadvantages in the use of digital transmission and storage of information.
Unit 6: Physics of the Geosphere	3 weeks Mid May – End of May (weeks-34-36) Note: temporary change (length) may occur to adjust for learning loss	**Subject Area:** • NJSLS-HS-ESS2-1 • NJSLS-HS-ESS2-3 • NJSLS-HS-ESS1-5 • NJSLS-HS-ESS2-2 **DCI** • NJSLS-ESS2.A: Earth Materials and Systems • NJSLS-ESS2.B: Plate Tectonics and Large-Scale System Interactions • NJSLS-ESS2.D: Weather and Climate • NJSLS-ESS1.C: The History of Planet Earth **Interdisciplinary:** *Literacy* • NJSLS-RST.11-12.1 • NJSLS-RST.11-12.2 • NJSLS-RST.11-12.8 • NJSLS-WHST.9-12.2 • NJSLS-WHST.9-12.7 • NJSLS-SL.11-12.5 *Mathematics*	• Students will understand that constructive and destructive forces in the earth operate at different rates and they can use these rates to explain/predict changes in the Earth's land and sea-floor features • Students will understand the Earth's interior structure functions to facilitate thermal convection and this in turn causes tectonic plate motion. • Students will understand the movement of continental and oceanic crust causes rocks to have different ages. • Students will be able to explain how changes in the geosphere can affect the atmosphere.	• HS-ESS2-1 Students will be able to develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features. • HS-ESS2-3 Students will be able to develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection • HS-ESS1-5 Students will be able to evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. • HS-ESS2-2 Students will be able to analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems

Unit Title:	Months & Number of Weeks	Relevant Content Standards	Learning Goals:	Learning Objectives (Identify the DOK Level):
		• NJSLS-MP.2 • NJSLS-MP.4 • NJSLS-HSN-Q.A.1 • NJSLS-HSN-Q.A.2 • NJSLS-HSN-Q.A.3 **Technology** • NJSLS.8.2.12.ED.3 • NJSLS.8.2.12.ED.4 • NJSLS.8.1.12.IC.1 • NJSLS.8.1.12.AP.9 • NJSLS.8.1.12.AP.7 • NJSLS.8.2.12.ITH.1 • NJSLS.8.2.12.ETW.4 • NJSLS.8.2.12.ITH.3 • NJSLS-S.8.2.12.NT.2 **NJ PFL** • NJSLS.9.2.12.CAP.4 **NJ CTE** • NJSLS-S.9.3.ST.1 • NJSLS-S.9.3.ST.6 • NJSLS-S.9.3.ST.ET.1 • NJSLS-S.9.3.ST.ET.2 • NJSLS-S.9.3.ST.ET.4 • NJSLS-S.9.3.ST.ET.5 • NJSLS-S.9.3.ST.SM.1 • NJSLS-S.9.3.ST.SM.2 • NJSLS-S.9.3.ST.SM.3 **NJ Career Ready Practices** • NJSLS-CLKS1 • NJSLS-CLKS2 • NJSLS-CLKS4 • NJSLS-CLKS5 • NJSLS-CLKS6 • NJSLS-CLKS7 • NJSLS-CLKS8		

Unit Title:	Months & Number of Weeks	Relevant Content Standards	Learning Goals:	Learning Objectives (Identify the DOK Level):
		• NJSLS-CLKS9 • NJSLS-CLKS11 • NJSLS-CLKS12		
Unit 7: Electricity & Magnetism	3 weeks June (weeks 37-39) Note: temporary change (length) may occur to adjust for learning loss	**Subject Area:** • NJSLS-HS-PS2-5 • NJSLS-HS-PS3-5 **DCI** • NJSLS-PS2.B: Types of Interactions • NJSLS-PS3.C: Relationship between Energy and Forces **Interdisciplinary:** *Literacy* • NJSLS-WHST.9-12.7 • NJSLS-WHST.11-12.8 • NJSLS-WHST.9-12.9 • NJSLS-SL.11-12.5 *Mathematics* • NJSLS-MP.2 • NJSLS-MP.4 • NJSLS-HSN.Q.A.1 • NJSLS-HSN.Q.A.2 • NJSLS-HSN.Q.A.3 **Technology** • NJSLS.8.2.12.ED.3 • NJSLS.8.2.12.ED.4 • NJSLS.8.1.12.IC.1 • NJSLS.8.1.12.AP.9 • NJSLS.8.1.12.AP.7 • NJSLS.8.2.12.ITH.1 • NJSLS.8.2.12.ETW.4 • NJSLS.8.2.12.ITH.3 • NJSLS-S.8.2.12.NT.2 **NJ PFL** • NJSLS.9.2.12.CAP.4	• Students will design and conduct an investigation to collect data showing that electric currents produce magnetic fields and changing magnetic fields produce electric currents. • Students will investigate the interactions between two objects in an electrical field or magnetic field to show the forces acting at a distance.	• HS-PS2-5 Students will be able to 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-PS3-5 Students will be able to 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.

Unit Title:	Months & Number of Weeks	Relevant Content Standards	Learning Goals:	Learning Objectives (Identify the DOK Level):
		NJ CTE • NJSLS-S.9.3.ST.1 • NJSLS-S.9.3.ST.6 • NJSLS-S.9.3.ST.ET.1 • NJSLS-S.9.3.ST.ET.2 • NJSLS-S.9.3.ST.ET.4 • NJSLS-S.9.3.ST.ET.5 • NJSLS-S.9.3.ST.SM.1 • NJSLS-S.9.3.ST.SM.2 • NJSLS-S.9.3.ST.SM.3 **NJ Career Ready Practices** • NJSLS-CLKS1 • NJSLS-CLKS2 • NJSLS-CLKS4 • NJSLS-CLKS5 • NJSLS-CLKS6 • NJSLS-CLKS7 • NJSLS-CLKS8 • NJSLS-CLKS9 • NJSLS-CLKS11 • NJSLS-CLKS12		

Unit Title: Forces and Motion (Unit 1)	Unit Length Months/Weeks: 9 weeks (September-November)
Unit Description: In this unit, students will use mathematical models to support the claim that momentum is a function of mass and velocity. Students will be expected to demonstrate understanding by (1) analyzing both physical and conceptual models, (2) planning/conducting investigations, (3) and apply these core ideas to solve scientific and engineering design problems. They will also explore Newton's second law of motion by analyzing data through various investigations. Students will build the foundation of their understanding on force, velocity, mass, and acceleration, and use this knowledge to describe the mathematical relationships between these variables. Additionally, we will use a series of Newsela articles to expose students to a wide variety of careers using examples of under-represented populations in those STEAM based careers.	
*To ensure the needs of all learners (including, but not limited to, special education, 504, ELL, & advanced learners) are met when **delivering instruction and assessing students**, please refer to the District approved **Instructional & Assessment Supports: Accommodations/Modifications Reference Sheet**. These must be used in the planning and delivery of instruction. Specific student learning activities, differentiated instructional techniques, and accommodations/modifications are noted in Schoology.*	

