Englewood Public School District
Science
Grade 8
First Marking Period

Unit 1: Structure and Properties of Matter

Overview: Students build understandings of what occurs at the atomic and molecular scale. Students apply their understanding that pure substances have characteristic properties and are made from a single type of atom or molecule. They also provide a molecular level accounts to explain states of matter and changes between states. The crosscutting concepts of *cause and effect, scale, proportion and quantity, structure and function, interdependence of science, engineering, and technology*, and *the influence of science, engineering and technology on society and the natural world* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade appropriate proficiency in *developing and using models*, and *obtaining, evaluating, and communicating information*. Students are also expected to use the scientific and engineering practices to demonstrate understanding of the core ideas.

Time Frame: 15 to 20 Days

Enduring Understandings:
Substances are made from different types of atoms that can combine in various ways.
Each pure substance has characteristic physical and chemical properties that can be used to identify it.

Essential Questions:
How is it that everything is made of stardust?
What is the universe made of?
Is it possible to tell if two substances mixed or if they reacted with each other?

Standards	Topics and Objectives	Activities	Resources	Assessments
(MS-PS1-1) **Develop models to describe the atomic composition of simple molecules and extended structures.** **(MS-PS1-2)**	**Topics** Describing Matter Changes in Matter Twenty-First Century Themes and Skills include: • The Four C's • Life and Career Skills • Information and Media literacy	Students will complete the text activities: 1. Discover Activity (p6) What is a Mixture? 2. Interpreting Data Activity (p8) Melting/Boiling point 3. Discover Activity (p22) Is a New Substance Formed? Students will explore the interactive tutorial Particulate Nature of Matter.	**Text:** Prentice Hall Science Explorer: Chemical Building Blocks **Materials:** For Discover Activity (p6) What is a Mixture? • Small objects: checkers, marbles papers clips of different sizes and colors For Discover Activity (p22) Is	**Formative Assessments:** • Journals • Learning/Response Logs • Discussions **Summative Assessments:** Unit quizzes and test Student will use models to differentiate between

Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	**Objectives** Students will: Develop a model of a simple molecule and describe its atomic composition. Analyze and interpret data to determine similarities and differences from results of chemical reactions between substances before and after they undergo a chemical process.	(CRP4, 8.2.8.A.2, 6.1.8.C.4b) Students will complete the Lab: Identifying Elements, Compounds, and Mixtures. Students will watch a demonstration of chemical changes and complete the Chemical Change Un-Notes page to introduce the concept of chemical change and discuss with peers. (MS-PS1-2, 8.EE.A.3, CRP8, 9.2.8.B.3, RST.6-8.1) Students will the complete the Chemical vs. Physical Group Challenge. (MS-PS1-1, MP.4) Students will complete the Physical and Chemical Change Station Lab. (CRP4, 8.2.8.A.2) Students will view the Chemical Change Song, Elephant Toothpaste 1, Elephant Toothpaste 2 videos. **Enrichment Activity:** Students will complete the virtual labs Molecular Models and Physical or Chemical Change? (RST.6-8.7)	a New Substance Formed?) • Chalk • Sheet of paper • Metal spoon • Vinegar • Dropper **Websites:** • Particulate Nature of Matter **Videos:** • Chemical Change Song • Elephant Toothpaste 1 • Elephant Toothpaste 2 **Enrichment Lesson Plans:** See Molecular Models and Physical or Chemical Change? Virtual lab **Additional Resources:** http://www.learningscience.org/psc3bstrucpropmatter.htm http://www.thesciencezone.org/uploads/1/0/7/2/10722737/structure_of_matter_reading_4th.pdf **Book:** The Structure And Properties Of Matter, by Herman T. Briscoe	different types of matter in the Lab: Identifying Elements, Compounds, and Mixtures. Projects, Drawings, Charts, Graphs, Journals Students will provide evidence that a physical or chemical change has occurred during the Physical and Chemical Change Station Lab. Observation, Simulations Students will develop a model of a simple molecule. Project, Drawing, Response Log/Journal **Benchmark Assessments:** • Exact Path • Common Formative Assessment **Alternative Assessments:** Student understanding will be gauged based on responses to Chemical vs. Physical Group Challenge. Peer Assessment Student will analyze and interpret data to determine similarities and differences from results of chemical reactions between substances before and after they undergo a chemical process. Graphic Organizers, Rubric

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

ELL/ESL students: Students will be supported according to the recommendations for "can do's" as outlined by WIDA – https://www.wida.us/standards/CAN_DOs/
This particular unit has limited language barriers due to the physical nature of the curriculum.

