Course: Middle School Science
Thomas Edison Energy Smart School Unit 1 of 5

Title of the Unit	**Waves and Electromagnetic Radiations.**	Grade Level	6th
Part of the Unit	A & B	Time Frame	7 week Unit- Sep – October, 2015

Unit Overview

Students are able to describe and predict characteristic properties and behaviors of waves when the waves interact with matter. Students can apply an understanding of waves as a means to send digital information. The crosscutting concepts of patterns and structure and function are used as organizing concepts for these disciplinary core ideas. These performance expectations focus on students demonstrating proficiency in developing and using models, using mathematical thinking, and obtaining, evaluating and communicating information; and to use these practices to demonstrate understanding of the core ideas.

SLO	Corresponding DCI's and PE's
1.Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	MS-PS4-1
2.Explain why we can see the color of an object in space but cannot hear sound.	PS4.B
3.Use ray diagrams to explain how refracted light and reflected light bring images of distant objects closer and enlarge things that are too small to be observed with an unaided eye.	PS4.B
4.Create a simple model that explains the mechanism for how wave pulses are used to save, transmit, and receive information.	PS4.C
5.Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	MS-PS4-2
6. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	MS-PS4-3

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using mathematics and Computational thinking (MS-PS4-1) ● Students model a simple wave with patterns in graphs and charts, including identifying and mathematical representing: ● A certain distance in which the quantity repeats, or the distance between the maximum and minimum	<u>PS4 A: Wave Properties</u> ● Whether a wave in water, a sound wave or a light wave, all waves have some features in common. A simple wave has a repeating pattern of specific wavelength, frequency and amplitude. The wavelength and frequency are related to one another by the speed of travel of the wave, which for each type of wave is traveling.(MS-PS4-1) ● Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter.	<u>Scale, Proportion and Quantity</u> <u>Patterns</u> ● Students use graphs and charts can be used to identify patterns in data. (MS-PS4-1) (SLO 1 & 2) <u>Cause and Effect</u> ● Students use cause and effect relationships to predict phenomenon. (MS-PS4-1) (SLO 1 &2)

values of the quantity- Wavelength. ● A certain maximum extent of the repeating quantity (height of a water wave, amplitude ● The number of times the pattern if maximum and minimum amplitude occurs per second- frequency. ● Students use the mathematical model to determine the how the energy changes as the wavelength , amplitude and frequency change. Analysis – includes computational thinking ● Students use their mathematical models to identify that the energy of the wave is proportional to the square of the amplitude , and does not vary with wavelength or frequency. ● Students predict the change in the energy of the wave if any one of the parameters of the wave is changed. Using a Mathematical Model (MS_PS4-1) ● a repeating patterns in the variation of a quantity (eg. Vibrating string where the	● Light and sound are wavelike phenomena, A sound wave needs a medium through which it is transmitted. (SLO2) ● When light shines on an object, it is reflected , absorbed, or transmitted throught the object , depending on the object's material and the frequency of the light. (SLO 2) ● The path that light travels can be traced as straight lines, except at surfaces between different transparent materials, where the light path bends. Lenses and prisms are applications of this effect. (SLO3) PS4B: Electromagnetic Radiation: ● Electromagnetic radiation can be modeled as wave patterm or alternatively , as particles. The model is useful for understanding aspects of the phenomenon and its inter- actions with matter. (MS- PS4-1) (SLO 1 &2) ● A wave model of light is useful for explaining brightness, color and frequency – dependent bending of light at a surface between media(prisms) . However, because light can travel through space, it can not be a matter wave, like sound or water waves. (MS-PS4-1)(SLO 1 &2) PS4.C: Information Technologies and Instrumentation ● Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)	● Students use forms and functions to different level of organization (MS-PS4-3)

position of the string is the quantity that is varying) ● MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. ● MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.		

CCSS English Language Art	CCSS Mathematics
● Cite specific textual evidence to support analysis of science and technical texts. (MS-PS4-3) ● Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. *(MS-PS4-3)* ● Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-PS4-3)	● Use ratio and rate reasoning to solve real world and mathematical problems, by drawing tables or equivalent ratios, tape diagrams, double number line diagrams, or equations. 6.RP.A.3 (SL0 1) ● Reason abstractly and quantitatively. MP.2 (SLO 1) ● Model with mathematics .MP.4 (SLO1)

Essential Questions	1. What are the characteristic properties and behaviors of waves when they interact with matter? 2. What is the relationship between a wave's amplitude and the amount of energy transferred? 3. How can waves be used to send digital information? 4.What is light? 5. How can one explain the varied effects that involve light? 6. What other forms of electromagnetic radiation are there?

