

4th Grade Science Curriculum Map for (The Fluid Earth GLECS)

Units of Study	Standards, Benchmarks, GLCEs or HSCEs	Big Ideas / Key Concepts	Assessments		Learning Strategies <i>Skills</i>	Content Activities <i>Knowledge</i>	Vocabulary	Instructional Resources
			FOR LEARNING <i>(Formative)</i>	OF LEARNING <i>(Summative)</i>				
	<p>E.FE.02.11 Identify water sources (wells, springs, lakes, rivers, oceans).</p> <p>E.FE.02.22 Describe the major bodies of water on the Earth's surface (lakes, ponds, oceans, rivers, streams).</p> <p>E.FE.02.13 Describe the properties (visible, flowing, melting, dew) of water as a liquid (lakes, rivers, streams, oceans).</p> <hr/> <p>E.FE.02.12 Identify household uses of water (drinking, cleaning, food preparation).</p> <hr/> <p>E.FE.02.14 Describe the properties (hard, visible, freezing, ice) of water as a solid (ice, snow, iceberg, sleet, hail).</p> <hr/> <p>E.FE.02.21 Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground.</p>	Bodies of water on the earth	<p>See Attachment: 10 questions from United Streaming "Water Smart: Water on the Earth"</p> <p>15:02 minute video</p> <hr/> <p>Class discussion and chart responses</p> <hr/> <p>After viewing United Streaming clip- Quick Write (journal) <i>How are water and ice alike?</i> <i>How are they different?</i></p> <hr/> <p>After viewing 51 second video clip- Journal entry (quick write) What happens to rainwater when it hits the earth? Emphasize "downhill"</p>		<p>Identify/view the major bodies of water on the earth.</p> <p>Discover/describe the various types of bodies of water and how they are connected.</p> <hr/>	Properties of various bodies of water on the planet.	<p>River Glacier Salt water Fresh water Lake Ice</p> <hr/> <p>Liquid Ice Water Vapor Evaporation Condensation Freezing</p> <hr/> <p>Precipitation Downhill Groundwater Streams Rivers</p>	<p>United Streaming: Water smart: Water on the earth (15:02)</p> <hr/> <p>United Streaming: Water: A First Look Clip: <i>Phase changes and Water: Liquid, Solid and Gas</i></p> <hr/> <p>United Streaming: How Rivers and Streams are formed: Clip: Rivers & Streams (51 seconds)</p> <hr/> <p>United Streaming: Water Smart: Water on Earth Clip: Video Quiz: Water on Earth (1.50)</p>

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Investigation 1 The Force	<p>S.IP.04.12 Generate questions based on observations.</p> <p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IP.04.15 Make accurate measurements with appropriate units (millimeters centimeters, meters, milliliters, liters, Celsius, grams, seconds, minutes) for the measurement tool.</p> <p>S.IP.04.16 Construct simple charts and graphs from data and observations.</p> <p>S.IA.04.11 Summarize information from charts and graphs to answer scientific questions.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.15 Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences.</p> <p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p> <p>P.PM.04.33 Demonstrate magnetic field by observing the patterns formed with iron filings using a variety of</p>	<p>Magnets are attracted to iron.</p> <p>Magnetic force</p> <p>Forces include attraction and repulsion</p> <p>Distance affects magnetic force</p> <p>Magnetism can be induced</p>	<p>Student Worksheets: #3 Magnetic Observations</p> <p>#4 Response Sheet/Magnets</p> <p>#5 The Force (graph)</p> <p>#6 Detecting Magnets</p>	<p>I Check #1</p> <p>Posttest Assessment</p>	<ul style="list-style-type: none"> Observe magnetic interactions and sort objects based on whether they are affected by a magnet. Measure the force of an attraction between magnets. Record and organize results of investigations. Record data on a graph Compare data from graphs 	<ul style="list-style-type: none"> Magnets stick to metal objects made of iron. Magnetic interactions are caused by the magnetic force. Magnets display forces of attraction and repulsion that decrease with distance. Magnetism can be induced in a piece of steel that is close to or touching a magnet. 	<p>Force Magnet Magnetism Attract Repel Temporary Magnets</p> <p>Induced Magnetism</p> <p>Graph Prediction Intersection Detector</p>	<p>Science Stories</p> <ul style="list-style-type: none"> <i>Magnus Gets Stuck</i> <i>Magnificent Magnetic Models</i> <i>How Magnets Interact</i> <i>Make a Compass</i>