Students at risk of school failure: Formative and summative data will be used to monitor student success at first signs of failure student work will be Reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity In planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	**Special Education**	**At-Risk**	**Gifted and Talented**
● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Speak and display terminology ● Teacher modeling ● Peer modeling ● Provide ELL students with multiple literacy strategies. ● Word walls ● Use peer readers ● Give page numbers to help the students find	● Utilize modifications & accommodations delineated in the student's IEP ● Work with paraprofessional ● Use multi-sensory teaching approaches. ● Work with a partner ● Provide concrete examples ● Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA). ● Provide students with multiple choices for how	● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Using visual demonstrations, illustrations, and models ● Give directions/instructions verbally and in simple written format. Oral prompts can be given. ● Peer Support ● Increase one on one time ● Teachers may modify instructions by modeling what the student is expected to do ● Instructions may be printed	● Inquiry-based instruction ● Independent study ● Higher order thinking skills ● Adjusting the pace of lessons ● Interest based content ● Real world scenarios ● Student Driven Instruction ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understand -ings. ● Use project-based science learning to connect science with observable phenomena. ● Structure the learning around explaining or solving a social or

answers ● Provide a computer for written work ● Provide two sets of textbooks, one for home and one for school ● Provide visual aides ● Provide additional time to complete a task ● Use graphic organizers	they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	out in large print and hung up for the student to see during the time of the lesson. ● Review behavior expectations and make adjustments for personal space or other behaviors as needed. ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).	community-based issue. ● Collaborate with after-school programs or clubs to extend learning opportunities.

Interdisciplinary Connections:

ELA-NJSLS/ELA:

RST.6-8.1: Cite specific textual evidence to support analysis of science and technical texts. (MS-PS1-2)
RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-1),(MS-PS1-2)

Mathematics:
8.EE.A.3: 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. (MS-PS1-1)

Career Ready Practices:
CRP4: Communicate clearly and effectively and with reason.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Integration of Technology Standards NJSLS 8:
8.2.8.A.2: Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.

Integration of 21st Century Standards NJSLS 9:
9.2.8.B.3
Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

Social Studies:
6.1.8.C.4.b: Explain how major technological developments revolutionized land and water transportation, as well as the economy, in New Jersey and the nation.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models • Develop a model to predict and/or describe phenomena. (MS-PS1-1) **Analyzing and Interpreting Data** • Analyze and interpret data to determine similarities and differences in findings. (MS-PS1-2)	**PS1.A: Structure and Properties of Matter** • Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1) • Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1) • Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2) **PS1.B: Chemical Reactions** • Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2)	**Scale, Proportion, and Quantity** • Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1) **Patterns** • Macroscopic patterns are related to the nature of microscopic and atomic-level structure. (MS-PS1-2) - ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence** • Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS1-2)

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Unit 2: Interactions of Matter

Overview: Students build understandings of what occurs at the atomic and molecular scale. Students apply their understanding that pure substances have characteristic properties and are made from a single type of atom or molecule. They also provide a molecular level accounts to explain states of matter and changes between states. The crosscutting concepts of *cause and effect, scale, proportion and quantity, structure and function, interdependence of science, engineering, and technology*, and *the influence of science, engineering and technology on society and the natural world* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade appropriate proficiency in *developing and using models*, and *obtaining, evaluating, and communicating information*. Students are also expected to use the scientific and engineering practices to demonstrate understanding of the core ideas.

Time Frame: 20 to 25 Days

Enduring Understandings:
Changes in particle motion, temperature, and state of a pure substance occur when thermal energy is added or removed.
In a chemical process, the atoms that make up the original substances are regrouped into different molecules.

Essential Questions:
How can we trace synthetic materials back to natural ingredients?
How can you tell what the molecules are doing in a substance?

