Unit Title: Looking at the Properties of Matter	**Content Area:** Physical Science	**Grade Level:** 8th Grade

Unit Summary: This is a mini unit designed to review and cover skills that students will need in order to fully master the Unit: "Experimenting with Mixtures, Compounds, and Elements."
Furthermore, students will revisit the concept that all matter is composed of extremely small particles called atoms. Students will be reviewing the States of Matter, Periodic Table, How to Balance Chemical Equations, and Bonds between elements (covalent and ionic.)

Crosscutting Concepts: Patterns; Cause and Effect; Scale, Proportion, and Quantity; Energy and Matter: Flows, Cycles, and Conservation
Science and Engineering Practices: Asking Questions and Defining Problems; Developing and Using Models; Engaging in Argument from Evidence; Constructing Explanations and Designing Solutions; Using Mathematical and Computational Thinking

Unit Essential Questions:	**Unit Enduring Understanding:**
• Why learn the Periodic Table?	• All matter comes from a smaller unit called an atom. • The Periodic Table of Elements allows us to be able to organize and see the pattern in which atoms are arranged from lightest to heaviest.

Possible Student Misconceptions:
- The Periodic Table in its present form is the way the elements have always been categorized.
- There is only one way to categorize the elements, consensus was easily achieved.

NJCCCS: 5.2.8.A.1, 5.2.8.A.4, 5.2.8.A.5, 5.2.8.A.6, 5.2.8.A.7

NGSS Performance Expectations: *Students who demonstrate understanding can…*

- MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures. Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.
- 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. Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.
- 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. Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.

Primary CCSS ELA/Literacy Connections: RST.6-8.1; RST.6-8.7	**Primary CCSS Mathematics Connections:** MP.2; MP.4, 6.RP.A.3, 6.SP.B.4; 6.SP.B.5, 8.EE.A.3

Lesson Pace & Sequence

Lesson Title/Number: Molecules Matter	**Learning Objective(s):** Students will describe their observations about water on the molecular level using the idea that water is composed of tiny molecules that are attracted to one another.	**Lesson Duration:** 100 minutes (or 2 50 minute classes)

Learning Cycle ***What lesson elements will support students' progress towards mastery of the learning objectives(s)?*** ****Elements do not have to be in conducted in sequence.***	***Learning Activities*** ***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?***	***Resources/Materials*** ***What curricular resources/materials are available to facilitate the implementation of the learning activities?***	***Science and Engineering Practices*** ***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?***	***Disciplinary Core Ideas*** ***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?***	***Crosscutting Concepts*** ***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?***
Elicit: How will you access students' prior knowledge?	Ask students to jot down what they believe chemistry is.	• Chart paper • Markers • Smart board			

Engage: How will you capture students' interest and get students' minds focused on the concept/topic?	Have a whole group discussion about what chemistry and matter are.				
Explore: What hands-on/minds-on common experience(s) will you provide for students?	Students look closely at a drop of water and move drops of water on wax paper. They see that the water holds together well and is not so easy to separate. The goal is for students to begin thinking about water, or any substance, on the molecular level and to conclude that water molecules must be attracted to one another.	• Water in a small cup • Pipette • Popsicle sticks • Wax paper • Index cards • Tape • Chapter 1: Lesson 1.1 Molecules Matter	Developing and Using Models Develop a model to predict and/or describe phenomena.	PS1.A: Structure and Properties of Matter Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. 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.	Patterns; Cause and Effect
Explain: How will you help students connect their exploration to the concept/topic under investigation?	Show an animation of the molecules in water (liquid).	• Projector or Smart board: http://www.middleschoolchemistry.com/multimedia/chapter1/lesson1#particles_of_a_liquid	Lesson Title/Number:		Patterns
Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?	Students will have to draw their own model of water on the molecular level	• Chapter 1: Lesson 1.1 Molecules Matter	Develop a model to predict and/or describe phenomena.		Cause and Effect
Extend: How will students deepen their conceptual understanding through use in new context?	Show a video so that students can see an example that water molecules are attracted to one another.	• Projector or Smart board: http://www.middleschoolchemistry.com/multimedia/chapter1/lesson1#particles_of_a_liquid			
Lesson Title/Number: Moving Molecules in a Solid		**Learning Objective(s):** Students will describe, on the molecular level, how heating and cooling affect the motion of atoms in a solid.		**Lesson Duration:** 100 minutes (or 2 50 minute classes)	
Learning Cycle ***What lesson elements will support students' progress towards mastery of the learning objectives(s)?*** ****Elements do not have to be in***	***Learning Activities*** ***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?***	***Resources/Materials*** ***What curricular resources/materials are available to facilitate the implementation of the learning activities?***	***Science and Engineering Practices*** ***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?***	***Disciplinary Core Ideas*** ***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?***	***Crosscutting Concepts*** ***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?***

