Pace Charter School of Hamilton

52 Lafayette Avenue

Hamilton, NJ 08610

pacecharter.com

Science: 8th Grade

The Pace Charter School of Hamilton Science Department is committed to equipping the students of Hamilton Township with scientific habits of mind and scientific skill sets. Our sincere goal is for every student of Hamilton Township to leave our halls with an increased level of scientific literacy which will enable them to evaluate competing claims in a rapidly changing society. We aspire to have science make sense to every student, and for each of them to think critically and skeptically about the world they live in. Beyond this central goal, our general intent is to prepare our students for college, technical coursework, career, and life-long interest and curiosity for the sciences.

Science is a field of human endeavor that seeks the truth about how the natural world functions via what is commonly called "the scientific method." Although there is not one single scientific method, the heart of science centers on deductive reasoning and making claims based upon evidence. To reflect these central scientific values, the question that guides our Science Department is: "How do I/we know what is really true?" As we plan curricula, lessons, and activities, our focus is on presenting relevant material, placing emphasis on students analyzing data and solving problems, and ensuring effective communication among all parties.

Pace Charter School of Hamilton's Science Program Beliefs:

- Make sense of the world with the lens of science
- Demonstrate curiosity about the natural world
- Analyze argumentative claims based on available evidence
- Practice a balance of open-mindedness and skepticism as they navigate their world
- Make progress in attaining scientific literacy
- Apply scientific concepts to solve problems in sensible and creative ways
- Design solutions to real world problems using the integration of science, technology, engineering and mathematics
- Use data in making decisions and drawing conclusions
- See the relevance of science to their lives
- Be proud, life-long students of science!

Pace Charter School of Hamilton | **Curriculum and Pacing Guide**

Grade: 8th | **Content Area: Science**

Unit Title Scientific Method, Graphing, and CER	**Duration of Unit** 2 Weeks
Essential Questions	• What is the Scientific Method? • What is a dependent variable? • What is an independent variable? • What are the essential components of a graph? • What are the three parts of CER (Claim-Evidence-Reasoning)?
NJSLS Subject Area Standards/ Literacy Companion Standards (Reading & Writing)	MS-PS1-1 Developing models to describe the atomic composition of simple molecules and extended structures MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. RI.8.1. Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text. RI.8.2. Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text. SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade level topics, texts, and issues, building on others' ideas and expressing their own clearly. NJSLSA.L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
Learning Objectives	• Students will be able to explain and identify the different steps of the Scientific Method. • Students will be able to identify the manipulated variable, responding variable, and controls in the experiment. • Students will be able to properly graph variables. • Students will be able to accurately write a CER (Claim, Evidence, Reasoning)
Learning Activities	• Paper airplane lab • Graphing lab • "My Dad is an Alien" CER • Potted Plant Graphing and CER
Formative Assessment	• Daily Do Now questions • Informal checks for understanding • Class discussions • Classroom polls/ survey

	• Graded homework • Kahoot • BrainPOP
Alternative Assessment	• Student led labs listed above in "Learning Activities" • Group activities: • Demonstrations
Summative Assessment	• Lab reports • Lesson quizzes • Chapter test
Technology Standards	• 8.1.8.IC.2: Describe issues of bias and accessibility in the design of existing technologies. • 8.1.8.DA.3: Identify the appropriate tool to access data based on its file format. • 8.1.8.AP.2: Create clearly named variables that represent different data types and perform operations on their values. • 8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem. • 8.2.8.ITH.3: Evaluate the impact of sustainability on the development of a designed product or system. • 8.2.8.ETW.4: Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best. • 8.2.8.EC.1: Explain ethical issues that may arise from the use of new technologies. • 8.2.8.EC.2: Examine the effects of ethical and unethical practices in product design and development.
21st Century Life and Career Practices	• 9.1.8.CR.2: Compare various ways to give back through strengths, passions, goals, and other personal factors. • 9.1.8.CP.1: Compare prices for the same goods or services. • 9.1.8.EG.5: Interpret how changing economic and societal needs influence employment trends and future education. • 9.1.8.FP.6: Compare and contrast advertising messages to understand what they are trying to accomplish. • 9.1.8.PB.5: Identify factors that affect one's goals, including peers, culture, location, and past experiences. • 9.2.8.CAP.4: Explain how an individual's online behavior (e.g., social networking, photo exchanges, video postings) may impact opportunities for employment or advancement. • 9.2.8.CAP.9: Analyze how a variety of activities related to career preparation (e.g., volunteering, apprenticeships, structured learning experiences, dual enrollment, job search, scholarships) impacts post- secondary options. • 9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option. • 9.4.8.DC.8: Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities). • 9.4.8.GCA.1: Model how to navigate cultural differences with sensitivity and respect.