	7.How are instruments that transmit and detect waves used to extend human senses?
Formative Assessments	We use formula  to describe relationship between the amplitude of an wave and the amount of energy in the wave. How does this formula describe how the amplitude of a wave is related to energy in a wave (SLO1)
	Using Scientific evidence, explain why gamma radiation is so much more dangerous to people than radiation in the visible part of the spectrum?(SLO1)
	In science fiction movies, we often see and hear things exploding, why would it be possible to see an explosion in space but not hear it (SLO2)
	Using text and illustrations, explain how a prism works.
	Use ray diagrams and illustrations of lenses to explain why a telescope can make images of distant object appear and why microscopes make small things appear larger.
Main Resource	Pearson Interactive www.fossweb.com
Examples of OERS for this Phenomenon	• Waves on a string Simulation- Students do open exploration of the wave simulator, They plan investigation and collaboratively produce data to serve the basis for evidence. • http://phet.colorado.edu/en/contributions/view/2819 • What are waves and how do you describe them? Students watch video to gather relevant information about the fundamental vocabulary of waves. Students will paraphrase the information illustrated in the video. • Making light of science: Students apply scientific reasoning to link the evidence from the simulation to claims that all light travels as waves, and that wavelength defines various regions of electromagnetic spectrum.

Course: Middle School Science
Thomas Edison Energy Smart School **Unit 2 of 5**

Title of the Unit	**Weather and Climate**	**Grade Level**	6th
Part of the Unit	A	**Time Frame**	Nov – December 2015

Unit Overview

Students construct and use models to develop understanding of the factors that control weather and climate. They take a systems approach to examining the feedbacks between systems as energy from the sun is transferred between systems and circulates though the ocean and atmosphere. The crosscutting concepts of cause and effect, systems and system models, and stability and change are called out as organizing concepts for these disciplinary core ideas.

SLO	**Corresponding DCI's and PE's**
1. Develop a conceptual model to explain the mechanisms for the Sun's energy to drive wind and the hydrologic cycle	ESS2.C
2. **Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions**	**MS-ESS2-5**
3. Explain how variations in density result from variations in temperature and salinity drive a global pattern of interconnected ocean currents..	ESS2.C
4. Use a model to explain the mechanisms that cause varying daily temperature ranges in a coastal community and in a community located in the interior of the country.	ESS2.C; ESS2.D
5. **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-ESS2-6**
6. **Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.**	**MS-ESS3-5**

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
● Students develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. ● Students Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions when air	● The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5) (SLO 1& 2) ● Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6) (SLO3) ● Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice,	**Cause and Effect** Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5) (SLO 1- 6) **Systems and System Models** Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. (MS-ESS2-6) (SLO 1-6)

A. Air mass flows from a region of high pressure to low pressure causing change in weather at a fixed location to change over time. B. How changes in weather can result when different air masses collide. C. Explain how weather can be predicted within predicated probabilistic ranges. ● Students develop and use a model such as diagrams, maps and globes or digital representations to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates in terms of latitude, altitude, and geographical distribution. ● Students develop and use models such as diagrams, maps and globes or digital representations to show how atmospheric circulation is on the sunlight driven latitudinal banding, the coriolis effect and the resulting prevailing winds. ● Students develop and use models such as diagrams, maps and globes or digital respresentations to describe how ocean circulation is on the transfer of heat by the global ocean convenction cycle, which is constrained by coriolis effect and to the outlines of continents.	landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6) (SLO 4 & ● These patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5) (SLO 4 & 5) ● The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6) (SLO 4 & 5) ● Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5) (SLO 6)	
CCSS English Language Art	**CCSS Mathematics**	

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. *(MS-ESS2-5),(MS-ESS3-5)* **RST.6-8.9** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. *(MS-ESS2-* **WHST.6-8.8** Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. *(MS-ESS2-5)* **SL.8.5** Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. *(MS-ESS2-6)*	**MP.2** Reason abstractly and quantitatively. (MS-ESS2-5) **MP.2** Reason abstractly and quantitatively. (MS-ESS2-5) **6.NS.C.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. *(MS-ESS2-5)*

Essential Questions	**MS-ESS2-6** What is weather? What is climate? What are some similarities and differences between climate and weather? Where does weather occur in the atmosphere and what causes it? **MS-ESS2-5** What do temperature changes in air masses cause? What is a frontal boundary? How do warm and cold air masses affect each other? What is a cold front? Warm front? Stationary front? Occluded front? Jet stream? What is wind?, What is wind? What is ocean current? **MS-ESS2-4** How do oceans affect temperature and climate? What is the water cycle? What processes move water through the water cycle? What is a watershed? How does water flow between the different components of watersheds? How does rain form?, What is convection? How does it affect the water cycle?, How are winds and ocean currents produced?

