THOMAS EDISON ENERGYSMART CHARTER SCHOOL			
CONTENT AREA: Science Curriculum 2015-2016	**GRADE: 7**	**UNIT #: 1**	**UNIT NAME:Structure and Properties of Matter**

UNIT OVERVIEW

Students build understandings of what occurs at the atomic and molecular scale. Students apply 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 influence of science, engineering and technology on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students demonstrate proficiency in developing and using models, and obtaining, evaluating, and communicating information. Students use these scientific and engineering practices to demonstrate understanding of the core ideas.

#	STUDENT LEARNING OBJECTIVES (SLO)	Corresponding DCIs and PEs
1	Identify unknown substances based on data regarding their physical and chemical properties.	PS1.A
2	Predict the physical and chemical properties of elements based on their positions on the Periodic Table.	PS1.A
3	Develop models to describe the atomic composition of simple molecules and extended structures.	**MS-PS1-1**
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-PS1-4**
5	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	**MS-PS1-3**

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Science and Engineering Practices	Diplinary Core IdeasDisc	Crosscutting Concepts
Developing and Using Model • Student prepare PowerPoint presentation to develop 3D model of molecule showing different arrangement of atoms. (MS-PS1-1) • Student build a model of simple molecule like Ammonia or Methanol using ball and stick structure. (MS-PS1-1) • Lab demonstration showing increase or decrease in thermal energy of substance change the relative motion of molecules results in change of the state of substance. (MS-PS1-4) **Mechanical Application / Applying to real world:**	**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) • Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-3) (MS-PS1-2.) • 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	**Cause and Effect** • Natural substance like water, some oils, Carbon Dioxide undergo the change of state with the loss or gain of thermal energy.(MS-PS1-4) **Scale. Proportion and Quantity** • Student can chart a pure substance and their characteristic properties(MS-PS1-1) • Student identify unknown substance based on the data regarding their physical and chemical properties(MS-PS1-1) • Prediction can be made of physical and chemical properties of substance based on their positions on the periodic table. (MS-PS1-1) **Structure and Function**

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• Mechanism of preventing Diesel being solidify in heavy automobiles (like Trucks) (MS-PS1-4) • Deeper underground installation of water pipes help prevent water freezing to ice during extreme winter. (MS-PS1-4)	a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4) • Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1) • 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) **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-PS1-3) *(Note: This Disciplinary Core Idea is also addressed by MS-PS1-2 and MS-PS1-5.)* **PS3.A: Definitions of Energy**	• Pure natural substances in our surrounding undergo a chemical process to form synthetic material. Both Natural and synthetic materials used on large scale in society. (MS-PS1-3)

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	• 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 called the total internal energy) of a system depends jointly on the temperature, the total number of	

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	atoms in the system, and the state of the material. *(secondary to MS-PS1-4)*	

CCSS ENGLISH LANGUAGE ART:

- Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.(MS-PS1-3)
- 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-PS1-4

CCSS MATHEMATICS:

- Model with mathematics. (MS-PS1-1)
- Reason abstractly and quantitatively (MS-PS1-1)

ESSENTIAL QUESTIONS

1. How can particle combine to produce a substance with different properties?
2. How does thermal energy affect particles?
3. Variations in which of the two units are responsible to change the state of substance?
4. How does a relative motion of molecules differ in each of the three states of substance?
5. What is chemical reaction?

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6. How does a substance differ than that of reactant?

FORMATIVE ASSESSMENTS

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CONTENT AREA: Science Curriculum 2015- 2016	**GRADE: 7**	**UNIT #: 2**	**UNIT NAME: Chemical Reactions**

UNIT OVERVIEW

Students understand what occurs at the atomic and molecular scale during chemical reactions. Students provide molecular level accounts to explain that chemical reactions involve regrouping of atoms to form new substances, and that atoms rearrange during chemical reactions. Students are also able to apply an understanding of the design and the process of optimization in engineering to chemical reaction systems. The crosscutting concepts of patterns and energy and matter are called out as organizing concepts for these disciplinary core ideas. In these performance expectations, students are expected to demonstrate proficiency in developing and using models, analyzing and interpreting data, and designing solutions. Students use these scientific and engineering practices to demonstrate understanding of the core ideas.

