Seventh Grade Companion Document

7-Unit 1: Waves and Energy

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Introduction to the K-7 Companion Document
An Instructional Framework

Overview

The Michigan K-7 Grade Level Content Expectations for Science establish what every student is expected to know and be able to do by the end of Grade Seven as mandated by the legislation in the State of Michigan. The Science Content Expectations Documents have raised the bar for our students, teachers and educational systems.

In an effort to support these standards and help our elementary and middle school teachers develop rigorous and relevant curricula to assist students in mastery, the Michigan Science Leadership Academy, in collaboration with the Michigan Mathematics and Science Center Network and the Michigan Science Teachers Association, worked in partnership with Michigan Department of Education to develop these companion documents. Our goal is for each student to master the science content expectations as outlined in each grade level of the K-7 Grade Level Content Expectations.

This instructional framework is an effort to clarify possible units within the K-7 Science Grade Level Content Expectations. The Instructional Framework provides descriptions of instructional activities that are appropriate for inquiry science in the classroom and meet the instructional goals. Included are brief descriptions of multiple activities that provide the learner with opportunities for exploration and observation, planning and conducting investigations, presenting findings and expanding thinking beyond the classroom.

These companion documents are an effort to clarify and support the K-7 Science Content Expectations. Each grade level has been organized into four teachable units- organized around the big ideas and conceptual themes in earth, life and physical science. . The document is similar in format to the Science Assessment and Item Specifications for the 2009 National Assessment for Education Progress (NAEP). The companion documents are intended to provide boundaries to the content expectations. These boundaries are presented as “notes to teachers”, not comprehensive descriptions of the full range of science content; they do not stand alone, but rather, work in conjunction with the content expectations. The boundaries use seven categories of parameters:

a. **Clarifications** refer to the restatement of the “key idea” or specific intent or elaboration of the content statements. They are not intended to denote a sense of content priority. The clarifications guide assessment.
b. **Vocabulary** refers to the vocabulary for use and application of the science topics and principles that appear in the content statements and expectations. The terms in this section along with those presented

within the standard, content statement and content expectation comprise the assessable vocabulary.

c. **Instruments, Measurements and Representations** refer to the instruments students are expected to use and the level of precision expected to measure, classify and interpret phenomena or measurement. This section contains assessable information.
d. **Inquiry Instructional Examples** presented to assist the student in becoming engaged in the study of science through their natural curiosity in the subject matter that is of high interest. Students explore and begin to form ideas and try to make sense of the world around them. Students are guided in the process of scientific inquiry through purposeful observations, investigations and demonstrating understanding through a variety of experiences. Students observe, classify, predict, measure and identify and control variables while doing “hands-on” activities.
e. **Assessment Examples** are presented to help clarify how the teacher can conduct formative assessments in the classroom to assess student progress and understanding
f. **Enrichment and Intervention** is instructional examples the stretch the thinking beyond the instructional examples and provides ideas for reinforcement of challenging concepts.
g. **Examples, Observations, Phenomena** are included as exemplars of different modes of instruction appropriate to the unit in which they are listed. These examples include reflection, a link to real world application, and elaboration beyond the classroom. These examples are intended for instructional guidance only and are not assessable.
h. **Curricular Connections and Integrations** are offered to assist the teacher and curriculum administrator in aligning the science curriculum with other areas of the school curriculum. Ideas are presented that will assist the classroom instructor in making appropriate connections of science with other aspects of the total curriculum.

This Instructional Framework is NOT a step-by-step instructional manual but a guide developed to help teachers and curriculum developers design their own lesson plans, select useful portions of text, and create assessments that are aligned with the grade level science curriculum for the State of Michigan. It is not intended to be a curriculum, but ideas and suggestions for generating and implementing high quality K-7 instruction and inquiry activities to assist the classroom teacher in implementing these science content expectations in the classroom.

