

Teacher Resource Guide



RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

For Elementary Units of Study

1.0 INTRODUCTION

The Infinite Power of Texas Units of Study were developed by the Texas State Energy Conservation Office (SECO) to provide educational resources for K-12 teachers on renewable energy and energy efficiency. The Units introduce students to concepts such as solar, wind and biomass energy, energy conservation in the home, and alternative vehicle power. The Units were created to address three grade-level groups: grades 4 and 5 (elementary Units), grades 6, 7 and 8 (middle school Units) and grades 9, 10, 11 and 12 (high school Units). This document provides an overview of the Elementary Units of Study. It describes the general structure

of the Units; explains in more detail some instructions provided in the Units; offers safety guidelines; identifies Texas Essential Knowledge and Skills (TEKS) addressed by each Unit; provides resources needed to complete the Units, including recommended Internet and other resources; and presents guidelines for creating rubrics.

1.1 Structure of the Units

The Units of Study are classified in the black bar on the top of every page according to whom the content is geared: the teacher (Teacher Overview or Teacher Answer Key) or the student (Reading Passage or Student Data Sheet). The following table summarizes the content of each section:

TABLE 1. Organization of Units

TEACHER OVERVIEW	
SECTION	DESCRIPTION
Overview	Summarizes the topic of the lesson and the activities involved
Objectives	Refers teacher to Teacher Resource Guide for TEKS objectives
Suggested Timeframe	Provides a daily breakdown of activities involved in the Unit that includes the amount of time each activity requires, the activity title, the content area and the primary task. Teacher should note that the amounts of time printed are simply guidelines that often reflect the upper limit. Actual times will vary and may be shorter.
Required Materials	Materials needed for the various activities included in the Unit
Daily Activities	Detailed instructions of each activity involved in the Unit. Typical structure is: <ul style="list-style-type: none"> • Teacher Introduction – includes anticipatory set • Assessment of Current Knowledge • Vocabulary Review • Literature Link (Units 1 – 3 only) • Reading and Cooperative Group Work – students are divided into groups and assigned sections of a Reading Passage and questions to answer about their topic • Homework Assignment • Group Presentations (based on reading) • Lab or research activity (may precede group presentations) • Assessment • Additional Activity
Teacher Answer Key	Includes vocabulary definitions, and answers to reading questions, lab questions, assessment questions and additional activity questions (if applicable)
STUDENT DATA SHEETS	
Reading Passage	Age appropriate 2-3 page write-up of the Unit's topic.
Lab Report Form	Format for research or lab activity to be photocopied or for students to copy into their science notebooks and complete as they conduct the activity
Assessment Questions	A list of questions to be photocopied and distributed to each student to assess what the student has learned about the Unit's topic.

2.0 GENERAL GUIDELINES

Although the Units were designed to be stand-alone lessons, teachers are strongly encouraged to complete Unit 1 before proceeding to higher Units. Unit 1 offers a good introduction to the concepts of renewable energy and energy efficiency that will provide the proper framework when studying later Units. Once Unit 1 has been completed, the remaining Units can be completed in any order. In general, the teacher should review the entire Unit beforehand. It is highly recommended that the teacher conduct the activity before the class does. Although a materials list is provided, the availability of materials may vary, which would require modifications to the setup and instructions that should be presented to the class.

All of the activities can be modified to be more general or more involved depending on the skill level and grade of the class. The Additional Activity section was included to provide teachers with the opportunity to explore a topic further. Often the additional activities offer alternative teaching methods to convey the Unit's subject and offer the students a chance to be more creative. These activities are listed after the Assessment and are therefore not covered in the Assessment Questions.

Some of the Units involve activities for students to complete at home. The teacher is encouraged to send a note home with students to their parents/guardians explaining the purpose of the activity. For example, Unit 2 requires students to make wind observations at home; Unit 3 requires students to get information regarding recent gasoline purchases for their cars several days before the Lab Activity. Where appropriate, the specific Unit will prompt the teacher to send communication home with the students.

The following sections address specific elements in the Units of Study.

2.1 Anticipatory Set/Teacher Introduction

In order to spark the class' attention about the upcoming subject, the Units are structured so that an "attention-getter" activity is first. This anticipatory set should not only make the subject interesting to the class before they begin learning about it, but it should also relate how the subject affects their lives. Suggestions are provided in some of the Units, but since teachers know best what will motivate their students, the anticipatory set should really be left to the teacher's creativity. Some suggestions include: quick experiment or demonstration of the technology taught in the Unit; toys or gadgets reflecting the technology taught in the Unit, such as a model solar car or mini-wind turbine (see Resources section for websites to get such gadgets); expert speaker "show & tell" (request a speaker to bring an interesting demonstration about the subject being taught that will motivate the class to learn more about the subject - should be very brief and

interactive); or a field trip to a facility that is involved in the technology taught in the Unit. Once the class is engaged and ready to learn more, the teacher should summarize the activities involved in the Unit so the class will have an idea what to expect over the next few days.

2.2 Graphic Organizers

Graphic organizers, such as webs, are good tools to use, allowing visual learners the opportunity to make connections to what they already know. Each Unit involves creating a graphic organizer in the Assessment of Current Student Knowledge activity to record what the students already know about a particular subject. The graphic organizer can be added to throughout the lesson or even throughout related Units. Organizers can be any shape or size and can be drawn quickly on the board or on a large sheet of paper. The teacher may want to use large sheets of paper so they can be saved, added to, and kept posted. As an alternative, transparencies may be made of the graphic organizers as well. Information should be added to the class-generated organizers as students make presentations. This is part of the teacher's on-going assessment and gets students focused on the lesson. See Figures 1 - 6 for sample graphic organizers, which can be photocopied and enlarged to create templates.

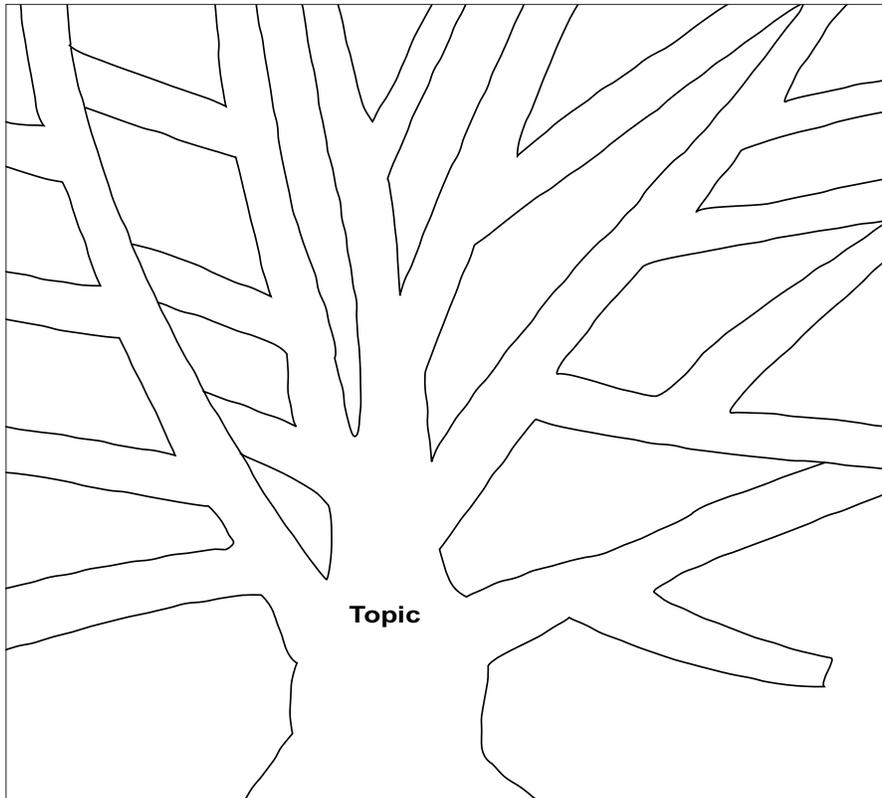
2.3 Creativity with Vocabulary

The traditional approach to learning vocabulary words relevant to the Unit's subject is included in the activity description. However, as an alternative, teachers may want to compile a list of all the vocabulary words in all six Units of Study and present them to the class a week or two before beginning the Units. Students can work individually or in groups to make flashcards of the words and definitions and test their peers periodically on the words. This can be taken even further into the form of a simple board game, where the board consists of a series of squares making a path with a beginning point and an end point with interesting challenges along the way. Each square can consist of either a word or a definition that the students, landing on the square with their markers (such as small, colored squares made of poster board), must identify correctly in order to proceed. Although this will require advanced preparation and additional time, it will break the monotony of only writing vocabulary words and definitions. After students have used the flashcards, they should be able to immediately recognize and define the new words in the Reading Passages. During the vocabulary activity in the Units, rather than first writing definitions, students can progress directly to writing meaningful sentences using the vocabulary words specific to the Unit.