#	STUDENT LEARNING OBJECTIVES (SLO)	Corresponding DCIs and PEs
1	Design qualitative investigations to differentiate between physical and chemical changes in matter.	PS1.A; PS1.B
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-PS1-2**
3	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-PS1-5**
4	Compare the properties of reactants with the properties of the products when two or more substances are combined and react chemically.	PS1.B
5	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal	**MS-PS1-6**

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	energy by chemical processes.*	

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models • Model and explain current technologies used to capture solar energy and convert it to an electric energy through a chemical process. (MS-PS1-1),(MS-PS1-4) • Students can prepare a Digital Presentation showing compare and contrast the properties of reactant with products after chemical reaction, such as those occur • during photosynthesis and cellular respiration. (MS-PS1-5) **Analyzing and Interpreting Data**	**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. (MS-PS1-2) *(Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.)* **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	**Patterns** • Macroscopic patterns are related to the nature of microscopic and atomic-level structure. (MS-PS1-2) • Demonstration of burning sugar, fat reacting with Sodium Hydroxide and mixing Zinc with Hydrogen Chloride (MS-PS1-2) **Energy and Matter** • Matter is conserved because atoms are conserved in physical and chemical processes. (MS-PS1-5)

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• When substance undergo chemical change, the number and kinds of atoms in each reaction are the same as the number and kinds of atoms in the products. The mass of the reactants is same as the mass of the products. (MS-PS1-2) • Compare and Contrast the physical properties of reactants with products after a chemical reaction, such as those occur during photosynthesis and cellular respiration. (MS-PS1-2) • In Plants light energy from sun is transferred to Oxygen and Carbon Compounds. Which in • combination have chemical potential energy.(MS-PS1-2) **Constructing Explanations and Designing Solutions**	of the reactants. (MS-PS1-2),(MS-PS1-5) *(Note: This Disciplinary Core Idea is also addressed by MS-PS1-3.)* • The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5) • Some chemical reactions release energy, others store energy. (MS-PS1-6) **ETS1.B: Developing Possible Solutions** • A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. *(secondary to MS-PS1-6)* **ETS1.C: Optimizing the Design Solution** • Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process - that is, some of the	• The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS1-6)

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• Law of conservation of matter and on physical model or drawing, including digital form that represent atoms • Explain using an understanding of the concept of chemical change, why the mass of product and the mass of reactants remain constant and prove the Law of conservation of mass using a balance to track the mass before, during and after a chemical reaction between t • wo components. (MS-PS1-6) • Model and explain the chemical process and conservation of the light energy and transform to electric energy using solar panel (MS-PS1-6)	characteristics may be incorporated into the new design. *(secondary to MS-PS1-6)* • The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. *(secondary to MS-PS1-6)*	

CCSS ENGLISH LANGUAGE ART:

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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-PS1-2)*
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS1-6)
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-PS1-2),*(MS-PS1-5)*
WHST.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-PS1-6)

CCSS MATHEMATICS:

MP.2	Reason abstractly and quantitatively. (MS-PS1-2),(MS-PS1-5)
MP.4	Model with mathematics. (MS-PS1-5)
6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems. *(MS-PS1-2)*,(MS-PS1-5)

ESSENTIAL QUESTIONS:

1. What happens when new materials are formed?
2. What stays the same and what changes?

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3. Why the mass of reactant and mass of product remain constant?
4. How can energy be transfer from one material to another?
5. describe the physical and chemical changes occurs in our surroundings

FORMATIVE ASSESSMENT:

THOMAS EDISON ENERGYSMART CHARTER SCHOOL			
CONTENT AREA: Science Curriculum 2015-2016	**GRADE: 7**	**UNIT #: 3**	**UNIT NAME: Matter and Energy in Organisms and Ecosystems**

UNIT OVERVIEW

Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. They construct explanations for the cycling of matter in organisms and the interactions of organisms to obtain the matter and energy from the ecosystem to survive and grow. Students have a grade-appropriate understanding and use of the practices of investigations, constructing arguments based on evidence, and oral and written communication. They understand that sustaining life requires substantial energy and matter inputs and the structure and functions of organisms contribute to the capture, transformation, transport, release, and elimination of matter and energy. Adding to these crosscutting concepts is a deeper understanding of systems and system models that ties the performances expectations in this topic together.