Learning Goals & (Primary Content Standards):	Learning Objectives (Identify the DOK Level):
• Students will understand that momentum is a function of an object's mass and velocity and predict the net effect of a collision by one object on another in a closed system. (3 weeks) • Students will understand the factors involved in the collision of moving bodies and be able to make design improvements for safer outcomes of collisions based upon calculations, experimentation and engineering. (3 weeks) • Students will be able to explain how force, mass and acceleration are related and be able to predict how changes in one variable will effect a second variable if the third is kept constant. (3 weeks)	Students who understand the concepts are able to: • Analyze data using tools, technologies, and/or models 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. • Analyze data using one-dimensional motion at nonrelativistic speeds 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. • 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. • Use mathematical representations of the quantitative conservation of momentum and the qualitative meaning of this principle in systems of two macroscopic bodies moving in one dimension. • Describe the boundaries and initial conditions of a system of two macroscopic bodies moving in one dimension. • Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. • Apply scientific ideas to solve a design problem for a device that minimizes the force on a macroscopic object during a collision, taking into account possible unanticipated effects.

Learning Goals & (Primary Content Standards):	Learning Objectives (Identify the DOK Level):
	• Use qualitative evaluations and /or algebraic manipulations to design and refine a device that minimizes the force on a macroscopic object during a collision.

Essential Questions: *(higher level questions that need to be considered/answers; are open and broad)*	**Enduring Understandings:** *(general/transferable ideas to other contexts)*
• How can one explain and predict interactions between objects and within systems of objects? • How does a solution or design take into account the constraints and requirements set by society including cost, safety, reliability, and aesthetics—and to consider social, cultural, and environmental impacts for a given design?	*Students will understanding that…* • Theories and laws provide explanations in science. • Momentum is directly related to both the mass and the velocity of an object. The momentum of a closed system is conserved and can be transferred from one object to another in a collision. • Newton's second law accurately predicts changes in the motion of macroscopic objects. • With a given design, the criteria and constraints should satisfy any requirements set by society including cost, safety, reliability, and aesthetics—and to consider social, cultural, and environmental impacts.

Secondary Assessments (Formative)	Primary Assessments (Summative)

• Assessments (Quizzes & Tests)
• Assessment retakes (optional)
• White board responses and presentations
• Entrance Ticket or Exit Ticket, Written understanding checks
• Literacy Practice
• Drawing/interpretation of models
• Questioning/Discussions (Q &A, A &Q)
• Checks for understanding with responses through:
  ○ small whiteboards
  ○ Kahoot
  ○ thumbs up
  ○ scale 1-4
• Graphic Organizers (Venn diagram of relationships)- Forces
• Think/Pair/Share
• Homework
	• Benchmarks (#1- based upon summer packet content after review and any necessary remediation of material)
	• Assessment questions asked throughout the year, which are specifically designed to show cumulative knowledge and mastery of previous topics. These questions will address various DOK skills/concepts and will be asked in a variety of ways (MC, short answer, data interpretation, investigation design, implementation and revision)
	• Analysis of Lab practical (Hopper Lab/Bubble Tube Lab)

Interdisciplinary Connections: *CORE AREA CONNECTIONS*

Literacy

- NJSLS-S.RST.11-12.7
- NJSLS-S.RST.11-12.9
- NJSLS-S.WHST.11-12.9

Mathematics

- NJSLS-S.MP.2
- NJSLS-S.MP.4
- NJSLS-S.HSN-Q.A.1
- NJSLS-S.HSN-Q.A.2
- NJSLS-S.HSN-Q.A.3
- NJSLS-S.HSA-SSE.A.1
- NJSLS-S.HSA-SSE.B.3
- NJSLS-S.HSA-CED.A.1
- NJSLS-S.HSA-CED.A.2
- NJSLS-S.HSA-CED.A.4
- NJSLS-S.HSF-IF.C.7
- NJSLS-S.HSS-IS.A.1

Career Ready Practices: *Note applicable CRPs used within the unit.*

NJ Career Ready Practices

- NJSLS-CLKS1
- NJSLS-CLKS2
- NJSLS-CLKS4
- NJSLS-CLKS5
- NJSLS-CLKS6
- NJSLS-CLKS7
- NJSLS-CLKS8
- NJSLS-CLKS9
- NJSLS-CLKS11
- NJSLS-CLKS12

Career Readiness, Life Literacies, & Key Skills (21st Century Themes & Skills): *Note applicable 2020 NJ standards 9.1, 9.2, 9.3, or 9.4 within the unit.*

NJ CTE

- NJSLS.9.2.12.CAP.4
- NJSLS-S.9.3.ST.1
- NJSLS-S.9.3.ST.6
- NJSLS-S.9.3.ST.ET.1
- NJSLS-S.9.3.ST.ET.2

- NJSLS-S.9.3.ST.ET.4
- NJSLS-S.9.3.ST.ET.5
- NJSLS-S.9.3.ST.SM.1
- NJSLS-S.9.3.ST.SM.2
- NJSLS-S.9.3.ST.SM.3

Integration of Technology: *Note applicable 2020 standards 8.1 & 8.2 used within the unit.*

Technology

- NJSLS.8.2.12.ED.3
- NJSLS.8.2.12.ED.4
- NJSLS.8.1.12.IC.1
- NJSLS.8.1.12.AP.9
- NJSLS.8.1.12.AP.7
- NJSLS.8.2.12.ITH.1
- NJSLS.8.2.12.ETW.4
- NJSLS.8.2.12.ITH.3
- NJSLS-S.8.2.12.NT.2

Course/Unit Resources:

Text/Materials: No Text book; Materials: computer simulations (Gizmo/Phet), Physics classroom.com, PhET, NJCTL, various lab equipment, Newsela, YouTube (Understanding Car Crashes – Physics/Biology)

Unit Title: Fundamental Forces & Kepler's Laws (Unit 2)	**Unit Length Months/Weeks: 7 weeks (November-December)**

Unit Description: In this unit, students gain an understanding of Newton's law of gravitation and Coulomb's Law by conducting investigations. Students apply these ideas to predict gravitational and electrostatic forces between objects. They use mathematical and computational thinking to understand how the solar system and universe work (Kepler's Law). Students use the concept of patterns in this unit in recognizing the relationships between both laws. Students must plan and conduct investigations to demonstrate understanding and apply these scientific ideas. The concepts of scale, proportion, and quantity are necessary concepts in this unit. They are responsible for using mathematical and computational thinking to demonstrate understanding. Additionally, we will use a series of Newsela articles to expose students to a wide variety of careers using examples of under-represented populations in those STEAM based careers.