	• 9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.
Interdisciplinary Connections	Mathematics: • Students practice using quantitative data to support arguments in CER responses and draw conclusions • Students analyze data sets included in scientific research and understand how the data sets support the conclusion in the research. They may reference these data sets to help support their own conclusions when writing a CER response. ○ 8F.B. Use functions to model relationships between quantities. 5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
Instructional Materials/Resources/ Technology Resources	• Elevate Science - Physical, Savvas • Google Classroom • YouTube/ other video streaming services • BrainPOP • Kahoot • Chromebooks (1:1) • Smart Board • Classroom speakers • FM device

Accommodations and Modifications	**504** • Provide copy of class notes • Provide preferential seating • Use a consistent daily routine • Break down tasks into manageable units • Check homework on a daily basis • Frequently check for understanding • Allow for repetition and/or clarification of directions, as needed • Allow wait time for processing before calling on student for response • Announce test with adequate prep time • Additional time to complete classroom tests/quizzes **IEP** • Provide copy of class notes • Provide preferential seating • Use a consistent daily routine • Break down tasks into manageable units • Check homework on a daily basis • Frequently check for understanding • Allow for repetition and/or clarification of directions, as needed • Allow wait time for processing before calling on student for response • Announce test with adequate prep time • Additional time to complete classroom tests/quizzes **ELL** No students at this time **Gifted and Talented** • Provide extension, enrichment, acceleration, and complexity in specific areas of strength • Meet the needs of various learners through flexible grouping, being sure not to depend on advanced learners to often "teach" others. • Invite students to explore different points of view on a topic and compare them • Provide exploration and extension learning opportunities • Ask students higher-level questions • Provide open-ended, creative assessments • Provide more advanced/challenging test items **At Risk:** • I&RS (Intervention & Referral Services) • Provide copy of class notes • Use a consistent daily routine • Break down tasks into manageable units • Check homework on a daily basis • Frequently check for understanding • Allow for repetition and/or clarification of directions, as needed • Allow wait time for processing before calling on student for response • Announce test with adequate prep time • Additional time to complete classroom tests/quizzes

Unit Title Introduction to Matter	**Duration of Unit** 8 Weeks
Essential Questions	• What is matter?

	• How do you identify the properties used to describe matter? • How can you describe what makes up matter and the properties of matter? • What are the different categories for classifying matter? • What are different methods used to separate mixtures? • What units are used to express mass and volume? • What tools are used to measure volume, mass, length, and density? • What is density and how is it determined? • How do you describe a solid, liquid, or gas? • What happens to the particles of a solid as it melts? • What happens to the particles of a liquid as it vaporizes? • What happens to the particles of a solid as it sublimes? • How are pressure and temperature of a gas related? • How are volume and temperature of a gas related? • How are pressure and volume of a gas related?
NJSLS Subject Area Standards/ Literacy Companion Standards (Reading & Writing)	MS-PS1-1 Developing models to describe the atomic composition of simple molecules and extended structures MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society MS-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. RI.8.1. Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text. RI.8.2. Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text. SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade level topics, texts, and issues, building on others' ideas and expressing their own clearly. NJSLSA.L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
Learning Objectives	• Students will be able to define the term "matter" • Students will be able to classify matter through different physical and chemical properties.