2.4 Cooperative Group Work

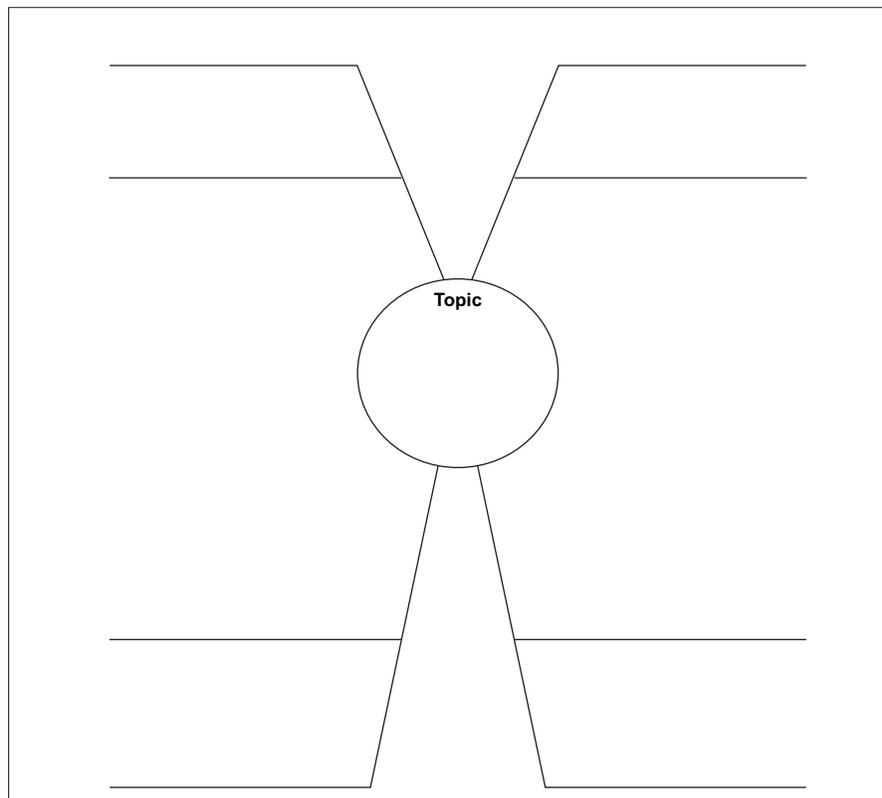
Explain to the class what it looks and sounds like for a group to be working well together, with everyone sharing the responsibility for their knowledge. Discussion should include the development of group roles and

SAMPLE GRAPHIC ORGANIZERS



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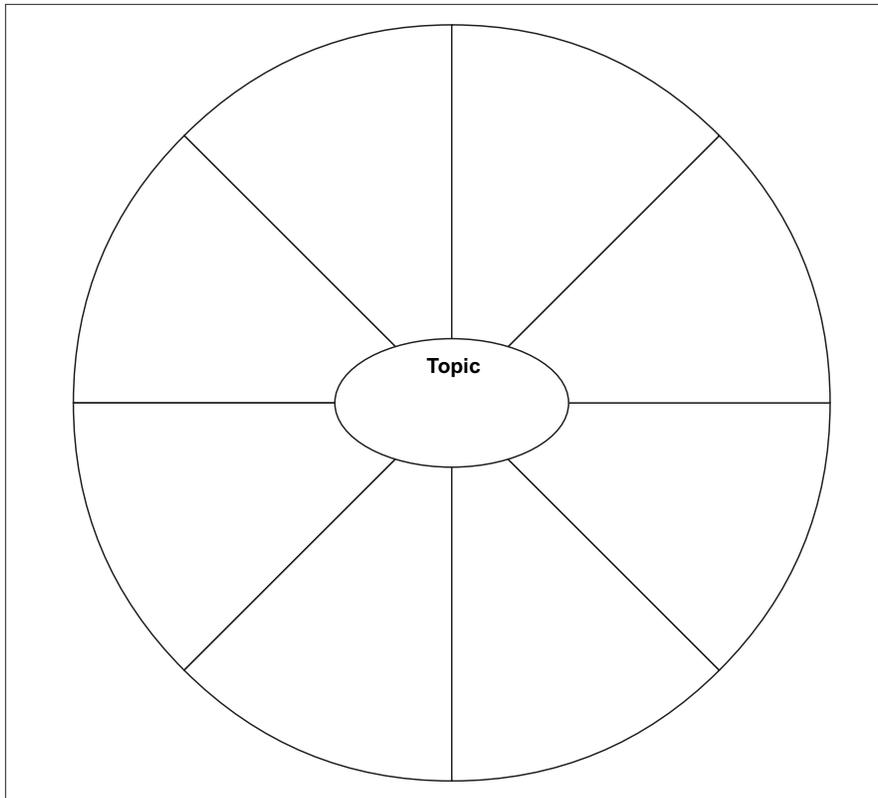
FIGURE 1. Tree Chart Write the details on the branches.



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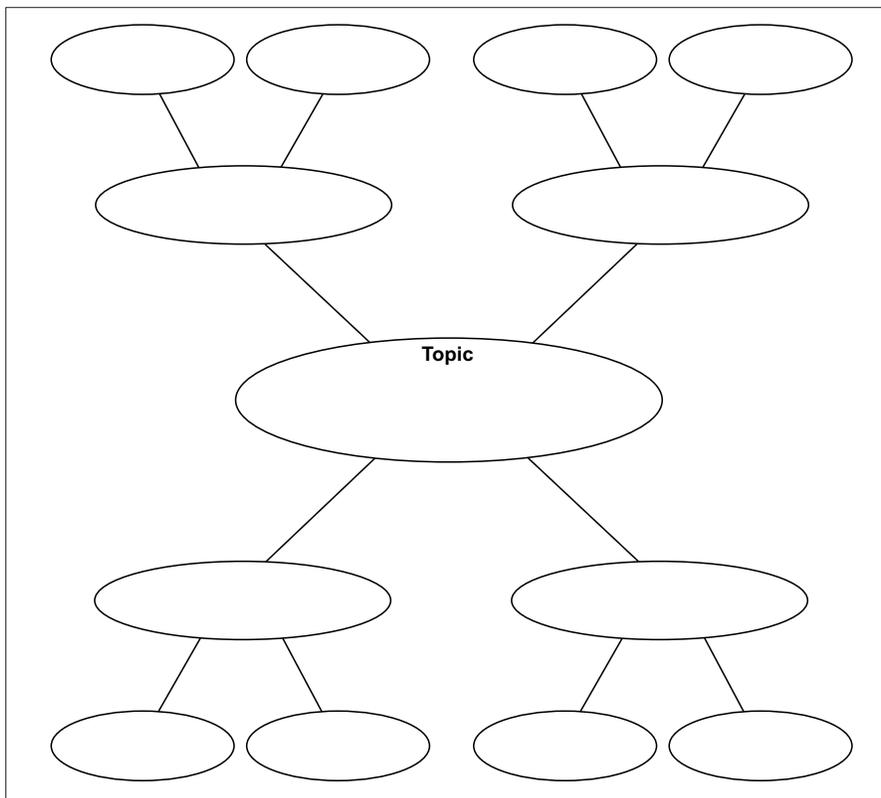
FIGURE 2. Spider Map Write main ideas on the slanted lines that connect to the circle. Write details on the branching lines.