	magnets.							
Investigation 2 Making Connections	P.EN.04.12 Identify heat and electricity as forms of energy. P.EN.04.51 Explain how electrical energy is transferred and changed through the use of a simple circuit. P.PM.04.53 Identify objects that are good conductors or poor conductors of heat and electricity.	Electricity flows through pathways called circuits. Switches open and close circuits. An open circuit is an incomplete electric pathway. A closed circuit is a complete electric pathway Conductors allow energy to flow and Insulators do not allow energy to flow.	Student Worksheets: #7 The Flow of Electricity #8 Drawings and Schematics #9 Response Sheet/Bulbs #10 Conductors and Insulators #11 Mystery Circuits #12 Making Connections #13 Mystery Board Designs	I Check #2 Making Connections Posttest Assessment	<ul style="list-style-type: none"> Build a test circuit and test objects for conductivity. Predict conductivity of materials Sort materials based on whether they conduct electricity. Build and compare simple circuits. Identify essential components of a circuit. Demonstrate evidence of the flow of energy. Draw pictures and schematic diagrams. Use technology to solve problems. 	<ul style="list-style-type: none"> Electricity flows through pathways called circuits. A switch is a device used to open and close circuits. An open circuit is an incomplete electric pathway. A closed circuit is a complete electric pathway Materials that allow electricity to flow are conductors those that do not are insulators. 	D Cell Battery Electricity Source Elec. Receiver Circuit Filament Component Circuit Base Fahnstock Clip Switch Open Circuit Closed Circuit Schematic Diagram Conductor Insulator	PEN 4: 12 HEAT missing, it's in the matter and energy kit for grade 3. Science Stories: <i>Making Static</i> <i>A Fictional Interview with Benjamin Franklin</i> <i>Two Reference Sources about Edison</i>
Investigation 3 Advanced Connections	S.IP.04.13 Plan and conduct simple and fair investigations. S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups. P.EN.04.12 Identify heat and electricity as forms of energy. P.EN.04.51 Explain how electrical energy is transferred and changed through the use of a simple circuit.	Series Circuits share energy Series Circuits only have one pathway of energy Parallel Circuits have more than one pathway of energy	Student Worksheets: #15 Advanced Connections #16 Response Sheet/Circuit Design #17 Recommendation to the board	I Check #3 Advanced Connections Posttest Assessment	<ul style="list-style-type: none"> Observe the functioning of different kinds of circuits. Compare the brightness of lamps in different kinds of circuits. Determine the defining characteristics of series and parallel circuits Analyze and solve circuitry problems Organize data to support judgments about advantages of series and parallel circuits 	<ul style="list-style-type: none"> A circuit with only one pathway for current flow is a series circuits, components share the electric energy. A circuit with two or more pathways for current flow is a parallel circuit; components each have a direct pathway to the energy source. 	Series Circuit Component Parallel Circuit	FOSS: Science Stories pages 28 to 35 <i>Illuminating Teamwork: A Story of the Edison Pioneers</i> <i>A True Pioneer: Lewis Latimer</i>
Investigation 4 Current	S.IA.04.11 Summarize information from charts and graphs to answer scientific questions. S.IA.04.14 Develop	An iron or steel core can become an electromagnet	Student Worksheets: #18 Winding Electromagnets	I Check #4 Current Attractions Posttest	<ul style="list-style-type: none"> Observe the interaction between an electromagnet and objects. Systematically 	<ul style="list-style-type: none"> A core of iron or steel becomes an electromagnet when electricity flows through a coil of 	Electromagnet Core Coil Prediction Graph	Science Stories: <i>From Rags to Riches: A Story of Michael Faraday</i>