#	STUDENT LEARNING OBJECTIVES (SLO)	Corresponding DCIs and PEs
1	Create a representation the process by which plants, algae and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water.	LS1.C
2	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.	**MS-LS1-6**
3	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.	**MS-LS1-7**
4	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	**MS-LS2-1**
5	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	**MS-LS2-3**

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6	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	**MS-LS2-4**

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts

Developing and Using Models
● Describe that molecules are broken apart and put back together and that in this process , energy is released. This is can be describe using Chart or multimedia showing the steps of process of Photosynthesis and Cellular Respiration.(MS-LS2-3)
  ● Students can select one of the Ecosystem and for which model the conversation of matter and flow of energy in to and out of Ecosystem. (MS-LS1-7)
  ● Sustaining life requires energy and matter input. Interaction of organisms to obtain matter and energy from ecosystem to survive and grow.
 	
Analyzing and Interpreting Data
	LS1.C: Organization for Matter and Energy Flow in Organisms
	● Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also release oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6)
	● Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)
	
	LS2.A: Interdependent Relationships in Ecosystems
		Cause and Effect
		● Relate the energy and nutritional needs of organisms in a variety of life stages and situations, including stages of development and periods of maintenance.
		● Accountable Talk / Debate:
		1. Relationship between resources and growth of organisms in ecosystems during periods of scarce and abundant resources.
		2. what if you change availability of one the reactants of cellular respiration? (MS-LS2-1)
		
		Energy and Matter

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• Model the flow of energy through an ecosystem, beginning at photosynthesis and explain how energy and matter are both acquired and used by each organism in a food web. (MS-LS2-1) • Analyze and and interpret data to provide evidence for the effect of resource availability:___ Students can gather information on available resources in specific region or ecosystem and analyze them with comparative growth of organism in that specific region or ecosystem. (MS-LS2-1) • Research project about number of organisms in ecosystem during abundant and scare resources. (MS-LS2-1) & (MS-LS1-6) **Constructing Explanations and Designing Solutions** • Construct a scientific explanation based on evidence for the role of photosynthesis in the	• Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) • In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1) • Growth of organisms and population increases are limited by access to resources. (MS-LS2-1) **LS2.B: Cycle of Matter and Energy Transfer in Ecosystems** • Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level.	• Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7) • Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6) • The transfer of energy can be tracked as energy flows through a natural system. (MS-LS2-3) **Stability and Change** • Small changes in one part of a system might cause large changes in another part. (MS-LS2-4)

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cycling of matter and flow of energy into and out of organisms. (MS-LS1-6) ● Project Performance by Multimedia Presentations: Let students summarize their learning using text, graphics, video, sound, etc… (PowerPoint) ● Have them trace energy through a specific food web incorporating what they know about photosynthesis and respiration. Students should explain if number of photosynthetic organisms declined. Present the analysis. (MS-LS1-6) **Engaging in Argument from Evidence** ● Organize an accountable talk: (MS-LS2-4) 1. What happened if you change availability of one of the reactants of cellular respiration? 2. Does photosynthesis help consumer survive? How?	Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3) **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) **PS3.D: Energy in Chemical Processes and Everyday Life** ● The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic	

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3. How does respiration help consumers and producers survive? ● Have students read an article about content and come up 2 questions for discussion. (MS-LS2-4)	molecules and release oxygen. *(secondary to MS-LS1-6)* ● Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. *(secondary to MS-LS1-7)*	

CCSS ENGLISH LANGUAGE ART:

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. ,(MS-LS1-6),(MS-LS2-1),(MS-LS2-4)
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. *(MS-LS1-6)*
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-LS2-1)
RI.8.8	Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. (MS-LS2-4)
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-LS1-7),(MS-LS2-3)*

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CCSS MATHEMATICS

6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *(MS-LS1-6),(MS-LS2-3)*

ESSENTIAL QUESTIONS:

1. How do organisms obtain and use matter and energy?
2. how do matter and energy move through and ecosystem?
3. How does the process of photosynthesis help consumer survive?
4. What are the reactants and products of cellular respiration?