*To ensure the needs of all learners (including, but not limited to, special education, 504, ELL, & advanced learners) are met when **delivering instruction and assessing students**, please refer to the District approved **Instructional & Assessment Supports: Accommodations/Modifications Reference Sheet**. These must be used in the planning and delivery of instruction. Specific student learning activities, differentiated instructional techniques, and accommodations/modifications are noted in Schoology.*

Learning Goals & (Primary Content Standards):	**Learning Objectives (Identify the DOK Level):**
• Students will understand that gravitational forces exist between any	Students who understand the concepts are able to:

Learning Goals & (Primary Content Standards):	Learning Objectives (Identify the DOK Level):
two objects and are directly related to the masses of the objects and inversely related to the square of the distance between them. • Students will be able to predict the effect on the electrostatic force between two charges from changes in those charges or the distance between them. • Students will understand that planets orbit the sun in an elliptical orbit and will be able to make predictions about motion of orbiting objects related to their period or distance.	• Use mathematical representations of phenomena to describe or explain how gravitational force is proportional to mass and inversely proportional to distance squared. • Demonstrate how Newton's Law of Universal Gravitation provides explanations for observed scientific phenomena. • Observe patterns at different scales to provide evidence for gravitational forces between two objects in a system with two objects. • Use mathematical representations of phenomena to describe or explain how electrostatic force is proportional to charge and inversely proportional to distance squared. • Use mathematical representations of Coulomb's Law to predict the electrostatic forces between two objects in systems with two objects. • Observe patterns at different scales to provide evidence for electrostatic forces between two objects in systems with two objects. • Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. • Use mathematical and computational representations of Newtonian gravitational laws governing orbital motion that apply to moons and human-made satellites. • Use algebraic thinking to examine scientific data and predict the motion of orbiting objects in the solar system.

Essential Questions: *(higher level questions that need to be considered/answers; are open and broad)*	**Enduring Understandings:** *(general/transferable ideas to other contexts)*
• How do the mathematical models for both Newton's Law of Universal Gravitation and Coulomb's Law make predictions about the interactions between objects and within systems of objects? • What types of forces act at a distance and how are they explained, described and measured? • What is the inter-relationship between electric currents and changing magnetic fields? • How do Kepler's laws describe the motion of orbiting objects and how can you use them to calculate the distance of orbiting objects or the period of those objects?	*Students will understanding that…* • 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, respectively, between distant objects. • Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. • 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 the gravitational and electrostatic forces between objects. • Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.

Essential Questions: *(higher level questions that need to be considered/answers; are open and broad)*	**Enduring Understandings:** *(general/transferable ideas to other contexts)*
	• 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. • Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another. (e.g., linear growth vs. exponential growth).

Secondary Assessments (Formative)	**Primary Assessments (Summative)**

• Assessments (Quizzes & Tests)
• Assessment retakes (optional)
• White board responses and presentations
• Entrance Ticket or Exit Ticket
• Drawing/interpretation of models
• Questioning/Discussions (Q &A, A &Q)
• Checks for understanding with responses through:
  ○ small whiteboards
  ○ Kahoot
  ○ thumbs up
  ○ scale 1-4
• Student/Teacher/Peer Conferences
• Graphic Organizers (Venn diagram of relationships)
• Lab Reports (rubric used)
• Think/Pair/Share
• Homework
	• Benchmarks (#2 based upon Summer packet, Unit 1 & Unit 2)
	• Assessment questions asked throughout the year which are specifically designed to show cumulative knowledge and mastery of previous topics. These questions will address various DOK skills/concepts and will be asked in a variety of ways (MC, short answer, data interpretation, investigation design, implementation and revision)
	• Lab practical

Interdisciplinary Connections: *CORE AREA CONNECTIONS*
Literacy • NJSLS-S.RST.11-12.7 • NJSLS-S.RST.11-12.9 • NJSLS-S.WHST.11-12.9 **Mathematics** • NJSLS-S.MP.2 • NJSLS-S.MP.4

- NJSLS-S.HSN-Q.A.1
- NJSLS-S.HSN-Q.A.2
- NJSLS-S.HSN-Q.A.3
- NJSLS-S.HSA-SSE.A.1
- NJSLS-S.HSA-SSE.B.3
- NJSLS-S.HSA-CED.A.1
- NJSLS-S.HSA-CED.A.2
- NJSLS-S.HSA-CED.A.4
- NJSLS-S.HSF-IF.C.7
- NJSLS-S.HSS-IS.A.1

Career Ready Practices: *Note applicable CRPs used within the unit.*

NJ Career Ready Practices

- NJSLS-CLKS1
- NJSLS-CLKS2
- NJSLS-CLKS4
- NJSLS-CLKS5
- NJSLS-CLKS6
- NJSLS-CLKS7
- NJSLS-CLKS8
- NJSLS-CLKS9
- NJSLS-CLKS11
- NJSLS-CLKS12

Career Readiness, Life Literacies, & Key Skills (21st Century Themes & Skills): *Note applicable 2020 NJ standards 9.1, 9.2, 9.3, or 9.4 within the unit.*

NJ CTE

- NJSLS.9.2.12.CAP.4
- NJSLS-S.9.3.ST.1
- NJSLS-S.9.3.ST.6
- NJSLS-S.9.3.ST.ET.1
- NJSLS-S.9.3.ST.ET.2
- NJSLS-S.9.3.ST.ET.4
- NJSLS-S.9.3.ST.ET.5
- NJSLS-S.9.3.ST.SM.1
- NJSLS-S.9.3.ST.SM.2
- NJSLS-S.9.3.ST.SM.3

Integration of Technology: *Note applicable 2020 standards 8.1 & 8.2 used within the unit.*

Technology

- NJSLS.8.2.12.ED.3
- NJSLS.8.2.12.ED.4
- NJSLS.8.1.12.IC.1
- NJSLS.8.1.12.AP.9
- NJSLS.8.1.12.AP.7
- NJSLS.8.2.12.ITH.1
- NJSLS.8.2.12.ETW.4
- NJSLS.8.2.12.ITH.3
- NJSLS-S.8.2.12.NT.2

Course/Unit Resources:

Text/Materials: No Text book; Materials: computer simulations (Gizmo/Phet), Physics classroom.com, PhET, NJCTL, various lab equipment, Newsela, YouTube (Understanding Car Crashes – Physics/Biology)

Unit Title: Energy (Unit 3)	**Unit Length Months/Weeks:** 6 weeks-January–early February(weeks 15-20)

Unit Description: In this unit, students will being by identifying and comparing the types of energy within systems, leading them to the core idea that energy is a quantitative property dependent on the motion and interactions between matter. By using models and other representations, students will be able to calculate changes of energy in its various forms. By identifying patterns in energy flow, students will understand the total change in any system is equal to the total energy transferred. Students are expected to demonstrate understanding by defining core ideas, identifying patterns, using concepts to solve non-routine problems, and applying concepts to design and create solutions of real world problems.