<p>Attractions</p>	<p>research strategies and skills for information gathering and problem solving. S.RS.04.14 Use data/samples as evidence to separate fact from opinion. P.EN.04.12 Identify heat and electricity as forms of energy. P.EN.04.52 Create a simple working electromagnet and explain the conditions necessary to make the electromagnet.</p>	<p>Electromagnets require wire wrapped around a core</p> <p>The number of wraps determines the strength of the electromagnets</p> <p>Strength of electromagnets can be changed</p>	<p>#19 Response Sheet/Reverse Switch</p> <p>#20 Electromagnetic Investigation</p>	<p>Assessment</p>	<p>investigate ways to strengthen electromagnets</p> <ul style="list-style-type: none"> • Compare the strength of electromagnets • Organize data • Conduct multiple trials, average results, and display results on a graph • Find the relationship between the number of winds of wire around a core and the strength of the magnetic force. 	<p>insulated wire surrounding it.</p> <ul style="list-style-type: none"> • There are a number of ways to change the strength of an electromagnet, including changing the number of winds of wire around the core. 		<p><i>How Electromagnetism Stopped a War</i></p> <p><i>Magnets and Electricity in Your Life</i></p>
<p>Investigation 5</p> <p>Click It</p>	<p>P.EN.04.52 Create a simple working electromagnet and explain the conditions necessary to make the electromagnet. S.RS.04.19 Describe how people have contributed to science throughout history and across cultures. P.FM.05.22 Demonstrate contact and non-contact forces to change the motion of an object.</p>		<p>Student Sheets:</p> <p>#21 Stream Code</p>	<p>I Check #5 Click It</p> <p>Posttest Assessment</p>	<ul style="list-style-type: none"> • Explore the behavior of an electromagnet under different conditions. • Solve circuitry problems • Encode and Decode clicks produced by telegraphs • Build a telegraph • Use as simple code to send and receive messages 	<ul style="list-style-type: none"> • An electromagnet placed in a complete circuit can be used to make a telegraph • A switch can serve as a key in a telegraph system • A code is a symbolic system • Technology is the application of science 	<p>Technology Telegraph Key Gap Code Long-distance</p>	<p>Science Stories: <i>Morse Gets Clicking: A Story of Samuel Morse</i></p>

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<p>Lesson 1</p> <p>Designing Vehicles</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.12 Generate questions based on observations.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IP.04.15 Make accurate measurements with appropriate units (millimeters, centimeters, meters, milliliters, liters, Celsius, grams, seconds, minutes) for the measurement tool.</p> <p>S.IA.04.11 Summarize information from charts and graphs to answer scientific questions.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p>	<p>When a force is applied/exerted on an object, the motion of that object changes (speed, direction)</p>	<p>Student notebook entry</p> <p>Responses during brainstorming sessions</p> <p>Constructed Vehicle that travels at least 100cm</p> <p>Students measure and record distance accurately</p>		<ul style="list-style-type: none"> Brainstorm prior knowledge on motion and design Work cooperatively to construct a moving vehicle Discover ways to make their vehicle move Solve problems if the vehicle isn't functional 	<ul style="list-style-type: none"> Engineers use science and math to plan, design, and construct products (like vehicles). It takes a push or a pull to make the vehicle move. Motion is movement 	<p>Motion</p> <p>Design</p> <p>Engineer</p> <p>vehicle</p>	

	<p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p> <p>S.RS.04.15 Use evidence when communicating scientific ideas.</p> <p>S.RS.04.16 Identify technology used in everyday life.</p> <p>P.FM.03.36 Relate a change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing down).</p>							
<p>Lesson 2</p> <p>Using Drawings to Record and Build</p>	<p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p>	<p>A force is a push or a pull</p> <p>A blueprint is a detailed plan or drawing that shows how something is designed.</p>	<p>Student drawings of vehicles</p>		<ul style="list-style-type: none"> • Draw group vehicles from lesson 1, using graph paper. • In order to build the vehicle, students must be able to view and understand the technical drawing • Work cooperatively to construct the standard vehicle (which is used for the rest of the unit) 	<ul style="list-style-type: none"> • Engineers sketch their ideas and plan before they build • A blueprint is a detailed plan or drawing that shows how something is designed and is used for building • Identify useful features on a blueprint/technical drawing that makes construction easier. • A prototype is an original model or design (the standard vehicle is and example of a prototype). • Speed is the measurement of how fast an object is moving. 	<p>Sketch</p> <p>Template/Circle template</p> <p>Technical drawing</p> <p>Blueprint</p> <p>Three-view drawing</p> <p>Prototype</p> <p>Standard vehicle</p>	<p>Reading selection: <i>The Race That Wasn't Run</i></p>