	MS-ESS2-6 What is the atmosphere composed of? How does the composition of the atmosphere change at different elevations? How do these changes affect the properties and temperature of the air? What risks and benefits does the sun have on the Earth? What is the atmosphere? Geosphere? Hydrosphere? What role does the sun play in the water cycle?
Formative Assessments	From the given investigation plan, describe the phenomenon which includes the relationships between air mass interactions and weather conditions. (SLO 1 & 2)
	Identify the purpose of the investigation, which includes providing evidence to answer questions about how motions and complex interactions of air masses result in changes in weather conditions. (SLO 1,2, 3)
	Identify the relevant components of the system, with inputs and outputs, including: i. The rotating Earth. ii. The atmosphere. iii. The ocean, including the relative rate of thermal energy transfer of water compared to land or air. iv. Continents and the distribution of landforms on the surface of Earth. v. Global distribution of ice. vi. Distribution of living things. vii. Energy. 1. Radiation from the sun as an input. 2. Thermal energy that exists in the atmosphere, water, land, and ice
Main Resource	FOSS WEB.COM
Examples of OERS for this Phenomenon	● "Weather and Climate: The Short and the Long of It" in this issue for more information about how the weather and climate of these two places differ. ● http://info.acceleratelearning.com/

Course: Middle School Science
Thomas Edison Energy Smart School **Unit 3 of 5**

Title of the Unit	**Space Systems**	**Grade Level**	6th
Unit	3	**Time Frame**	January 2015 – 4 weeks

Unit Overview

Students examine the Earth's place in relation to the solar system, Milky Way galaxy, and universe. There is a strong emphasis on a systems approach, using models of the solar system to explain astronomical and other observations of the cyclic patterns of eclipses, tides, and seasons. There is also a strong connection to engineering through the instruments and technologies that have allowed us to explore the objects in our solar system and obtain the data that support the theories that explain the formation and evolution of the universe. The crosscutting concepts of patterns; scale, proportion, and quantity; systems and system models; and interdependence of science, engineering, and technology are called out as organizing concepts for these disciplinary core ideas

SLO

1.Generate and analyze evidence (through simulations or long term investigations) to explain why the Sun's apparent motion across the sky changes over the course of a year.

2 **Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.**

3. Develop and use a model that shows how gravity causes smaller objects to orbit around larger objects at increasing scales, including the gravitational force of the sun causes around it holding together the solar system.

4. **Analyze and interpret data to determine scale properties of objects in the solar system.**

5. **Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.**

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
● Developing and Using Models ● Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and ● predict more abstract phenomena and design systems. ● x Develop and use a model to describe phenomena. (MS-ESS1- ● 1),(MS-ESS1-2)	● Patterns of the apparent motion of the sun, the moon, andstars in the sky can be observed, described, predicted, andexplained with models. (MS-ESS1-1) ● Earth and its solar system are part of the Milky Way galaxy,which is one of many galaxies in the universe. (MS-ESS1-2)ESS1.B: Earth and the Solar System. ● The solar system consists of the sun and a collection ofobjects, including planets, their moons, and asteroids that areheld in orbit around the sun by its gravitational pull on them.(MS-ESS1-2),(MS-ESS1-3) ● This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over theshort-term but tilted relative to its orbit around the sun. Theseasons are a result of that tilt and are caused by thedifferential intensity of sunlight on different areas of Earthacross the year. (MS-ESS1-1) o x The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1	**Patterns** Patterns can be used to identify cause-and-effectr **Scale, Proportion, and Quantity** Time, space, and energy phenomena can be obser study systems that are too large or too small. (MS- Models can be used to represent systems and thei -Connection **Engineering,Technology,** and Applica Interdependence of Science, Engineering Engineering advances have led to important disco virtually every field of science and scienti

