


4th Grade - Elementary Science Bundle # 10

Title		Suggested Dates
Energy		3/22/10 – 4/16/10 (19 days)

Big Idea/Enduring Understanding	Guiding Questions
<p>Energy exists in different forms and can change from one form to another.</p> <p>Different forms of energy travel in unique ways, and can be observed in cycles, patterns, and systems.</p>	<p>How are mechanical, sound, electrical, light, and heat/thermal energy similar?</p> <p>What are some common examples of energy changing from one form to another?</p> <p>After observing the various forms of energy what could you infer are the similarities and differences?</p> <p>What materials conduct heat or insulate objects from heat?</p>

The resources included here provide teaching examples and/or meaningful learning experiences to address the District Curriculum. In order to address the TEKS to the proper depth and complexity, teachers are encouraged to use resources to the degree that they are congruent with the TEKS and research-based best practices. Teaching using only the suggested resources does not guarantee student mastery of all standards. Teachers must use professional judgment to select among these and/or other resources to teach the district curriculum.

Knowledge & Skills with Student Expectations	District Specificity/Examples	Suggested Resources (See note above)
<p>NEW TEKS 4.6 Force, motion, and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns, and systems.</p> <p>4.6a differentiate among forms of energy including mechanical, sound, electrical, light, and heat/thermal</p>	<p style="color: red;">Make observations of common forms of energy and changes, including:</p> <ul style="list-style-type: none"> • Mechanical energy – energy of movement – created from: <ul style="list-style-type: none"> ○ Burning fuel in an automobile (chemical energy) moves the engine and wheels ○ Use food (chemical) energy to push the pedals and move a bike • Electrical energy – changes to many other forms of energy: <ul style="list-style-type: none"> ○ Electricity is changed to light, sound and heat in a t.v. ○ Electricity is changed to mechanical and sound in a fan • Light energy changes to electrical energy in a solar panel • Light, heat and sound energy are released from a campfire (chemical energy) 	<p>Resources listed here apply to the entire bundle.</p> <p>Science Notebooks</p> <p>IF I TRY (Intranet)</p> <p>KLEW/ Claims & Evidence</p> <p>PISD Elem Science Homepage</p> <p>PISD K-5 Equipment Alignment</p>
<p>NEW TEKS 4.6 Force, motion, and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns, and systems.</p> <p>4.6b differentiate between conducts and insulators</p>	<p style="color: red;">This bundle – concentrate on the conduction and insulation of heat/thermal energy – the following bundle will include electrical energy where connections can be made between heat and electrical insulators and conductors</p>	<p>United Streaming: “Forms of Energy” A segment of Getting to Know Energy</p>
<p>NEW TEKS 4.1 Scientific investigation and reasoning The student conducts classroom and outdoor</p>	<p style="color: red;">No tasting or touching unless instructed Safe smelling – wafting Goggles</p>	<p>PISD Safety Website -Safety Contracts, games, etc -Science Safety is Elementary (for teachers)</p>

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<p>investigations following home and school safety procedures and environmentally appropriate and ethical practices.</p> <p>4.1a demonstrate safe practices and the use of safety equipment as described in the Texas Safety Standards during classroom and outdoor investigation</p> <p>4.1b make informed choices in the use and conservation of natural resources and reusing and recycling of materials such as paper, aluminum, glass, cans, and plastic</p> <p>CURRENT TEKS 4.1 Scientific processes. The student conducts field and laboratory investigations following home and school safety procedures and environmentally appropriate and ethical practices.</p> <p>4.1a demonstrate safe practices during field and laboratory investigations</p> <p>4.1b make wise choices in the use and conservation of resources and the disposal or recycling of materials</p>	<p>Wait for teacher directions No glassware Students do not handle hot water, hot plates or burners. Wash hands after science activities</p> <p>Review investigation safety procedures for both indoor and outdoor activities, as applicable:</p> <ul style="list-style-type: none"> • Directly point out possible safety risks • Discuss precautions • Share specific guidelines for the lesson <ul style="list-style-type: none"> ○ Use of equipment and materials ○ Respect for environment <p>Encourage students to identify these on their own throughout the year [document in science notebooks via words and/or pictures]</p> <p>Make note of and teach use of district-wide recycling resource.</p>	<p>-Safety in the Elementary Classroom (for teachers)</p> <p>DuPont Science Safety Zone website</p> <p>Texas Science Safety Standards</p>
<p>NEW TEKS 4.2 Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and outdoor investigations.</p> <p>4.2a plan and implement descriptive investigations including asking well-defined questions, making inferences, and selecting and using appropriate equipment or technology to answer his/her questions</p> <p>4.2b collect and record data by observing and measuring, using the metric system, and using descriptive words and numerals such as labeled drawings, writing, and concept maps</p> <p>4.2c construct simple tables, charts, bar graphs, and maps using tools and current technology to organize, examine, and evaluate data</p>	<p>New 4.2a: The emphasis in all types of investigations is the <u>systematic approach</u> used: students form questions or define a problem and develop a plan to answer their question or solve the problem using appropriate tools to implement the plan.</p> <p>Develop questions using resources such as Science Notebooks, KLEW charts and students sharing with one another</p> <p>Question Example: How is electrical energy used in school or in a home? OR Which type of material is the best heat insulator?</p> <p>Class discussion is a critical element to allow students to elaborate and build understanding</p> <p>New 4.2b:</p>	