<p>Lesson 3</p> <p>Pulling a Vehicle: Looking at Force</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IP.04.15 Make accurate measurements with appropriate units (millimeters, centimeters, meters, milliliters, liters, Celsius, grams, seconds, minutes) for the measurement tool.</p> <p>S.IP.04.16 Construct simple charts and graphs from data and observations.</p> <p>S.IA.04.11 Summarize information from charts and graphs to answer scientific questions.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>P.FM.03.22 Identify the force that pulls objects towards the Earth.</p> <p>P.FM.03.35 Describe how a push or a pull is a force.</p> <p>P.FM.03.36 Relate a</p>	<p>A pull is a force</p> <p>In order to move an object at rest, a force is required (push or pull).</p> <p>Gravity is an example of a force.</p> <p>Friction is a force that opposes motion (this concept is only introduced in this lesson).</p> <p>The greater the force, the greater the speed.</p>	<p>Record Sheet 3-A: "Recording How Our Vehicle Moves"</p>		<ul style="list-style-type: none"> Record experimental data Rank speeds based on mass/force. Use engineering skills to solve problems if their vehicle doesn't move. Work cooperatively to conduct experiment. 	<ul style="list-style-type: none"> Gravity pulls on the washers, which makes the vehicle move. The greater the mass (# washers), the faster the vehicle moves. It takes an unbalanced force (the bookend and/or friction) to slow/stop the motion of the vehicle. A variable is an element in an experiment that can be changed. A controlled experiment is a scientific investigation in which one variable is changed and all others are kept the same. The variable that is changed in this experiment is the amount of mass/force of pull. 	<p>Falling-weight system</p> <p>Gravity</p> <p>Weight</p> <p>Force</p> <p>Constant</p> <p>Controlled Experiment</p> <p>Variable</p> <p>Speed</p>	
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	<p>change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p> <p>P.FM.03.38 Demonstrate when an object does not move in response to a force, it is because another force is acting on it.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing down).</p>							
<p>Lesson 4</p> <p>Testing the Motion of Vehicles Carrying a Load</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IP.04.15 Make accurate measurements with appropriate units (millimeters, centimeters, meters, milliliters, liters, Celsius, grams, seconds, minutes) for the measurement tool.</p> <p>S.IP.04.16 Construct simple charts and graphs from data and observations.</p> <p>S.IA.04.11 Summarize information from charts and graphs to answer scientific questions.</p> <p>S.IA.04.12 Share ideas about science through</p>	<p>Mass/load is the amount of material in an object</p> <p>Weight is the amount of force gravity exerts on an objects' mass.</p> <p>The greater the load, the slower the vehicle speeds up.</p> <p>The smaller the load, the quicker the vehicle speeds up.</p>	<p>Record Sheet 4-A: "Graphing Data: How Load Affects the Time a Vehicle Travels"</p>		<ul style="list-style-type: none"> Record data on a line plot Calculate mean, median and mode Accurately use a timer to measure speed. 	<ul style="list-style-type: none"> 	<p>Mass (vs. weight)</p> <p>Load</p> <p>Line plot (mean, median, mode)</p>	

	<p>purposeful conversation in collaborative groups.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.IA.04.15 Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p> <p>P.FM.03.36 Relate a change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p> <p>P.FM.03.38 Demonstrate when an object does not move in response to a force, it is because another force is acting on it.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing down).</p>							
<p>Lesson 5</p> <p>Designing Vehicles to Meet Requirements</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.14 Develop</p>	<p>There is a relationship between the number of washers (force of pull), the load, and changing one of these variables will affect the speed of the</p>	<p>Student drawings of lunar vehicles (use color, labels, multiple perspectives, circle template, rulers, etc...)</p>		<ul style="list-style-type: none"> Identify and record what made the vehicle move slowly and fast. Be able to repeat results for the experiment for another group or the teacher. Make modifications in order to meet design challenge. 	<ul style="list-style-type: none"> The vehicle moves the distance of the height of the workspace. Changes made to vehicles or to the experimental process is called making modifications. Vehicles must meet design requirements. There is a 	<p>Lunar Rover/vehicle</p> <p>Modify</p>	<p>Reading Selection: <i>Lunar Rover: Making Tracks on the Moon</i></p> <p>Trade books that illustrate load-bearing vehicles (such as trucks, minivans, moving vans, tractor trailers, and wagons).</p>

