Grade 5 curriculum roadmaps
Physical Science

Module Title: Living Systems (FOSS)										
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
2 part 1	**What is the process to develop a black box?**	Students use multisensory observations, develop models and try to reach consensus to determine what is inside sealed boxes. They construct physical models to replicate the behavior of original black boxes.	1. Models are explanations of objects, events, or systems that cannot be observed directly. 2. Developing a model is an iterative process, which may involve observing, construcitng, analyzing, and revisiting.	1 active	model collaboration construct consensus analyze revisit			Systems and system models	Developing and using models. Planning and carrying out investigaitons, Constructing explanations, Engaging in argument from evidence, Obtaining, evaluating, and communicating information	This lesson does not address specific Gr. 5 content standards but is an outstanding lesson employing the practices of science and engineering. It is designed for implementation later in the module, but it is advised to begin the module with this lesson as it provides excellent understanding regarding the nature of science and the role of developing models as explanations for phenomena.
NASA lesson not found in module	**What is the difference between mass and weight?**	Teams of two students each measure the force gravity exerts on objects of different mass by suspending them on elastic strings made from cut rubber bands and measuring the distance the band stretches. Students compare their results to that of a similar experiment done on the International Space Station (ISS) and discuss their conclusions.	Weight is a measurement dependent on gravity. Mass is a measurement of the amount of matter in a given substance or material.	1 active 2 videos	gravity microgravity mass weight	**5.PS.4**	**Describe the difference between weight being dependent on gravity and mass comparised of the amount of matter in a given substance or material.**	Cause and effect	Defining problems, Planning and carrying out investigaitons, Analyzing and interpreting data,Obtaining, evaluating and communicating information	See NASA online resource education.ssc.nasa.gov *Mass vs. Weight* See Introduction Video, Stretching Mass video. Download the lesson for Stretching Mass education.ssc.nasa.gov/pdf/mvw/MVW_Stretching_Mass_Activity.pdf
1 part1	**How can a mixture be separated?**	Students make 3 different mixtures then use screens an filters to separate the mixtures. They discover that salt and water form a solution and can not be separated with a filter	A mixture is 2 or more materials intermingled. An aqueous solution is a mixture in which a substance dissolves in water to make a clear liquid.	1 active	mixture separated screens filter solution dissolves transparent	5.PS.1 5.PS.3	**PS.1 Describe and measure the volume and mass of a sample of a given material. PS.3 Determine if matter has been added or lost by comparing mass when** melting, freezing **or dissolving a sample of a substance. (Law of Conservation of Mass)**	Cause and effect	Planning and carrying out investigations.	

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1 part 2	**Where does the solid material go when a solution is made?**	Students add a measured amountof salt to a measured amount of water and note the total mass. They evaporate the water and note remaining salt crystals.	1. The mass of a mixture is equal to the mass of the mixture's components. 2. Mixtures can be separated their components.	2 active 1 reading	mass evaporation crystal	5.PS.1 5.PS.2 5.PS.3	**PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts; however,** the volume can differ from the sum of the volumes. **(Law of Conservation of Mass). PS.3 Determine if matter has been added or lost by comparing mass when** melting, freezing **or dissolving a sample of a substance. (Law of Conservation of Mass)**	Scale, proportion and quantity Systems and system models	Developing and using models, Planning and carrying out investigaitons, Analyzing and interpretig data, Using mathematics and computational thinking, Construcitng explanations	
1 part 3 FOCUS on Engineering Design	**How can you sepaate a mixute of dry materials?**	Students design ways to separate dry mixtures of gravel, powder, salt and magnetite.	Mixtures can be separated into their constituents. 2. Possible solutions ot a problem are liited by available materials and resources (constraints). 3 The success of a desgined solution is determined by considering the desired features (criteria).	2 active 1 reading	engineer criteria constraints magnets	3-5.E.1 3-5.E.2 3-5.E.3	E.1 Identify a simple problem with the design of an object that reflects a need or a want. Include criteria for success and constraints on materials, time or cost. E.2 Construct and compare multiple plausible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. E.3 Construct and perform fair investigaitons in which variables are controlled and failure points are considered to identify aspects of a model or prototype.	Cause and effect	Defining problems, Planning and carrying out investigaitons, Analyzing and interpreting data, Designing solutions, Engaging in argument from evidence, Obtaining, evaluating and communicating information	Note: Regarding 5.PS.2 "..the volume can differ from the sum of the volumes." It is true that in non ideal solutions, the total volume may differ from the sum of the solvent and the solute volume. The checmical understanding of this phenomena is beyond the scope for Grade 5. Consequently, there are no investigations to address this aspect of 5.PS.2.

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1 part 4	**Are there materials outdoors that will dissolve in water?**	Students use organic material from the school yard to mix with water in an attempt to make a solution.	1. A mixture is 2 or more materials intermingled. 2. An aqueous solution is a mixture in which a substance dissolves in water to make a clear liquid.	1 active 1 reading 2 assessment	extract filtrate	5.PS.3	PS.3 Determine if matter has been added or lost by comparing mass when melting, freezing or dissolving a sample of a substance. (Law of Conservation of Mass)	Cause and effect	Planning and carrying out investigatins, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations,	
2 part 2 **OPTIONAL**	**How does a drought-stopper work?**	Students observe a device that deivers 600-700 ML of water when only 100 mL of water put in. They develop a conceptual model to explain how the device might work.	1. Models are explanations of objects, events, or systems that cannot be observed directly. 2. Models are representations used for communicating and testing.	1 active 1 reading	siphon			Systems and system models	Planning and carrying out investigatins, Analyzing and interpreting data, Constructing explanations,	Excellent lesson for students to make a claim based on evidence and to practice productive argumentation.
2 part3	**What is the difference between dissolving and melting?**	Students heat 4 common solid materials. After observing results, they develop models for dissolving and for melting-noting the differences.	The amount of matter is conserved when it changes forms (melts). Dissolving is an intreaction between 2 or more substances: a solute dissolves into the solvent. A change of mass occurs when a solute is added to the solvent.	1 active 2 readingn 2 video 2 assessment	phase change melted freezing condensation water vapor	5.PS.1 5.PS.2 5.PS.3	PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts; however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass). PS.3 Determine if matter has been added or lost by comparing mass when **melting, freezing or dissolving** a sample of a substance. (Law of Conservation of Mass)	Energy and matter, Cause and effect	**Developing and using models**, Planning and carrying out investigatins, , Constructing expalnations, Obtaining, evaluating , and communicating information.	This lesson could be optional. It could; however, be used as an engineering/design investigation. See Lesson 1.3 for IN standards for Engineering. It also reinforces the deeper concepts regarding models in science and engineering.