SAMPLE GRAPHIC ORGANIZERS



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FIGURE 3. Describing Wheel Add describing words about your topic between the spokes.



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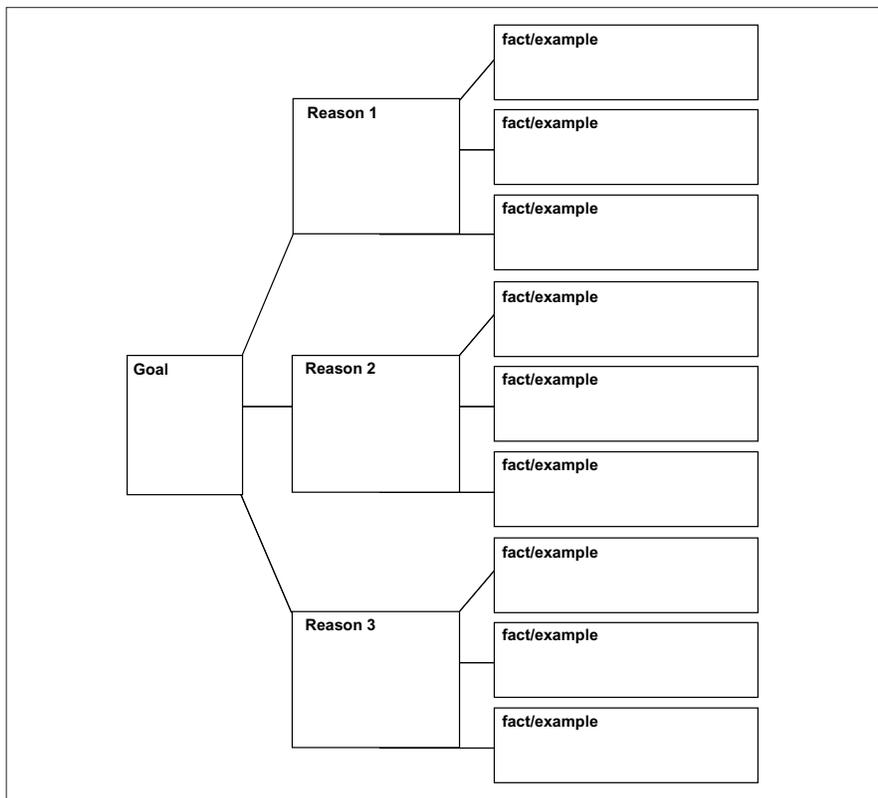
FIGURE 4. Cluster/Word Web 1 Write your topic in the center circle and details in the smaller circles. Add circles as needed.

SAMPLE GRAPHIC ORGANIZERS

Topic _____		
What I Know	What I Want to Know	What I Learned

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FIGURE 5. KWL Before you begin your research, list details in the first two columns. Fill in the last column after completing your research.



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FIGURE 6. Persuasion Map Write your goal in the first box. Write three reasons in the next boxes. List facts and examples in the branching boxes.

GENERAL GUIDELINES

proper interactions among group members, resulting in clear expectations. This needs to include respectful communication in order for all students to feel safe to participate and be respected for what they know and think about.

There are numerous approaches to teaching elementary students how to work together in cooperative group work. For instance, each student in a group can be assigned a specific role. Examples of roles for a cooperative group reading or research project are:

- Discussion Leader – responsible for making sure that the group of students discusses all the questions posed for its topic
- Researcher – responsible for gathering facts and other information needed to complete the assignment
- Recorder – responsible for writing down the information the group finds during its research of the assigned topic.
- Graphics / Illustrator – responsible for drawing or creating the visual information found in their research in a manner that can be displayed. (NOTE: this role can be combined with any of the three roles for groups of three students).

When students are assigned specific roles within a cooperative group work setting, it helps the student to learn responsibility for completing his/her part as it effects the whole presentation. The assignment of roles assists the teacher in determining grades since there can be two grades for cooperative group work – one grade for the individual student participatory role and one grade for the effort of the entire group. Allowing this two-tiered grading system enables students to be responsible for their own grade while learning the importance of supportive group work efforts.

2.5 Reading Passage Assignment

The purpose of the Reading and Cooperative Group Work activity is to allow students to exercise their reading skills while focusing on short topics of information. Therefore the Reading Passage is divided into several sections that are assigned as topics to small groups of students. Student groups will read aloud and answer questions pertaining to their assigned section and present their topics to the class. If time permits, the teacher may decide to allow all groups to read the entire Reading Passage but only answer questions and present on their assigned section. Since many of the sections vary in length, the teacher should be conscious of assigning the longer reading sections and/or those without graphics to advanced readers.

As the Units explain, the teacher should prepare on a large sheet of paper the Group Reading Section Topic and its related questions for each group. Students should write

the answers to their questions directly on their large sheet of paper. They can use it for their presentation by neatly writing the answers to their questions on it and adding their new graphic to it.

2.6 Group Presentation Guidelines

As the groups prepare information for their presentations, inform them that their presentation must: 1) summarize in clear and concise language, using vocabulary from the Unit, the information within its topic; 2) support its summary with details; and 3) present some type of visual aide, different than or a variation of those in the Reading Passage, to help explain and teach its topic. A brief written explanation or description should accompany the visual aide. As a class, create clear expectations for presentations by writing down what the students and teacher agree upon to be a quality presentation and what are effective behaviors by listeners during presentations. This could lead into developing a rubric, or system of standards, for grading purposes. A sample of rubrics is included in Section 6 of this Guide.

Students can use the large sheets of paper to display information for their presentation. (If the teacher prefers, other visual aides may be used instead such as the chalkboard or overhead transparencies.) Students should be reminded to talk clearly, slowly and loudly enough for the entire class to hear.

Finally, unless all groups read the entire Reading Passage, the presentations will be the only exposure that students have to the information not contained in their reading section. Before the presentation, review each group's materials and make sure that concepts included in the assessment are covered by its presentation. Remind the class that they should listen very carefully to the presentations because the information that is presented will be included in the assessment. As part of the wrap-up discussion, you may want to reiterate the facts presented that are included in the assessment to reinforce the concepts to the class. Be sure to add them to the original graphic organizer.

The other students as listeners should be encouraged to generate questions in order to broaden their scope of understanding. After each group presents, any new information can be added to the graphic organizer that was created at the beginning of the lesson.

2.7 Library Research and Internet Research

Before assigning students library research, meet with the librarian to determine the location and the type of books that are available regarding energy, the environment and sustainability. Additional resources are provided in this Guide; you may decide to order some of these publications for your library.

SAFETY GUIDELINES

Before assigning students Internet research, learn about your school's Internet access including any filters that might be installed to prevent access to inappropriate websites. Most Internet research is assigned as group work to allow students to collaborate together and learn cooperative group skills. The teacher can determine the optimal number of students for a group depending on logistics of the computer lab, the number of computers and the class's skills.

The teacher should review with the class basic instructions on using search engines and provide search tips such as the use of quotations around word phrases or specifying the domain (.edu, .gov, etc.). Most search engines have options to perform advanced searches that provide a template for users to input specific information. The teacher can review the advanced options of a search engine with the class to help them refine their searches.

Suggested search engines:

www.google.com
www.altavista.com
www.yahoo.com and <http://yahooligans.yahoo.com/> (“web guide for kids”)
<http://sunsite.berkeley.edu/KidsClick/> (“web search for kids by librarians”)

3.0 SAFETY GUIDELINES

Standard science and lab safety guidelines should be followed if the teacher or school already has some in place. To take safety further, the teacher can develop a safety chart and safety contract listing basic expectations that would be signed by students individually.