	<p>research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p>	vehicle			<ul style="list-style-type: none"> Sketch lunar vehicles 	relationship between the number of washers (force of pull), the load, and changing one of these variables will affect the speed of the vehicle		
<p>Lesson 6</p> <p>Evaluating Vehicle Design: Looking at Rubber Band Energy</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.15 Use evidence when communicating scientific ideas.</p> <p>P.FM.03.36 Relate a change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing down).</p>	<p>There are many forms of energy</p> <p>Winding the rubber band causes the vehicle to move.</p>	Record Sheet 6-A: "Evaluating Our Vehicle Design for Rubber Band Energy"		<ul style="list-style-type: none"> Construct rubber band driven vehicle Explore different ways to make the vehicle move using the rubber band Make connections between the rubber band and potential and kinetic energy 	<ul style="list-style-type: none"> There are many forms of energy Energy is the ability to do work. Potential energy is stored energy. When you wind the rubber band around the axle, energy is stored. When the rubber band is released, potential energy turns into kinetic (energy of movement) energy, and the vehicle moves. Winding the rubber band over the axle makes the vehicle move forward; winding it under the axle makes the vehicle move backward. 	<p>Energy</p> <p>Stored energy (potential energy)</p> <p>Energy of motion/kinetic energy</p> <p>Rubber band energy</p> <p>Axle</p>	

<p>Lesson 7</p> <p>Testing the Effects of Rubber Band Energy</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IP.04.15 Make accurate measurements with appropriate units (millimeters, centimeters, meters, milliliters, liters, Celsius, grams, seconds, minutes) for the measurement tool.</p> <p>S.IP.04.16 Construct simple charts and graphs from data and observations.</p> <p>S.IA.04.11 Summarize information from charts and graphs to answer scientific questions.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.IA.04.15 Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p>	<p>The more potential energy that is stored, the more kinetic energy.</p>			<ul style="list-style-type: none"> • Make predictions • Record data 	<ul style="list-style-type: none"> • The more times you wind the rubber band, the farther (and faster) the vehicle moves. 	<p>No new vocab.</p>	
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<p>Lesson 8</p> <p>Evaluating Vehicle Design: Looking at Friction</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.12 Generate questions based on observations.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.16 Construct simple charts and graphs from data and observations.</p> <p>S.IA.04.11 Summarize information from charts and graphs to answer scientific questions.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.15 Use evidence when communicating scientific ideas.</p> <p>P.FM.03.36 Relate a change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing down).</p> <p>P.FM.03.43 Calculate the</p>	<p>Friction is a force that occurs when two surfaces rub together.</p> <p>Friction opposes motion</p> <p>Sometimes friction is needed</p> <p>Sometimes engineers try to reduce friction</p> <p>Revisit concepts of a controlled experiment and changing only 1 variable at a time to get results.</p>	<p>Record Sheet 8-A: "Evaluating Vehicle Design for Friction"</p>		<ul style="list-style-type: none"> • Modify the vehicles to learn about the affects of friction • Record observations 	<ul style="list-style-type: none"> • Friction can "help or hinder" the motion of a vehicle. • The tan hub connector keeps the wheels from rubbing against the frame, therefore reduces friction. • The tires grip the surface, therefore increase friction, and help the vehicle move forward. • The frame and crossbars provide a straight structure that keeps the pieces from rubbing, therefore reduces friction to help the vehicle move freely. • Engineers must consider ways that friction can affect the movement of the vehicle 	<p>Friction</p> <p>Rubbing</p> <p>Tan hub connector</p> <p>Tires (vs. wheels)</p> <p>Frame & crossbars</p>	
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	speed of an object based on the distance it travels divided by the amount of time it took to travel that distance.							
Lesson 9 Designing and Building a Vehicle with a Sail	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p>	<p>Sails catch the wind</p> <p>A sail can speed up or slow down a vehicle</p>	Student self-assessment		<ul style="list-style-type: none"> Hypothesize about how a sail might affect the motion of a vehicle. Construct a vehicle with a sail Record observations/data Measure distance 	<ul style="list-style-type: none"> Sails are designed to catch the wind. A sail can speed up or slow down a vehicle depending on the wind and the direction. When the wind is too strong or going in the wrong direction it can tip the vehicle or blow off course. 	No new vocab.	
Lesson 10 Testing the Effects of Air Resistance on a Vehicle's Motion	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.12 Generate questions based on observations.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IP.04.15 Make accurate measurements with appropriate units (millimeters, centimeters, meters, milliliters, liters, Celsius, grams, seconds, minutes) for the measurement tool.</p> <p>S.IP.04.16 Construct simple charts and graphs from</p>	An aerodynamic design reduces air resistance and helps the vehicle to move forward.			<ul style="list-style-type: none"> Modify and compare sail designs Record observations/data Measure distance Discuss ways to reduce air resistance or drag. 	<ul style="list-style-type: none"> Air resistance is the force of friction on an object (like a vehicle) as it moves through the air. Aerodynamic is the ability to move through the air with as little air resistance (friction) as possible. Drag is a force that opposes the forward movement of a vehicle. 	Resistance Air resistance Drag Aerodynamic	Reading Selection: <i>Shirley Muldowney—Drag Racer</i>

