

GREEN TOWNSHIP SCHOOL DISTRICT



Content Area: Science
Course/Grade Level: 8th Grade

Curriculum Committee Members:

Principal:
Jon Paul Bollette

Board Approval Date:
10/21/26



8th Grade

Mission:

All students will develop an understanding of scientific concepts and processes essential for informed decision-making, meaningful participation in civic life, and readiness for postsecondary opportunities, including careers in STEM fields.

Vision:

Prepare students to become scientifically literate individuals who can effectively:

- Apply scientific thinking, skills, and understanding to real-world phenomena and problems;
- Engage in systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned;
- Conduct investigations, solve problems, and engage in discussions;
- Discuss open-ended questions that focus on the strength of the evidence used to generate claims;
- Read and evaluate multiple sources, including science-related magazine and journal articles and web-based resources to gain knowledge about current and past science problems and solutions and develop well-reasoned claims; and
- Communicate ideas through journal articles, reports, posters, and media presentations that explain and argue.



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Key Performance and Benchmark Tasks/Assessments

Formative assessments:

- Used to gauge student understanding and progress throughout the unit.
- Not necessarily graded
- Provide feedback for students to use to reflect, revise and refine their work.

Summative Assessments:

- Final projects or assessments to determine what students have learned over the course of the project or unit.

Benchmark Assessments:

- Teacher-created benchmark assessments to be given periodically during the year.

Alternative Assessments:

- Teacher modifies assignments and activities based on student needs.
- Oral assessments administered in place of written when necessary.
- Accommodation and modification ideas may be found here:
 - [Modifications & Accommodations Menu](#)
 - *Assessments other than paper & pencil tests See link for more info:*
http://education.qmu.edu/assets/docs/forms/mirs/assessment_brochure.pdf

Integrated Accommodations & Modifications

Please utilize the link below for ideas and strategies to use with ***ELL, Students with IEPs & 504s, At-Risk Students and Gifted & Talented Students.***

The attached worksheets can be printed ahead of each unit during the planning phase to help the teacher plan for the needs of particular students in each class, allowing for differentiation per unit and per year. The worksheets contain suggested accommodations and modifications for Content & Material, Student



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Organization, Instructional Strategies, Assessments, Attention/Focus, Written Language, and Social/Behavioral.
[Modifications & Accommodations Menu](#)



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Unit 1

Motion and Forces: Density and Motion

Pacing: 3 weeks

Unit Summary: In this unit, students develop the laboratory skills needed to accurately measure and analyze physical properties of matter and motion using the metric system. Through investigations and data analysis, students explore density, mass versus weight, and the relationships among speed, velocity, displacement, and acceleration.

Essential Questions:

- How do accurate measurements and proper laboratory techniques improve scientific investigations?
- How do mass, volume, density, and weight help us explain the behavior of matter?
- How can speed, velocity, displacement, acceleration, and graphs be used to describe and predict an object's motion?

Enduring Understandings:

- Accurate measurement and proper laboratory techniques are essential for collecting reliable scientific data and investigating the physical properties of matter.
- The physical properties of matter, including mass, volume, density, and weight, determine how materials behave and interact with one another.
- Motion can be described, measured, and predicted using speed, velocity, displacement, acceleration, and graphical representations.

New Jersey Student Learning Standards	Student Learning Objectives	Practices
MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures. 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.	• demonstrate the ability to accurately measure in metric linear, mass, and volume units following appropriate lab techniques. • measure and calculate the the density of various objects • compare the density of water to that of other materials. • differentiate between mass and weight. • describe an object's motion in terms of speed, velocity, and displacement.	• Planning and Carrying Out Investigations • Using Mathematics and Computational Thinking • Analyzing and Interpreting Data • Developing and Using Models • Obtaining, Evaluating, and



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- define acceleration in terms of the rate of change of velocity of an object.
- construct and interpret velocity and acceleration graphs.