conducted in sequence.					
Elicit: How will you access students' prior knowledge?	Review what students have discovered about molecules in a liquid and discuss whether these same ideas might apply to solids				
Engage: How will you capture students' interest and get students' minds focused on the concept/topic?	Show an animation to help students compare atoms and molecules in solids and liquids	• http://www.middleschoolchemistry.com/multimedia/chapter1/lesson4#particles_of_a_solid		PS1.A: Structure and Properties of Matter Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).	Scale, Proportion, and Quantity
Explore: What hands-on/minds-on common experience(s) will you provide for students?	Teacher will demonstrate that solid metal expands when it is heated and contracts when cooled	• Ball and ring designed for the demonstration (if not available there is a video) • Bunsen burner • Room temperature water • Chapter 1: Lesson 4 Moving Molecules in a Solid • Heating and Cooling a Metal Ball: http://www.middleschoolchemistry.com/multimedia/chapter1/lesson4#heating_cooling_metal_ball	Asking questions and defining problems	PS1.A: Structure and Properties of Matter Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). 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)	
Explain: How will you help students connect their exploration to the concept/topic under investigation?	Show an animation and explain what happened to the atoms in the metal ball as it was heated and cooled	• Projector or Smartboard: http://www.middleschoolchemistry.com/multimedia/chapter1/lesson4#particles_of_a_solid			

Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?	Ask students to apply what they have learned about heating and cooling solids to explain why bridges have flexible connections		Engaging in Argument from Evidence		
Lesson Title/Number: Air, It's Really There	**Learning Objective(s):** Students will be able to describe gas as matter. Students will also be able to describe, on the molecular level, the effect of heating and cooling on the motion of molecules of a gas.			**Lesson Duration:** 100 minutes (or 2 50 minute classes)	
Learning Cycle ***What lesson elements will support students' progress towards mastery of the learning objectives(s)?*** ****Elements do not have to be in conducted in sequence.***	***Learning Activities*** ***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?***	***Resources/Materials*** ***What curricular resources/materials are available to facilitate the implementation of the learning activities?***	***Science and Engineering Practices*** ***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?***	***Disciplinary Core Ideas*** ***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?***	***Crosscutting Concepts*** ***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?***
Elicit: How will you access students' prior knowledge?	Discuss with students whether they think gas is matter				
Engage: How will you capture students' interest and get students' minds focused on the concept/topic?	Do a Demonstration to show that gas has mass Show an animation of the molecules of gas	• Deflated basketball • Balance • Pump • Can of compressed gas • Projector or Smart board: http://www.middleschoolchemistry.com/multimedia/chapter1/lesson5#particles_of_a_gas	Asking questions and defining problems	PS1.A: Structure and Properties of Matter Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it.	Patterns

Explore: What hands-on/minds-on common experience(s) will you provide for students?	Students will do an activity to find out how heating and cooling affect gasses	• Plastic cups • 8 oz. plastic bottle • Detergent • Hot water • Cold water • Chapter 1: Lesson 5: Air, It's Really There		PS1.A: Structure and Properties of Matter Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. 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)	Patterns; Cause and Effect
Explain: How will you help students connect their exploration to the concept/topic under investigation?	Student will answer questions about the growing and shrinking bubble in the activity sheet previously provided	• Chapter 1: Lesson 5: Air, It's Really There			
Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?	Students will have to compare the molecules in solids, liquids, and gases.	• Chapter 1: Lesson 5: Air, It's Really There	Constructing explanations and designing solutions		Cause and Effect
Extend: How will students deepen their conceptual understanding through use in new context?	Have students apply what they have learned to explain why a balloon grows when it is heated	• Bottle • Balloon • Water heater	Developing and Using Models		

Lesson Title/Number: Heat, Temperature, and Conduction	**Learning Objective(s):** I will be able to describe and draw a model, on the molecular level, showing how energy is transferred from one substance to another through conduction.	**Lesson Duration:** 100 minutes (or 2 50 minute classes)