	<p>data and observations.</p> <p>S.IA.04.11 Summarize information from charts and graphs to answer scientific questions.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.IA.04.15 Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p> <p>S.RS.04.15 Use evidence when communicating scientific ideas.</p> <p>P.FM.03.36 Relate a change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing down).</p>							
<p>Lesson 11</p> <p>Building a</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p>	<p>Propellers create a force that moves vehicles</p>			<ul style="list-style-type: none"> Construct a propeller-driven vehicle based on a technical drawing 	<ul style="list-style-type: none"> Potential energy is stored energy. When you wind the propeller, it winds 	<p>Propeller</p>	

<p>Propeller-Driven Vehicle</p>	<p>S.IP.04.13 Plan and conduct simple and fair investigations. S.IP.04.16 Construct simple charts and graphs from data and observations. S.IA.04.11 Summarize information from charts and graphs to answer scientific questions. S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups. S.IA.04.14 Develop research strategies and skills for information gathering and problem solving. S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p>	<p>(planes and boats) forward</p> <p>A propeller demonstrates Newton's 3rd law of motion: that there is an equal, but opposite reaction.</p> <p>The more times you wind the propeller, the farther (and faster) the vehicle moves.</p>			<ul style="list-style-type: none"> Record observations/data Measure distance 	<p>the rubber band, and energy is stored.</p> <ul style="list-style-type: none"> When the rubber band is released, potential energy turns into kinetic energy, which spins the propeller. The propeller pushes air backward and propels the vehicle forward. The more times you wind the propeller, the farther (and faster) the vehicle moves. 		
<p>Lesson 12</p> <p>Analyzing the Motion and Design of a Propeller-Driven Vehicle</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses. S.IP.04.12 Generate questions based on observations. S.IP.04.13 Plan and conduct simple and fair investigations. S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups. S.IA.04.13 Communicate and present findings of observations and investigations. S.IA.04.14 Develop research strategies and skills for information gathering and problem solving. S.IA.04.15 Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences. S.RS.04.11 Demonstrate scientific concepts through various illustrations,</p>	<p>The propeller-driven vehicles stores energy in the same way the axle-driven vehicles—in a rubber band.</p>	<p>Record Sheet 12-A: "What Happens If..."</p>		<ul style="list-style-type: none"> Choose 3 different variables or modifications and test to see the affects on the vehicle's motion. Record observations Share and compare results with the class 	<ul style="list-style-type: none"> Changing one variable at a time helps us see the affects/results of that one variable and make reliable conclusions. Making modifications to a vehicle can change the vehicle's motion. 	<p>No new vocab.</p>	

	<p>performances, models, exhibits, and activities.</p> <p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p> <p>S.RS.04.15 Use evidence when communicating scientific ideas.</p> <p>P.FM.03.36 Relate a change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing down).</p>							
<p>Lesson 13</p> <p>Looking at Cost</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IP.04.15 Make accurate measurements with appropriate units (millimeters, centimeters, meters, milliliters, liters, Celsius, grams, seconds, minutes) for the measurement tool.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate</p>	<p>Cost is an important design requirement</p>	<p>Record Sheet 13-A: "Evaluating the Cost of Our Design"</p>		<ul style="list-style-type: none"> Brainstorm ways to reduce a vehicle's cost Determine and remove unnecessary parts of the vehicle Modify and redesign propeller-driven vehicles to reduce cost without affecting performance. Determine cost of the vehicle 	<ul style="list-style-type: none"> Cost-effective is the ability to produce the best results for the least amount of money. Engineers have to make decisions and make trade-offs in order to be the most cost-effective. 	<p>Cost-effective</p>	

	<p>and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.15 Use evidence when communicating scientific ideas.</p>							
<p>Lesson 14</p> <p>Planning Our Final Design Challenge</p>	<p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IP.04.15 Make accurate measurements with appropriate units (millimeters, centimeters, meters, milliliters, liters, Celsius, grams, seconds, minutes) for the measurement tool.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.15 Compare and contrast sets of data from multiple trials of a science investigation to explain reasons for differences.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p>	<p>No new ideas: Use concepts learned throughout this unit to plan for a new design challenge</p>	<p>Record Sheet 14-A: "Planning Our Final Design Challenge"</p>		<ul style="list-style-type: none"> • Brainstorm possible solutions to a design challenge • Sketch the vehicle • List materials needed • Determine cost of the vehicle • Show evidence for meeting the design challenge • Modify the plan 	<ul style="list-style-type: none"> • 	<p>Aerospace engineer</p> <p>Computer scientist</p> <p>Mechanical engineer</p> <p>Electrical engineer</p>	