- Communicating Information
- Constructing Explanations and Designing Solutions
 - Engaging in Argument from Evidence

Interdisciplinary Connections

2020 Career Readiness, Life Literacies, and Key Skills

- 9.4.8.CT.1 – Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to solve a problem.
- 9.4.8.IML.1 – Critically curate multiple resources to assess the credibility of sources when selecting information to answer questions.
- 9.4.8.TL.3 – Select appropriate tools to organize and present information.
- 9.4.8.TL.4 – Describe how technologies can be used to create, modify, and display digital artifacts.
- 9.4.8.TL.6 – Collaborate to develop and refine a digital artifact.

Instructional Materials & Resources

- *Glencoe iScience Physical Science Series*
(Mcgraw-Hill Companies, Inc. 2012)
- Discovery Education videos
- Glencoe ConnectEd online resources

Unit 1: Assessments

Formative assessments:

- Class discussions in which student share prior knowledge
- Quizzes



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- Task Cards
- Stations

Summative Assessments:

- Teacher-created quizzes
- Unit Test
- Speed Lab
- Acceleration Lab

Alternative Assessments:

Unit 1: Accommodations & Modifications

Please utilize the link below for ideas and strategies to use with ELL, Students with IEPs & 504s, At-Risk Students and Gifted & Talented Students. Note possible accommodations or modifications for this unit below.

[Modifications & Accommodations Menu](#)



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Unit 2

Motion and Forces: Newton's Laws	Pacing: 5 weeks
Unit Summary: In this unit, students investigate how forces influence the motion of objects by applying Newton's Laws of Motion, the Law of Universal Gravitation, and the Law of Conservation of Momentum. Through hands-on engineering challenges, including designing impact-absorbing systems and launching model rockets, students use scientific principles to analyze, predict, and improve the performance of moving objects.	
Essential Questions: • How do contact and non-contact forces affect the motion of objects? • How do Newton's Laws, gravity, and the conservation of momentum help us explain and predict motion? • How can engineers apply the principles of force and motion to design, test, and improve solutions to real-world challenges?	Enduring Understandings: • Forces, both contact and non-contact, interact to influence the motion of objects according to predictable physical laws. • Newton's Laws of Motion and the Law of Universal Gravitation explain and predict how objects move and interact in everyday life and throughout the universe. • Engineering design applies the principles of force, motion, and momentum to solve problems through testing, analysis, and refinement.

New Jersey Student Learning Standards	Student Learning Objectives	Practices
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-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. MS-ETS1-1. Define the criteria and constraints of a design problem	• Define and describe contact and non-contact forces. • describe the Law of Universal Gravitation with respect to mass and distance. • define friction as a force that resists motion. • describe the motion of an object in terms of the net forces acting upon it. (Newton's First Law) • identify and diagram the forces acting on an object at rest and in motion. • explain how acceleration results from the net forces acting on an object. (Newton's Second Law) • Use Newton's Second Law to describe the circular	• Developing and Using Models • Planning and Carrying Out Investigations • Using Mathematics and Computational Thinking • Constructing Explanations and Designing Solutions • Analyzing and Interpreting Data • Engaging in Argument from Evidence



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with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

motion of satellites.

- describe the motion of a rocket in terms of action and reaction (Newton's Third Law)
- Apply Newton's Laws to calculate variables to define the motion of an object in a given situation.
- Use the Law of the Conservation of Momentum to predict the motion of objects after a collision.
- design and test a compartment that successfully absorbs force from a predetermined altitude and evaluate their design for further modifications.
- Construct and launch a model rocket and critique all aspects of its performance.

- Obtaining, Evaluating, and Communicating Information

Interdisciplinary Connections

2020 Career Readiness, Life Literacies, and Key Skills

9.4.8.CT.1 – Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to solve a problem.

9.4.8.CT.2 – Develop criteria and constraints for a solution to a problem.

9.4.8.CT.4 – Explore the role of failure in the iterative design process.

9.4.8.TL.3 – Select appropriate tools to organize and present information.

9.4.8.TL.6 – Collaborate to develop and refine a digital artifact.



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Instructional Materials & Resources

- *Glencoe iScience Physical Science Series*
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- Discovery Education videos
- Glencoe ConnectEd online resources

Unit 2: Assessments

Formative assessments:

- Class discussions in which student share prior knowledge
- Quizzes

Summative Assessments:

- Teacher-created quizzes
- Teacher-created unit assessments
- Labs

Alternative Assessments:

Unit 2: Accommodations & Modifications

Please utilize the link below for ideas and strategies to use with ELL, Students with IEPs & 504s, At-Risk Students and Gifted & Talented Students. Note possible accommodations or modifications for this unit below.