7th Grade Unit 1:
Waves and Energy

Content Statements and Expectations

Code	Statements & Expectations	Page
P.EN.M.3	**Waves and Energy – Waves have energy and transfer energy when they interact with matter. Examples of waves include sound waves, seismic waves, waves on water, and light waves.**	1
P.EN.07.31	Identify examples of waves, including sound waves, seismic waves, and waves on water.	1
P.EN.07.32	Describe how waves are produced by vibrations in matter.	1
P.EN.07.33	Demonstrate how waves transfer energy when they interact with matter (for example: tuning fork in water, waves hitting a beach, earthquake knocking over buildings).	2
P.EN.M.6	**Solar Energy Effects – Nuclear reactions take place in the sun producing heat and light. Only a tiny fraction of the light energy from the sun reaches Earth, providing energy to heat the Earth.**	3
P.EN.07.61	Identify that nuclear reactions take place in the sun, producing heat and light.	3
P.EN.07.62	Explain how only a tiny fraction of light energy from the sun is transformed to heat energy on Earth.	3

7 – Unit 1: Waves and Energy

Big Ideas (Key Concepts)

- Waves are produced through vibrations.
- Waves transfer energy when they interact with matter.
- Nuclear reactions that take place in the sun produce heat and light.
- A fraction of the light energy from the sun provides energy to heat the Earth.

Clarification of Content Expectations

Standard: Energy

Content Statement – P.EN.M.3

Waves and Energy-Waves have energy and transfer energy when they interact with matter. Examples of waves include sound waves, seismic waves, waves on water, and light waves.

Content Expectations

P.EN.07.31 Identify examples of waves, including sound waves, seismic waves, and waves on water.

Instructional Clarifications

1. Identify means to recognize the differences between waves, such as sound waves, seismic waves, and waves on water.
2. A wave is a disturbance that transmits energy through matter and space. The wave is the motion of a vibration.
3. Sound is created when something vibrates. Sound waves are a vibration that spreads away from a vibrating object. Sound waves travel through solids, liquids, and gases.
4. Seismic waves are waves that travel through the Earth.
5. Waves on water are waves that move outward from a disturbance.

Assessment Clarification

1. A wave is a disturbance that transmits energy through matter and space. The wave is the motion of a vibration.
2. Sound is created when something vibrates. Sound waves are a vibration that spreads away from a vibrating object. Sound waves travel through solids, liquids, and gases.
3. Seismic waves are waves that travel through the Earth.
4. Waves on water are waves that move outward from a disturbance.

P.EN.07.32 Describe how waves are produced by vibrations in matter.

Instructional Clarifications

1. Describe is to tell or depict in spoken or written words or with drawings how waves are produced by vibrations in matter.
2. A wave is a disturbance that transmits energy through matter and space. The wave is the motion of a vibration.
3. Vibrations are back-and-forth motions.
4. Matter is anything that has mass and volume.
5. When molecules in matter vibrate, they excite other molecules to vibrate and waves travel outward from the center of the vibration.
6. Waves are characterized by wavelength, frequency, and amplitude.

Assessment Clarification

1. A wave is a disturbance that transmits energy through matter and space. The wave is the motion of a vibration.
2. Vibrations are back-and-forth motions.
3. Matter is anything that has mass and takes up space.
4. When molecules in matter vibrate, they excite other molecules to vibrate and waves travel outward from the center of the vibration.

P.EN.07.33 Demonstrate how waves transfer energy when they interact with matter (for example: tuning fork in water, waves hitting a beach, earthquake knocking over buildings).

Instructional Clarifications:

1. Demonstrate is to show through manipulation of materials, drawings, and written and verbal explanations how waves transfer energy.
2. Energy is the ability to do work or cause motion.
3. Matter is anything that has mass and takes up space.
4. A wave is a disturbance that transmits energy through matter and space. The wave is the motion of a vibration.
5. An energy transfer takes place when molecules transfer the energy of motion to other molecules then return to their state of rest.
6. When a tuning fork is place in water, ripples (waves) are seen coming away from the tuning fork in even rings.
7. When waves hit a beach, erosion takes place. Ripples are left in the sand to show the reaction of the wave.
8. Seismic waves are vibrations that travel through the Earth carrying the energy of motion released during an earthquake.
9. When seismic waves from an earthquake travel through the earth, buildings shake and sometimes crumble, the ground trembles, and the vibrations are transferred outward from the origin of the quake.

Assessment Clarifications:

1. Energy is the ability to do work or cause motion.
2. Matter is anything that has mass and takes up space.
3. A wave is a disturbance that transmits energy through matter and space. The wave is the motion of a vibration.