Equity Integration (Using James Banks' Levels of Multicultural Integration): Equity: We will use a series of Newsela articles to expose students to a wide variety of careers using examples of under-represented populations in those STEAM based careers.

*To ensure the needs of all learners (including, but not limited to, special education, 504, ELL, & advanced learners) are met when **delivering instruction and assessing students**, please refer to the District approved **Instructional & Assessment Supports: Accommodations/Modifications Reference Sheet**. These must be used in the planning and delivery of instruction. Specific student learning activities, differentiated instructional techniques, and accommodations/modifications are noted in Schoology.*

Learning Goals & (Primary Content Standards):	**Learning Objectives (Identify the DOK Level):**
• Students will be able to demonstrate through models that energy is conserved and be able to use mathematical expressions to quantify the transfer of energy from one form to another. • Students will be able to apply their understanding of energy transfer and conservation by explaining how the change in one component of a system effects one (or more) other components of the system.	Students who understand the concepts are able to: • Develop and use models based on evidence to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with motions of particles (objects) and energy associated with the relative position of particles (objects).

Learning Goals & (Primary Content Standards):	**Learning Objectives (Identify the DOK Level):**
• Students will be able to design or analyze the usefulness or effectiveness of a device that converts one form of energy to another.	• Develop and use models based on evidence to illustrate that energy cannot be created or destroyed. It only moves between one place and another place, between objects and/or fields, or between systems. • Use mathematical expressions to quantify how the stored energy in a system depends on its configuration (e.g., relative positions of charged particles, compressions of a spring) and how kinetic energy depends on mass and speed. • Use mathematical expressions and the concept of conservation of energy to predict and describe system behavior. • Use basic algebraic expressions or computations to create a computational model to calculate the change in the energy of one component in a system (limited to two or three components) when the change in energy of the other component(s) and energy flows in and out of the system are known. • Explain the meaning of mathematical expressions used to model the change in the energy of one component in a system (limited to two or three components) when the change in energy of the other component(s) and out of the system are known. • Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. • Analyze a device to convert one form of energy into another form of energy by specifying criteria and constraints for successful solutions. • Use mathematical models and/or computer simulations to predict the effects of a device that converts one form of energy into another form of energy.

Essential Questions: *(higher level questions that need to be considered/answers; are open and broad)*	**Enduring Understandings:** *(general/transferable ideas to other contexts)*
• How is energy transferred and conserved? • What is energy? • How can you quantify a change of energy of living and non-living systems (abiotic and biotic systems)? • How can different sources of energy and energy transformations both positively and negatively affect society and the environment?	*Students will understanding that…* • Energy cannot be created or destroyed. It only moves between one place and another place, between objects and/or fields, or between systems. • 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 is a quantitative property of a system that depends on the motion and interactions of matter

Essential Questions: *(higher level questions that need to be considered/answers; are open and broad)*	**Enduring Understandings:** *(general/transferable ideas to other contexts)*
	• Energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy. • 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. • With a given design, the criteria and constraints should satisfy any requirements set by society including cost, safety, reliability, and aesthetics—and to consider social, cultural, and environmental impacts.

Secondary Assessments (Formative)	**Primary Assessments (Summative)**

• Assessments (Quizzes & Tests)
• Assessment retakes (optional)
• White board responses and presentations
• Entrance Ticket or Exit Ticket
• Drawing/interpretation of models
• Questioning/Discussions (Q &A, A &Q)
• Checks for understanding with responses through:
  ○ small whiteboards
  ○ Kahoot
  ○ thumbs up
  ○ scale 1-4
• Student/Teacher/Peer Conferences
• Graphic Organizers (Venn diagram of relationships)
• Lab Reports (rubric used)
• Think/Pair/Share
• Homework
	• Benchmark prep questions
	• Assessment questions asked throughout the year, which are specifically designed to show cumulative knowledge and mastery of previous topics. These questions will address various DOK skills/concepts and will be asked in a variety of ways (MC, short answer, data interpretation, investigation design, implementation and revision)
	• Lab practical

Interdisciplinary Connections: *CORE AREA CONNECTIONS*
Literacy • NJSLS-S.RST.11-12.7 • NJSLS-S.RST.11-12.9 • NJSLS-S.WHST.11-12.9 **Mathematics** • NJSLS-S.MP.2

- NJSLS-S.MP.4
- NJSLS-S.HSN-Q.A.1
- NJSLS-S.HSN-Q.A.2
- NJSLS-S.HSN-Q.A.3
- NJSLS-S.HSA-SSE.A.1
- NJSLS-S.HSA-SSE.B.3
- NJSLS-S.HSA-CED.A.1
- NJSLS-S.HSA-CED.A.2
- NJSLS-S.HSA-CED.A.4
- NJSLS-S.HSF-IF.C.7
- NJSLS-S.HSS-IS.A.1

Career Ready Practices: *Note applicable CRPs used within the unit.*

NJ Career Ready Practices

- NJSLS-CLKS1
- NJSLS-CLKS2
- NJSLS-CLKS4
- NJSLS-CLKS5
- NJSLS-CLKS6
- NJSLS-CLKS7
- NJSLS-CLKS8
- NJSLS-CLKS9
- NJSLS-CLKS11
- NJSLS-CLKS12

Career Readiness, Life Literacies, & Key Skills (21st Century Themes & Skills): *Note applicable 2020 NJ standards 9.1, 9.2, 9.3, or 9.4 within the unit.*

NJ CTE

- NJSLS.9.2.12.CAP.4
- NJSLS-S.9.3.ST.1
- NJSLS-S.9.3.ST.6
- NJSLS-S.9.3.ST.ET.1
- NJSLS-S.9.3.ST.ET.2
- NJSLS-S.9.3.ST.ET.4
- NJSLS-S.9.3.ST.ET.5
- NJSLS-S.9.3.ST.SM.1
- NJSLS-S.9.3.ST.SM.2
- NJSLS-S.9.3.ST.SM.3

Integration of Technology: *Note applicable 2020 standards 8.1 & 8.2 used within the unit.*

Technology

- NJSLS.8.2.12.ED.3
- NJSLS.8.2.12.ED.4
- NJSLS.8.1.12.IC.1
- NJSLS.8.1.12.AP.9
- NJSLS.8.1.12.AP.7
- NJSLS.8.2.12.ITH.1
- NJSLS.8.2.12.ETW.4
- NJSLS.8.2.12.ITH.3
- NJSLS-S.8.2.12.NT.2

Course/Unit Resources:

Text/Materials: No Text book; Materials: computer simulations (Gizmo/Phet), Physics classroom.com, PhET, NJCTL, various lab equipment, Newsela, YouTube (Understanding Car Crashes – Physics/Biology)