[Modifications & Accommodations Menu](#)



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Unit 3

Motion and Forces: Work and Simple Machines and Solar Sprints solar car design project	Pacing: 2 weeks Solar Car design project: 3 weeks
Unit Summary: In this unit, students investigate the relationships among work, energy, power, and simple machines to understand how energy is transferred and transformed in physical systems. Through engineering design, students apply these concepts to build, test, and optimize a solar-powered car that meets specific performance criteria.	
Essential Questions: - How are work, energy, and power related in physical systems? - How do simple machines affect the way work is performed, and what determines their mechanical advantage and efficiency? - How can the principles of work and energy be applied to design, test, and improve engineering solutions such as a solar-powered car?	Enduring Understandings: - Work, energy, and power are interconnected concepts that describe how forces cause motion and transfer energy within a system. - Simple machines make work easier by changing the magnitude or direction of forces, but all machines involve tradeoffs between mechanical advantage and efficiency. - Engineering design uses scientific principles of work and energy to develop, test, and improve technological solutions to real-world problems.

New Jersey Student Learning Standards	Student Learning Objectives	Practices
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-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	- define work in terms of force and distance and perform associated calculations. - explain the relationship between work and energy. - apply the Law of the Conservation of Energy to a closed system. - differentiate between kinetic and potential energy. - calculate power requirements from given work criteria. - describe how simple machines affect how work is	- Using Mathematics and Computational Thinking - Planning and Carrying Out Investigations - Developing and Using Models - Constructing Explanations and Designing Solutions



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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-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

- done.
- distinguish between mechanical advantage and efficiency.
- calculate mechanical advantage and efficiency of a given system.
- design and construct a solar car to meet established criteria
- test and modify their solar car designs for maximized performance.

- Analyzing and Interpreting Data
- Obtaining, Evaluating, and Communicating Information
- Engaging in Argument from Evidence

Interdisciplinary Connections

2020 Career Readiness, Life Literacies, and Key Skills

- 9.4.8.CT.1 – Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to solve a problem.
- 9.4.8.CT.2 – Develop criteria and constraints for a solution to a problem.
- 9.4.8.CT.4 – Explore the role of failure in the iterative design process.
- 9.4.8.TL.3 – Select appropriate tools to organize and present information.
- 9.4.8.TL.6 – Collaborate to develop and refine a digital artifact.



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Instructional Materials & Resources

- *Glencoe iScience Physical Science Series*
(Mcgraw-Hill Companies, Inc. 2012)
- Discovery Education videos
- Glencoe ConnectEd online resources

Unit 3: Assessments

Formative assessments:

- Class discussions in which student share prior knowledge
- Quizzes

Summative Assessments:

- Teacher-created quizzes
- Teacher-created unit assessments
- Labs

Alternative Assessments:

Unit 3: Accommodations & Modifications

Please utilize the link below for ideas and strategies to use with ELL, Students with IEPs & 504s, At-Risk Students and Gifted & Talented Students. Note possible accommodations or modifications for this unit below.

[Modifications & Accommodations Menu](#)



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Unit 4

Motion and Forces: Force and Fluids	Pacing: 4 weeks
Unit Summary: In this unit, students investigate the properties and behavior of fluids by exploring pressure, buoyancy, and the principles that govern fluid motion. Students apply these concepts to explain hydraulic systems, flight, and the interactions of forces that enable objects to move through air and water.	
Essential Questions: - How do force, area, and depth affect pressure in fluids? - How do the principles of Archimedes, Pascal, and Bernoulli explain the behavior of fluids and the operation of hydraulic systems? - How do the four forces of flight work together to enable and control flight?	Enduring Understandings: - Pressure in fluids is determined by the relationship between force, area, depth, and fluid properties. - Scientific principles, including those of Archimedes, Pascal, and Bernoulli, explain how fluids behave and are applied in everyday technologies. - The motion of aircraft is the result of balanced and unbalanced forces acting within fluid systems.