Standards	Topics and Objectives	Activities	Resources	Assessments
(MS-PS1-3) **Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.** **(MS-PS1-4)**	**Topics** States of Matter Changes in States of Matter Polymers Twenty-First Century Themes and Skills include: • The Four C's • Life and Career Skills • Information and Media	Students will complete the text activities: 1. Discover Activity (p42) What are Solids, Liquids and Gases? 2. Lab Activity (p46) As Thick as Honey (Viscosity) 3. Lab Activity (p50) Keeping It Cool 4. Lab (p54) Melting Ice 5. Discover Activity (p55) How Can Air Keep Chalk from Breaking?	**Text:** Prentice Hall Science Explorer: Chemical Building Blocks **Materials:** For Discover Activity (p42) What are Solids, Liquids and Gases? • Fizzing antacid tablet, large balloon, soda bottle, water	**Formative Assessments:** • Journals • Learning/Response Logs • Discussions **Summative Assessments:** Unit quizzes and test Students learning needs will be gauged based on responses to *Lab Activity (p46) As Thick*

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.	literacy **Objectives** Students will: Predict changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed in natural or designed systems. Obtain, evaluate, and communicate information to show that synthetic materials come from natural resources and affect society.	6. Lab (p66) It's a Gas 7. Discover Activity (p118) What Did You Make? Students will complete the Oobleck Lab to compare properties of different states of matter and explore polymers. (9.2.8.B.3, 6.1.8.C.4.b, WHST.6-8.8) Students will use States of Matter:, Molecular View of a Gas:, Molecular View of a Liquid: , and, Molecular View of a Solid: interactive computer models to trace an atom's trajectory at a certain physical stage, and investigate how molecular behavior is responsible for the substance's state. (MS-PS1-3, 8.2.8.C.5, RST.6-8.7, RST.6-8.1) Students will view the States of Matter Rap. **Enrichment Activity:** Students will complete the Lab (p126) Design and Build a Polymer Package. (MS-PS1-4, CRP6, 8.2.8.C.5, 8.2.8.C.4)	For Lab Activity (p46) As Thick as Honey (Viscosity) • Three clear jars with lids • Honey • Vegetable oil • A third thick liquid • Paper towels For Lab Activity (p50) Keeping It Cool • 2 alcohol thermometers • 2 pieces of gauze • Paper towels • Aluminum foil • 2 medicine droppers • Water • Nail polish remover For Lab (p54) Melting Ice • Timer • Thermometer • 2 plastic cups • 2 plastic stirring rods • Ice cube • Warm water • Water at room temperature For Discover Activity (p55) How Can Air Keep Chalk from Breaking? • 3 pieces of chalk • Sheet of waxed paper or plastic bubble wrap • Tape For Lab (p66) It's a Gas • Strong plastic syringe without the needle • Modeling clay • 4 books of uniform weight.	*as Honey (Viscosity)* and *Lab Activity (p50) Keeping It Cool.* Discussion, Journals, Think Pair Share Students will receive a grade for analysis questions for the following labs: *Lab (p54) Melting Ice, and Lab (p66) It's a Gas.* Questioning, Rubric, Self-Assessment Students will demonstrate understanding of properties of states of matter, changes in state, and polymers by completing the Oobleck Lab. Written Responses, Discussion, Questioning, Observing Student responses to States of Matter:, Molecular View of a Gas:, Molecular View of a Liquid: , and Molecular View of a Solid: interactive computer models show understanding of how thermal energy changes particle motion. Models/Projects, Journal Assignments, Review **Benchmark Assessment:** See Unit 1 for quarterly assessment **Alternative Assessments:** Students will use positive and negative numbers to represent changes in particle motion

For Discover Activity (p118) What Did You Make?

- White school glue
- Saturated solution of borax and water
- Paper cups
- Stirrers
- Large spoons

For Oobleck Lab

- Borax solution [15 ml Borax dissolved in 250 ml of warm water]
- Elmer's glue mixture [30 ml of glue mixed with 30 ml water]
- Zipper-lock plastic bag (small)
- 2 bowls
- Measuring spoons and cup
- Green food coloring

Websites:

- States of Matter:
- Molecular View of a Gas:
- Molecular View of a Liquid:
- Molecular View of a Solid:

Videos:

- States of Matter Rap

Enrichment Materials:
For Lab (p126) Design and Build a Polymer Package

- Water
- Hand lens
- Weights or books
- Scissors

and temperature when thermal energy is added or removed.