Learning Cycle ***What lesson elements will support students' progress towards mastery of the learning objectives(s)?*** ****Elements do not have to be in conducted in sequence.***	***Learning Activities*** ***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?***	***Resources/Materials*** ***What curricular resources/materials are available to facilitate the implementation of the learning activities?***	***Science and Engineering Practices*** ***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?***	***Disciplinary Core Ideas*** ***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?***	***Crosscutting Concepts*** ***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?***
Elicit: How will you access students' prior knowledge?	Discuss what happens when a spoon is placed in a hot liquid like soup or hot chocolate	• Chart Paper • Markers	Asking Questions and Defining Problems	PS1.A: Structure and Properties of Matter The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)	Energy and Matter
Engage: How will you capture students' interest and get students' minds focused on the concept/topic?	Preview of Student Activity Sheet 2-1	• Student Activity Sheet 2-1			
Explore: What hands-on/minds-on common experience(s) will you provide for students?	Students will explore what happens when room-temperature metal is places in hot water and room temperature water	• 2 sets of large metal washers on a string • Styrofoam cup filled with hot water • Room-temperature water • 2 thermometers • Graduated cylinder or beaker • 1 Styrofoam cup • Thermometer • Hot plate or coffee maker • Large beaker or coffee pot	Constructing Explanations and Designing Solutions Planning and Carrying out Investigations	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)	Cause and Effect

Explain: How will you help students connect their exploration to the concept/topic under investigation?	Show two animations to help students understand how energy is transferred from one substance to another	• http://www.middleschoolchemistry.com/multimedia/chapter2/lesson1#heated_spoon http://www.middleschoolchemistry.com/multimedia/chapter2/lesson1#cooled_spoon	Constructing Explanations and Designing Solutions Planning and Carrying out Investigations		
Evaluate: How will students demonstrate their mastery of the learning objective(s)?	Teacher will ask students to discuss the connection between molecular motion, temperature, and conduction	• Chart Paper • Markers (Can be done as an exit slip as well- post its)	Obtaining, Evaluating, and Communicating Information		
Extend: How will students deepen their conceptual understanding through use in new context?	Students will try one or more extensions (see materials) and use conduction to explain common phenomena	• http://www.middleschoolchemistry.com/multimedia/chapter2/lesson1#conducting_energy			Energy and Matter
Lesson Title/Number: The Periodic Table	**Learning Objective(s):** I will be able to identify different atoms by the number of protons in the nucleus and realize that the number of electrons equals the number of protons in a neutral atom. I will also be able to explain the meaning of atomic atom and atomic mass.			**Lesson Duration:** 100 minutes (or 2 50 minute classes)	
Learning Cycle ***What lesson elements will support students' progress towards mastery of the learning objectives(s)?*** ****Elements do not have to be in conducted in sequence.***	***Learning Activities*** ***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?***	***Resources/Materials*** ***What curricular resources/materials are available to facilitate the implementation of the learning activities?***	***Science and Engineering Practices*** ***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?***	***Disciplinary Core Ideas*** ***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?***	***Crosscutting Concepts*** ***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?***
Elicit: How will you access students' prior knowledge?	Explain the meaning of the numbers and letters in the boxes in the Periodic Table	• A copy of the Periodic Table (can be digital or hardcopy)		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)	

Engage: How will you capture students' interest and get students' minds focused on the concept/topic?	Describe the activity that the students will do to learn about the first 20 elements of the Periodic Table	• Element Game Cards • Activity Sheet Lesson 4.2	Planning and Carrying out Investigations		Patterns
Explore: What hands-on/minds-on common experience(s) will you provide for students?	Students will have to work together to place index card (containing the Element Symbol along with the number of protons, electrons, and mass.)	• Element Game Cards	Planning and Carrying out Investigations		Patterns
Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?	Students will have to complete p. 268 in order to show that they can calculate the number of protons, electrons, and neutrons.	• Activity Sheet Lesson 4.2	Planning and Carrying out Investigations Using Mathematical and Computational Thinking	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)	Patterns
Evaluate: How will students demonstrate their mastery of the learning objective(s)?	Students will have to discuss the placement of the cards for two or three atoms (Exit Ticket)	• Post- Its			
Extend: How will students deepen their conceptual understanding through use in new context?	Introduce students to an online resource that they may use for this lesson as well as the upcoming unit.	• SmartBoard or Computer			