The following laboratory management techniques are taken from the Texas Safety Standards for K-12 included in the Science TEKS Toolkits developed by the Charles A. Dana Center at the University of Texas.

1. Maintain fair and consistent classroom discipline to prevent unsafe conditions from being created during laboratory investigations.
2. Establish routine procedures for conducting a laboratory investigation that promote an orderly and safe environment. Ask different students in each laboratory group to obtain materials from a supply area, return materials at the completion of a laboratory investigation, and record data, if class data are needed.
3. Explain and post the expectations for orderly conduct in the classroom, laboratory, and field. Teachers should always model appropriate classroom, laboratory, and field procedures.
4. Explain and post safety rules for the classroom, laboratory, and field. Students and parents should complete and return a signed safety contract before students begin investigations.
5. Explain the consequences of unsafe behavior.
6. Before each laboratory investigation, review the safety rules for using laboratory equipment and facilities.
7. Prior to the investigation, arrange for the proper disposal of wastes.
8. Keep up with current information on safety and class procedures, and practice those procedures consistently.
9. Examine laboratory investigations and equipment for appropriateness and safety.
10. Review with the students the procedures for using the laboratory. Discuss safety rules and precautions before the investigation begins.
11. Promote a positive attitude. Students should not fear doing experiments, using reagents, or using equipment, but should have a positive attitude toward safe laboratory procedures.
12. Adjust procedures for students with emotional, physical, or educational problems to capitalize on the contributions they are able to make.
13. When a substitute teacher is in charge, create an alternate lesson plan that does not involve laboratory work.
14. Monitor continuously for maximized learning and safe conditions.
15. Plan post-lab activities for after the laboratory work has been completed.
16. Clean the work areas thoroughly and regularly.
17. Develop procedures to be followed in case of an accident.
18. Establish procedures for asking students to leave the laboratory when they demonstrate unacceptable behavior.

TEKS – GRADE 4

4.0 TEXAS ESSENTIAL KNOWLEDGE SKILLS

TABLE 2. Grade 4 TEKS Addressed

TEKS Grade 4	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
SCIENCE							
(4.1) Scientific processes. The student conducts field and laboratory investigations following home and school safety procedures and environmentally appropriate and ethical practices.	The student is expected to:						
	(A) demonstrate safe practices during field and laboratory investigations; and	x	x	x	x	x	x
	(B) make wise choices in the use and conservation of resources and the disposal or recycling of materials.	x	x	x	x	x	x
(4.2) Scientific processes. The student uses scientific inquiry methods during field and laboratory investigations.	The student is expected to:						
	(B) collect information by observing and measuring;		x		x		
	(C) analyze and interpret information to construct reasonable explanations from direct and indirect evidence;		x	x	x		x
	(D) communicate valid conclusions; and	x	x	x	x	x	x
	(E) construct simple graphs, tables, maps, and charts to organize, examine, and evaluate information.			x	x		x
(4.3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to:						
	(D) evaluate the impact of research on scientific thought, society, and the environment; and	x	x	x	x	x	x
(4.4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to:						
	(A) 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; and				x		
(4.6) Science concepts. The student knows that change can create recognizable patterns.	The student is expected to:						
	(A) identify patterns of change such as in weather, metamorphosis, and objects in the sky;		x				

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SCIENCE							
(4.7) Science concepts. The student knows that matter has physical properties.	The student is expected to:						
	(A) observe and record changes in the states of matter caused by the addition or reduction of heat; and				x		
	(B) conduct tests, compare data, and draw conclusions about physical properties of matter including states of matter, conduction, density, and buoyancy.		x		x		
(4.11) Science concepts. The student knows that the natural world includes earth materials and objects in the sky.	The student is expected to:						
	(C) identify the Sun as the major source of energy for the Earth and understand its role in the growth of plants, in the creation of winds, and in the water cycle.	x	x	x	x	x	x
ENGLISH LANGUAGE ARTS							
(4.1) Listening/speaking/ purposes. The student listens actively and purposefully in a variety of settings.	The student is expected to:						
	(A) determine the purposes for listening such as to gain information, to solve problems, or to enjoy and appreciate (4-8);	x	x	x	x	x	x
	(C) understand the major ideas and supporting evidence in spoken messages (4-8).	x	x	x	x	x	x
(4.3) Listening/speaking/ appreciation. The student listens, enjoys, and appreciates spoken language.	The student is expected to:						
	(A) listen to proficient, fluent models of oral reading, including selections from classic and contemporary works (4-8);	x	x	x			
(4.5) Listening/speaking/ audiences. The student speaks appropriately to different audiences for different purposes and occasions.	The student is expected to:						
	(B) demonstrate effective communications skills that reflect such demands as interviewing, reporting, requesting, and providing information (4-8);	x	x	x	x	x	x
	(D) use effective rate, volume, pitch, and tone for the audience and setting (4-8);	x	x	x	x	x	x
	(F) clarify and support spoken ideas with evidence, elaborations, and examples (4-8).	x	x	x	x	x	x

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ENGLISH LANGUAGE ARTS							
(4.6) Reading/word identification. The student uses a variety of word recognition strategies.	The student is expected to:						
	(A) apply knowledge of letter-sound correspondences, language structure, and context to recognize words (4-8);						
	(B) use structural analysis to identify root words with prefixes such as <i>dis-</i> , <i>non-</i> , <i>in-</i> ; and suffixes such as <i>-ness</i> , <i>-tion</i> , <i>-able</i> (4-6); and						
	(C) locate the meanings, pronunciations, and derivations of unfamiliar words using dictionaries, glossaries, and other sources (4-8).	x	x	x	x	x	x
(4.7) Reading/fluency. The student reads with fluency and understanding in texts at appropriate difficulty levels.	The student is expected to:						
	(B) read regularly in instructional-level materials that are challenging but manageable (texts in which no more than approximately 1 in 10 words is difficult for the reader; a “typical” fourth grader reads approximately 90 wpm) (4);	x	x	x	x	x	x
	(E) read aloud in selected texts in ways that both reflect understanding of the text and engage the listeners (4-8); and	x	x	x	x	x	x
(4.8) Reading/variety of texts. The student reads widely for different purposes in varied sources.	The student is expected to:						
	(B) select varied sources such as nonfiction, novels, textbooks, newspapers, and magazines when reading for information or pleasure (4-5); and	x	x	x	x	x	x
	(C) read for varied purposes such as to be informed, to be entertained, to appreciate the writer’s craft, and to discover models for his/her own writing (4-8).	x	x	x	x	x	x
(4.9) Reading/vocabulary development. The student acquires an extensive vocabulary through reading and systematic word study.	The student is expected to:						
	(A) develop vocabulary by listening to selections read aloud (4-8);	x	x	x	x	x	x
	(B) draw on experiences to bring meanings to words in context such as interpreting figurative language and multiple-meaning words (4-5);	x	x	x	x	x	x
	(C) use multiple reference aids, including a thesaurus, a synonym finder, a dictionary, and software, to clarify meanings and usage (4-8);	x	x	x	x	x	x

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ENGLISH LANGUAGE ARTS							
(4.10) Reading/comprehension. The student comprehends selections using a variety of strategies.	The student is expected to:						
	(A) use his/her own knowledge and experience to comprehend (4-8);	x	x	x	x	x	x
	(C) monitor his/her own comprehension and make modifications when understanding breaks down such as by rereading a portion aloud, using reference aids, searching for clues, and asking questions (4-8);	x	x	x	x	x	x
	(E) use the text’s structure or progression of ideas such as cause and effect or chronology to locate and recall information (4-8);	x	x	x	x	x	x
	(F) determine a text’s main (or major) ideas and how those ideas are supported with details (4-8);	x	x	x	x	x	x
	(G) paraphrase and summarize text to recall, inform, and organize ideas (4-8);	x	x	x	x	x	x
	(H) draw inferences such as conclusions or generalizations and support them with text evidence and experience (4-8);	x	x	x	x	x	x
	(K) answer different types and levels of questions such as open-ended, literal, and interpretative as well as test-like questions such as multiple choice, true-false, and short answer (4-8); and	x	x	x	x	x	x
(L) represent text information in different ways such as in outline, timeline, or graphic organizer (4-8).	x	x	x	x	x	x	
(4.11) Reading/literary response. The student expresses and supports responses to various types of texts.	The student is expected to:						
	(A) offer observations, make connections, react, speculate, interpret, and raise questions in response to texts (4-8);	x	x	x	x	x	x
	(B) interpret text ideas through such varied means as journal writing, discussion, enactment, media (4-8);	x	x	x	x	x	x
	(C) support responses by referring to relevant aspects of text and his/her own experiences (4-8); and	x	x	x	x	x	x
	(D) connect, compare, and contrast ideas, themes, and issues across text (4-8).	x	x	x	x	x	x