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3 part 1	**Are all solutions made with soft-drink powder and water the same?**	Students observe and compare soft-drink solutions that differ in the amount of powder then in the amount of water.	1. Concentration is the amount of solid material dissolvedper unit volume of water.	1 active 1reading	concentrated dilute concentration	5.PS.1 5.PS.2 5.PS.3	PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts; however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass). PS.3 Determine if matter has been added or lost by comparing mass when melting, freezing **or dissolving** a sample of a substance. (Law of Conservation of Mass)	Structure and function, Systems and system models	Developing and using models, Planning and carrying out investigatins,Using mathematics and computational thinking, ,Constructing explanaitons, Obtaining, evlauaitng and communicating information	
3 part 2	**How can you determine which salt solution is more concentrated?**	Students use a balance to determine the relative concentration of various salt solutions.	When equal volumes of 2 salt solutions are weighed, the heavier one is the more concentrated solution.	1 active 1 reading	equal volumes	5.PS.1 5.PS.2 5.PS.3	PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts; however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass). PS.3 Determine if matter has been added or lost by comparing mass when melting, freezing **or dissolving** a sample of a substance. (Law of Conservation of Mass)	Cause and effect Scale, proportion, and quantity	Developing and using models,Planning and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations	Definitely include the online Tutorial *Conservation of Mass*

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Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
3 part 3	**How can you determine the relative concentra-tions of three mystery solutions?**	Students develop their own procedure for determining the relative concntrations of 3 mystery slat solutions by comparing equal volumes on a balance.	When equal volumes of 2 salt solutions are weighed, the heavier one is the more concentrated solution.	1 active 1 reading		5.PS.1 5.PS.2 5.PS.3	PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts; however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass). PS.3 Determine if matter has been added or lost by comparing mass when melting, freezing **or dissolving** a sample of a substance. (Law of Conservation of Mass)	Scale, proportion, and quantity	Planning and carrying out investigatins, Analyzing and interpreting data, Using mathematics and computational thinking, **Engaging in argument from evidence**, , Obtaining, evlauaitng and communicating information	
3 part 4	**What is the relationship between salt solution concentration and density?**	Students observe that less dense objects float on more dense liquids. They investigate 4 salt colored salt solutions to discover wich is moe concentrated based on how they layer.	1. Density is mass per unit volume. 2. The greater the concentraiton of a solution, the greater is its density. 3. Less dense solids and liquids float on more dense solutions.	1 active 1 reading 2 assessment	density layer less dense more dense	5.PS.1 5.PS.2 5.PS.3	PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 **Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts;** however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass). PS.3 **Determine if matter has been added** or lost by comparing mass when melting, freezing **or dissolving** a sample of a substance. (Law of Conservation of Mass)	Cause and effect	Planning and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations, Obtaining, evaluaitng, and commnicating information	Students develop their own procedure for solving the concentraiton puzzle. Perfect opportunity for performance assessment

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Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
4 part 1 could be optional- see 4 part 3Notes	**Is there a limit to the amount of salt that will dissolve in 50 mL of water?**	Students make a saturated solution by adding salt to water until no more salt will dissolve. After separtating the undissolved solid salt, students use a balance to determine the mass of salt needed to saturate 50 ML of water.	A solution is saturated when as much solid material as possible has dissolved in the liquid.	1-2 active 1 reading	solvent review solute review saturated solution	5.PS.1 5.PS.2 5.PS.3	PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 **Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts;** however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass). PS.3 **Determine if matter has been added** or lost by comparing mass when melting, freezing **or dissolving** a sample of a substance. (Law of Conservation of Mass)	Cause and effect Scale, proportion, and quantity Systems and sytem models Energy and matter	Asking questions, Planning and carrying out investigatins,Using mathematics and computation, Analyzing and interpreting data,Constructing explanations, Obtaining, evlauaitng and communicating information	Note: This lesson reinforces that equal volumes of liquid can differ in mass based on concentration of the solutions. This module does NOT address the last portion of 5.PS.2 the volume can differ from the sum of the volumes
4 part 2 could be optional- see 4 part 3 Notes	**Does it always take the same amount of solid materials to saturate 50 mL of water?**	Students add Epsom salts to 50 ML of water to make a saturated solution. They use a balance to determine the mass of Epsom salts in the saturated solution in order to compare the solubility of salt and Epsom salts.	Solubility varies from substance to substance and is affected by kind solvent, termperature and other factors.	1 active 1 reading	epsom salts solubiility soluble insoluble	5.PS.1 5.PS.2 5.PS.3	PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 **Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts;** however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass). PS.3 **Determine if matter has been added** or lost by comparing mass when melting, freezing **or dissolving** a sample of a substance. (Law of Conservation of Mass)		Developing and using models, Planning and carrying out investigatins, Analyzing and interpreting data,,Constructing explanations, Engaging in argument from evidence	