	<p>P.FM.03.36 Relate a change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing down).</p> <p>P.FM.03.43 Calculate the speed of an object based on the distance it travels divided by the amount of time it took to travel that distance.</p>							
<p>Lesson 15</p> <p>Refining Our Design</p>	<p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>P.FM.03.36 Relate a change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing</p>	<p>No new ideas: Make revisions based on feedback from classmates, build, test, and evaluate the design.</p>			<ul style="list-style-type: none"> • Modify/refine the design of the vehicle • Build the vehicle • Test vehicle • Prepare ways to present findings 	<ul style="list-style-type: none"> • All concepts from previous lessons 	<p>No new vocab.</p>	

	down).							
Lesson 16 Presenting Our Final Design Challenge	<p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.15 Use evidence when communicating scientific ideas.</p>	No new ideas: Students present designs to the class.		<p>Lessons 13-16 is a performance assessment</p> <p>Use activities in Lesson 17 to assess understanding of concepts learned throughout.</p>	<ul style="list-style-type: none"> • Present findings 	<ul style="list-style-type: none"> • All concepts from previous lessons 	No new vocab.	

Unit of Study Sun, Moon and Stars	Standards, Benchmarks, GLCEs or HSCEs	Big Ideas / Key Concepts	Assessments		Learning Strategies <i>Skills</i>	Content Activities <i>Knowledge</i>	Vocab.	Instructional Resources
			FOR LEARNING <i>(Formative)</i>	OF LEARNING <i>(Summative)</i>				
Investigation 1 The Sun	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.12 Generate questions based on observations.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.14 Manipulate simple tools that aid observation and data collection (for example: hand lens, balance, ruler, meter stick, measuring cup, thermometer, spring scale, stop watch/timer, graduated cylinder/beaker).</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p>	<ul style="list-style-type: none"> • Rotation causes day/night • The Sun rises in the East and sets in the West • Compass-tool (N,S,E,W) • Shadows change based on the position of the Sun. 	<p>Notebook Sheet: <i>Where's the Sun?</i></p> <p>Teacher Observations /Notebook sheet <i>Sun and Shadows</i></p> <p>I-Check 1</p>	<p>Post Test</p> <p>Additional assessment questions will be provided for E.ST.04.12</p>	<ul style="list-style-type: none"> • Observe and record the path the Sun takes in the sky • Observe and collect shadow data at different times of day • Analyze shadow data to develop an explanation about the Sun's daily movements • Use shadow data to predict the position of the sun in the sky • Use models to develop explanations • Communicate observations 	<ul style="list-style-type: none"> • Day happens when a location on Earth is facing toward the Sun: Night happens when a location on earth is facing away from the Sun. • The Sun appears to rise in the east and set in the west everyday. • A compass is a tool to determine direction (east, west, north, south) • Shadows are the areas of darkness created when an opaque object blocks light • The shapes of shadows change over a day and depend of the position of the Sun in the sky • The exact path the sun takes in the sky varies by season 	<ul style="list-style-type: none"> • Cardinal directions • Compass • Day • East • Night • North • Predictable • Season • Shadow • South • Sun • West 	<p>Science Resources Book- 1. <i>Sunrise and Sunset</i> 2. <i>Changing Shadow Summary: The Sun</i></p>