● Analyzing and Interpreting Data ● Analyzing data in 6–8 builds on K–5 experiences and progresses to ● extending quantitative analysis to investigations, distinguishing ● between correlation and causation, and basic statistical ● techniques of data and error analysis. ● x Analyze and interpret data to determine similarities and ● differences in findings. (MS-ESS1-3)		led to the development of entire industri systems. (MS-ESS1-3) - Connections to Nature of Science Scientific Knowledge Assumes an Order a Natural Systems x Science assumes that objects and event occur in consistent patterns that are und measurement and observation. (MS-ESS1
ELA/Literacy -	**CCSS Mathematics**	
● Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3 ● 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-ESS1-3) ● Integrate multimedia and visual displays into	*Mathematics -* **MP.2**Reason abstractly and quantitatively. (MS-ESS1-3) **MP.4**Model with mathematics. *(MS-ESS1-1),(MS-ESS1-2)* **6.RP.A.1**Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *(MS-ESS1-1),(MS-ES* **7.RP.A.2**Recognize and represent proportional relationships between quantities. *(MS-ESS1-1),(MS-ESS1-2)*,(MS-ESS1-3) **6.EE.B.6**Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a vari *(MS-ESS1-2),(MS-ESS1-4)* **7.EE.B.6** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to sol	

presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-ESS1-1),(MS-ESS1-2)*	

Essential Questions	How does Earth's place in the universe affect life on Earth? What is the role of gravity in the motions of objects in our Solar System? How does Earth's moon affect tides on Earth? How would our lives be different if the Earth was not tilted on its axis?
	Vocabulary: Planetary System, Asteroid, Meteoroid, Comet, Astronomical unit, Rotation, Axis, Revolution, Orbit, Ellipse, Season, Axial tilt, Phases, First quarter, Third quarter, Gravity, Eclipse
Main Resource	FOSS Planetary Science
Examples of OERS for this Phenomenon	●

Course: Middle School Science **Thomas Edison Energy Smart School**			**Unit 4 of 5**
Title of the Unit	**Structure, Function and Information processing**	**Grade Level**	6th
Unit	4	**Time Frame**	March - April

Enduring Understanding: ***How do the structures of organisms contribute to life's functions?***

Unit Overview

Students plan and carry out investigations to develop evidence that living organisms are made of cells and to determine the relationship of organisms to the environment. Students use their understanding of cell theory to develop physical and conceptual models of cells. They construct explanations for the interactions of systems in cells and organisms and how organisms gather and use information from the environment. Students understand that all organisms are made of cells, that special structures are responsible for particular functions in organisms, and that for many organisms the body is a system of multiple interacting subsystems that form a hierarchy from cells to the body. Crosscutting concepts of cause and effect, structure and function, and matter and energy are called out as organizing concepts for these core ideas.

SLO	**Corresponding DCI's and PE's**
1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.	**MS-LS1-1**
2. **Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function**	**MS-LS1-2**
3. **Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells**	**MS-LS1-3**
4.. Develop a model to explain how senses change energy coming from the environment (light, sound waves, chemicals in gases or food, heat or	LS1.D

touch/pressure) into electrical signals in the nerves that go into the brain and spinal cord.		
5. **Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.**		**MS-LS1-8**
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different types of cells. MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute of the function. MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.	All living things are made up of cells, which is the smallest unit that can be said to be alive. • An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). • Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. • In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. • Cells form tissues, which form organs, which form systems • Sensory receptors send messages to our brain	**Cause and Effect** ● Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8) **Scale, Proportion, and Quantity** ● Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1) **Systems and System Models** ● Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3) **Structure and Function** ● Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural

		structures/systems can be analyzed to determine how they function. (MS-LS1-2) ***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-LS1-1) ***Connections to Nature of Science*** **Science is a Human Endeavor** ● Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-3
CCSS English Language Art	**CCSS Mathematics**	

ELA/Literacy - **RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3) **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-LS1-5),(MS-LS1-6)* **RI.6.8** Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MS-LS1-3) **WHST.6-8.1** Write arguments focused on discipline content. (MS-LS1-3) **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-LS1-1) **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-LS1-8) **SL.8.5**	**6.EE.C.9** Use variables to represent two quantities in a real-w problem that change in relationship to one another; an equation to express one quantity, thought of as th dependent variable, in terms of the other quantity, th of as the independent variable. Analyze the relations between the dependent and independent variables u graphs and tables, and relate these to the equation. *(MS-LS1-1),(MS-LS1-2),(MS-LS1-3*

Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.	
Essential Questions	What are the building blocks of life? 2. How does each part of a cell function? 3. How is the body a system of interacting subsystems composed of groups of cells? 4. What are fundamental differences between animal and plant cells pertaining to cell reproduction? 5. How do our sensory receptors send information to our brain?
Formative Assessments	Lab 1: Investigating Cells Quiz 1: Cell Structure and Function Project: Cell City Build an Organ Activity Lab 2: Dissecting a Chicken Wing Organ Systems Activity Quiz 2: Tissues, Organs & Organ Systems Lab 3: Can You Trust Your Senses? Quiz 3: Information Processing Unit Test
Main Resource	Pearson Interactive

Examples of OERS for this Phenomenon	http://phet.colorado.edu/en/simulation/legacy/neuron https://www.njctl.org/courses/science/7th-grade-science/structure-and-function-information-processing/structure-and-function-information-processing-2/ - Slides.