Unit Title: Wave Properties (Unit 4)	**Unit Length Months/Weeks:** 6 weeks ~~E~~arly February-March(weeks 21-26)
Unit Description: In this unit, students recognize properties of waves and identify patterns within these properties. Students apply these concepts to investigate the transfer of information across long distances and store information. The crosscutting concept of *cause and effect* is highlighted as an organizing concept for these disciplinary core ideas. Students are expected to demonstrate proficiency in *using mathematical thinking*, and to use this practice to demonstrate understanding of the core idea. Additionally, we will use a series of Newsela articles to expose students to a wide variety of careers using examples of under-represented populations in those STEAM based careers.	
*To ensure the needs of all learners (including, but not limited to, special education, 504, ELL, & advanced learners) are met when **delivering instruction and assessing students**, please refer to the District approved **Instructional & Assessment Supports: Accommodations/Modifications Reference Sheet**. These must be used in the planning and delivery of instruction. Specific student learning activities, differentiated instructional techniques, and accommodations/modifications are noted in Schoology.*	

Learning Goals & (Primary Content Standards):	**Learning Objectives (Identify the DOK Level):**
• Students will be able to explain how frequency, wavelength and the speed of a wave are related and be able to mathematically predict how either changing one of those variables or traveling through a different medium will affect those variables.	Students who understand the concepts are able to: • Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. • Use algebraic relationships to quantitatively describe relationships among the frequency, wavelength, and speed of waves traveling in various media.

Essential Questions: *(higher level questions that need to be considered/answers; are open and broad)*	**Enduring Understandings:** *(general/transferable ideas to other contexts)*
• What are the various types of waves and what are their characteristics? • What are the relationships between these wave characteristics? • How can we use wave properties to make predictions about our environment? • How are waves used to transfer energy, send, and store information?	*Students will understanding that…* • 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. • Empirical evidence is required to differentiate between cause and correlation and to make a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Secondary Assessments (Formative)	**Primary Assessments (Summative)**

• Assessments (Quizzes & Tests)
• Assessment retakes (optional)
• White board responses and presentations
• Entrance Ticket or Exit Ticket
• Drawing/interpretation of models
• Questioning/Discussions (Q &A, A &Q)
• Checks for understanding with responses through:
  ○ small whiteboards
  ○ Kahoot
  ○ thumbs up
  ○ scale 1-4
• Student/Teacher/Peer Conferences
• Graphic Organizers (Venn diagram of relationships)
• Lab Reports (rubric used)
• Think/Pair/Share
• Homework
	• Benchmark prep questions
	• Assessment questions asked throughout the year, which are specifically designed to show cumulative knowledge and mastery of previous topics. These questions will address various DOK skills/concepts and will be asked in a variety of ways (MC, short answer, data interpretation, investigation design, implementation and revision)
	• Lab practical

Interdisciplinary Connections: *CORE AREA CONNECTIONS*
Literacy • NJSLS-S.RST.11-12.7 • NJSLS-S.RST.11-12.9 • NJSLS-S.WHST.11-12.9 **Mathematics** • NJSLS-S.MP.2 • NJSLS-S.MP.4

- NJSLS-S.HSN-Q.A.1
- NJSLS-S.HSN-Q.A.2
- NJSLS-S.HSN-Q.A.3
- NJSLS-S.HSA-SSE.A.1
- NJSLS-S.HSA-SSE.B.3
- NJSLS-S.HSA-CED.A.1
- NJSLS-S.HSA-CED.A.2
- NJSLS-S.HSA-CED.A.4
- NJSLS-S.HSF-IF.C.7
- NJSLS-S.HSS-IS.A.1

Career Ready Practices: *Note applicable CRPs used within the unit.*

NJ Career Ready Practices

- NJSLS-CLKS1
- NJSLS-CLKS2
- NJSLS-CLKS4
- NJSLS-CLKS5
- NJSLS-CLKS6
- NJSLS-CLKS7
- NJSLS-CLKS8
- NJSLS-CLKS9
- NJSLS-CLKS11
- NJSLS-CLKS12

Career Readiness, Life Literacies, & Key Skills (21st Century Themes & Skills): *Note applicable 2020 NJ standards 9.1, 9.2, 9.3, or 9.4 within the unit.*

NJ CTE

- NJSLS.9.2.12.CAP.4
- NJSLS-S.9.3.ST.1
- NJSLS-S.9.3.ST.6
- NJSLS-S.9.3.ST.ET.1
- NJSLS-S.9.3.ST.ET.2
- NJSLS-S.9.3.ST.ET.4
- NJSLS-S.9.3.ST.ET.5
- NJSLS-S.9.3.ST.SM.1
- NJSLS-S.9.3.ST.SM.2
- NJSLS-S.9.3.ST.SM.3

Integration of Technology: *Note applicable 2020 standards 8.1 & 8.2 used within the unit.*

Technology

- NJSLS.8.2.12.ED.3

- NJSLS.8.2.12.ED.4
- NJSLS.8.1.12.IC.1
- NJSLS.8.1.12.AP.9
- NJSLS.8.1.12.AP.7
- NJSLS.8.2.12.ITH.1
- NJSLS.8.2.12.ETW.4
- NJSLS.8.2.12.ITH.3
- NJSLS-S.8.2.12.NT.2

Course/Unit Resources:

Text/Materials: No Text book; Materials: computer simulations (Gizmo/Phet), Physics classroom.com, PhET, NJCTL, various lab equipment, Newsela, YouTube

Unit Title: Electromagnetic Radiation (Unit 5)	**Unit Length Months/Weeks: 7 weeks (End of March – mid May)**

Unit Description: In this unit, students connect their understanding of wave properties to electromagnetic radiation. They are then able to relate electromagnetic radiation to the transfer of information across long distances and the storage of information. Students design models of electromagnetic radiation as a wave of alternating electrical and magnetic fields and/or as a wave of particles. Students also prove how technological devices transmit and capture information and energy based on wave behavior and interaction with matter. The crosscutting concepts of *systems and system models*; *stability and change*; *interdependence of science*, *engineering, and technology; and influence of engineering, technology, and science on society and the natural world* are highlighted as organizing concepts. Students are expected to demonstrate proficiency in *asking questions, engaging in argument from evidence, and obtaining, evaluating, and communicating information*, and they are expected to use these practices to demonstrate understanding of the core ideas. Additionally, we will use a series of Newsela articles to expose students to a wide variety of careers using examples of under-represented populations in those STEAM based careers.