4. An energy transfer takes place when molecules transfer the energy of motion to other molecules then return to their state of rest.
5. When a tuning fork is place in water, ripples (waves) are seen coming away from the tuning fork in even rings.
6. When waves hit a beach, erosion takes place. Ripples are left in the sand to show the reaction of the wave.
7. Seismic waves are vibrations that travel through the Earth carrying the energy of motion released during an earthquake.
8. When seismic waves from an earthquake travel through the earth, buildings shake and sometimes crumble, the ground trembles, and the vibrations are transferred outward from the origin of the quake.

Content Statement – P.EN.M.6

Solar Energy Effects - Nuclear reactions take place in the sun producing heat and light. Only a tiny fraction of the light energy from the sun reaches Earth, providing energy to heat the Earth.

Content Expectations

P.EN.07.61 Identify that nuclear reactions take place in the sun, producing heat and light.

Instructional Clarifications:
1. Identify means to recognize that nuclear reactions take place in the sun and produces heat and light.
2. The Sun produces a tremendous amount of light and heat through nuclear reactions.
3. Nuclear reactions occur when atoms change their structure to become new atoms. These reactions release large amounts of energy. The energy from these reactions leaves the sun as light energy.
4. Heat is a form of energy associated with the motion of atoms or molecules and capable of being transferred through solid and fluid media by conduction, through fluid media by convection, and through empty space by radiation.
5. Light is electromagnetic radiation (radiation consisting of electromagnetic waves, including radio waves, infrared, visible light, ultraviolet, x-rays, and gamma rays of any wavelength).

Assessment Clarification:
1. Nuclear reactions that take place in the sun produce heat.
2. Nuclear reactions that take place in the sun produce light.

P.EN.07.62 Explain how only a tiny fraction of light energy from the sun is transformed to heat energy on Earth.

Instructional Clarification:

1. Explain is to clearly describe by means of illustrations (drawings), demonstrations, written reports and/or verbally how only a tiny fraction of light energy from the sun is transformed to heat energy on Earth.
2. The heating of the Earth at any location is related to the angle of the sun in the sky.
3. Only a small percentage of light energy from the sun that hits the Earth produces heat energy on Earth.
4. Light energy from the sun is absorbed by the Earth's surface and changed into heat energy. The heat energy radiates out and heats the air above. Some molecules (e.g., carbon dioxide) in the air absorb this heat energy and radiate some of it back to the Earth's surface, making the Earth warm enough to support life (the greenhouse effect).
5. The color of the Earth's surface affects the amount of heat that the Earth absorbs. Many Earth surfaces reflect light energy away from the Earth. Due to these reflective properties of many Earth surfaces large amounts of light energy are reflected and cannot be used directly as heat energy.

Assessment Clarification

1. The heating of the Earth at any location is related to the angle of the sun in the sky.
2. Only a small percentage of light energy from the sun that hits the Earth produces heat energy on Earth.
3. Light energy from the sun is absorbed by the Earth's surface and changed into heat energy. The heat energy radiates out and heats the air above. Some molecules (e.g., carbon dioxide) in the air absorb this heat energy and radiate some of it back to the Earth's surface, making the Earth warm enough to support life (the greenhouse effect).
4. The color of the Earth's surface affects the amount of heat that the Earth absorbs. Many Earth surfaces reflect light energy away from the Earth. Due to these reflective properties of many Earth surfaces large amounts of light energy are reflected and cannot be used directly as heat energy.

Inquiry Process, Inquiry Analysis and Communication, Reflection and Social Implications