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<p>4.2d analyze data and interpret patterns to construct reasonable explanations from data that can be observed and measured</p> <p>4.2e perform repeated investigations to increase the reliability of results</p> <p>4.2f communicate valid, oral, and written results supported by data</p> <p>CURRENT TEKS</p> <p>4.2 Scientific processes. The student uses scientific inquiry methods during field and laboratory investigations.</p> <p>4.2a plan and implement descriptive investigations including asking well defined</p> <p>4.2b collect information by observing and measuring</p> <p>4.2e construct simple graphs, tables, maps, and charts to organize, examine, and evaluate information.</p> <p>4.2c analyze and interpret information to construct reasonable explanations from direct and indirect evidence</p> <p>4.4 Scientific Processes. The student knows how to use a variety of tools and methods to conduct science inquiry.</p> <p>4.4b demonstrate that repeated investigations may increase the reliability of results</p> <p>4.2d communicate valid conclusions</p>	<p>Use Science Notebook to build the skill of constructing ways to record data.</p> <p>Record their ideas, the process and discussion points</p> <p>Initial support for recording collected information should be more guided in the beginning of the year and move toward students making independent decisions on which type of graphic organizer to use as the year progresses.</p> <p>New 4.2c: Math connections:</p> <p>Math TEK 4.11a: Estimate and use measurement tools to determine length (including perimeter), area, capacity and weight/mass using standard units, SI (metric) and customary</p> <p>Math TEK 4.12a Use a thermometer to measure temperature and changes in temperature (Celsius)</p> <p>New 4.2d and e: Claims and Evidence:</p> <ul style="list-style-type: none">• Student generated explanations: always justify reasoning with evidence<ul style="list-style-type: none">○ The KLEW format is a graphic organizer: students record learning and show the connection to evidence (the L and E section)• This can be whole group, small group, partners or individuals<ul style="list-style-type: none">○ Discussion is important – students compare results and make specific connections between the investigation – the concepts – and the supporting vocabulary• Construct explanations verbally and in Science Notebook (write and draw)<ul style="list-style-type: none">○ Labeling technical drawings, diagrams and pictures is a huge support for vocabulary development – creates a model to connect to the text <p>Related Math TEKS:</p> <p>TEKS 4.15a: Explain and record observations using objects, words, pictures, numbers, and technology.</p> <p>New 4.2e:</p> <p>Repeated trials will not need to be done on every hands-on/ minds-on investigation during the year.</p> <p>There should be an opportunity to discuss or have a mini-lesson on the reason for repeating investigations during each bundle.</p>	
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	<p>It is good to remember that many demonstrations and investigations in science do not work in the classroom on a particular day – however, that is a great time to discuss repeating a test to get a more valid result – even if there is no time to actually try the demonstration or investigation again that day.</p>	
<p>NEW TEKS 4.3 Scientific investigation and reasoning. The student uses critical thinking and scientific problem solving to make informed decisions. 4.3a in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations so as to encourage critical thinking by the student 4.3b draw inferences and evaluate accuracy of services and product claims found in advertisements and labels such as toys, food, and sunscreen 4.3c represent the natural world using models such as rivers, stream tables, or fossils, and identify their limitations, including accuracy and size 4.3d connected grade level appropriate concepts with the history of science, science careers, and contributions of science</p> <p>CURRENT TEKS 4.3 Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. 4.3a analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information 4.3b draw inferences based on information related to promotional materials for products and services 4.3c represent the natural world using models and identify their limitations 4.3e connect Grade 4 science concepts with the history of science and contributions of scientists</p>	<p>Continue to support building understanding of using a <u>systematic approach</u> to solve a problem or answer a question</p> <p>The key here is to support students as they observe the world and the results of their investigations and build their critical thinking by looking at those results as evidence that supports a concept.</p> <p>Use the KLEW graphic organizer to support this process. Use reflective discussions to review learning and the evidence for it. Look for connections in results to develop and answer questions about the scientific concepts studied.</p> <p>Example of Critical Questioning:</p> <p>Based on observations, which type of energy is most important to conserve? OR If you had to choose one type of energy to give up for a day, what would it be?</p> <p>Student should use and reference their Science Notebooks and one another</p> <p>New 4.3c: For every model used during the year, ask the following questions:</p> <ul style="list-style-type: none"> • What is the model for? • What do the parts of the model represent? • How is the model the same as its target – the real thing? • How is the model different from its target – the real thing? • How well does the model represent its target? What can it not show? • (limitations) <p>Use different models of each concept target where each different model is designed to highlight a different important part of the overall concept. The questions allow you to focus on each part of each model so that when</p>	

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<p>CURRENT TEKS 4.3 Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. 4.3d evaluate the impact of research on scientific thought, society, and the environment</p>	<p style="color: red;">all those parts combine, a better mental model is created for students.</p>	
<p>NEW TEKS 4.4 Scientific investigation and reasoning. The student knows how to use a variety of tools, materials, equipment, and models to conduct science inquiry. 4.4a collect, record, and analyze information using tools including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, mirrors, spring scales, pan balances, triple beam balances, graduated cylinders, beakers, hot plates, meter sticks, compasses, magnets, collecting nets, and notebooks; timing devices including clocks and stopwatches and materials to support the observation of habitats such as terrariums and aquariums 4.4b use safety equipment as appropriate, including goggles and gloves</p> <p>CURRENT TEKS 4.4 Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry. 4.4a collect and analyze information using tools including calculators, safety goggles, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, meter sticks, timing devices, balances, and compasses 4.4(B) is with New 4.2(E)</p>	<p style="color: red;">Metric units of measurement only</p> <p style="color: red;">Can include microscopes for further study.</p> <p style="color: red;">TEACHER NOTE: Teaching the proper use of tools should be scaffolded:</p> <ul style="list-style-type: none"> • Tools are modeled • Students are exposed through group interaction and then, • Individuals develop skills through multiple opportunities for practice • during the year. <p style="color: red;">Tools and equipment, including senses, should be used in authentic learning settings including during an outside field investigation</p> <p style="color: red;">TEACHER NOTE: In linear measurement, one area of difficulty for students is the point of origin.</p>	