New Jersey Student Learning Standards	Student Learning Objectives	Practices
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-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.	- describe pressure as a relationship between force and area. - measure and complete pressure calculations from given criteria. - distinguish between a liquid and a fluid. - describe the relationship between a fluid's pressure and its height. - discuss variations in air pressure on Earth. - apply Archimede's Principle correctly. - use Pascal's Principle to explain how hydraulic systems work. - demonstrate the relationship between fluid pressure and fluid velocity using Bernoulli's Principle.	- Using Mathematics and Computational Thinking - Developing and Using Models - Planning and Carrying Out Investigations - Constructing Explanations and Designing Solutions - Analyzing and Interpreting Data - Obtaining, Evaluating, and Communicating Information



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- identify and describe the four forces of flight
- Engaging in Argument from Evidence

Interdisciplinary Connections

2020 Career Readiness, Life Literacies, and Key Skills

- 9.4.8.CT.1 – Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to solve a problem.
- 9.4.8.CT.2 – Develop criteria and constraints for a solution to a problem.
- 9.4.8.CT.4 – Explore the role of failure in the iterative design process.
- 9.4.8.TL.3 – Select appropriate tools to organize and present information.
- 9.4.8.TL.6 – Collaborate to develop and refine a digital artifact.

Instructional Materials & Resources

- *Glencoe iScience Physical Science Series*
(Mcgraw-Hill Companies, Inc. 2012)
- Discovery Education videos
- Glencoe ConnectEd online resources

Unit 4: Assessments

Formative assessments:

- Class discussions in which student share prior knowledge
- Quizzes

Summative Assessments:

- Teacher-created quizzes



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- Teacher-created unit assessments
- Labs

Alternative Assessments:

Unit 4: Accommodations & Modifications

Please utilize the link below for ideas and strategies to use with ELL, Students with IEPs & 504s, At-Risk Students and Gifted & Talented Students. Note possible accommodations or modifications for this unit below.

[Modifications & Accommodations Menu](#)

Unit 5

Energy and Thermal Energy

Pacing: 3 weeks

Unit Summary: In this unit, students investigate the different forms of energy, how energy is transferred and transformed, and how the Law of Conservation of Energy applies to physical systems. Through scientific inquiry and engineering design, students explore heat transfer, temperature, and thermal properties while designing and improving an insulated container to minimize energy transfer.

Essential Questions:

- How is energy transformed while remaining conserved within a system?
- How do thermal energy, temperature, and the properties of materials affect heat transfer?
- How can an understanding of energy and heat transfer be used to design and improve technologies such as insulated containers?

Enduring Understandings:

- Energy exists in many forms and can be transformed from one form to another while being conserved within a closed system.
- Heat transfer and changes in temperature are governed by the movement of thermal energy and the properties of materials.
- Engineering design applies the principles of energy transfer and thermal properties to create solutions that meet specific performance criteria.



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New Jersey Student Learning Standards	Student Learning Objectives	Practices
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-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best	- differentiate between kinetic and potential energy. - describe the various types of potential energy. - identify and describe the main forms of energy: sound, thermal, electrical, radiant, nuclear, and mechanical. - explain how the law of the conservation of energy applies to energy transformations within a system. - distinguish between Kelvin, Fahrenheit, and Celsius temperature scales. - differentiate between thermal energy and temperature. - describe the transfer of heat in terms of radiation, conduction, and convection. - compare the specific heats of various materials and explain the reason for the differences. - contrast thermal expansion and contraction. - design an insulated container to meet established criteria and evaluate for further modifications.	- Developing and Using Models - Planning and Carrying Out Investigations - Using Mathematics and Computational Thinking - Constructing Explanations and Designing Solutions - Analyzing and Interpreting Data - Obtaining, Evaluating, and Communicating Information - Engaging in Argument from Evidence



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characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Interdisciplinary Connections

2020 Career Readiness, Life Literacies, and Key Skills

9.4.8.CT.1 – Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to solve a problem.

9.4.8.CT.2 – Develop criteria and constraints for a solution to a problem.

9.4.8.CT.4 – Explore the role of failure in the iterative design process.