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4 part 3	**What is the identity of the mystery substance?**	Students are given an unknown substance (citric acid) to identify based on its properties. Students must develop their own plan for determining the substance's solubility. They compare results to a table of known solubilities for 5 substances. They evaporate the inkown solution and compare the crystals to photographic images.	Solubility is the propety that indicates how readily a solute dissolves in a solvent. 2. A substance is a single, pure material. 3. Substances form predictable, identifiable crystals when soluitons evaporate.	2 active 1 reading	citric acid substance	5.PS.1 5.PS.2 5.PS.3	PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 **Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts;** however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass). PS.3 **Determine if matter has been added** or lost by comparing mass when melting, freezing **or dissolving** a sample of a substance. (Law of Conservation of Mass)	Patterns	Asking quesitons, Developing and using models, Planning and carrying out investigatins, Analyzing and interpreting data, Using mathematics and computational thinking, **Constructing explanations**	
4 part 4 * Engineering & Design and ESS applica-tion	**What is in our water samples? What is a design to remove salt from ocean water?**	Students use observation and evaporation to determine what is inside various samples of local water. They discover source of local water, where it is stored and how it is treated. Students apply knowledge of solution chemistry to design a process to make ocean water suitable for drinking.	Criteria are a set of standards for evaluating or testing something. A constraint is a limitation or restriction. The demand for safe drinking water is increasing and engineers are developing solutions for this problem.	3 active 2 reading 2 assessment	criteria constraint desalination	5.ESS.3 3-5.E.1 3-5.E.2	ESS.3 Investigate ways individual communities within the United States protect the Earth's resources and environment. 3-5.E.1 I**dentify a simple problem with the design of an object that reflects a need or a want. Include criteria for success and constraints on materials, time, or cost**. 3-5.E.2 Construct and **compare multiple plausible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.**	Cause and effect	Defining problems, Planning and carrying out investigaitons, **Designing solutions**, Obtaining, evaluating and communicating information	Excellent lesson for students to demonstrate **ability to develop their own plan** for identifying the mystery substance. Also excellent opportunity to construct an argument based on evidence in identifying the mystery substance. **NOTE: IF you implement this lesson, students must also experience Lessons 4 part 1 and 4 part 2.**

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5 part 1 optional	**What is the effect of mixing two substances with water?**	Students use calcium chloride, baking soda, and citric acid to make different combinaitons. When water is added they note changes that occur. They see evidence of chemical change when new products are formed: gas and a precipitate.	1. Some mixtures of substances result in a **chemical reaction**. 2. During reactions, starting substances (**reactants**) change into new substances (**products**). 3. Formation of a gas or precipitate is evidence of a chemical reaction.	1 active 1 reading	carbon dioxide calcium chloride, chemical reaction, precipitate product reactant gas	5.PS.1	PS.1 Describe and measure the volume and mass of a sample of a given material	Cause and effect	Planning and carrying out investigatins, Analyzing and interpreting data, Constructing explanations,	Real world application of evaporation procedures to analyze local water. Real world application of solution chemistry learned in this modue to solve an **Engineering/Design problem.** Students do not actually contruct the salt removal device but they generate detailed drawings (models). Students compare solutions-finding similarities and differences and providing feedback. See extension resources in Investigation Guide on pages 298-9 World Water Monitoring Day. Learn about easy-to-use water test kit http://www.worldwaternmonitoringday.org See ideas in IG for Engineering challenges to clean up simulated oil spills. You might also explore the idea of engineering to secure water through *The Boy Who Harnessed the Wind,* a true story of a boy in Malawi who built a crude windmill to generate electricity for his family and to power a water pump to alleviate the drought and famine in his region. You can see him tell his story on *Ted Talks. William Kamkwamba: How I harnessed the wind | TED Talk | TED.com* *Video for the boy who harnessed the wind ▸ 5:59* *https://www.ted.com/.../william_kamkwamba_how_i_harnessed ..*
5 part 2 optional	**How can identify the productrs from the baking solda ancalcium chloride reactions?**		1.Formation of a gas or precipitate is evidence of a chemical reaction. 2. Some products of a reaction are soluble and can be observed only after evaporating the solution. 3. Calcium carbonate reacts with acid.	2 active 1 reading		5.PS.1	PS.1 Describe and measure the volume and mass of a sample of a given material	Cause and effect, Systems and system models	Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Obtaining, evaluaitng, and commnicating information	Grade 5 PS standards do not directly address chemical reactions. Investigations 5.1, 5.2 and 5.3 can be optional if your schedule does not allow for these explorations. If you do have time, the learning provides excellent background for Grade 7 7.PS.3 Investigate the Law of Conservation of Mass by measuring and comparing the mass of a substance before and after a change of state.

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5 part 3 optional	**What happens when you mix substances with water in a bag?**	Students produce chemical reactions in zip bags. The closed system allows students to observe the **volume of gas** and discover a new precipitate.	1. Some mixutures of substances result in a chemical reaction. 2. Formation of a gas or precipitate is evidence of a chemical reaction. 3. The mass of the substances in the closed bag remains the same before and after the chemical change- eventhough the volume of gas produced is greater than the volume of the substances before the phase change.	1 active 1 reading 2 assessment		5.PS.1 5.PS.2 5.PS.3	PS.1 Describe and measure the volume and mass of a sample of a given material. PS.2 **Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mass of the parts;** however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass). PS.3 **Determine if matter has been added** or lost by comparing mass when melting, freezing **or dissolving** a sample of a substance. (Law of Conservation of Mass)	Cause and effect, Systems and system models	Asking quesitons, Developing and using models, Planning and carrying out investigatins, Analyzing and interpreting data, Constructing explanations, Obtaining, evaluating and communicating information	Note: Students will not be able to measure the mass of the gas in the closed bag. This requires more precise and sensitive measurement tools that are not available in a grade 5 classroom or in the module.