	• Students will be able to identify and classify different types of matter and mixtures. • Students will be able to measure the mass, volume, and density of matter. • Students will be able to identify what happens during a physical and chemical change. • Students will be able to identify and describe the different states of matter. • Students will be able to describe the different properties of each state of matter. • Students will be able to identify and describe the ways in which matter changes state. • Students will be able to explain how the pressure, volume, and temperature of a gas are all related.
Learning Activities	• Elements, Compounds, and Mixtures • Nuts and Bolts Classification • Getting the Iron Out • Separating a Mixture • The Uncertainty of Measurement • The Mass of a Paper Clip • Mass of an Object • Volume of a Regularly Shaped Object • Volume of an Irregularly Shaped Object • Discovering Density • Density of a Liquid • Surface Tension, Adhesion, and Cohesion • The Mass of a Gas • Sublimation of Dry Ice • Hot and Cold Balloons • Look-alike Liquids
Formative Assessment	• Daily Do Now questions • Informal checks for understanding • Class discussions • Classroom polls/ survey • Graded homework • Kahoot • BrainPOP
Alternative Assessment	• Student led labs listed above in “Learning Activities” • Group activities • Demonstrations
Summative Assessment	• Lab reports • Lesson quizzes • Chapter test
Technology Standards	• 8.1.8.IC.2: Describe issues of bias and accessibility in the design of existing technologies. • 8.1.8.DA.3: Identify the appropriate tool to access data based on its file format. • 8.1.8.AP.2: Create clearly named variables that represent different data types and perform operations on their values.

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21st Century Life and Career Practices	• 9.1.8.CR.2: Compare various ways to give back through strengths, passions, goals, and other personal factors. • 9.1.8.CP.1: Compare prices for the same goods or services. • 9.1.8.EG.5: Interpret how changing economic and societal needs influence employment trends and future education. • 9.1.8.FP.6: Compare and contrast advertising messages to understand what they are trying to accomplish. • 9.1.8.PB.5: Identify factors that affect one's goals, including peers, culture, location, and past experiences. • 9.2.8.CAP.4: Explain how an individual's online behavior (e.g., social networking, photo exchanges, video postings) may impact opportunities for employment or advancement. • 9.2.8.CAP.9: Analyze how a variety of activities related to career preparation (e.g., volunteering, apprenticeships, structured learning experiences, dual enrollment, job search, scholarships) impacts post- secondary options. • 9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option. • 9.4.8.DC.8: Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities). • 9.4.8.GCA.1: Model how to navigate cultural differences with sensitivity and respect. • 9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

Interdisciplinary Connections	Mathematics:
	• Students practice balancing chemical equations using coefficients and subscripts to demonstrate that the number of atoms does not change during a chemical reaction
	• Students will measure the amounts of various matter during experiments or lab activities
	  ○ 8.EE.C7.b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
	  ○ 8.EE.A3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large

	or very small quantities, and to express how many times as much one is than the other.
Instructional Materials/Resources/ Technology Resources	• Elevate Science - Physical, Savvas • Google Classroom • YouTube/ other video streaming services • BrainPOP • Kahoot • Chromebooks (1:1) • Smart Board • Classroom speakers • FM device
Accommodations and Modifications	**504** • Provide copy of class notes • Provide preferential seating • Use a consistent daily routine • Break down tasks into manageable units • Check homework on a daily basis • Frequently check for understanding • Allow for repetition and/or clarification of directions, as needed • Allow wait time for processing before calling on student for response • Announce test with adequate prep time • Additional time to complete classroom tests/quizzes **IEP** • Provide copy of class notes • Provide preferential seating • Use a consistent daily routine • Break down tasks into manageable units • Check homework on a daily basis • Frequently check for understanding • Allow for repetition and/or clarification of directions, as needed • Allow wait time for processing before calling on student for response • Announce test with adequate prep time • Additional time to complete classroom tests/quizzes **ELL** No students at this time **Gifted and Talented** • Provide extension, enrichment, acceleration, and complexity in specific areas of strength • Meet the needs of various learners through flexible grouping, being sure not to depend on advanced learners to often "teach" others. • Invite students to explore different points of view on a topic and compare them • Provide exploration and extension learning opportunities • Ask students higher-level questions • Provide open-ended, creative assessments • Provide more advanced/challenging test items **At Risk:** • I&RS (Intervention & Referral Services) • Provide copy of class notes • Use a consistent daily routine • Break down tasks into manageable units • Check homework on a daily basis