	<p>S.RS.04.15 Use evidence when communicating scientific ideas.</p> <p>E.ST.04.11 Identify common objects in the sky, such as the sun and the moon.</p> <p>E.ST.04.12 Compare and contrast the characteristics of the sun, moon and Earth, including relative distances and abilities to support life.</p> <p>E.ST.04.21 Describe the orbit of the Earth around the sun as it defines a year.</p> <p>E.ST.04.22 Explain that the spin of the Earth creates day and night.</p> <p>E.ST.04.23 Describe the motion of the moon around the Earth.</p> <p>E.ST.04.24 Explain how the visible shape of the moon follows a predictable cycle which takes approximately one month.</p> <p>E.ST.04.25 Describe the apparent movement of the sun and moon across the sky through day/night and the seasons.</p>							
<p>Investigation 2 The Moon</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IP.04.13 Plan and conduct simple and fair investigations.</p> <p>S.IP.04.16 Construct simple charts and graphs from data and observations.</p> <p>S.IA.04.11 Summarize information from charts and graphs to answer scientific</p>	<ul style="list-style-type: none"> • Objects in the night sky • Earth orbits the sun in the Solar System • The Moon orbits Earth • The moon visible day and night. • Moon has phases and patterns • During phases, portions of the 	<p>Notebook Sheet <i>The Night Sky Review</i></p> <p>Notebook sheet <i>Phases of the Moon</i></p> <p>I-Check 2</p>	<p>Post Test</p> <p>Additional assessment questions will be provided for E.ST.04.12</p>	<ul style="list-style-type: none"> • Observe and record changes in the Moon's appearance over a month • Analyze observations to discover the sequence of changes that occur during the Moon's phase cycle • Use models to develop explanations • Learn vocabulary associated with Moon's phases 	<ul style="list-style-type: none"> • Objects in the night sky include the Moon, stars and other planets • Earth is one of several planets that orbits the sun in the Solar System • The Moon orbits Earth • The moon can appear in the sky during both night and day • The moon changes its appearance or phase in a regular pattern in 4 weeks • Moon phase is the portion of the illuminated half of the 	<ul style="list-style-type: none"> • Cycle • Lunar cycle • Moon • Night sky • Orbit • Planet • Star • Moon phases • New Moon • First-quarter Moon • Third-quarter Moon 	<p>Science Resources Book:</p> <ol style="list-style-type: none"> 1. <i>The Night Sky</i> 2. <i>Changing Moon Summary: The Moon</i> <p>Additional Resource needed for E.ST.04.12</p>

	<p>questions.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.IA.04.13 Communicate and present findings of observations and investigations.</p> <p>S.IA.04.14 Develop research strategies and skills for information gathering and problem solving</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.</p> <p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p> <p>S.RS.04.15 Use evidence when communicating scientific ideas.</p> <p>E.ST.04.11 Identify common objects in the sky, such as the sun and the moon.</p> <p>E.ST.04.12 Compare and contrast the characteristics of the sun, moon and Earth, including relative distances and abilities to support life.</p>	<p>Moon are visible</p>				<p>Moon that is visible from Earth</p>	<ul style="list-style-type: none"> • Full Moon • Crescent Moon • Gibbous Moon • Waxing Moon • Waning Moon 	
<p>Investigation 3 The STARS</p>	<p>S.IP.04.11 Make purposeful observation of the natural world using the appropriate senses.</p> <p>S.IA.04.12 Share ideas about science through purposeful conversation in collaborative groups.</p> <p>S.RS.04.11 Demonstrate scientific concepts through various illustrations,</p>	<ul style="list-style-type: none"> • Stars are suns • Constellations • Constellations appear to move because • Earth rotates • Stars visible only at night • Constellations seen during different seasons • Constellations revolves 	<p>Notebook Sheet <i>Stargazing Review</i></p> <p>I-Check 3</p>	<p>Post Test</p> <p>Additional assessment questions will be provided for E.ST.04.12</p>	<ul style="list-style-type: none"> • Identify several constellations as stable, predictable patterns of stars • Use models and simulations to develop explanations 	<ul style="list-style-type: none"> • Stars are suns positioned great distances from Earth • Groups of stars form patterns called constellations • Stars (constellations) appear to move together across the night sky because Earth rotates • Stars can be observed from Earth's surface only at night • Different constellations can be seen during different seasons because Earth 	<ul style="list-style-type: none"> • Astronomer • Constellation • Magnify • Rotate • Star • telescope 	<p>Science Resources Book</p> <ol style="list-style-type: none"> 1. <i>Stargazing</i> 2. <i>Looking through Telescopes</i> 3. <i>Star Scientists Summary: The Stars</i>

	<p>performances, models, exhibits, and activities.</p> <p>S.RS.04.14 Use data/samples as evidence to separate fact from opinion.</p> <p>E.ST.04.11 Identify common objects in the sky, such as the sun and the moon.</p> <p>E.ST.04.12 Compare and contrast the characteristics of the sun, moon and Earth, including relative distances and abilities to support life.</p>	<ul style="list-style-type: none"> • Stars have different sizes/ brightnessess • Telescopes 				<p>revolves around the Sun</p> <ul style="list-style-type: none"> • Stars are different sizes and have different brightnesses • Telescopes make distant objects look closer and larger 		