*To ensure the needs of all learners (including, but not limited to, special education, 504, ELL, & advanced learners) are met when **delivering instruction and assessing students**, please refer to the District approved **Instructional & Assessment Supports: Accommodations/Modifications Reference Sheet**. These must be used in the planning and delivery of instruction. Specific student learning activities, differentiated instructional techniques, and accommodations/modifications are noted in Schoology.*

Learning Goals & (Primary Content Standards):	**Learning Objectives (Identify the DOK Level):**
• Students will be able to evaluate the statement: either the particle model or the wave model or both can explain the properties and behaviors of electromagnetic radiation. • Students will understand that different frequencies of light have photons with differing amounts of energy and be able to evaluate the validity of claims about the effect of the energy on living tissue • Students will be able to explain how technical devices have exploited	Students who understand the concepts are able to: • Evaluate the claims, either a wave model or a particle model can describe evidence, and reasoning behind the idea that electromagnetic radiation and that for some situations one model is more useful than the other. • Evaluate experimental evidence that either a wave model or a particle model can describe electromagnetic radiation and that for some situations one model is more useful than the other.

Learning Goals & (Primary Content Standards):	Learning Objectives (Identify the DOK Level):
wave behavior and wave interactions to transmit and capture information and energy as well as analyze and evaluate the usefulness and practicality of those devices. • Students will be able to critically examine the advantages and disadvantages of the digital transmission and storage of information.	• Use models (e.g., physical, mathematical, computer models) to simulate electromagnetic radiation systems and interactions—including energy, matter, and information flows—within and between systems at different scales. • Evaluate the validity and reliability of multiple claims in published materials about the effects that different frequencies of electromagnetic radiation have when absorbed by matter. • Evaluate the validity and reliability of claims that photons associated with different frequencies of light have different energies and that the damage to living tissue from electromagnetic radiation depends on the energy of the radiation. • Give qualitative descriptions of how photons associated with different frequencies of light have different energies and how the damage to living tissue from electromagnetic radiation depends on the energy of the radiation. • Suggest and predict cause-and-effect relationships for electromagnetic radiation systems when matter absorbs different frequencies of light by examining what is known about smaller scale mechanisms within the system. • Communicate qualitative 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. • Communicate technical information or ideas about technological devices that use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy in multiple formats (including orally, graphically, textually, and mathematically). • Analyze technological devices that use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy by specifying criteria and constraints for successful solutions. • Evaluate a solution offered by technological devices that use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. • Evaluate questions about the advantages of using digital transmission and storage of information by challenging the premise of the advantages of digital transmission and storage of information, interpreting data, and considering the suitability of digital transmission and storage of

Learning Goals & (Primary Content Standards):	Learning Objectives (Identify the DOK Level):
	information. • Consider advantages and disadvantages in the use of digital transmission and storage of information.

Essential Questions: *(higher level questions that need to be considered/answers; are open and broad)*	Enduring Understandings: *(general/transferable ideas to other contexts)*
• How can electromagnetic radiation be both a wave and a particle at the same time? • How does the frequency of a wave, its wavelength and the energy (amplitude) of a wave influence its ability to cause damage to living cells? • How can we take advantage of the properties of electromagnetic radiation to store large amounts of information and communicate over long distances and space?	*Students will understanding that…* • Light can be modeled as a wave or a particle. Determining which model is appropriate will be dictated by the context of the situation you are examining. • 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. • Multiple technologies based on the understanding of waves and their interactions with matter are part of everyday experiences in the modern world (e.g., medical imaging, communications, and scanners) and in scientific research. They are essential tools for producing, transmitting, and capturing signals and for storing and interpreting the information contained in them.

Secondary Assessments (Formative)	Primary Assessments (Summative)
• Assessments (Quizzes & Tests) • Assessment retakes (optional) • White board responses and presentations • Entrance Ticket or Exit Ticket • Drawing/interpretation of models • Questioning/Discussions (Q &A, A &Q) • Checks for understanding with responses through: ○ small whiteboards ○ Kahoot ○ thumbs up ○ scale 1-4 • Student/Teacher/Peer Conferences	• Benchmark prep questions • Assessment questions asked throughout the year, which are specifically designed to show cumulative knowledge and mastery of previous topics. These questions will address various DOK skills/concepts and will be asked in a variety of ways (MC, short answer, data interpretation, investigation design, implementation and revision) • Lab practical

• Graphic Organizers (Venn diagram of relationships) • Lab Reports (rubric used) • Think/Pair/Share • Homework	

Interdisciplinary Connections: *CORE AREA CONNECTIONS*

Literacy

- NJSLS-S.RST.11-12.7
- NJSLS-S.RST.11-12.9
- NJSLS-S.WHST.11-12.9

Mathematics

- NJSLS-S.MP.2
- NJSLS-S.MP.4
- NJSLS-S.HSN-Q.A.1
- NJSLS-S.HSN-Q.A.2
- NJSLS-S.HSN-Q.A.3
- NJSLS-S.HSA-SSE.A.1
- NJSLS-S.HSA-SSE.B.3
- NJSLS-S.HSA-CED.A.1
- NJSLS-S.HSA-CED.A.2
- NJSLS-S.HSA-CED.A.4
- NJSLS-S.HSF-IF.C.7
- NJSLS-S.HSS-IS.A.1

Career Ready Practices: *Note applicable CRPs used within the unit.*

NJ Career Ready Practices

- NJSLS-CLKS1
- NJSLS-CLKS2
- NJSLS-CLKS4
- NJSLS-CLKS5
- NJSLS-CLKS6
- NJSLS-CLKS7
- NJSLS-CLKS8
- NJSLS-CLKS9
- NJSLS-CLKS11
- NJSLS-CLKS12

Career Readiness, Life Literacies, & Key Skills (21st Century Themes & Skills): *Note applicable 2020 NJ standards 9.1, 9.2, 9.3, or 9.4 within the unit.*

NJ CTE

- NJSLS.9.2.12.CAP.4
- NJSLS-S.9.3.ST.1
- NJSLS-S.9.3.ST.6
- NJSLS-S.9.3.ST.ET.1
- NJSLS-S.9.3.ST.ET.2
- NJSLS-S.9.3.ST.ET.4
- NJSLS-S.9.3.ST.ET.5
- NJSLS-S.9.3.ST.SM.1
- NJSLS-S.9.3.ST.SM.2
- NJSLS-S.9.3.ST.SM.3

Integration of Technology: *Note applicable 2020 standards 8.1 & 8.2 used within the unit*.

Technology

- NJSLS.8.2.12.ED.3
- NJSLS.8.2.12.ED.4
- NJSLS.8.1.12.IC.1
- NJSLS.8.1.12.AP.9
- NJSLS.8.1.12.AP.7
- NJSLS.8.2.12.ITH.1
- NJSLS.8.2.12.ETW.4
- NJSLS.8.2.12.ITH.3
- NJSLS-S.8.2.12.NT.2

Course/Unit Resources:

Text/Materials: No Text book; Materials: computer simulations (Gizmo/Phet), Physics classroom.com, PhET, NJCTL, various lab equipment, Newsela, YouTube (Einstein's Big Idea)

Unit Title: Physics of the Geosphere (Unit 6)	**Unit Length Months/Weeks:** 3 weeks Mid May – End of May (weeks-34-36)

Unit Description: In this unit, students will use the Earth's processes and the length of time they take to occur in making inferences about events in the Earth's history. By recognizing patterns, they will also extrapolate information based upon data from the geologic record (that becomes increasingly incomplete the further back in time you go). Radiometric dating and the mathematical analysis of how ages can be approximated will also be examined. They will take into account the constructive and destructive forces simultaneously creating land and wearing it down when they develop and use models, construct explanations, and engage in argument from evidence about this topic to develop models and explanations that use this data. The crosscutting concepts of stability and change, energy and matter, and patterns are called out as organizing elements of this unit. Additionally, we will use a series of Newsela articles to expose students to a wide variety of careers using examples of under-represented populations in those STEAM based careers.