Inquiry Processes
S.IP.07.11 Generate scientific questions on waves and energy based on observations, investigations, and research.
S.IP.07.12 Design and conduct scientific investigations on waves and energy.
S.IP.07.13 Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens, thermometer, models, sieves, microscopes, hot plates, pH meters) appropriate to scientific investigations of waves and energy.
S.IP.07.14 Use metric measurement devices in an investigation dealing with waves and energy.
S.IP.07.15 Construct charts and graphs from data and observations dealing with waves and energy.
S.IP.07.16 Identify patterns in data regarding waves and energy.
Inquiry Analysis and Communication
S.IA.07.11 Analyze information from data tables and graphs to answer scientific questions concerning waves and energy.
S.IA.07.12 Evaluate data, claims, and personal knowledge through collaborative science discourse on waves and energy.
S.IA.17.13 Communicate and defend findings of observations and investigations dealing with waves and energy.
S.IA.07.14 Draw conclusions from sets of data from multiple trials of a scientific investigation to draw conclusions on waves and energy.
S.IA.07.15 Use multiple sources of information on waves and energy to evaluate strengths and weaknesses of claims, arguments, or data.
Reflection and Social Implication
S.RS.07.11 Evaluate the strengths and weaknesses of claims, arguments, and data regarding waves and energy.
S.RS.07.12 Describe limitations in personal and scientific knowledge regarding waves and energy.
S.RS.07.13 Identify the need for evidence in making scientific decisions about waves and energy.
S.RS.07.14 Evaluate scientific explanations based on current evidence and scientific principles dealing with waves and energy.
S.RS.07.15 Demonstrate scientific concepts through various illustrations to depict waves and energy.
S.RS.07.16 Design solutions to problems about waves and energy using technology.
S.RS.07.17 Describe the effect humans and other organisms have on the balance of the natural world when the amount of pollution in the air affects the amount of light energy to heat energy the Earth receives.
S.RS.07.18 Describe what science and technology can and cannot reasonably contribute to society when dealing with waves and energy.
S.RS.07.19 Describe how science and technology concerning waves and energy have advanced because of the contributions of many people throughout history and across cultures.

Vocabulary

Critically Important – State Assessable	Instructionally Useful
wavelength sun's radiation seismic wave water wave light energy sound wave energy vibration matter waves energy transfer nuclear reactions	solar energy transform waves transverse waves transfer crest trough amplitude frequency erosion greenhouse effect medium

Instruments, Measurement, Representations

Measurements	Instruments	Representations
length	meter stick, measuring tape	meter, centimeter, millimeter
waves	tuning fork, coils, springs, stop watch	millimeter/second, centimeter/second, meter/second

Instructional Framework

The following Instructional Framework is an effort to clarify possible units within the K-7 Science Grade Level Content Expectations. The Instructional Framework provides descriptions of instructional activities that are appropriate for inquiry science in the classroom and meet the instructional goals. Included are brief descriptions of multiple activities that provide the learner with opportunities for exploration and observation, planning and conducting investigations, presenting findings, and expanding thinking beyond the classroom. The Instructional Framework is NOT a step-by-step instructional manual, but a guide intended to help teachers and curriculum developers design their own lesson plans, select useful and appropriate resources and create assessments that are aligned with the grade level science curriculum for the State of Michigan.

Instructional Examples

Waves and Energy: P.EN.07.31, P.EN.07.32, P.EN.07.33
Solar Energy Effects: P.EN.07.61, P.EN.07.62

Objectives

- Using sound waves, seismic waves, waves on water, and light waves demonstrate how waves transfer energy.
- Describe how the sun is the major source of light and heat on Earth.
- Demonstrate how only a tiny fraction of the light energy from the sun reaches Earth to heat the Earth.

Engage and Explore

- Have the students demonstrate a “stadium wave.” Explain that the “stadium wave” is a model of how sound waves, seismic waves, and waves on water are produced. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- Explore waves due to vibrations using a Slinky or coil as a model. Have students work in pairs to first cause a disturbance or in a Slinky at rest and make observations of the movement along the coil of the Slinky. Have the students jerk the slinky forward and make observations. As a class, discuss student initial ideas about waves. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- What happens when students snap fingers to simulate seismic waves? Try it and observe and record what is happening. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- Brainstorm ideas of how sounds produced. Construct a simple banjo and use it to find out how sound is produced. (P.EN.07.31, P.EN.07.32, P.EN.07.33)

- Have students make observations of the vibrations of tuning forks through their sense of touch, sight, and hearing. Use a shallow pan of water to demonstrate the transfer of sound waves in the air to waves in water. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- Go outside and make observations of the effects of the sun's warming on different materials and areas of the schoolyard. Ask students to describe the effects of the sun on different surfaces, living things, and nonliving things, in direct sunlight and in the shade. (P.EN.07.61, P.EN.07.62)
- Pose a "what would happen if…question" to the class: What would happen if there wasn't any sun? Discuss the importance of sunlight on Earth. Take this opportunity to review the safety when making sun observations and explain why it is important not to look directly into the sun. (P.EN.07.61, P.EN.07.62)
- Visit a greenhouse. Why is glass or plastic used to retain the heat from the sun? (P.EN.07.61, P.EN.07.62)