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ENGLISH LANGUAGE ARTS							
(4.13) Reading/inquiry/research. The student inquires and conducts research using a variety of sources.	The student is expected to:						
	(C) use multiple sources, including electronic texts, experts, and print resources, to locate information relevant to research questions (4-8);			x			x
	(D) interpret and use graphic sources of information such as maps, graphs, timelines, tables, and diagrams to address research questions (4-5);	x	x	x	x	x	x
	(E) summarize and organize information from multiple sources by taking notes, outlining ideas, or making charts (4-8);	x	x	x	x	x	x
	(F) produce research projects and reports in effective formats using visuals to support meaning, as appropriate (4-5);	x	x	x	x	x	x
	(G) draw conclusions from information gathered from multiple sources (4-8); and			x			x
	(H) use compiled information and knowledge to raise additional, unanswered questions (3-8).			x			x
(4.15) Writing/purposes. The student writes for a variety of audiences and purposes, and in a variety of forms.	The student is expected to:						
	(A) write to express, discover, record, develop, reflect on ideas, and to problem solve (4-8);	x		x			x
	(C) write to inform such as to explain, describe, report, and narrate (4-8);	x	x	x	x	x	x
(F) choose the appropriate form for his/her own purpose for writing, including journals, letters, reviews, poems, narratives, and instructions (4-5).			x				x
(4.19) Writing/writing processes. The student selects and uses writing processes for self-initiated and assigned writing.	The student is expected to:						
	(B) develop drafts by categorizing ideas, organizing them into paragraphs, and blending paragraphs within larger units of text (4-8);	x		x			x
(I) select and use reference materials and resources as needed for writing, revising, and editing final drafts (4-8).				x			x
(4.23) Viewing/representing/interpretation. The student understands and interprets visual images, messages, and meanings.	The student is expected to:						
	(B) interpret important events and ideas gathered from maps, charts, graphics, video segments, or technology presentations (4-8); and	x	x	x	x	x	x
(C) use media to compare ideas and points of view (4-8).				x			x

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ENGLISH LANGUAGE ARTS							
(4.25) Viewing/representing/production. The student produces visual images, messages, and meanings that communicate with others.	The student is expected to:						
	(A) select, organize, or produce visuals to complement and extend meanings (4-8); and	x	x	x	x	x	x
MATH							
(4.3) Number, operation, and quantitative reasoning. The student adds and subtracts to solve meaningful problems involving whole numbers and decimals.	The student is expected to:						
	(A) use addition and subtraction to solve problems involving whole numbers; and			x	x		x
(4.4) Number, operation, and quantitative reasoning. The student multiplies and divides to solve meaningful problems involving whole numbers.	The student is expected to:						
	(D) use multiplication to solve problems involving two-digit numbers; and			x	x		x
	(E) use division to solve problems involving one-digit divisors.			x	x		x
(4.12) Measurement. The student applies measurement concepts.	The student is expected to:						
	measure to solve problems involving length, including perimeter, time, temperature, and area.				x		
(4.15) Underlying processes and mathematical tools. The student communicates about Grade 4 mathematics using informal language.	The student is expected to:						
	(A) explain and record observations using objects, words, pictures, numbers, and technology; and		x		x		x
(4.16) Underlying processes and mathematical tools. The student uses logical reasoning to make sense of his or her world.	The student is expected to:						
	(A) make generalizations from patterns or sets of examples and nonexamples; and		x	x	x		x
	(B) justify why an answer is reasonable and explain the solution process.		x	x	x		x
TECHNOLOGY APPLICATIONS							
(4) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision.	The student is expected to:						
	(A) apply appropriate electronic search strategies in the acquisition of information including keyword and Boolean search strategies; and			x			x
	(B) select appropriate strategies to navigate and access information on local area networks (LANs) and wide area networks (WANs), including the Internet and intranet, for research and resource sharing.			x			x

TEKS – GRADE 4

TEKS Grade 4	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
TECHNOLOGY APPLICATIONS							
(8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge.	The student is expected to:						
	(A) use communication tools to participate in group projects;			x			x
SOCIAL STUDIES							
(4.9) Geography. The student understands how people adapt to and modify their environment.	The student is expected to:						
	(A) describe ways people have adapted to and modified their environment in Texas, past and present;		x		x	x	
	(B) identify reasons why people have adapted to and modified their environment in Texas, past and present, such as the use of natural resources to meet basic needs; and		x		x	x	
	(C) analyze the consequences of human modification of the environment in Texas, past and present.		x				
(4.21) Science, technology, and society. The student understands the impact of science and technology on life in Texas.	The student is expected to:						
	(B) describe how scientific discoveries and technological innovations have benefited individuals, businesses, and society in Texas; and		x		x	x	
(4.22) Social studies skills. The student applies critical-thinking skills to organize and use information acquired from a variety of sources including electronic technology.	The student is expected to:						
	(B) analyze information by sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions;	x	x	x	x	x	x
	(C) organize and interpret information in outlines, reports, databases, and visuals including graphs, charts, timelines, and maps;	x	x	x	x	x	x
(4.24) Social studies skills. The student uses problem-solving and decision-making skills, working independently and with others, in a variety of settings.	The student is expected to:						
	(A) use a problem-solving process to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution; and	x	x	x	x	x	x

TEKS – GRADE 5

TABLE 3. Grade 5 TEKS Addressed

TEKS Grade 5	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
SCIENCE							
(5.1) Scientific processes. The student conducts field and laboratory investigations following home and school safety procedures and environmentally appropriate and ethical practices.	The student is expected to:						
	(A) demonstrate safe practices during field and laboratory investigations; and	x	x	x	x	x	x
	(B) make wise choices in the use and conservation of resources and the disposal or recycling of materials.	x	x	x	x	x	x
(5.2) Scientific processes. The student uses scientific methods during field and laboratory investigations.	The student is expected to:						
	(B) collect information by observing and measuring;		x		x		
	(C) analyze and interpret information to construct reasonable explanations from direct and indirect evidence;		x	x	x		
	(D) communicate valid conclusions; and	x	x	x	x	x	x
	(E) construct simple graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate information.			x	x		x
(5.3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to:						
	(D) evaluate the impact of research on scientific thought, society, and the environment; and	x	x	x	x	x	x
(5.4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to:						
	(A) collect and analyze information using tools including calculators, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, compasses, balances, hot plates, meter sticks, timing devices, magnets, collecting nets, and safety goggles; and						
	(B) demonstrate that repeated investigations may increase the reliability of results.						
(5.8) Science concepts. The student knows that energy occurs in many forms.	The student is expected to:						
	(A) differentiate among forms of energy including light, heat, electrical, and solar energy;	x	x	x	x	x	x
	(C) demonstrate that electricity can flow in a circuit and can produce heat, light, sound, and magnetic effects; and					x	