Unit Title: Physics of the Geosphere (Unit 6)	**Unit Length Months/Weeks:** 3 weeks Mid May – End of May (weeks-34-36)
*To ensure the needs of all learners (including, but not limited to, special education, 504, ELL, & advanced learners) are met when **delivering instruction and assessing students**, please refer to the District approved **Instructional & Assessment Supports: Accommodations/Modifications Reference Sheet**. These must be used in the planning and delivery of instruction. Specific student learning activities, differentiated instructional techniques, and accommodations/modifications are noted in Schoology.*	

Learning Goals & (Primary Content Standards):	**Learning Objectives (Identify the DOK Level):**
• Students will understand that constructive and destructive forces in the earth operate at different rates and they can use these rates to explain/predict changes in the Earth's land and sea-floor features • Students will understand the Earth's interior structure functions to facilitate thermal convection and this in turn causes tectonic plate motion. • Students will understand the movement of continental and oceanic crust causes rocks to have different ages. • 4. Student's will be able to explain how changes in the geosphere can affect the atmosphere.	Students who understand the concepts are able to: • Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features. • Develop a model to illustrate how the appearance of land features and sea-floor features are a result of both constructive forces and destructive mechanisms. • Quantify and model rates of change of Earth's internal and surface processes over short and very long periods. • Develop an evidence-based model of Earth's interior to describe the cycling of matter by thermal convection. • Develop a one-dimensional model, based on evidence, of Earth with radial layers determined by density to describe the cycling of matter by thermal convection. • Develop a three-dimensional model of Earth's interior, based on evidence, to show mantle convection and the resulting plate tectonics. • Develop a model of Earth's interior, based on evidence, to show that energy drives the cycling of matter by thermal convection. • Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. • Evaluate evidence of plate interactions to explain the ages of crustal rocks. • Analyze geoscience data using tools, technologies, and/or models (e.g., computational, mathematical) to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

Essential Questions: *(higher level questions that need to be considered/answers; are open and broad)*	**Enduring Understandings:** *(general/transferable ideas to other contexts)*
• How do the earth's systems cause feedback effects that can increase or decrease rates of original changes? • How does the theory of plate tectonics explain the movements of rocks at the Earth's surface, the Earth's geologic history, continental and ocean-floor geologic features and the distribution of rocks and minerals in the Earth's crust? • How does evidence from deep probes, seismic waves, reconstructions of historic changes in the Earth's surface and its magnetic field and an understanding of physical and chemical processes lead to a functional model of the earth with a hot but solid inner core, liquid outer core and a solid mantle and crust? • How does thermal convection cause the motion of the mantle and its plates? • What moves continents and what could provide the energy for that much movement? • Are all rocks the same age? • How do changes in the geosphere effect the atmosphere?	*Students will understanding that…* • Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the rates of the original changes. • The theory of plate tectonics explains the past and current movements of the rocks at Earth's surface and helps us understand the Earth's geologic history. The theory says that plate movements are responsible for most continental and ocean-floor features and for the distribution of most rocks and minerals within Earth's crust. • Evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, and a solid mantle and crust. • Motions of the mantle and its plates occur primarily through thermal convection, which involves the cycling of matter due to the outward flow of energy from Earth's interior and gravitational movement of denser materials toward the interior. • Continental rocks, which can be older than 4 billion years, are generally much older than the rocks of the ocean floor, which are less than 200 million years old. • The foundation for Earth's global climate systems is the electromagnetic radiation from the sun (as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems) and that energy being re-radiated into space. • Feedback (negative or positive) can stabilize or destabilize a system.

Secondary Assessments (Formative)	**Primary Assessments (Summative)**
• Assessments (Quizzes & Tests) • Assessment retakes (optional) • White board responses and presentations • Entrance Ticket or Exit Ticket • Drawing/interpretation of models • Questioning/Discussions (Q &A, A &Q) • Checks for understanding with responses through: ○ small whiteboards	• Benchmarks (#3 based upon Summer packet, Unit 1 -Unit 4) • Assessment questions asked throughout the year, which are specifically designed to show cumulative knowledge and mastery of previous topics. These questions will address various DOK skills/concepts and will be asked in a variety of ways (MC, short answer, data interpretation, investigation design, implementation and revision) • Lab practical

○ Kahoot ○ thumbs up ○ scale 1-4 • Student/Teacher/Peer Conferences • Graphic Organizers (Venn diagram of relationships) • Lab Reports (rubric used) • Think/Pair/Share • Homework	

Interdisciplinary Connections: *CORE AREA CONNECTIONS*

Literacy

- NJSLS-S.RST.11-12.7
- NJSLS-S.RST.11-12.9
- NJSLS-S.WHST.11-12.9

Mathematics

- NJSLS-S.MP.2
- NJSLS-S.MP.4
- NJSLS-S.HSN-Q.A.1
- NJSLS-S.HSN-Q.A.2
- NJSLS-S.HSN-Q.A.3
- NJSLS-S.HSA-SSE.A.1
- NJSLS-S.HSA-SSE.B.3
- NJSLS-S.HSA-CED.A.1
- NJSLS-S.HSA-CED.A.2
- NJSLS-S.HSA-CED.A.4
- NJSLS-S.HSF-IF.C.7
- NJSLS-S.HSS-IS.A.1

Career Ready Practices: *Note applicable CRPs used within the unit.*

NJ Career Ready Practices

- NJSLS-CLKS1
- NJSLS-CLKS2
- NJSLS-CLKS4
- NJSLS-CLKS5
- NJSLS-CLKS6
- NJSLS-CLKS7
- NJSLS-CLKS8
- NJSLS-CLKS9

- NJSLS-CLKS11
- NJSLS-CLKS12

Career Readiness, Life Literacies, & Key Skills (21st Century Themes & Skills): *Note applicable 2020 NJ standards 9.1, 9.2, 9.3, or 9.4 within the unit.*

NJ CTE

- NJSLS.9.2.12.CAP.4
- NJSLS-S.9.3.ST.1
- NJSLS-S.9.3.ST.6
- NJSLS-S.9.3.ST.ET.1
- NJSLS-S.9.3.ST.ET.2
- NJSLS-S.9.3.ST.ET.4
- NJSLS-S.9.3.ST.ET.5
- NJSLS-S.9.3.ST.SM.1
- NJSLS-S.9.3.ST.SM.2
- NJSLS-S.9.3.ST.SM.3