FORMATIVE ASSESSMENT:

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THOMAS EDISON ENERGYSMART CHARTER SCHOOL			
CONTENT AREA: Science Curriculum 2015-2016	**GRADE: 7**	**UNIT #: 4**	**UNIT NAME: Interdependent Relationships in Ecosystems**

UNIT OVERVIEW

Students construct explanations for the interactions in ecosystems and the scientific, economic, political, and social justifications used in making decisions about maintaining biodiversity in ecosystems. Students use models, construct evidence-based explanations, and use argumentation from evidence. Students understand that organisms and populations of organisms are dependent on their environmental interactions both with other organisms and with nonliving factors. They also understand the limits of resources influence the growth of organisms and populations, which may result in competition for those limited resources. Crosscutting concepts of matter and energy, systems and system models, and cause and effect are used by students to support understanding the phenomena they study.

#	STUDENT LEARNING OBJECTIVES (SLO)	Corresponding DCIs and PEs
1	Describe how one population of organisms may affect other plants and/or animals in an ecosystem.	LS2.A
2	Predict the impact of humans altering biotic and abiotic factors has on an ecosystem.	LS2. C
3	Model the effect of positive and negative changes in population size on a symbiotic pairing.	LS2. A
4	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	**MS-LS2-5**
5	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*	**MS-LS2-2**

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Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions ● **Organisms depend on their environmental interactions with both, living organisms and non living factors.** (MS-LS2-2) ● **Limit of resources results in competition between organisms.**(MS-LS2-2) - Explain how symbiotic pairing affect population size - Given a specific symbiotic pairing , predict the effect of positive and negative changes in population size. - Create and Analyze the graph of Population to available resources in given ecosystem or given interdependent relationship.	**LS2.A: Interdependent Relationships in Ecosystems** ● Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2) **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of	**Patterns** ● **Think-Pair-Share:** Discuss with partner and chart - benefits of mutually beneficial interaction and drawbacks of predatory interactions. (MS-LS2-i2) ● Model effect of positive changes in population size on a symbiotic pairing. (MS-LS2-i2) ● **Reflective Journals -** Different examples of mutually beneficial interaction and reflect how well student identified factors affecting the relationships.. (MS-LS2-i2)

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• **Scientific and Social justifications in making decision about maintaining biodiversity in ecosystem.** (MS-LS2-5) - Research on article about "maintaining biodiversity" followed by student's justification (in group or one on one) - Students can chart the ecosystem services(water purification, Nutrient recycling, soil erosion etc…) that human rely on. - Digital presentation of how these ecosystem services has affected by increasing competition of resources - Design the solution with scientific and social consideration for maintaining biodiversity and ecosystem services with	an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5) **LS4.D: Biodiversity and Humans** • Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. *(secondary to MS-LS2-5)* **ETS1.B: Developing Possible Solutions** • There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. *(secondary to MS-LS2-5)*	• Small changes in one part of a system might cause large changes in another part. (MS-LS2-5)

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CCSS ENGLISH LANGUAGE ART:

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-LS2-2)
RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. (MS-LS2-5)
WHST.6-8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS2-2)
WHST.6-8.9	Draw evidence from literary or informational texts to support analysis, reflection, and research. (MS-LS2-2)
SL.8.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. *(MS-LS2-2)*

CCSS MATHEMATICS:

MP.4	Model with mathematics. *(MS-LS2-5)*
6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems. *(MS-LS2-5)*
6.SP.B.5	Summarize numerical data sets in relation to their context. *(MS-LS2-2)*

ESSENTIAL QUESTIONS:

1. How do organisms interact with other organisms in the physical environment to obtain matter and energy?
2. How does limit of resources influence the growth of organisms?

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CONTENT AREA: Science Curriculum 2015-2016	**GRADE: 7**	**UNIT #: 4**	**UNIT NAME: Interdependent Relationships in Ecosystems**

3. How symbiotic pairing effect population size?
4. How can you help maintaining biodiversity in ecosystems?
5. What factors lead the organisms to compete for the resources?
6. What are the ecosystem services that human rely on?