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Unit Title Organizing the Elements	**Duration of Unit** 8 Weeks
Essential Questions	• What are the parts that make up an atom? • What is atomic theory? • What evidence supports the modern model of the atom? • Why do elements need to be organized? • What information does the periodic table contain and how is it useful? • What are the properties of metals, nonmetals, and metalloids? • What are some of the reasons we calculate half-life? • What makes an element radioactive? • Who was Marie Curie and how did her accomplishments help future women pursue careers in science?
NJSLS Subject Area Standards/ Literacy Companion Standards (Reading & Writing)	MS-PS1-1 Developing models to describe the atomic composition of simple molecules and extended structures MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. RI.8.1. Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text. RI.8.2. Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text. SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade level topics, texts, and issues, building on others' ideas and expressing their own clearly. NJSLSA.L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

Learning Objectives	• Students can identify and explain the key parts of an atom • Students can explain the difference between atomic number and atomic mass • Students will can identify and describe the different models of the atom • Students can recall which scientist created which model of the atom • Students understand how the first model of the atom has been adapted and changed over time • Students understand how the periodic table is organized • Students understand the organization of groups vs periods • Students will be able to identify and organize the different elements within the periodic table • Students can describe the properties of metals, non-metals, and metalloids • Students can describe the differences between metals, non-metals, and metalloids • Students can explain what happens to an atom during radioactive decay • Students can calculate and graph half-life • Students are able to analyze the significance of Marie Curie's discoveries, and explain why her contributions to science were so historically significant due to women's limited rights at the time
Learning Activities	• Atomic theory timeline • Atoms and the periodic table • Escape the Room: Periodic Table • Elemental Puns • Element cube project • Finding non-metals • Organizing the elements • Calculating half - life • Radiometric dating lab • Webquest: Researching influential women and other diverse groups of people (disabled people) and their accomplishment in science
Formative Assessment	• Daily Do Now questions • Informal checks for understanding • Class discussions • Classroom polls/ survey • Graded homework • Kahoot • BrainPOP
Alternative Assessment	• Student led labs listed above in "Learning Activities" • Group activities • Demonstrations
Summative Assessment	• Lab reports • Lesson quizzes • Chapter test
Technology Standards	• 8.1.8.IC.2: Describe issues of bias and accessibility in the design of existing technologies.

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Interdisciplinary Connections	Mathematics: • Students will express the number of atoms using exponents to show how small they are and demonstrate the size of the atom relative to regular objects around them ○ 8.EE.A2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

Instructional Materials/Resources/ Technology Resources	• Elevate Science - Physical, Savvas • Google Classroom • Periodic Table handout • YouTube/ other video streaming services • BrainPOP • Kahoot • Chromebooks (1:1) • Smart Board • Classroom speakers • FM device
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Unit Title Atoms and Bonding	**Duration of Unit** 8 Weeks
Essential Questions	• What causes atoms to bond together? • How are electrons involved in bond formation? • What types of bonds form between atoms? • How do valence electrons and bonding affect the properties of elements? • How does the type of bond contribute to certain properties of compounds? • How do ions and ionic bonds form? • How are the formulas and names of ionic compounds written? • What are the properties of ionic compounds? • How are atoms held together in a covalent bond? • What are the properties of molecular compounds? • How do bonded atoms become partially charged?
NJSLS Subject Area Standards/ Literacy Companion Standards (Reading & Writing)	MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. RI.8.1. Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text. RI.8.2. Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text. SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade level topics, texts, and issues, building on others' ideas and expressing their own clearly. NJSLSA.L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