TEKS – GRADE 5

TEKS Grade 5	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
ENGLISH LANGUAGE ARTS							
(5.1) Listening/speaking/ purposes. The student listens actively and purposefully in a variety of settings.	The student is expected to:						
	(A) determine the purposes for listening such as to gain information, to solve problems, or to enjoy and appreciate (4-8);	x	x	x	x	x	x
	(C) understand the major ideas and supporting evidence in spoken messages (4-8).	x	x	x	x	x	x
(5.3) Listening/speaking/ appreciation. The student listens to enjoy and appreciate spoken language.	The student is expected to:						
	(A) listen to proficient, fluent models of oral reading, including selections from classic and contemporary works (4-8);	x	x	x			
(5.5) Listening/speaking/ audiences. The student speaks clearly and appropriately to different audiences for different purposes and occasions.	The student is expected to:						
	(B) demonstrate effective communications skills that reflect demands such as interviewing, reporting, requesting, and providing information (4-8);	x	x	x	x	x	x
	(D) use effective rate, volume, pitch, and tone for the audience and setting (4-8);	x	x	x	x	x	x
	(F) clarify and support spoken ideas with evidence, elaborations, and examples (4-8).	x	x	x	x	x	x
(5.6) Reading/word identification. The student uses a variety of word identification strategies.	The student is expected to:						
	(C) locate the meanings, pronunciations, and derivations of unfamiliar words using dictionaries, glossaries, and other sources (4-8).	x	x	x	x	x	x
(5.7) Reading/fluency. The student reads with fluency and understanding in texts at appropriate difficulty levels.	The student is expected to:						
	(B) read regularly in instructional-level materials that are challenging but manageable (texts in which no more than approximately 1 in 10 words is difficult for the reader; a “typical” 5th grader reads approximately 100 wpm) (5);	x	x	x	x	x	x
	(E) read aloud in selected texts in ways that both reflect understanding of the text and engage the listeners (4-8); and	x	x	x	x	x	x
(5.8) Reading/variety of texts. The student reads widely for different purposes in varied sources.	The student is expected to:						
	(B) select varied sources such as nonfiction, novels, textbooks, newspapers, and magazines when reading for information or pleasure (4-5); and	x	x	x	x	x	x
	(C) read for varied purposes such as to be informed, to be entertained, to appreciate the writer’s craft, and to discover models for his/her own writing (4-8).	x	x	x	x	x	x

TEKS – GRADE 5

TEKS Grade 5	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
ENGLISH LANGUAGE ARTS							
(5.9) Reading/vocabulary development. The student acquires an extensive vocabulary through reading and systematic word study.	The student is expected to:						
	(A) develop vocabulary by listening to selections read aloud (4-8);	x	x	x	x	x	x
	(B) draw on experiences to bring meanings to words in context such as interpreting figurative language and multiple-meaning words (4-5);	x	x	x	x	x	x
	(C) use multiple reference aids, including a thesaurus, a synonym finder, a dictionary, and software, to clarify meanings and usage (4-8);	x	x	x	x	x	x
(5.10) Reading/comprehension. The student comprehends selections using a variety of strategies.	The student is expected to:						
	(A) use his/her own knowledge and experience to comprehend (4-8);	x	x	x	x	x	x
	(C) monitor his/her own comprehension and make modifications when understanding breaks down such as by rereading a portion aloud, using reference aids, searching for clues, and asking questions (4-8);	x	x	x	x	x	x
	(E) use the text's structure or progression of ideas such as cause and effect or chronology to locate and recall information (4-8);	x	x	x	x	x	x
	(F) determine a text's main (or major) ideas and how those ideas are supported with details (4-8);	x	x	x	x	x	x
	(G) paraphrase and summarize text to recall, inform, or organize ideas (4-8);	x	x	x	x	x	x
	(H) draw inferences such as conclusions or generalizations and support them with text evidence and experience (4-8);	x	x	x	x	x	x
	(K) answer different types and levels of questions such as open-ended, literal, and interpretative as well as test-like questions such as multiple choice, true-false, and short-answer (4-8); and	x	x	x	x	x	x
	(L) represent text information in different ways such as in outline, timeline, or graphic organizer (4-8).	x	x	x	x	x	x

TEKS – GRADE 5

TEKS Grade 5	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
ENGLISH LANGUAGE ARTS							
(5.11) Reading/literary response. The student expresses and supports responses to various types of texts.	The student is expected to:						
	(A) offer observations, make connections, react, speculate, interpret, and raise questions in response to texts (4-8);	x	x	x	x	x	x
	(B) interpret text ideas through such varied means as journal writing, discussion, enactment, and media (4-8);	x	x	x	x	x	x
	(C) support responses by referring to relevant aspects of text and his/her own experiences (4-8); and	x	x	x	x	x	x
	(D) connect, compare, and contrast ideas, themes, and issues across text (4-8).	x	x	x	x	x	x
(5.13) Reading/inquiry/research. The student inquires and conducts research using a variety of sources.	The student is expected to:						
	(C) use multiple sources, including electronic texts, experts, and print resources, to locate information relevant to research questions (4-8);			x			x
	(D) interpret and use graphic sources of information such as maps, graphs, time lines, tables, or diagrams to address research questions (4-5);	x	x	x	x	x	x
	(E) summarize and organize information from multiple sources by taking notes, outlining ideas, and making charts (4-8);	x	x	x	x	x	x
	(F) produce research projects and reports in effective formats using visuals to support meaning as appropriate (4-5);	x	x	x	x	x	x
	(G) draw conclusions from information gathered from multiple sources (4-8); and			x			x
	(H) use compiled information and knowledge to raise additional, unanswered questions (3-8).			x			x
(5.15) Writing/purposes. The student writes for a variety of audiences and purposes, and in a variety of forms.	The student is expected to:						
	(A) write to express, discover, record, develop, reflect on ideas, and to problem solve (4-8);	x		x			x
	(C) write to inform such as to explain, describe, report, and narrate (4-8);	x	x	x	x	x	x
	(F) choose the appropriate form for his/her own purpose for writing, including journals, letters, reviews, poems, narratives, and instructions (4-5); and	x		x			x

TEKS – GRADE 5

TEKS Grade 5	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
ENGLISH LANGUAGE ARTS							
(5.19) Writing/writing processes. The student selects and uses writing processes for self-initiated and assigned writing.	The student is expected to:						
	(B) develop drafts by categorizing ideas, organizing them into paragraphs, and blending paragraphs within larger units of text (4-8);	x		x			x
	(I) select and use reference materials and resources as needed for writing, revising, and editing final drafts (4-8).			x			x
(5.23) Viewing/representing/interpretation. The student understands and interprets visual images, messages, and meanings.	The student is expected to:						
	(B) interpret important events and ideas gleaned from maps, charts, graphics, video segments or technology presentations (4-8); and	x	x	x	x	x	x
	(C) use media to compare ideas and points of view (4-8).			x			x
(5.25) Viewing/representing/production. The student produces visual images, messages, and meanings that communicate with others.	The student is expected to:						
	(A) select, organize, or produce visuals to complement and extend meanings (4-8); and	x	x	x	x	x	x
MATH							
(5.3) Number, operation, and quantitative reasoning. The student adds, subtracts, multiplies, and divides to solve meaningful problems.	The student is expected to:						
	(A) use addition and subtraction to solve problems involving whole numbers and decimals;			x	x		x
	(B) use multiplication to solve problems involving whole numbers (no more than three digits times two digits without technology);			x	x		x
	(C) use division to solve problems involving whole numbers (no more than two-digit divisors and three-digit dividends without technology);			x	x		x
(5.4) Number, operation, and quantitative reasoning. The student estimates to determine reasonable results.	The student is expected to:						
	(A) round whole numbers and decimals through tenths to approximate reasonable results in problem situations; and				x		
(5.6) Patterns, relationships, and algebraic thinking. The student describes relationships mathematically.	The student is expected to select from and use diagrams and number sentences to represent real-life situations.			x	x		x