Grade 5 curriculum roadmaps
Earth Science

Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
1 part 1	**How and why does your shadow change during the day?**	Students trace and compare their am and pm shadows.	1. Shadow lengths change during the day because the position of the Sun changes in the sky. 2. The direction of shadows change during the day because of the position of the Sun changes in the sky.	2 active	orientation shadow	5.ESS.2	**Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows**, day and night, and the seasonal appearance of some stars in the night sky.	Patterns	Planning, carrying out investigations, Developing and using models, Analyzing and interpreting data, Constructing explanations	
1 part 2	**What can be learned by studying the lenth and direction of shadows?**	Students make hourly records of the length and direction of shadows cast by a golf tee on a Sun tracker.	1. Shadows change during the day because the positin of the Sun changes in the sky. 2. The length and direction of a shadow depends on the Sun's position in the sky.	2-3 active, 1 reading	compass	5.ESS.2	**Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows**, day and night, and the seasonal appearance of some stars in the night sky.	Patterns, Cause and effect, Systems and system models	Planning, carrying out investigations, Developing and using models, Analyzing and interpreting data, Constructing explanations, Using mathematics and computational thinking	

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Earth Science

Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
1 part 3	**What causes day and night?**	Using a lamp, students use their bodies and later small globes to observe day and night.	1. Day is half of Earth's surface being illuminated by sunlight; night is the half of Earth's surface in its own shadow. 2. The cyclical change between day and night is the result of Earth's rotating around the stationary Sun.	1active, 1 reading 2 assess	axis, orbit, revolution, rotation, sunrise, sunset, North Pole, South Pole	5.ESS.2	**Represent data in graphical displays to reveal patterns of daily changes** in length and direction of shadows, **day and night,** and the seasonal appearance of some stars in the night sky.	Patterns, Cause and effect, Systems and system models	Asking quesitons, Developing and using models, Analyzing and interpreting data, Constructing explanaitons, Obtaining, evaluating, and communicating information	

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
2 part 1	**How can you explain why we see some natural objects only in the night sky, some only in the day sky, and some at both times?**	Students record the moon's appearanace every day for a month. 4 nights they are asked to record observaitons of the night time sky including the shape of the moon and the appearance of stars or planets.	1. The moon can be seen at times during the day and at night. 2. The sun, moon and stars do not appear in the same place. 3. Stars and some planets can be seen at night.	2 active 2 reading	planet moon stars	5.ESS.1	**Analyze the** scale of our **solar system and its components**: our solar system includes the sun, **moon,** seven other **planets** and their moons, and many other objects like asteroids and comets.	Patterns	Planning and carrying out investigations, Analyzing and interpreting data, Obtaining, evaluating and communicating information	Moon phases are addressed in Gr. 4 (4.ESS1) If your students show mastery of this concept, skip the month-long data collection but DO the 4 nights of observations to emphasize the appearance of natural objects in the night sky.

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
2 part 2	**How would you describe the size of and distance between Earth, the Moon, and the Sun?**	Students build a model of the Earth/Moon/Sun system. They use mathematics to determine the size and distance relationships among Earth, the Moon and the Sun.	1. The moon is much smaller than the Earth and orbits at a distance equal to about 30 Earth diameters. 2. The Sun is 12,000 Earth diameters away from Earth and is more than 100 time larger than Earth.	1 active 2 reading	model diameter	5.ESS.1	**Analyze the scale of our solar system and its components: our solar system includes the sun, moon,** seven other planets and their moons, and many other objects like asteroids and comets.	Scale, proportion and quantity, Systems and systems models	Planning and carrying out investigations, Developing and using models, Using mathematics and computational thinking, Engaging in argument from evidence	

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
2 part 3 Optional	**How does the shape of the moon change over 4 weeks?**	Students watch a video *All About the Moon* . They analyze moon observations from Inv. 2.1. They use a light source and sphere to simulate a Sun-Earth-Moon system to replicate the moon phases.	1. The appearance of the Moon when viewed from Earth changes in a regular pattern over 4 weeks. 2. Moon phase is the portion of the illuminated half of the Moon that is visible from Earth.	2 active 2 reading	new moon quarter full crescent waxing waning gibbous	NA	NA	Patterns	Analyzing and interpreting data, Constructing explanations	**This investigaiton is optional.** Moon phases are addressed in Gr. 4 (4.ESS1) If your students show mastery of this concept, skip this lesson.

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
2 part 4	**How do the parts of the solar system interact?**	Students work in pairs to organize a set of solar system cards into a model of the solar system. They view a video *The Planets and the Solar System.* They observe a ball swinging in a circle on the end of a string as a model of gravity's effect on the motion of planets in a circular orbit around the sun.	1. The solar sysem includes a star, the Sun, and the objects that orbit it, including Earth, the Moon, seven other planets, their satellites, and smaller objects. 2. The pulling force of gravity keeps the palnets and other objects in orbit by continuously changing their direction of travel.	2 active 2 reading	asteroid comet dwarf planet gas giant Kuiper Belt solar system terrestrial satellite	5.ESS.1 5.PS.4	**Analyze the scale of our solar system and its components: our solar system includes the sun, moon, seven other planets and their moons, and many other objects like asteroids and comets.**	Scale, proportion and quantity, Systems and systems models	Developing and using models, Analyzing and interpreting data, Engaging in argument from evidence, Obtaining, evaluating and communicating information	This may provide an opportunity to address **5.PS.4** *Describe the difference between weight being dependent on gravity and mass comprised of the amount of matter in a given substance or material. See Finding Your Weight in Other Worlds* at Exploratorium https://www.exploratorium.edu/ronh/weight/