Learning Objectives	• Students can determine an atom's valence electrons based on its location on the periodic table • Students can predict what type of bond a group of elements will form • Students can recall and identify the different types of chemical bonds • Students can recall the properties associated with each type of chemical bond • Students can compare the relative strengths of different chemical bonds • Students can calculate the net charge on an ion • Students can create lewis dot diagrams • Students can explain the differences between polar and nonpolar covalent bonds • Students can balance chemical equations • Students can correctly name chemical compounds
Learning Activities	• Identifying valence electrons • Gummy bear lab • Covalent bonding dot structure practice • Building electron dot diagrams • Chemical bonds graphic organizer • Modeling types of chemical bonds • Covalent, ionic, or metallic? • Attraction between polar molecules • Naming chemical compounds • Balancing chemical equations puzzle
Formative Assessment	• Daily Do Now questions • Informal checks for understanding • Class discussions • Classroom polls/ survey • Graded homework • Kahoot • BrainPOP
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Interdisciplinary Connections	Mathematics: • Students can calculate the charge on a molecule based on the number of electrons it has lost or gained while bonding ○ 8EE.C.7.Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).
Instructional Materials/Resources/ Technology Resources	• Elevate Science - Physical, Savvas • Google Classroom • YouTube/ other video streaming services • BrainPOP • Kahoot • Chromebooks (1:1) • Smart Board • Classroom speakers

	• FM device
Accommodations and Modifications	**504** • Provide copy of class notes • Provide preferential seating • Use a consistent daily routine • Break down tasks into manageable units • Check homework on a daily basis • Frequently check for understanding • Allow for repetition and/or clarification of directions, as needed • Allow wait time for processing before calling on student for response • Announce test with adequate prep time • Additional time to complete classroom tests/quizzes **IEP** • Provide copy of class notes • Provide preferential seating • Use a consistent daily routine • Break down tasks into manageable units • Check homework on a daily basis • Frequently check for understanding • Allow for repetition and/or clarification of directions, as needed • Allow wait time for processing before calling on student for response • Announce test with adequate prep time • Additional time to complete classroom tests/quizzes **ELL** No students at this time **Gifted and Talented** • Provide extension, enrichment, acceleration, and complexity in specific areas of strength • Meet the needs of various learners through flexible grouping, being sure not to depend on advanced learners to often "teach" others. • Invite students to explore different points of view on a topic and compare them • Provide exploration and extension learning opportunities • Ask students higher-level questions • Provide open-ended, creative assessments • Provide more advanced/challenging test items **At Risk:** • I&RS (Intervention & Referral Services) • Provide copy of class notes • Use a consistent daily routine • Break down tasks into manageable units • Check homework on a daily basis • Frequently check for understanding • Allow for repetition and/or clarification of directions, as needed • Allow wait time for processing before calling on student for response • Announce test with adequate prep time • Additional time to complete classroom tests/quizzes

Unit Title	**Duration of Unit**
Motion and Forces	6 Weeks

Essential Questions	• When is an object in motion? • How do you calculate speed? • How do you describe velocity? • How do you graph motion? • What is acceleration? • How do you graph acceleration? • How are forces described? • How do forces affect motion? • What factors affect friction? • What factors affect gravity? • What is Newton's first law of motion? • What is Newton's second law of motion? • What is Newton's third law of motion?
NJSLS Subject Area Standards/ Literacy Companion Standards (Reading & Writing)	MS-PS2-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. MS-PS2-2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. MS-PS2-3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. MS-PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. MS-PS2-5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. RI.8.1. Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text. RI.8.2. Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text. SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade level topics, texts, and issues, building on others' ideas and expressing their own clearly. NJSLSA.L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
Learning Objectives	• Students will be able to describe motion using terms like speed, velocity, and acceleration. • Students will be able to describe what motion, force, friction, and gravity are as well as the differences between them • Students can calculate net force