9.4.8.TL.3 – Select appropriate tools to organize and present information.

9.4.8.TL.6 – Collaborate to develop and refine a digital artifact

Instructional Materials & Resources

- *Glencoe iScience Physical Science Series*
(Mcgraw-Hill Companies, Inc. 2012)
- Discovery Education videos
- Glencoe ConnectEd online resources

Unit 5: Assessments

Formative assessments:

- Class discussions in which student share prior knowledge
- Quizzes



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Summative Assessments:

- Teacher-created quizzes
- Teacher-created unit assessments
- Labs

Alternative Assessments:

Unit 5: Accommodations & Modifications

Please utilize the link below for ideas and strategies to use with ELL, Students with IEPs & 504s, At-Risk Students and Gifted & Talented Students. Note possible accommodations or modifications for this unit below.

[Modifications & Accommodations Menu](#)

Unit 6

Foundations of Chemistry

Pacing: 3 weeks

Unit Summary: In this unit, students investigate the composition and properties of matter by examining atomic structure, the organization of the Periodic Table, and the classification of substances. Students explore physical and chemical properties, analyze chemical reactions using the Law of Conservation of Mass, and investigate the factors that affect the rate of chemical reactions.

Essential Questions:

- How can matter be classified and described based on its composition, structure, and properties?
- How does the organization of the Periodic Table help us understand and predict the properties of elements?
- How do chemical reactions demonstrate the conservation of mass, and what factors influence the rate of a chemical reaction?

Enduring Understandings:

- All matter is composed of atoms and can be classified based on its composition, structure, and physical properties.
- The Periodic Table organizes elements according to their atomic structure and properties, allowing scientists to predict their behavior.
- Chemical reactions rearrange atoms to form new substances



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while conserving mass, and their rates can be influenced by various factors.

New Jersey Student Learning Standards	Student Learning Objectives	Practices
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-PS1-4. 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	• classify matter as elements, compounds or mixtures • define the characteristics of elements, compounds, and mixtures • describe the structure of an atom. • make distinctions between heterogeneous and homogeneous mixtures. • describe the organization of the Periodic Table of the Elements. • identify the structure of an element's atom based on the Periodic Table. • define the characteristics of metals, metalloids, and non-metals. • describe matter in terms of its physical properties. • distinguish between size-dependent and size-independent physical properties. • describe the state of matter of a substance in terms of the thermal energy of its particles. • explain the difference between physical and chemical properties. • differentiate between physical and chemical changes. • identify the signs of a chemical change. • demonstrate how chemical equations are used to detail the conservation of mass during a chemical reaction. • indicate how to speed up and slow down a chemical reaction.	• Developing and Using Models • Obtaining, Evaluating, and Communicating Information • Analyzing and Interpreting Data • Planning and Carrying Out Investigations • Using Mathematics and Computational Thinking • Constructing Explanations and Designing Solutions • Engaging in Argument from Evidence



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Interdisciplinary Connections

[2020 Career Readiness, Life Literacies, and Key Skills](#)

- 9.4.8.IML.1 – Critically curate multiple resources to assess the credibility of sources when selecting information to answer questions.
- 9.4.8.TL.3 – Select appropriate tools to organize and present information.
- 9.4.8.TL.4 – Describe how technologies can be used to create, modify, and display digital artifacts.
- 9.4.8.TL.6 – Collaborate to develop and refine a digital artifact.

Instructional Materials & Resources

- *Glencoe iScience Physical Science Series*
(Mcgraw-Hill Companies, Inc. 2012)
- Discovery Education videos
- Glencoe ConnectEd online resources

Unit 6: Assessments

Formative assessments:

- Class discussions in which student share prior knowledge
- Quizzes

Summative Assessments:

- Teacher-created quizzes
- Teacher-created unit assessments
- Labs

Alternative Assessments:



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Unit 6: Accommodations & Modifications

Please utilize the link below for ideas and strategies to use with ELL, Students with IEPs & 504s, At-Risk Students and Gifted & Talented Students. Note possible accommodations or modifications for this unit below.