Course: Middle School Science **Thomas Edison Energy Smart School**			**Unit 5 of 5**
Title of the Unit	**Growth, Development and Reproduction of Organisms**	**Grade Level**	6th
Unit	**5**	**Time Frame**	May -June

Enduring Understanding: ***How do organisms grow, develop, and reproduce?***

Unit Overview

Students understand how the environment and genetic factors determine the growth of an individual organism. They also demonstrate understanding of the genetic implications for sexual and asexual reproduction. Students develop evidence to support their understanding of the structures and behaviors that increase the likelihood of successful reproduction by organisms. They have a beginning understanding of the ways humans can select for specific traits, the role of technology, genetic modification, and the nature of ethical responsibilities related to selective breeding. At the end of the unit, students can explain how selected structures, functions, and behaviors of organisms change in predictable ways as they progress from birth to old age.

SLO	Corresponding DCI's and PE's
1. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	**MS-LS1-4**
2. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms	**MS-LS1-5**
3. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in	**MS-LS3-1**

harmful, beneficial, or neutral effects to the structure and function of the organism		
4.. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.		**MS-LS3-2**
5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.		**MS-LS4-5**
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Model the order of mitosis given pictures, name the function of mitotic structures • Differentiate between animal types and reproductive strategies • Identify extreme structures for attracting mates • Identify behaviors which enhance reproductive success • Differentiate between aquatic and land fertilization and development of young • Compare parenting styles of	• Animals engage in characteristic behaviors that increase the odds of reproduction (MS-LS1-4) • Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction (MS-LS1-4) • Genetic factors as well as local conditions affect the growth of the adult plant (MS-LS1-5) • Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring (secondary to MS-LS3-2)	**Cause and Effect** • Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2) • Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4),(MS-LS1-5),(MS-LS 4-5) **Structure and Function** • Complex and microscopic structures and systems can be

animals • Compare pollination types • Dissect and identify flower structures and function • Distinguish between different types of pollen • Compare fruits, nuts and seeds • Identify environmental effects on growth • Argue the importance of nurture vs. nature		visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1) ***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-LS4-5) ***Connections to Nature of Science*** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Science assumes that objects and events in natural systems	

		occur in consistent patterns that are understandable through measurement and observation. (MS-LS4-1),(MS-LS4-2) **Science Addresses Questions About the Natural and Material World** Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS4-5)

CCSS English Language Art	CCSS Mathematics
WHST.6-8.1-Write arguments focused on discipline content. (MS-LS1-4) **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-LS1-5* **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-LS4-5)* **WHST.6-8.9** - Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-5)	**MP.4**- Model with mathematics. *(MS-LS3-2)]* **6.SP.A.2** - Understand that a set of data collected to answe a statistical question has a distribution, which can be described by its center, spread, and overall shape. *(MS-LS1-4),(MS-LS1-5)* **6.SP.B.4** - Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-5). **6.SP.B.5**- Summarize numerical data sets in relation to the context. *(MS-LS3-2)*

SL.8.5 - Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-LS3-1),(MS-LS3-2)* -	
Essential Questions	1. How do organisms reproduce? 2. What is the difference between sexual and asexual reproduction? 3. How can an organism's behavior increase its chance of survival and reproduction? 4. What structures or mechanisms aid in plant reproduction? 5. How does the environment contribute to successful reproduction or growth? 6. How do genetic factors influence the growth of organisms? 7. How do natural differences in organisms increase survival and reproduction?
Formative Assessments	Quiz 1: Cell Division Lab 1: Yeast Budding Lab 2: Vegetative Propagation Quiz 2: Reproduction Activity 1: Animal Behavior Activity Quiz 3: Animal Behavior & Reproduction Lab 3: Pollen Observations Lab 4: Flower Dissection Quiz 4: Plant Reproduction Unit Test Unit Test

Main Resource	Pearson Interactive
Examples of OERS for this Phenomenon	http://phet.colorado.edu/en/simulation/legacy/neuron https://www.njctl.org/courses/science/7th-grade-science/structure-and-function-information-processing/structure-and-function-information-processing-2/ - Slides.