Multiple Choice, Checklists

Students will gather relevant information from multiple print and digital sources about the impact on society of synthetic materials that are formed from natural resources.

Research, Computers, Rubric, Observations

Students will describe how information about how synthetic materials formed from natural resources affect society is supported or not supported by evidence.
Writing, Reflection Journals, Discussion/Responses

Students will develop a model that predicts and describes changes in particle motion that could include molecules or inert atoms or pure substances.
Projects, Checklists, Rubrics, Peer Reviews

		• Packaging tape • Thermometer • Balance • Hot plate • Timer • Containers (20 beakers, trays, or plastic cups) • Iodine solution, 1% (10mL) • Cookies or hardboiled eggs • Polymers used in packaging (paper, Tyvek, plastic foam, ecofoam, cardboard, fabric, popcorn, sawdust, wood shavings, plastic)

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all
instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

ELL/ESL students: Students will be supported according to the recommendations for "can do's" as outlined by WIDA – https://www.wida.us/standards/CAN_DOs/
This particular unit has limited language barriers due to the physical nature of the curriculum.

Students at risk of school failure: Formative and summative data will be used to monitor student success at first signs of failure student work will be Reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity In planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	Special Education	At-Risk	Gifted and Talented
• Use peer readers • Speak and display terminology • Teacher modeling • Peer modeling • Provide ELL students with multiple literacy strategies. • Word walls • Give page numbers to help the students find answers • Provide a computer for written work • Provide two sets of textbooks, one for home and one for school • Provide visual aides • Provide additional time to complete a task • Use graphic organizers	• Use peer readers • Utilize modifications & accommodations delineated in the student's IEP • Work with paraprofessional • Use multi-sensory teaching approaches. • Work with a partner • Provide concrete examples • Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA). • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	• Peer Support and modeling • Using visual demonstrations, illustrations, and models • Give directions/instructions verbally and in simple written format. Oral prompts can be given. • Increase one on one time • Teachers may modify instructions by modeling what the student is expected to do • Instructions may be printed out in large print and hung up for the student to see during the time of the lesson. • Review behavior expectations and make adjustments for personal space or other behaviors as needed. • Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project,	• Real world scenarios • Curriculum compacting • Inquiry-based instruction • Independent study • Higher order thinking skills • Adjusting the pace of lessons • Interest based content • Student Driven Instruction • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. • Use project-based science learning to connect science with observable phenomena. • Structure the learning around explaining or solving a social or community-based issue. • Collaborate with after-school programs or clubs to extend learning opportunities.

		journal articles, and biographies).	

Interdisciplinary Connections:

ELA-NJSLS/ELA:

RST.6-8.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. (MS-PS1-3)

RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). *(MS-PS1-4)*
WHST.6-8.8: Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-PS1-3)

Social Studies:
6.1.8.C.4.b: Explain how major technological developments revolutionized land and water transportation, as well as the economy, in New Jersey and the nation.

Career Ready Practices:
CRP6: Demonstrate creativity and innovation.

Integration of Technology Standards NJSLS 8:
8.2.8.C.4: Identify the steps in the design process that would be used to solve a designated problem.
8.2.8.C.5: Create a technical sketch of a product with materials and measurements labeled.

Integration of 21st Century Skills:
9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information • Gather, read, and synthesize information from multiple appropriate sources and assess	**PS1.A: Structure and Properties of Matter** • Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that	**Structure and Function** • Structures can be designed to serve particular functions by taking into account properties of different materials, and how

the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3) **Developing and Using Models** • Develop a model to predict and/or describe phenomena. (MS-PS1-4)	can be used to identify it. (MS-PS1-3) • Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4) • In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4) **PS1.B: Chemical Reactions** • Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2),(MS-PS1-3) **PS3.A: Definitions of Energy** • The term "heat" as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. *(secondary to MS-PS1-4)* • The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system's total thermal energy. The total thermal energy (sometimes	materials can be shaped and used. (MS-PS1-3) **Cause and Effect** • Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4) - ***Connections to Engineering, Technology, and Applications of Science*** **Interdependence of Science, Engineering, and Technology** • Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-PS1-3) **Influence of Science, Engineering and Technology on Society and the Natural World** • The uses of technologies and any limitation on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-PS1-3)

	called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. *(secondary to MS-PS1-4)*	