[Modifications & Accommodations Menu](#)

Unit 7

Elements and Chemical Bonds

Pacing: 2 weeks

Unit Summary: In this unit, students investigate how the structure of atoms determines their chemical properties and how the arrangement of valence electrons influences bonding. Students explore the formation of ionic, covalent, and metallic bonds and explain how energy is transferred as atoms combine to form compounds.

Essential Questions:

- How does the arrangement of electrons influence an atom's chemical behavior?
- How do ionic, covalent, and metallic bonds form, and how do they affect the properties of substances?
- How does the organization of the Periodic Table help us predict bonding patterns and chemical reactivity?

Enduring Understandings:

- The arrangement of electrons, particularly valence electrons, determines an element's chemical properties and reactivity.
- Atoms form different types of chemical bonds to achieve stable electron configurations, resulting in substances with unique properties.
- The Periodic Table organizes elements into groups with similar properties, allowing scientists to predict bonding behavior and chemical interactions.

New Jersey Student Learning Standards

MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.

Student Learning Objectives

- differentiate between the electron energy levels within an atom.
- use the Periodic Table to determine the

Practices

- Developing and Using Models



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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-PS1-4. 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.

configuration of an atom's valence electrons and construct an electron-dot diagram.

- describe the characteristics of noble gases, halogens, and alkali metal groups.
- explain that atoms bond to form molecules.
- describe how energy is transferred when bonds are formed or broken.
- explain how covalent bonds form between two nonmetals.
- distinguish between polar and nonpolar covalent bonding.
- describe how ionic bonds form between a metal and a nonmetal.
- explain how metallic bonds form between two metals.

- Obtaining, Evaluating, and Communicating Information
- Constructing Explanations and Designing Solutions
- Analyzing and Interpreting Data
- Using Mathematics and Computational Thinking
- Planning and Carrying Out Investigations
- Engaging in Argument from Evidence

Interdisciplinary Connections

2020 Career Readiness, Life Literacies, and Key Skills

9.4.8.IML.1 – Critically curate multiple resources to assess the credibility of sources when selecting information to answer questions.

9.4.8.TL.3 – Select appropriate tools to organize and present information.

9.4.8.TL.4 – Describe how technologies can be used to create, modify, and display digital artifacts.

9.4.8.TL.6 – Collaborate to develop and refine a digital artifact.

Instructional Materials & Resources

- *Glencoe iScience Physical Science Series*
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- Discovery Education videos
- Glencoe ConnectEd online resources



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Unit 7: Assessments

Formative assessments:

- Class discussions in which student share prior knowledge
- Quizzes

Summative Assessments:

- Teacher-created quizzes
- Teacher-created unit assessments
- Labs

Alternative Assessments:

Unit 7: Accommodations & Modifications

Please utilize the link below for ideas and strategies to use with ELL, Students with IEPs & 504s, At-Risk Students and Gifted & Talented Students. Note possible accommodations or modifications for this unit below.

[Modifications & Accommodations Menu](#)

Unit 8

Atmosphere

Pacing: 3 weeks

Unit Summary: In this unit, students investigate the composition and structure of Earth's atmosphere and analyze how energy transfer processes influence weather, climate, and global atmospheric patterns. Students explore the greenhouse effect, climate change, and the movement of air through global and local wind systems to understand interactions within Earth's climate system.



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Essential Questions:

- How does the structure and composition of Earth's atmosphere influence conditions on our planet?
- How does energy move through the atmosphere and affect weather, climate, and the greenhouse effect?
- How do global and local wind systems develop and influence Earth's climate patterns?

Enduring Understandings:

- Earth's atmosphere is a complex system composed of layers and gases that interact to regulate energy, weather, and climate.
- Energy transfer through radiation, conduction, convection, and latent heat drives atmospheric processes and influences Earth's temperature and climate patterns.
- Global and local wind systems are shaped by atmospheric conditions, Earth's rotation, and the unequal heating of Earth's surface.