TEKS – GRADE 5

TEKS Grade 5	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
MATH							
(5.11) Measurement. The student applies measurement concepts.	The student is expected to:						
	(A) measure to solve problems involving length (including perimeter), weight, capacity, time, temperature, and area; and				x		
(5.12) Probability and statistics. The student describes and predicts the results of a probability experiment.	The student is expected to:						
	(B) use experimental results to make predictions.				x		
(5.13) Probability and statistics. The student solves problems by collecting, organizing, displaying, and interpreting sets of data.	The student is expected to:						
	(A) use tables of related number pairs to make line graphs;				x		x
	(B) describe characteristics of data presented in tables and graphs including the shape and spread of the data and the middle number; and				x		x
(5.15) Underlying processes and mathematical tools. The student communicates about Grade 5 mathematics using informal language.	The student is expected to:						
	(A) explain and record observations using objects, words, pictures, numbers, and technology; and		x	x	x		x
	(B) justify why an answer is reasonable and explain the solution process.						
(5.16) Underlying processes and mathematical tools. The student uses logical reasoning to make sense of his or her world.	The student is expected to:						
	(A) make generalizations from patterns or sets of examples and nonexamples; and		x	x	x		x
	(B) justify why an answer is reasonable and explain the solution process.		x	x	x		x

TEKS – GRADE 5

TEKS Grade 5	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
SOCIAL STUDIES							
(5.24) Science, technology, and society. The student understands the impact of science and technology on life in the United States.	The student is expected to:						
	(B) identify how scientific discoveries and technological innovations such as the transcontinental railroad, the discovery of oil, and the rapid growth of technology industries have advanced the economic development of the United States;	x	x	x	x	x	x
	(D) analyze environmental changes brought about by scientific discoveries and technological innovations such as air conditioning and fertilizers; and	x	x	x	x	x	x
	(E) predict how future scientific discoveries and technological innovations could affect life in the United States.	x	x	x	x	x	x
(5.25) Social studies skills. The student applies critical-thinking skills to organize and use information acquired from a variety of sources including electronic technology.	The student is expected to:						
	(B) analyze information by sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions;	x	x	x	x	x	x
	(C) organize and interpret information in outlines, reports, databases, and visuals including graphs, charts, timelines, and maps;	x	x	x	x	x	x
(5.27) Social studies skills. The student uses problem-solving and decision-making skills, working independently and with others, in a variety of settings.	The student is expected to:						
	(A) use a problem-solving process to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution; and	x	x	x	x	x	x

TEKS – GRADE 5 AND RESOURCES

TEKS Grade 5	Description	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
TECHNOLOGY APPLICATIONS							
(4) Information acquisition. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision.	The student is expected to:						
	(A) apply appropriate electronic search strategies in the acquisition of information including keyword and Boolean search strategies; and			x			x
	(B) select appropriate strategies to navigate and access information on local area networks (LANs) and wide area networks (WANs), including the Internet and intranet, for research and resource sharing.			x			x
(8) Solving problems. The student uses research skills and electronic communication, with appropriate supervision, to create new knowledge.	The student is expected to:						
	(A) use communication tools to participate in group projects;			x			x

5.0 RESOURCES

5.1 Recommended Reading

1. *Saving Energy*, Jacqueline Dineen, Raintree Steck-Vaughn (1995), Grades 3 through 6
2. *How Do We Know Energy Exists?*, Terry Jennings, Raintree Steck-Vaughn (1995)
3. *Earth Words / A Dictionary of the Environment*, Seymour Simon, Harper Collins (1995)
4. *Energy: Simple Experiments for Your Scientists*, Larry White, Millbrook Press (1995)
5. *Our Endangered Planet: Air*, Lisa Yount, Lerner Publications Company (1995)
6. *The Passive Solar Energy Book*, Maria Edward, Rodale Press (1979)
7. *Renewable Energy*, Jacqueline Dineen, Raintree Steck-Vaughn (1995) Grades 3 through 6
8. *The Passive Solar House / Using Solar Design to Heat and Cool Your Home*, James Kachadorian, Chelsea Green Publishing Co. (1997)
9. *Solar Powered Racers: Racing with the Sun*, Hector Ibarra, Showboard, Inc., 2001

INTERNET RESOURCES

5.2 Internet Resources

TABLE 4. Suggested Websites

An “x” indicates a website that addresses the entire Unit, mostly geared for teachers. Numbers 1 through 4 indicate websites that can be used for research for Groups 1 through 4 in Unit 6.

Organization	Website	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
SECO Infinite Power of TX	http://www.InfinitePower.org	x	x	x	x	x	x
TX Solar Energy Society	http://www.txses.org	x	x	x	x	x	x
CA Environmental Resources Evaluation System – Sustainability Guide	http://ceres.ca.gov/tcsf/seg/	x					
U.S. EPA – Global Warming for Educators	http://yosemite.epa.gov/oar/globalwarming.nsf/content/VisitorCenterEducators.html	x					
U.S. DOE – Energy Efficiency and Renewable Energy (EERE) for Educators	http://www.eere.energy.gov/education/	x	x	x	x	x	x
U.S. DOE – Energy Efficiency and Renewable Energy for Students*	http://www.eere.energy.gov/kids/	x	x	x	x	x	x
US Geological Survey – Energy Resources Program	http://energy.usgs.gov/	x					
Environmental Defense	www.edf.org	x					
TERI - The Energy Resource Institute – Edugreen Program*	http://www.edugreen.teri.res.in/	x	x		x	x	
US DOE Energy Information Agency – Energy Kids Page*	http://www.eia.doe.gov/kids/energyfacts/index.html	x	x		x	x	
Union of Concerned Scientists	www.ucsusa.org	x					x
Alternative Energy Institute – Windenergy.org	http://www.windenergy.org/		x				
American Wind Energy Association – TX Projects Page	http://www.awea.org/projects/texas.html		x				
Alliance to Save Energy – Educators Page	http://www.ase.org/section/_audience/educators/			x			
Alliance to Save Energy – Kids Page*	http://www.ase.org/section/_audience/consumers/kids/			x			
Florida Solar Energy Center	www.fsec.ucf.edu			x			
Rocky Mountain Institute – Home Page	www.rmi.org			x			
Rocky Mountain Institute – Kids Page*	www.rmi.org/sitepages/pid468.php			x			
US EPA – Vehicle Fuel Economy	http://www.epa.gov/greenvehicles/			x			

* Website geared specifically for students

INTERNET RESOURCES

Organization	Website	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
Watt Watchers of Texas – Saving Energy in Schools	www.wattwatchers.org			x			
National Renewable Energy Labs – Passive Solar for Educators	http://www.nrel.gov/clean_energy/teach_passive.html				x		
U.S. DOE – Energy Efficiency and Renewable Energy – Solar Water Heaters	http://www.eere.energy.gov/RE/solar_hotwater.html				x		
American Solar Energy Society – general information	http://www.ases.org					x	
US DOE EERE – Photovoltaics	http://www.eere.energy.gov/RE/solar_photovoltaics.html					x	
National Renewable Energy Labs – Photovoltaics	http://www.nrel.gov/clean_energy/photovoltaic.html					x	
American Wind Energy Association	http://www.awea.org					x	
National Renewable Energy Labs – Wind Energy	http://www.nrel.gov/clean_energy/wind.html					x	
US DOE EERE – Wind Energy	http://www.eere.energy.gov/RE/wind.html					x	
National Renewable Energy Labs – Biomass Energy	http://www.nrel.gov/clean_energy/bioenergy.html					x	
US DOE EERE – Bioenergy	http://www.eere.energy.gov/RE/bioenergy.html					x	
US DOE EERE – Hydropower	http://www.eere.energy.gov/RE/hydropower.html					x	
National Renewable Energy Labs – Photovoltaics	http://www.nrel.gov/clean_energy/hydroelectric_power.html					x	
Texas Commission on Environmental Quality (formerly TNRCC) – Educators Page	http://www.tnrcc.state.tx.us/exec/sbea/education.html						x
Watts on Schools – Energy and pollution calculator	http://www.wattsonschoools.com/calculator.htm						x
Model Solar Car Parts Website	http://kitsusa.net/phpstore/index.php						1
Model Solar Car Parts Website	http://scientificsonline.com/category.asp?c=421196&sid=GOOGLE&EID=G0080&bhcd2=1088879544						1
Model Solar Car Parts Website	www.legoeducationstore.com						1
Model Solar Car Parts Website	http://www.solarworld.com/						1
Model Solar Car Parts Website	http://www.web.net/~sunwind						1