	• Students will be able to recall Newton's first three laws of motion and explain what they mean • Students will be able to calculate and graph factors such as acceleration, motion, and speed
Learning Activities	• Egg drop lab • Modeling Newton's laws of motion • Stopping on a Dime • Modeling unbalanced forces • Graphing acceleration, speed, and motion • Sticky Sneakers • Comparing types of friction
Formative Assessment	• Daily Do Now questions • Informal checks for understanding • Class discussions • Classroom polls/ survey • Graded homework • Kahoot • BrainPOP
Alternative Assessment	• Student led labs listed above in "Learning Activities" • Group activities • Demonstrations
Summative Assessment	• Lab reports • Lesson quizzes • Chapter test
Technology Standards	• 8.1.8.IC.2: Describe issues of bias and accessibility in the design of existing technologies. • 8.1.8.DA.3: Identify the appropriate tool to access data based on its file format. • 8.1.8.AP.2: Create clearly named variables that represent different data types and perform operations on their values. • 8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem. • 8.2.8.ITH.3: Evaluate the impact of sustainability on the development of a designed product or system. • 8.2.8.ETW.4: Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best. • 8.2.8.EC.1: Explain ethical issues that may arise from the use of new technologies. • 8.2.8.EC.2: Examine the effects of ethical and unethical practices in product design and development.
21st Century Life and Career Practices	• 9.1.8.CR.2: Compare various ways to give back through strengths, passions, goals, and other personal factors. • 9.1.8.CP.1: Compare prices for the same goods or services. • 9.1.8.EG.5: Interpret how changing economic and societal needs influence employment trends and future education. • 9.1.8.FP.6: Compare and contrast advertising messages to understand what they are trying to accomplish.

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Interdisciplinary Connections	Mathematics: • Students use algebra skills to rearrange formulas and solve for factors like speed and acceleration using data they gathered from the lab ○ 8.EE.C7.a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).
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Unit Title Energy/Renewable resources/waves	**Duration of Unit** 8 Weeks
Essential Questions	• What is energy? • How is energy transferred and conserved? • How do we know that objects have energy? • How is energy measured? • What are the types of energy? • What is heat and how is it transferred? • How do different materials affect heat transfer? • What is electricity? • What renewable resources can we utilize to minimize the number of nonrenewable materials we use? • How do nonrenewable resources contribute to climate change? How can renewable resources mitigate these effects?

	• What renewable resources can we utilize to minimize the number of nonrenewable materials we use? • How are waves measured?
NJSLS Subject Area Standards/ Literacy Companion Standards (Reading & Writing)	MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. MS-PS1-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. MS-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. MS-ESS2-6: Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. RI.8.1. Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text. RI.8.2. Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text. SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade level topics, texts, and issues, building on others' ideas and expressing their own clearly. NJSLSA.L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
Learning Objectives	• Students can define energy and the different types of energy hat exist • Students can define potential, kinetic, and total mechanical energy • Students can calculate potential, kinetic, and total mechanical energy • Students can define the main forms of energy and provide examples of each

	• Students can describe how heat is transferred and the different methods of heat transfer • Students can relate the flow of electrons to electrical current • Students can compare and contrast static and current electricity • Students can compare and contrast renewable and nonrenewable energy sources • Students are able to analyze the pros and cons of different energy sources and relate their understanding of these strengths and weakness to issues like climate change • Students understand that waves transfer energy not matter • Students can identify and describe the major properties of waves
Learning Activities	• Calculating mechanical energy • Efficiency lab • Solar Vehicles • Movement of Heat Lab • Keeping it Cool Lab • Energy transfer ice cream lab • Calculating specific heat • Renewable Resource Project • Building Parallel and Series Circuits • Practice with Ohm's law • Properties of light lab
Formative Assessment	• Daily Do Now questions • Informal checks for understanding • Class discussions • Classroom polls/ survey • Graded homework • Kahoot • BrainPOP
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