Integration of Technology: *Note applicable 2020 standards 8.1 & 8.2 used within the unit.*

Technology

- NJSLS.8.2.12.ED.3
- NJSLS.8.2.12.ED.4
- NJSLS.8.1.12.IC.1
- NJSLS.8.1.12.AP.9
- NJSLS.8.1.12.AP.7
- NJSLS.8.2.12.ITH.1
- NJSLS.8.2.12.ETW.4
- NJSLS.8.2.12.ITH.3
- NJSLS-S.8.2.12.NT.2

Course/Unit Resources:

Text/Materials: No Text book; Materials: computer simulations (Gizmo/Phet), Physics classroom.com, PhET, NJCTL, various lab equipment, Newsela, YouTube

Unit Title: Electricity & Magnetism (Unit 7)	**Unit Length Months/Weeks: 3 weeks (~~May~~ June)**

Unit Description: Unit Description: In this unit, students will recognize three core ideas: (1) gravitational, (2) electric, and (3) magnetic forces. They will compare and contrast these forces as explained by the different fields they create. By investigating physical and mathematical models, students will analyze and be able to predict changes in energy as objects interact through a magnetic, electric, or gravitational field. Students are expected to demonstrate understanding by defining core ideas, identifying patterns, using concepts to solve non-routine problems, and applying concepts to design and create solutions for real world problems.

Unit Title: Electricity & Magnetism (Unit 7)	**Unit Length Months/Weeks: 3 weeks (~~May~~ June)**
Equity Integration (Using James Banks' Levels of Multicultural Integration): Equity: We will use a series of Newsela articles to expose students to a wide variety of careers using examples of under-represented populations in those STEAM based careers.	
*To ensure the needs of all learners (including, but not limited to, special education, 504, ELL, & advanced learners) are met when **delivering instruction and assessing students**, please refer to the District approved **Instructional & Assessment Supports: Accommodations/Modifications Reference Sheet**. These must be used in the planning and delivery of instruction. Specific student learning activities, differentiated instructional techniques, and accommodations/modifications are noted in Schoology.*	

Learning Goals & (Primary Content Standards):	**Learning Objectives (Identify the DOK Level):**
• HS-PS2-5 Students will be able to 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-PS3-5 Students will be able to 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.	• Students will design and conduct an investigation to collect data showing that electric currents produce magnetic fields and changing magnetic fields produce electric currents. • Students will investigate the interactions between two objects in an electrical field or magnetic field to show the forces acting at a distance.

Essential Questions: *(higher level questions that need to be considered/answers; are open and broad)*	**Enduring Understandings:** *(general/transferable ideas to other contexts)*
• How are gravitational, electric and magnetic fields affected by forces at a distance? • What are the relationships between electric currents and magnetic fields? • What are the possible meanings of electrical energy and how can it be stored?	*Students will understanding that…* • 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. • "Electrical energy" may mean energy stored in a battery or energy transmitted by electric currents. • When two objects interacting through a field change relative position, the energy stored in the field is changed.

Secondary Assessments (Formative)	**Primary Assessments (Summative)**
• Assessments (Quizzes & Tests) • Assessment retakes (optional)	• Benchmarks (#3 based upon Summer packet, Unit 1 -Unit 4) • Assessment questions asked throughout the year, which are specifically

• White board responses and presentations
• Entrance Ticket or Exit Ticket
• Drawing/interpretation of models
• Questioning/Discussions (Q &A, A &Q)
• Checks for understanding with responses through:
  ○ small whiteboards
  ○ Kahoot
  ○ thumbs up
  ○ scale 1-4
• Student/Teacher/Peer Conferences
• Graphic Organizers (Venn diagram of relationships)
• Lab Reports (rubric used)
• Think/Pair/Share
• Homework
	designed to show cumulative knowledge and mastery of previous topics. These questions will address various DOK skills/concepts and will be asked in a variety of ways (MC, short answer, data interpretation, investigation design, implementation and revision)
	• Lab practical

Interdisciplinary Connections: *CORE AREA CONNECTIONS*

Literacy

- NJSLS-S.RST.11-12.7
- NJSLS-S.RST.11-12.9
- NJSLS-S.WHST.11-12.9

Mathematics

- NJSLS-S.MP.2
- NJSLS-S.MP.4
- NJSLS-S.HSN-Q.A.1
- NJSLS-S.HSN-Q.A.2
- NJSLS-S.HSN-Q.A.3
- NJSLS-S.HSA-SSE.A.1
- NJSLS-S.HSA-SSE.B.3
- NJSLS-S.HSA-CED.A.1
- NJSLS-S.HSA-CED.A.2
- NJSLS-S.HSA-CED.A.4
- NJSLS-S.HSF-IF.C.7
- NJSLS-S.HSS-IS.A.1

Career Ready Practices: *Note applicable CRPs used within the unit.*

NJ Career Ready Practices

- NJSLS-CLKS1
- NJSLS-CLKS2

- NJSLS-CLKS4
- NJSLS-CLKS5
- NJSLS-CLKS6
- NJSLS-CLKS7
- NJSLS-CLKS8
- NJSLS-CLKS9
- NJSLS-CLKS11
- NJSLS-CLKS12

Career Readiness, Life Literacies, & Key Skills (21st Century Themes & Skills): *Note applicable 2020 NJ standards 9.1, 9.2, 9.3, or 9.4 within the unit.*

NJ CTE

- NJSLS.9.2.12.CAP.4
- NJSLS-S.9.3.ST.1
- NJSLS-S.9.3.ST.6
- NJSLS-S.9.3.ST.ET.1
- NJSLS-S.9.3.ST.ET.2
- NJSLS-S.9.3.ST.ET.4
- NJSLS-S.9.3.ST.ET.5
- NJSLS-S.9.3.ST.SM.1
- NJSLS-S.9.3.ST.SM.2
- NJSLS-S.9.3.ST.SM.3

Integration of Technology: *Note applicable 2020 standards 8.1 & 8.2 used within the unit.*

Technology

- NJSLS.8.2.12.ED.3
- NJSLS.8.2.12.ED.4
- NJSLS.8.1.12.IC.1
- NJSLS.8.1.12.AP.9
- NJSLS.8.1.12.AP.7
- NJSLS.8.2.12.ITH.1
- NJSLS.8.2.12.ETW.4
- NJSLS.8.2.12.ITH.3
- NJSLS-S.8.2.12.NT.2

Course/Unit Resources:

Text/Materials: No Text book; Materials: computer simulations (Gizmo/Phet), Physics classroom.com, PhET, NJCTL, various lab equipment, Newsela, YouTube