* Website geared specifically for students

RESOURCES

Organization	Website	Unit of Study # 1 Renewable Energy and Sustainability	Unit of Study # 2 Advantages of Renewable Energy	Unit of Study # 3 Using Energy Wisely	Unit of Study # 4 Renewable Energy for the Home	Unit of Study # 5 Electricity from the Sun	Unit of Study # 6 Solar and Electric Cars
TX Solar Energy Society – Junior Solar Sprint Information	www.txses.org/tjss						1
Solar Car Race – American Solar Challenge	http://www.americansolarchallenge.org/						2
Solar Car Race – Winston Solar Challenge	http://www.winstonsolar.org/race/						2
Solar Car Race – World Solar Challenge	http://www.wsc.org.au/solarcars.htm						2
US DOE EERE – Hybrid Fuel Economy	http://www.fueleconomy.gov/feg/hybridtech.shtml						3
Electric hybrid vehicle manufacturer	http://automobiles.honda.com/models/specifications.asp?ModelName=Insight						3
Electric hybrid vehicle manufacturer	http://automobiles.honda.com/models/specifications_full_specs.asp?ModelName=Accord+Hybrid						3
Electric hybrid vehicle manufacturer	http://www.fordvehicles.com/escapehybrid/technology/index.asp						3
Electric hybrid vehicle manufacturer	http://www.toyota.com/vehicles/2005/prius/specs.html						3
Electric hybrid vehicle manufacturer	http://www.gmc.com/sierra/						3
US EPA – Vehicle Fuel Economy	http://www.epa.gov/greenvehicles/						4
Environmental Defense – Emissions Calculator	http://www.environmentaldefense.org/tool.cfm?tool=tailpipe						4

* Website geared specifically for students

5.3 Additional Resources

There are many resources for additional information and materials on renewable energy and energy efficiency from organizations, public agencies and supply companies, some of which are free and some of which can be purchased. Below are a few suggestions:

- Pitsco (educational tools and kits for renewable energy and energy education including solar cells, model wind turbines, etc.) www.pitsco.com (items to be purchased)
- Edmunds Scientific, www.scientificsonline.com
- Texas State Energy Conservation Office, www.seco.cpa.state.tx.us/
- U.S. Environmental Protection Agency, www.epa.gov/teachers/
- U.S. Department of Education, www.eere.energy.gov/education/

- Watt Watchers, a free, state sponsored program designed to help school districts save energy dollars by enlisting students to look for energy waste in their schools through patrolling the hallways looking for empty classrooms with the lights on, <http://wattwatchers.org/>

6.0 RUBRICS

In order for the teacher and students to have the same understanding of how students' performance will be assessed or how grades will be assigned in each Unit, the class can develop rubrics. Specific expectations can be identified for each Unit. Table 5 provides a generic template that can be modified with the class for each Unit.

RUBRICS

TABLE 5. Suggested Rubrics for Elementary Units

Activity	5 points – Exceptional (Advanced)	3 points – Satisfactory (Acceptable and Developing)	1 point – Unsatisfactory (Beginning)
<p>1. Vocabulary:</p> <p>Did the student complete the vocabulary assignment?</p>	<ul style="list-style-type: none"> • Yes, student defined all the vocabulary words correctly. 	<ul style="list-style-type: none"> • Yes, student attempted to define all the vocabulary words but some of the definitions were vague. 	<ul style="list-style-type: none"> • No, student did not define all the vocabulary words.
<p>2. Reading and Cooperative Group Work:</p> <p>a. Individual – did the student understand, complete the assignment, and contribute effectively to the group?</p> <p>b. Group – did the group work well together to complete the assignment?</p>	<p>a. The student completed the assignment; played an integral role in the group and contributed to the group’s success; student respected other group member’s views and opinions.</p> <p>b. All students enthusiastically participated; responsibility for task was shared evenly; excellent listening and leadership skills exhibited; students reflected awareness of other’s views and opinions in their discussions; group members performed roles (if assigned) effectively; presentation/report included new vocabulary words.</p>	<p>a. The student completed the assignment; played a minimal role in the group; student respected other group member’s views and opinions.</p> <p>b. All or most students participated; responsibility for task was shared by most group members; some ability to interact; attentive listening; students reflected awareness of other’s views and opinions in their discussions; group members did not consistently adhere to roles (if assigned).</p>	<p>a. The student did not complete the assignment; did not participate in the group; student was not respectful of other group member’s views and opinions.</p> <p>b. Less than half of the students participated; exclusive reliance on one or few team members; little interaction, brief conversations; some students were disinterested or distracted; no effort was made to adhere to roles (if assigned).</p>
<p>3. Lab/Research Activity:</p> <p>a. Individual – did the student understand, complete the assignment, and contribute effectively to the group?</p> <p>b. Group – did the group work well together to complete the assignment?</p>	<p>a. Student participated enthusiastically in the activity and following instructions; data/information gathered was appropriate; the data was accurately recorded and organized with tables, graphs, or drawings (if required); the results were summarized correctly in sentence form.</p> <p>b. All students enthusiastically participated; responsibility for task was shared evenly; group members performed roles (if assigned) effectively.</p>	<p>a. Student had minimal participation in the activity and followed most instructions correctly; data/information was gathered but with some errors; the data was recorded and organized with tables, graphs, or drawings (if required) but with some errors; the results were summarized.</p> <p>b. All or most students participated; responsibility for task was shared by most group members; some ability to interact; group members did not consistently adhere to roles (if assigned).</p>	<p>a. Student had little or no participation in the activity or did not follow the instructions correctly; data/information was not gathered; little or no data was recorded and organized with tables, graphs, or drawings (if required); the results were not summarized.</p> <p>b. Less than half of the students participated; exclusive reliance on one or few team members; little interaction, brief conversations; some students were disinterested or distracted; no effort was made to adhere to roles (if assigned).</p>

RUBRICS

Activity	5 points – Exceptional (Advanced)	3 points – Satisfactory (Acceptable and Developing)	1 point – Unsatisfactory (Beginning)
<p>4. Assessment:</p> <p>a. Short Answer Point assignment (2 points possible per question): 0 – student did not provide any answer for question; 1 – student attempted to answer question, but either not thoroughly or accurately; 2 – student answered the question thoroughly and correctly</p> <p>b. Multiple Choice Point assignment (1 point per question): 0 – student did not answer question correctly; 1 – student answered question correctly</p>	<p>a. 80% – 100% of total points possible (ex. 5 short answer questions, 10 points possible: 8 to 10 points were awarded to student).</p> <p>b. 80% – 100% of total points possible (ex. 10 short answer questions, 10 points possible: 8 to 10 questions were answered correctly).</p>	<p>a. 60% – 79% of total points possible (ex. 5 short answer questions, 10 points possible: 6 to 7 points were awarded to student).</p> <p>b. 60% – 79% of total points possible (ex. 10 short answer questions, 10 points possible: 6 to 7 questions were answered correctly).</p>	<p>a. Less than 60% of total points possible (ex. 5 short answer questions, 10 points possible: Less than 6 points were awarded to student).</p> <p>b. Less than 60% of total points possible (ex. 10 short answer questions, 10 points possible: less than 6 questions were answered correctly).</p>
<p>Total Scores:</p> <p>1. Vocabulary</p> <p>2. Reading/Cooperative Group Work</p> <p>a. Individual _____</p> <p>b. Group _____</p> <p>3. Lab/Research Activity</p> <p>a. Individual _____</p> <p>b. Group _____</p> <p>Scores for Unit Assessment:</p> <p>4. Assessment</p> <p>a. Short Answer _____</p> <p>b. Multiple Choice _____</p>			

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