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
2 part 5	**Why do stars appear to move across the night sky?**	While simulating Earth's rotation, students observe the appearance of stars rising in the east, traveling across the sky and setting in the west. They observe a demonstration of the Sun/Earth/Milky Way relationships to explain why different stars are visible in different seasons. The video *All about Stars*	1. Stars are at different distances from Earth. 2. Stars are different sizes and have different brightnesses. 3. Groups of stars form patterns called constellations. 4. Stars (constellations) appera to move together across the night sky because of Earth's rotaiton. 5. Different constellations	2 active 2 reading 2 assess	constellation	5.ESS.2	**Represent data in graphical displays to reveal patterns** of daily changes in length and direction of shadows, day and night, **and the seasonal appearance of some stars in the night sky.**	Patterns, Cause and effect, Systems and system models	Developing and using models, Analyzing and interpreting data, Constructing explanations, Engaging in argument from evidence, Obtaining and communicating informaiton	

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Module Title: Earth and Sun (FOSS)										
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3 part 1	**What is air**	Students explore the properties of air by workin gwith syringes and tubes. Three videos help students learn more about the properties of air.	1. Air is a mixture of gases held by gravity near Earth's surface. 2. Air has mass, takes up space, and is compressible.	1 active 1 reading	atmosphere compressed pressure syringe plunger matter mass	5.ESS.4	**Develop a model using an example to describe ways** the geosphere, biosphere, hydrosphere, and/or **atmosphere interact**.	Cause and effect	Planning and carrying out investigations, Obtaining, evlauating, and communicating information, Developing and using models	
3 part 2	**What is Earth's atmosphere?**	Students learn about Earth's atmosphere using diagrams, photos from space, a video (*Earth's Atmosphere*) and through reading.	1. Most of Earth's air resides in the troposhere, the layer of the atmosphere clsest ot eArth's surface. 2. Weather happens in the troposphere.	1 active 1 reading	troposphere weather stratosphere meteor-ologists	5.ESS.4	**Develop a model using an example to describe ways** the geosphere, biosphere, hydrosphere, and/or **atmosphere interact**.	Scale, proportion and quantity, Systems and system models	Obtaining, evaluating and communicating information	

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
3 part 3	**How do meteorologists measure and record weather variables?**	Students use weather instruments and a digital weather station to gather weather data and develp a plan for acquiring daily data and sharing them with the class.	Weather is the condition of the Earth's atmosphere at a given time in a given place. 2. Meteorology is the science of weather. 3. Weather is described in terms of several variables: temperature, humidity, precipitation, wind and air pressure.	1 active 1 reading 2 assess	variable forecast humidity precipitation temperature thermometer visibility air pressure millibars	5.ESS.4	**Develop a model using an example to describe ways** the geosphere, biosphere, **hydrosphere**, and/or **atmosphere interact**.	Scale, proportion and quantity, Systems and system models	Obtaining, evaluating and communicating information, Planning and carrying out investigations, Using mathematics and computational thinking	Excellent math extension for this inv. (See TG 281) Students are challenged to collect data for 2 cities for 5 consecutive days and then set up a graph to represent the data. (days of week on x-axis and temperatures on the y-axis).

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4 part 1	**What happens to earth materials when they are exposed to sunlight?**	Students monitor and record temperature changes when solar energy is trasferred to water and to dry soil. The note the changes in temperatures when the earth materials are placed in the shade.	1. The sun is the major source of energy that heats the Earth. 2. The different energy-transferring properties of earth materials can lead to uneven heating of Earth's surface. 3. It takes more energy to change the temperature of a given volume of water than an equal volume of dry soil.	3 active 1 reading	earth material solar energy radiation rays energy transfer	5.ESS.4	**Develop a model using an example to describe ways** the **geosphere**, biosphere, **hydrosphere**, and/or **atmosphere interact**.	Cause and effect Enery and matter Patterns	Planning and carrying out investigaitons, Analyzing and interpreting data, Using mathematics and computational thinking	Excellent for Gr. 5 ESS als provides real-world application of Gr 4 PS standards about energy: 4.PS.4 and 4.PS.5

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Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
4 part 2	**How does energy transfer to the air?**	Students observe two examples of heat transfer by conduciton: from ot water to a container of cold water, and from one end of a metal strip to the other.	1. The atmosphere is heated by conduciton between Earth's surfaces and air particles as a result of contact. 2. The atmosphere is heated by absorption of energy radiated directly from the Sun and reradiated from Earth's surfaces.	2 actuve 1 reading	conduction, matter, particles absorb geosphere hydrosphere reradiation	5.ESS.4	**Develop a model using an example to describe ways** the **geosphere**, biosphere, **hydrosphere**, and/or **atmosphere interact**.	Cause & effect, Energy & matter	Planning and carrying out investigaitons, Analyzing and interpreting data, Using mathematics and computational thinking	Strong lesson for 5.ESS.4. Good review of Grade 4: 4.PS.5 and prepares excellent base for Grade 6: 6.PS.4 *Investigate the properties of light, sound, and other energy waves and how they are reflected, absorbed, and transmitted through materials and space.*

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
4 part 3 (potential optional investigation if limited schedule for science) But **DO utilize the reading in FOSS Science Resources: *Wind Power and Solar Technology to address 5.ESS.3***	**What happens when a volume of fluid is warmed at the bottom?**	Students use water at different temperatures to discover the relaitonship between temperature and density. They place a bag of hot water against a vial of cold blue water and observe the creation of a conveciton current. The fluid water provides a model for the fluid atmospher- showing how temperature differences in	1. Convection is the circulation of fluid (liquid or gas) that results in energy transfer; cool masses sink, lifting warm masses. 2. Convection currents are driven by uneven heating of Earth's surface.	1 active 1 reading	fluid, convection current, air mass, expands, contracts wind turbine	5.ESS.4 5.ESS.3	**Develop a model using an example to describe ways** the **geosphere**, biosphere, **hydrosphere**, and/or **atmosphere interact**. 5.ESS.3 **Investigate ways individual communities within the United States protect the Earth's resources and environment.**	Cause and effect Enery and matter Patterns	Planning and carrying out investigations, Developing and using models, Constructing explanations,	if you don't pursue the investigation due to lack of time, **DO explore the reading *Wind Power* and *Solar Technology* which addresses 5.ESS.3** In addition to addressing 5.ESS.4, the lesson prepares excellent base for Grade 6: 6.PS.4 *Investigate the properties of light, sound, and other energy waves and how they are reflected, absorbed, and transmitted through materials and space.*

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
4 part 4	**What is the best design for a solar water heater?**	Students set up solar water heaters using black and white collectors to determine if water affects temperature change in the water. They also set up open and covered water heaters to determine if air affects temperature change in the water. Students determine the best design based on the results.	1. Materials either absorb solar energy or reflect solar energy. 2. Heat absorbed by the black plastic transfers directly to the water by conduction (energy transfer). 3. Covered solar heaters prevent cooler air from contacint the warming water, so heat could not transfer from the water to	2 active 1 reading 2 assess	radiant energy, reflect, absorb, solar collector	5.ESS.4, 5.ESS.3 3-5.E.1, 3-5.E.2, 3-5.E.3	**Develop a model using an example to describe ways** the **geosphere**, biosphere, **hydrosphere**, and/or **atmosphere interact**. 5.ESS.3 **Investigate ways individual communities within the United States protect the Earth's resources and environment.** 3-5.E.1 Identify a simple problem with the design of an object that reflects a need or a want. Include	Cause & effect, Energy & matter	Posing questions and defining problems, Developing and using models and tools, Construting and performing investigaitons, Analyizing and interpreting data, Using mathematics and computational thinking, Constructing explanaitons and designing solutions, Engaging in argument from evidence, Obtaining, evaluating and communicaitng information	Opportunity to apply science content to and enginering problem and design challenge that addresses the 3-5 engineering standards. The reading, *Solar Technology* , addresses **5.ESS.3**

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
5 part 1	**What causes condensa-tion to form?**	Students observe condensation on a cup of ice water and on other cold surfaces.	Condensation is the process by which gas (water vapor) changes into liquid (water).	2 active 1 reading	condense condensation dew, fog, frost, water vapor	5.ESS.4	Develop a model using an example to describe ways the **geosphere**, biosphere, **hydrosphere, and/or atmosphere** interact.	Cause and effect, Systems and system models Energy and matter	**Engaging in argument from evidence**, Constructing explanations, Developing and using models, Planning and carrying out investigations	
5 part 2	**How does water vapor get into the air?**	Students compare two cups with equal amounts of water placed on a balance. They observe what happens to the temperature, mass and volume of water in both cups while one cup is placed under a 60 watt lightbulb.	1. Evaporation is the process by which liquid changes into gas. 2. As temperature increases, the rate of evaporation increases	2 active	evaporate evaporation	5.ESS.4 5.PS.1	Develop a model using an example to describe ways the geosphere, biosphere, **hydrosphere, and/or atmosphere interact.** **5.PS.1** Describe and **measure the volume and mass** of a sample of a given material.	Cause and effect, Systems and system models Energy and matter	Planning and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations	

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
5 part 3	**What is the water cycle?**	Students simulate the travels of a water drop through the water cycle.	1. Evaporation and condensation contribute to the movement of water through the water cycle, redistributing waster over Earth's surface (geosphere). 2. Water can cycle through the environment in complex ways that involveinteractions between the biosphere, geosphere and	2 active 1 reading (could omit 1 reading) 1 vdeo	glacier groundwater recycle atmosphere water cycle	5.ESS.4	Develop a model using an example to describe ways the **geosphere, biosphere, hydrosphere, and/or atmosphere interact.**	Systems and system models	Developing and using models, Analyzing and interpreting data, Constructing explanations	This is a perfect activity for showing how water interacts with and moves through the biosphere and geosphere.You might ommit reading pages 132-138 about severe weather.

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Module Title: Earth and Sun (FOSS)										
Investigation #	Focus Question	Description	Objective(s)	# of Sessions	Vocabulary	IN #	Standard Text	Cross Cutting Concept(s)	Practices	Notes
5 part 3	How can communities protect Earth's fresh water?					5.ESS.3	Investigate ways individual communities within the United States protect the Earth's resources and environment.			Students learn in Inv. 5 part 3 that only 3% of Earth's water is fresh water and most ot that water is in ice caps, glaciers and groundwater. This would be a perfect opportunity for students to research the threats to fresh water in lakes and rivers as well as measures to protect this resource. You might consider assigning other teams of students to research the threats to the waters of the ocean and what communities are

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Module Title: Earth and Sun (FOSS)										
Investigation #	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
5 part 4	**What is the difference between weather and climate?**	Through video, readings and discussions, students describe world climate regions based on weather variables. They are introduced to factors affecting global climate change.	Climate is the average or typical weather that can be expected to occur in a region of Earth's surface.	1 active 2 reading 1 video 2 assessment	climate climatologist	5.ESS.4 5.ESS.3	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. Investigate ways individual communities within the United States protect the Earth's resources and environment.	Scale, proportion and quantity, Systems and system models	Obtaining, evaluating, and communicating information Constructing explanations	

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Module Title:	Living Systems (FOSS)									
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
1 part 1	**How can you identify a system?**	Students identify the interacting parts of a common object. They describe additonal systems and subsystems.	1. A system is a collection of interacting objects, ideas or procedures that together define a pysical entity or process. 2. A subsystem is a small system that is inside a larger system.	1 active 1 reading	system subsystem			Systems and system models	Constructing explanations, Obtaining, evaluating, and communicating information	This lesson does not directly address IN LS standards, but is necssary to build understanding for 5.LS.1 and 5.LS.2

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Module Title:	Living Systems (FOSS)									
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
1 part 2	**Is planet Earth a system?**	Through video, students learn about 4 subsystems of Earth: geosphere, atmosphere, hydrosphere and biosphere. They further explore biosphere by generating food webs within a deciduous forest ecosystem.	1. Four interactive systems compose planet Earth. 2. Food webs are subsystems within an ecosystem that desribe the transfere of matter and energy within the system.	2 active 2 reading	geosphere atmosphere hydrosphere biosphere ecosystem microorganism predator prey producers consumers herbivores carnivores omnivores decomposers	5.ESS.4 5.LS.1 5.LS.2	**ESS.4 Develop a model using an example to describe ways the geoshpere, biosphere, and hydrosphere, and/or atmosphere interact. LS.1 Develop a model to describe the movement of matter among plants, animals, decomposers and the environment. LS.2 Observe and classify common Indiana organisms as producers, consumers, decomposers or predator and prey based on their**	Energy and matter, Stability and change, Systems and system models	Developing and using models, Obtaining, evaluating, and communicating information, Construcitng explanations	Does not directly address IN-specific organisms, although the forest ecosystem card used feature oranisms common to IN forests- especially before European settlement.

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Module Title:	Living Systems (FOSS)									
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
1 part 3	**What organisms are both predators and prey in the kelp forest ecosystem?**	Students use organism cards to create food webs in a marine ecosystem. They compare the marine and forest ecosystems.	A food web is a model for the complex way matter and energy flow among plants, animals and decomposers in an environment. A kelp forest is a marine ecosystem.	1 active 2 reading 1 video	marine ecosystem zooplankton, phytoplankton kelp	5.LS.1	Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.	Energy and matter, Stability and change, Systems and system models	Developing and using models, Obtaining, evaluating, and communicating information, Construcitng explanations	
1 part 4 Order red worms prior to this lesson!	**What happens when compost worms interact with organic litter?**	Student groups set up redworm habitats and observe changes in the worm population and the organic materials over a 1-2 month period.	Decomposers play a critical role by consuming and recycling dead organisms and organic waste.	1 active 1 reading 2 assessment Note weekly observation till end of module	organic decomposer compost redworms	5.LS.1	Develop a model to describe the movement of matter among plants, animals, **decomposers** and the environment.	Systems and system models	Planning and carrying out investigaitons, Asking questions, Engaging in argument from evidence	Look closely in the ISI tote for information about ordering the redworms. **Order the delivery in advance as it may take 3-4 weeks for delivery. Plan for students to observe the jar weekly throughout this modules.** In the last part of Inv. 4 they disassemble the worm habitat system and observe the numbe of worms and conditions of organic material.

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Module Title:	Living Systems (FOSS)									
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
2 part 1	**What does yeast need to break its dormancy?**	Students design their own investigations using yeast, water and a cookie to determine conditions to activate yeast cells.	A nutrient is a substance that is used by a cell to produce the energy needed to perform the functions of life. Yeast is a single-celled fungus.	2 active 1 reading	yeast dormancy nutrients waste carbon dioxide metabolism fungus cell sugar	5.LS.1	Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.	Systems and system models Scale, proportion, and quantity	Planning and carrying out investigatins, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations,	
2 part 2	**How do plants get the food they need?**	Students plant wheat seeds in containers of soil. Half of the containers are placed in the dark and half are placed in a lighted environment.	Plants are producers that make their own food. Chlorophyll is the green pigment that absorbs sunlight in the cells of producer organisms.	5 active 1 reading	chlorophyll photosynthesis	5.LS.1	Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.	Energy and matter	Planning and carrying out investigatins, Analyzing and interpreting data, Constructing explanations,	Each group will need 2 L of soil. Plan to observe wheat seeds after 3 days when they should have sprouted. Observe again after 6 days (some are in dark and some in lighted environments). Observe again 1 and 4 days later.

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Module Title:	Living Systems (FOSS)									
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
2 part3 optional	**How do animals get the nutrients they need? OPTIONAL LESSON**	Students observe painted lady larvae and adut butterfiles eating different food sources. The human digestive system is explored though a video.	Animals obtain nutrients by eating. Digestion is the process used by animals to break down complex food items into simple nutrients.	2 active 2 readingn 2 video 2 assessme nt	by-product larvae chrysallis digestion digestive system esophogaus, stomach, small intestine, large intestine, bloodstream heterotrophs autotrophs	5.LS.1	Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.	Energy and matter, Systems and system models	Planning and carrying out investigatins, Analyzing and interpreting data, Constructing expalnations, Obtaining, evaluating , and communicating information.	This lesson is optional. You might consider combining this lesson with health science as it relates to the digestive process of humans. The butterfly cage is provided but the painted lady larvae are not. See Investigation Guide p. 58 for purchase guidance. If you do the investigation, plan for a about 1 week of brief observations at larvae stage before they begin to go to pupated stage. They should remain in this stage about 1 week before breaking out of chrysalis. The larvae arrive in food medium they require. Adult butterfies will sip from sweet juily fruit slices

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Module Title:	Living Systems (FOSS)									
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
3 part 1	**How are nutrients transported to cells in a plant?**	Students plant wheat seeds in clear straws to allow observations of leaves. They go outdoors to cover foliage in a clear plastic bag and observe the moisture condensed inside the bag.	Vascular plants have specialized tissues for the transport of water, minerals and sugar to cells. Leaves from common IN vascular plants can be classified by organizing them into groups with similar attributes.	4 active 3 reading	leaf veins sap xylem phloem vascular bundles, vascular system, transpiration	5.LS.1 5.LS.2	**Develop a model to describe the movement of matter among plants, animals, decomposers and the environment. LS.2 Observe and classify common Indiana organisms as producers, consumers, decomposers or predator and prey based on their relationships and interactions with other organisms in their ecosystem**	Structure and function, Systems and system models	Planning and carrying out investigatins, Analyzing and interpreting data,Constructing explanaitons, Obtaining, evlauaitng and communicating information	Plan to observe the wheat seeds and water levels 3 days and 6 days after setting up the whetat chambers. If implementing in the winter, try to secure an indoor plant for the class to observe transpiration. This lesson provides strong background for Grade 7 LS.3 *Explain how cells develop through differentiation into specialized tissues and organs in multicellular organisms.*

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Module Title:	Living Systems (FOSS)									
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
3 part 2 **OPTIONAL**	**How do humans transport nutrients to all their cells?**	After watching a video showing how blood is delivered to every human cell, they construct a functional model of a circulatory system.	Multicellular organisms have systems for transporting nutrients and waste. In the human circulatory system, blood transports resources to cells and wastes from the cells.	2-3 active 1 reading	circulatory system, arteries, veins, capillaries, heart valve, ventricle	5.LS.1	Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.	Systems and system models	Developing and using models, Obtaining, evaluating, and communicating information, Construcitng explanations	This lesson can be optional for Grade 5 unless you wish to combine with Health Science. It addresses Grade 7 LS. 4 *Research and describe the funtion and relationships between various cell types, tissues, and organs in the immune, circulatory and disgestive systems in the human body.*
3 part 3 **OPTIONAL**	**Why do people breathe?**	Students study structure and function of the respiratory system. They measure their lung volume.	Multicelluar organisms have systems for transporting nutrients and waste.	1 active 1 reading 2 assessme nt	respiratory system, diaphragm alveoli vital capacity	5.LS.1	Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.	Patterns Scale, proportion, and quantity Systems and system models	Asking questions, Planning and carrying out investigatins, Analyzing and interpreting data,Constructing explanaitons, Obtaining, evlauaitng and communicating information	This lesson is optional. You might consider combining this lesson with health science as it explores the respiratory process of humans.

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Module Title:	Living Systems (FOSS)									
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
4 part 1	**In dodgeball, how are you able to avoid being hit?**	Students use a falling cup to investigate the time that elapses between a visual stimulus and a response. They compare foot response time to hand response time. Through video and text they learn about sensory and motor neurons in brain messages.	A stimulus triggers a response and is often information received through the senses. A response is the reaction of a living thing to a stimulus.	1-2 active 1 reading	behavior stimulus response instinctive receptor central nervous system, neurons	5.LS.3	Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	Systems and system models Scale proportion, quantity	Asking questions, Planning and carrying out investigatins,Using mathematics and computation, Analyzing and interpreting data,Constructing explanations, Obtaining, evlauaitng and communicating information	
4 part 2	**What features of oganisms attract attention?**	Students create fictional organisms suited to various schooolyard habitats and attracted to specified visual stimuli.	Animals receive sensory information and respond by communicating to warn others of danger, scare predators away or locate others of their kind.	1 active 1 reading	adaptation	5.LS.3	Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	Systems and system models	Analyzing and interpreting data Obtaining, evaluating and communicating informaiton	This investigation addresses 5.LS.3 and provides strong review of 4.LS.3 *Construct and argument that plants and animals have internal and external structures that function to support survival, growth, behavior and reproduction in different ecosystems.*

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Module Title:	Living Systems (FOSS)									
Lesson	**Focus Question**	**Description**	**Objective(s)**	**# of Sessions**	**Vocabulary**	**IN #**	**Standard Text**	**Cross Cutting Concept(s)**	**Practices**	**Notes**
4 part 3	**What behaviors are instictive, and what behaviors are learned?**	Students learn about instinctive and learned behaviors and study monarch butterflies' instictive migration over several generations.	Some stimuli activate responses that are learned, others activate responses that are instictive.	1 active 1 reading	learned behavior, reflex instinct inherited trait	5.LS.3	Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	Stability and change	Constructing explanations, Obtaining, evaluating , and communicating information.	This investigation addresses 5.LS.3 and provides strong review of 4.LS.3 *Construct and argument that plants and animals have internal and external structures that function to support survival, growth, behavior and reproduction in different ecosystems.*

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Module Title:	Living Systems (FOSS)									
Lesson	Focus Question	Description	Objective(s)	# of Sessions	Vocabulary	IN #	Standard Text	Cross Cutting Concept(s)	Practices	Notes
4 part 4	What are the parts of a marine ecosytem?	Students conclude the study of decomposers by dismantling the worm habitat. They explore marine ecosystems and are introduced of the role of the ocean in the carbon cycle.	Ecosystems have biotic and abiotic parts. Carbon is matter that moves among plants, animals and decomposers. The ocean plays an important role in the carbon cycle.	1-2 active 1 reading 2 assessment		5.LS.1 5.ESS.4 5.ESS.3	Devlop a model to describe the movement of matter among plants, animals, decomposers, and the environment. Develop a model using an example to describe ways the geosphere, biosphere. Hydrosphere, and/or atmosphere interact. Investigate ways individual communities within the United States protect the earth's resources and environment.	Systems and system models, Energy and matter	Analyzing and interpreting data, Constructing expalnations, Obtaining, evaluating , and communicating information.	Although this investigation addresses a marine ecosystem and not one found in IN, it is an important culminating lesson that brings together everything learned about the movement of matter among plants, animals and decomposers. It also brings into focus the understanding that the biosphere is affected by hydrosphere and the atmosphere as well as human activity.