New Jersey Student Learning Standards	Student Learning Objectives	Practices
MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. 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. MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	• identify components of Earth's atmosphere. • detail the layers of Earth's atmosphere and their characteristics. • describe how energy transfer in the atmosphere occurs. • distinguish between radiation, conduction, and convection. • evaluate and graph the role of latent heat in energy storage • explain how the Greenhouse Effect occurs and its importance • identify and appraise current arguments related to climate change. • name and describe the four major global air currents • relate the Coriolis Effect to global wind systems. • distinguish between local and global winds.	• Developing and Using Models • Analyzing and Interpreting Data • Obtaining, Evaluating, and Communicating Information • Constructing Explanations and Designing Solutions • Planning and Carrying Out Investigations • Using Mathematics and Computational Thinking • Engaging in Argument from Evidence

Interdisciplinary Connections



8th Grade

2020 Career Readiness, Life Literacies, and Key Skills

- identify components of Earth's atmosphere.
- detail the layers of Earth's atmosphere and their characteristics.
- describe how energy transfer in the atmosphere occurs.
- distinguish between radiation, conduction, and convection.
- evaluate and graph the role of latent heat in energy storage
- explain how the Greenhouse Effect occurs and its importance
- identify and appraise current arguments related to climate change.
- name and describe the four major global air currents
- relate the Coriolis Effect to global wind systems.
- distinguish between local and global winds.

Instructional Materials & Resources

- *Glencoe iScience Physical Science Series*
(Mcgraw-Hill Companies, Inc. 2012)
- Discovery Education videos
- Glencoe ConnectEd online resources

Unit 8: Assessments

Formative assessments:

- Class discussions in which student share prior knowledge
- Quizzes

Summative Assessments:

- Teacher-created quizzes
- Teacher-created unit assessments
- Labs



8th Grade

Alternative Assessments:

Unit 8: Accommodations & Modifications

Please utilize the link below for ideas and strategies to use with ELL, Students with IEPs & 504s, At-Risk Students and Gifted & Talented Students. Note possible accommodations or modifications for this unit below.

[Modifications & Accommodations Menu](#)

Unit 9

Weather

Pacing: 3 weeks

Unit Summary: In this unit, students investigate the variables that influence weather, including atmospheric pressure, air masses, fronts, clouds, and oceanic circulation. Students collect, graph, and analyze weather data using scientific instruments and weather maps to identify patterns and make predictions about future weather conditions.

Essential Questions:

- How do atmospheric conditions and air movement influence weather patterns?
- How do scientists collect and analyze weather data to understand and predict changes in weather?
- How do air masses, fronts, and ocean currents affect weather and climate?

Enduring Understandings:

- Weather is the result of interactions among atmospheric variables, air masses, pressure systems, and energy transfer within Earth's atmosphere.
- Scientists use weather instruments, data analysis, and models to observe, interpret, and predict weather patterns.
- Large-scale systems, including ocean currents, air masses, and fronts, influence regional weather and climate patterns.

New Jersey Student Learning Standards

Student Learning Objectives

Practices



8th Grade

MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. 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.	• identify and explain the variables used to describe the weather. • differentiate the various cloud types and identify the weather associated with each. • demonstrate an understanding of high and low pressure systems. • identify characteristics of the major air masses that affect weather patterns in North America. • identify and describe the various types of fronts that occur at air mass boundaries and the weather patterns associated with each. • summarize the effect of oceanic circulation on weather and climate. • describe various instruments used for measuring weather. • graph and interpret data gathered from weather instruments. • interpret weather maps and predict future outcomes.	• Analyzing and Interpreting Data • Developing and Using Models • Obtaining, Evaluating, and Communicating Information • Planning and Carrying Out Investigations • Constructing Explanations and Designing Solutions • Using Mathematics and Computational Thinking • Engaging in Argument from Evidence
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Interdisciplinary Connections

2020 Career Readiness, Life Literacies, and Key Skills

- 9.4.8.IML.1 – Critically curate multiple resources to assess the credibility of sources when selecting information to answer questions.
- 9.4.8.TL.3 – Select appropriate tools to organize and present information.
- 9.4.8.TL.5 – Compare the process and results of using different digital tools to complete a task.
- 9.4.8.TL.6 – Collaborate to develop and refine a digital artifact.

Instructional Materials & Resources

McGraw Hill Physical Science Text



8th Grade

McGraw Hill Weather and Climate Text

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Unit 9: Accommodations & Modifications

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