FORMATIVE ASSESSMENT:

THOMAS EDISON ENERGYSMART CHARTER SCHOOL			
CONTENT AREA: Science Curriculum 2015-2016	**GRADE: 7**	**UNIT #: 5**	**UNIT NAME: Earth's Systems**

UNIT OVERVIEW

Students understand how Earth's geosystems operate by modeling the flow of energy and cycling of matter within and among different systems. Students investigate the controlling properties of important materials and construct explanations based on the analysis of real geoscience data. Of special importance in both topics are the ways that geoscience processes provide resources needed by society but also cause natural hazards that present risks to society; both involve technological challenges, for the identification and development of resources and for the mitigation of hazards. The crosscutting concepts of cause and effect, energy and matter, and stability and change are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models and constructing explanations; and to use these practices to demonstrate understanding of the core ideas.

#	STUDENT LEARNING OBJECTIVES (SLO)	CORRESPONDING PEs and DCIs
1	Analyze the characteristics of Earth materials before and after chemical and physical changes that occur during Earth's processes, including the direction of any matter flow.	ESS2.A
2	Using a systems model, explain how energy from the Sun is transformed or transferred in biological, hydrological, and meteorological systems.	ESS2.A
3	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	**MS-ESS2-1**
4	Develop a conceptual model to describe the multiple pathways that water cycles through Earth's systems driven by energy from the sun and the force of gravity.	ESS2.C

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5	Analyze and interpret data to deduce the mechanisms that resulted in a variety of rock formations.	ESS2.C
6	Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	**MS-ESS3-1**

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Developing and Using Model ● Using a system model explain how energy from sun transferred in biological, hydrological and meteorological systems.(MS-ESS2-1) ● Demonstrate how water cycle is essential for transferring heat energy from earth's surface to it's atmosphere and in moving heat around the earth.(MS-ESS2-1) **Analysis**(MS-ESS2-1)	**ESS2.A: Earth's Materials and Systems** ● All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1) **ESS2.C: The Roles of Water in Earth's Surface Processes** ● Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation,	**Cause and Effect** ● **Students identify a relationship between proximity to the ocean and daily temPerature.**(MS-ESS3-1) ● **Analyze the map of global air** circulation and ocean currents. (MS-ESS3-1) - Student takes the role of educator and spread the awareness about cause and effect of natural disaster and the precautions to be taken in the area. - Debate if increasing population correlated with the catastrophic evens that lead to changes in and on the Earth. (MS-ESS3-1)

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• Analyze a map of Global air circulation and plot a graph showing relation of variables like heat and rainfall, temperature and month etc.. • The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms (MS-ESS2-4) **Visual display of information** • Allow students to create model/posters/diagrams to model the process of melting, crystallization, weathering, deformation and sedimentation which act together to form the cycling of earth's material. (MS-ESS2-4)	condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4) • Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4) **ESS3.A: Natural Resources** • Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)	- Investigate a local global environment issue by defining the problem, researching possible causative factors, understanding the underlying science, and evaluating the benefits and risk of alternative solutions. (MS-ESS3-1) **Energy and Matter** • Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4)

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Constructing Explanations and Designing Solutions
 	
• Construct a scientific explanation based on valid and reliable evidence obtained from sources and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS3-1)
  • Debate the appropriateness of increasing human population in regions plagued by catastrophic events (MS-ESS3-1)
 	
  • Socratic Seminar: Lead a discussion on open ended question about the natural world in the past and now. What are major environmental issues and how can you bring solution in today's world of technology. (MS-ESS3-1)		

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• Assumption, Analysis and possible solution: • What if the Earth's temperature continue to rise? Collect weather report/data for past 10-15 years and analyze them. Imagine a small experimental area and explain how technology can help controlling temperature making use of natural resources(MS-ESS3-1)		

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CCSS ENGLISH LANGUAGE ART:

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS3-1)

WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS3-1)

WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-ESS3-1)

SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-ESS2-1)*

CCSS Mathematics:

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. *(MS-ESS3-1)*

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ESSENTIAL QUESTIONS:

1. How do the materials in and on Earth's crust change over the time?
2. How does water influence weather, circulate in the oceans, and shape Earth's surface?
3. What is the role of the Sun in energy transfer in the atmosphere and in the oceans?
4. How do changes in one part of Earth system affect the other part of system?
5. In what ways can Earth processes be explained as interactions among spheres?
6. How does geoscience processes cause natural hazards that represent risk to society?

FORMATIVE ASSESSMENT: