SCIENCE GRADE LEVEL 5	**YEAR AT A GLANCE** **Student Learning Outcomes by Unit** **2016-2017**

UNIT: Levers and Pulleys **Dates:** **Networks A & D - 1/25 to 3/28** **Network E - 4/4 to 6/13** **Networks B & F - 9/8 to 11/2** **Network C - 11/9 to 1/19**	**Overarching/general themes:** **Levers and lever systems; effort and work; simple machines** **Textual References** **Levers and Pulleys** **Teacher's Guide (FOSS)**	**To Demonstrate Proficiency by the End of the Unit Students Will:**
8 Sessions, 2-3 weeks	**Investigation 1** Levers	• Compare the effort needed to lift a load in different lever systems (ex: when the load remains stationary and the effort changes position, when the effort remains stationary and the load changes position) by building lever systems and recording/analyzing data. (PS-4) • Organize observations on a record sheet or science notebook. • Discover the relationships between the parts of a lever by arranging the components of a lever system in different ways, and writing in their science notebooks, using precise language and vocabulary. Use the results of their lever experiments to complete an argument writing assignment over an extended period of time, supporting their claim with reasons and evidence. • Indicate that a lever is a simple machine that people use to gain an advantage (a benefit obtained by using a lever or other simple machine), such as making work easier by providing reasons that are supported by facts and evidence on a data sheet or in a science notebook. (TE-1.3) • Define domain specific vocabulary (effort - the force needed to move a load or overcome resistance; fulcrum – the point where a lever arm pivots; load – a mass lifted or a resistance overcome by a lever) by producing clear and coherent writings and detailed illustrations in their notebook.
8 Sessions, 2-3 weeks	**Investigation 2** More Leverage	• Assess both the relative positions/sizes of the lever components and the behavior of different classes of levers by rearranging the components of a lever system, comparing the effort (direction and magnitude) needed to lift a load, recording accurate data on a data sheet or in a science notebook, and describing differences in the systems with precise language and accurate lever diagrams. • Determine how tools can be used as levers to give the user an advantage (a gain in effort, distance, or change of direction resulting from the use of a simple machine) by analyzing tools/everyday objects and documenting their work through detailed lever diagrams. (TE-1, TE-1.3) • Identify the ways in which classes of levers differ from each other (A class-1 lever has the fulcrum between the load and the effort, a class-2 lever has the load between the effort and the fulcrum, and a class-3 lever has the effort between the fulcrum and the load) by illustrating the components in lever diagrams, and writing informative texts in a science notebook to convey information clearly. • Recognize that conventions are operating procedures that help people communicate more efficiently by using appropriate symbols to complete lever diagrams. • **CWA: *Which lever system will require the least effort to lift the load?***

UNIT: Levers and Pulleys Dates: Networks A & D - 1/25 to 3/28 Network E - 4/4 to 6/13 Networks B & F - 9/8 to 11/2 Network C - 11/9 to 1/19	Overarching/general themes: Levers and lever systems; effort and work; simple machines	
	Textual References **Levers and Pulleys** **Teacher's Guide (FOSS)**	**To Demonstrate Proficiency by the End of the Unit Students Will:**
8 Sessions, 2-3 weeks	**Investigation 3** Pulleys	• Describe the advantages that different pulley systems provide the user by observing and measuring the effort needed to lift a load with both single-fixed- and single movable- pulley systems, organize information on a data sheet, and writing routinely in a science notebook over shorter periods of time. • Diagram and compare the components of four kinds of pulley systems (single-pulley system--fixed or movable, two-pulley system—effort applied up or down) by completing accurate pulley diagrams, documenting the effort (magnitude and direction) needed to lift a load, and analyzing the differences in the systems. (TE-1.3) • Document the different types of advantage that pulley systems provide by constructing these lever systems, and writing about findings qualitatively. (A single-movable-pulley system provides a mechanical advantage for its user, a single-fixed-pulley system provides no mechanical advantage, but changes the direction of the effort, a two-pulley system in which the effort is applied upward provides a greater advantage than one in which the effort is applied downward)
8 Sessions, 2-3 weeks	**Investigation 4** Pulleys at Work	• Observe and measure the effort to lift a load with one- and two-pulley systems by collecting data about both the magnitude and direction of the effort needed to lift a load, and organizing information on a data sheet. • Predict the effort needed to lift a load with a pulley system by calculating the advantage created by different pulley systems, and recognizing that patterns in data can be used to make predictions. • Conclude that the amount of work put into a system is equal to the work output of the system by measuring and comparing the distance the effort and load travels in different pulley systems, and producing clear and concise writing samples to explain the results of investigations. • **Close Reading:** ***Rube Goldberg: Biography www.rubegoldberg.com/about***

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UNIT: Measuring Time **Dates:** **Networks A & D - 4/4 to 6/13** **Network E - 1/25 to 3/28** **Networks B & F - 11/9 to 1/19** **Network C - 9/8 to 11/2**	**Overarching/general themes:** **Moon phases; engineering design; controlling variables; pendulum; energy and motion**	
	Textual References **Measuring Time** **Teacher's Guide (STC)**	**To Demonstrate Proficiency by the End of the Unit Students Will:**
7-9 Sessions, 3-4 weeks	**Investigations 1 – 6** Keeping time with the Sun and the Moon	• Explain how the natural cycles of the sun and moon can be used to measure time by constructing calendars, sun clocks and moon phase models, identifying patterns in data, and observing and recording information about the natural cycles of the sun and the moon. (ES-14) • Infer how shadows cast by the sun can be used to measure and predict the passage of time during a day by collecting shadow length data, and using this to write a scientific argument over an extended period of time, supporting their claim with reasons and evidence. (ES-14) • Demonstrate how the phases of the moon follow a cycle that can be used to measure and predict the passage of time during a month by completing a daily moon phase journal, and organizing a set of moon phase cards. (ES-15) • **Close Reading: ScienceNewsforKids.org *Home on The Moon*** • **CWA: *What happens to the length of a shadow during the day?***
10-14 Sessions, 4-5 weeks	**Investigations 7 – 16** Investigating invented clocks	• Determine that the accuracy of mechanical clocks is dependent on their design, the materials from which they are constructed, and their energy source by constructing a mechanical device to measure specific intervals of time consistently. (TE-1, TE-2) • Predicting and testing how changing a variable affects the outcome of an experiment by planning and conducting experiments in which variables are controlled, and analyzing data in science notebooks. • Interpret test results to draw conclusions about how changing variables affects the outcome of an experiment by conducting water clock and pendulum experiments, and communicating results through writing in notebooks; (ex: organizing information in charts, tables, and graphs; discussion; illustrating solutions through scientific drawings) • Conduct short research projects that use several sources to build knowledge of methods used to measure time by reading and researching science materials to gather more information. • Identify materials used to accomplish a design task by applying previously learned concepts and skills to build a one minute timer, documenting work by writing routinely over shorter time frames, using domain specific vocabulary, and illustrating solutions with technical drawings.

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UNIT: UNIT: Ecosystems* **Dates:**	**Overarching/general themes:** **Ecosystem; community; environment; models; pollution**	
Networks A & D - 9/8 to 11/2 **Network E - 11/9 to 1/19** **Networks B & F - 1/25 to 3/28** **Network C - 4/4 to 6/13**	**Textual References** **Ecosystems** **Teacher's Guide (STC)**	**To Demonstrate Proficiency by the End of the Unit Students Will:**
3-4 Sessions, 1-2 weeks	**Investigation 1 – 3** Modeling ecosystems	• Explain an ecosystem is a community of organisms and its interaction with its environment. Provide examples from observation and text. • Explain how model ecosystems can be used to learn more about the complex relationships that exist on earth by applying scientific processes and skills that can be used in both their eco-column, and in a natural ecosystem • Use a hand lens, pH paper, measuring devices, and other testing equipment appropriately • Conduct, record, and organize daily observations; plan, implement, and analyze experiments; make and test predictions and draw conclusions from the results
4-6 Sessions, 2 weeks	**Investigation 4 – 7** Explore dependent and independent relationships in ecosystems	• Determine the factors that affect growth and reproduction of organisms in an ecosystem (including light, water, temperature, and soil) by reading non-fiction texts, and writing/drawing routinely in science notebooks over shorter periods of time. • Identify dependent and interdependent relationships in an ecosystem by creating food webs and labeling the different types of relationships with arrows. • Categorize organisms by the functions they serve in an ecosystem) by making written observations in science notebooks, and using domain specific vocabulary (producers, consumers, or decomposers). (LS-6, LS-11) • Identify that ecosystems can be stable or disturbed (and recognize whether the causes of a disturbed ecosystem are natural or human-made) by reading for more information about ecosystems and pollution, communicating information about a real world environmental problem through writing, drawing, and discussion, and applying previously learned information to analyze an environmental problem and suggest solutions. Share this information through written work and oral presentations. (LS-10)
7-8 Sessions, 2-3 weeks	**Investigation 8 – 13** Study the effect of nature and human activity on an ecosystem	• Demonstrate how natural and human-made events can "disturb" an ecosystem by researching a pollutant; plan/conduct a pollution experiment, and analyze the experimental data. (LS-7) • Compare how different pollutants can affect the stability of an ecosystem by using previously collected information to develop a written report and presentation about the results. (LS-7) • **CWA: *What made Chandler Pond green?***
6-8 Sessions, 2-3 weeks	**Investigation 14 – 17** Generate solutions to mitigate the effects of pollutants	• Generate solutions to minimize or alleviate the effects of pollutants by drawing evidence from informational texts as well as previous investigations, and writing them on a data sheet or in a science notebook. • **Close Reading: *Rachel Carlson; A Quiet Book Makes Noise***

*Teach Ecosystems and Landforms if you are not using the Ocean System Science Unit.

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UNIT: Landforms* **Dates:**	**Overarching/general themes:** **Landforms and their formation; erosion, deposition; change over time; topographic map; cartographer**	
Networks A & D - 11/9 to 1/19 **Network E - 9/8 to 11/2** **Networks B & F - 4/4 to 6/13** **Network C - 1/25 to 3/28**	**Textual References** **Landforms** **Teacher Guide (FOSS)**	**To Demonstrate Proficiency by the End of the Unit Students Will:**
6 Sessions, 1-2 weeks	**Investigation 1** Schoolyard Models	• Demonstrate that models represent objects that are very large or small or processes that occur over long periods of time by observing the schoolyard area and creating a model of it. • Illustrate how maps can be made from models by making a representation of the schoolyard using a grid system and transferring the information to a smaller map. • Compare ways that models and maps can represent landforms and human structures by relating features on models with a corresponding map. (TE-2.2)
7 Sessions, 2-3 weeks	**Investigation 2** Stream Tables	• Explain how water is an important agent in shaping landforms by observing and measuring the effects of flowing water in a stream table, and documenting results with detailed illustrations, timed data tables, and written responses over shorter periods of time. (ES-12) • Identify that the wearing away of earth is erosion and the settling of eroded material is deposition by conducting stream table experiments, comparing the processes in the stream table to the natural processes of erosion and deposition, and documenting investigations in a science notebook. (ES-12) • Demonstrate that some landforms result from running water (ex: canyons, deltas, and alluvial fans) by comparing the features created in stream tables, and communicating the results of the investigations with domain specific vocabulary, clear, concise writing, and illustrations. (ES-4, ES-12) • **CWA: *Which location is the safest for building a home?***
6 Sessions, 2 weeks	**Investigation 3** Go with the Flow	• Experiment to find the effect of slope and floods on erosion and deposition by observing and measuring the results of stream table experiments, and communicating the results of experiments in a conference. (ES-12) • Identify the variables that contribute to erosion and deposition (during flooding, the rate of erosion and deposition increases; the slope of the land over which a river flows affects the processes of erosion and deposition) by relating the stream-table experiment results to these natural processes. Write an explanation. (ES-12) • Examine how humans affect the processes of erosion and deposition by planning and conducting a stream table experiment, and collecting and analyzing experimental data. Share findings in a presentation or in writing. (ES-12, TE-2) • Synthesize knowledge of landform formation (erosion, deposition, flooding, etc.) by completing an argumentative writing piece over an extended time frame, and supporting a claim with reasons and evidence gathered during class activities and from informational text. • **Close Reading: Science News article, *Curiosity Goes To the Flow***

UNIT: Landforms* Dates:	**Overarching/general themes: Landforms and their formation; erosion, deposition; change over time; topographic map; cartographer**	
Networks A & D - 11/9 to 1/19 Network E - 9/8 to 11/2 Networks B & F - 4/4 to 6/13 Network C - 1/25 to 3/28	**Textual References Landforms Teacher Guide (FOSS)**	**To Demonstrate Proficiency by the End of the Unit Students Will:**
6 Sessions, 2 weeks	**Investigation 4** Build a Mountain	• Relate topographic features to symbolic representations on maps by observing features on a foam mountain and comparing them in writing to a two-dimensional representation (topographic map). • Recognize that topographic maps are two-dimensional representations of three-dimensional surfaces by organizing information from a foam model mountain to create a topographic map and profile drawing of a mountain. • Examine how topographic maps show contour lines (which represent points of equal elevation) and use symbols and color to represent landforms by analyzing simple topographic map, and completing questions based on information provided on the map.
7 Sessions, 2-3 weeks	**Investigation 5** Birds Eye View	• Observe and describe the types of information represented on a topographic map by interpreting aerial photographs of Mt. Shasta, and relating information on maps and aerial photographs to the actual landforms, and using a topographic map of Mt. Shasta to answer map-based questions on a data sheet or in a science notebook. • Describe how landform maps can be generated from aerial photographs, and how cartographers use aerial photographs as one tool in constructing topographic maps by comparing the Mt. Shasta foam mountain, aerial photograph, and topographic map and writing informational text to convey ideas about this topic. (TE-2.2)

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SCIENCE GRADE LEVEL 5	**YEAR AT A GLANCE** **Student Learning Outcomes by Unit** **2016-2017**

UNIT: Ocean Science Sequence (Half Year)* Dates:	**Overarching/general themes:** **Ocean modeling; ocean currents; wind; salinity; density; habitats; ecosystem; adaptations; food webs**	
Networks A, D & E – 9/8 to 1/19 **Networks B, C & F – 1/25 to6/13**	**Textual References** **GEMS Ocean Sciences Sequence for Grades 3–5**	**To Demonstrate Proficiency by the End of the Unit Students Will:**
8 Sessions, 3 weeks	**Unit 1:** What Kind of Place is the Ocean?	• Use data from models to show that there is only one ocean and the percentage of water covering the Earth's surface. • Gather and use evidence from a model to answer questions and develop explanations relating the role of temperature and wind in the formation of currents. (ES-6) • Use a model to investigate the effects of temperature and salinity on water and currents. (ES-8, ES-10, PS-3) • Use a depth measurement model (Plumb bob) to demonstrate how early ocean scientist explored the Ocean floor and explain some of its features including trenches, deep-sea vents, and underwater mountains. (ES-12) • Use data on temperature, pressure, light, and salinity to write about some conditions and phenomenon found within the ocean. (PS-1, PS-4) • Read informational text about glider technology that helps scientists learn about conditions in the ocean, and that the deeper in the ocean you go, the colder it is and the more pressure there is. (TE-1.3, TE-2.2, TE-2.4) • Read informational text to realize that most of the living space on Earth is in the ocean. • Analyze data to develop a scientific argument to identify areas of the ocean that most need to be protected.
11 Sessions, 4 weeks	**Unit 2:** What is Life Like in the Ocean?	• Discuss and list ideas supporting the concept that all organisms have needs they must meet in order to survive. • Analyze data and read informational text to learn that a variety of different habitats in the ocean support a great diversity of life and some habitats support more life than others. (LS-1, LS-3) • Explore informational text to identify and explain adaptations that help ocean organisms survive in specific ocean habitats and that the foods they eat are related to their structures. (LS-5, LS-6, LS-8, LS-11) • Create/explore ocean food web and estuary food web to help explain how organisms in a habitat may be connected. Make predictions about where organisms might spend different parts of their lives based on observable characteristics that change during the life cycle. Use maps and data to explain their movement. (LS-3, LS-7, LS-11) • Use informational text to learn ways scientists use technology for investigating ocean life.
6 Sessions, 2-3 weeks	**Unit 3:** How are Humans and the Ocean Interconnected?	• Use a poster as informational text and write an explanation about how people use, need, harm and protect the ocean. • Use a model to observe and explain how pollutants far from an ocean can end up there. • Present research about ways that people can affect the ocean negatively (overfishing and pollution) and positively (solve problems and protect the ocean). (LS-8, LS-10, TE-2.2, TE-2.3)

*Teach the Ocean System Science Unit in place of both the Ecosystems and Landforms Units.

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