Explain and Define

- Have students share their observations of the waves they produced with the Slinky. Explain that when the Slinky is jerked forward the start moves away from its original position and then returns. The wave motion is called a pulse, producing a longitudinal wave. Explain that energy is transferred along the Slinky through motion and ends up in the same place. Compare the Slinky wave to the "stadium wave." (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- Use the Slinky model to how seismic waves travel through the earth. Seismic waves occur in earthquakes and volcanoes. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- Explain how sound is created when something vibrates. Sound waves spread away from a vibrating object. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- The atmosphere of the Earth traps heat energy from the sun. Without the greenhouse effect, the Earth would be too cold to support life. (P.EN.07.61, P.EN.07.62)
- Have students research the properties of the sun and gather information regarding the nuclear reactions that occur on the sun that produces heat and light. Ask students to share their information from their research. (P.EN.07.61, P.EN.07.62)
- Create a model to show the position and size of the Earth in relation to the sun to demonstrate the small fraction of the suns heat and light that reaches the Earth. (P.EN.07.61, P.EN.07.62)

Elaborate and Apply

- When fingers are snapped, imagine that each finger is a big chunk of rock deep inside the earth's surface. Like fingers, one rock mass is forced against another. Think of the increasing amount force placed on the fingers as pressure caused by movements of the Earth's crust. Now, think

of the movement of the fingers to create the snap as the sudden movement of the earth, an earthquake. Think too, that the sound of the snap itself as being the seismic energy traveling from the location of the quake. Using the snapped fingers aids in understanding how earthquakes are formed and the energy is released in huge waves that shake, rattle and roll the earth's surface. (P.EN.07.31, P.PE.07.32, P.EN.07.33)

- Make a pan of gelatin. Drop a marble/block at one end and observe the waves. How is this similar to the seismic waves of an earthquake? Place a structure of cubes at one end and drop the block at the other end of the pan, what happened to the cubes when the waves made contact? How is this similar to the way a building reacts during an earthquake? Vary the distance of impact from building and compare. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- Stretch a rubber band lengthwise over a ruler. Then insert a pencil under the rubber band at each end of the ruler so that the rubber band is lifted away from the surface of the ruler. Pluck the rubber band at any point between the two pencils. Observe what happens as the rubber band is plucked. Record what is observed and heard. How can the sound be changed? Does instrument make a difference where the rubber band is plucked? Describe the sounds that the “banjo” produces. Hypothesize how the rubber band produces sound. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- How did the sound change when the rubber band is pressed at different points on the ruler? Demonstrate “real” string instruments, like guitars, fiddles, banjos, and piano. How are these instruments producing sound?
- A greenhouse is usually made of glass. The glass lets in sunlight, which warms the ground and the other surfaces inside the greenhouse. As the surfaces warm, they release heat in the air. The glass (or plastic) keeps the house from escaping. The air inside the greenhouse stays warm enough for plants to grow throughout the year. (P.EN.07.61, P.EN.07.62)
- Inside a closed up car on a hot summer’s day is similar to the heat in a greenhouse. The temperature inside a closed up car can easily reach more that 100 degrees in a short period of time. (P.EN.07.61, P.EN.07.62)

Evaluate Student Understanding

Formative Assessment Examples

- Design different instruments that produce sound. How can the sound be changed; example – use a collection of pop bottles that are all the same – put water in the bottle at different heights – how can sound be produced and changed. Describe.
- How might a hearing-impaired person keep perfect time to music from a piano he or she cannot hear? [Use the video, *Mr. Holland’s Opus*]
- Describe why a motorboat would sound closer when you are under water than if actually is when you come to the surface.

- Discuss the sounds that are heard around the school? How does the sound reach the ear? How do students react to the sounds around the school?
- Discuss what is the difference between music and noise? Discuss what the similarities between music and noise are. What sounds/music are around everyday life? [Use the video *August Rush*]
- Students interview people that work at a greenhouse. How are temperatures controlled in a greenhouse? What kind of plants must be grown in a greenhouse? Students write a report to present to the class on the findings.
- Students research the problems of leaving young children in a car on a hot summer's day. What happens to these children? What then could happen to the parents? Students report their findings to the class. (S.RS.07.16)

Summative Assessment Examples

- Unit test covering waves and energy, especially sound waves, water wavers, seismic waves, and nuclear energy from the sun in the form of light and heat. (P.EN.07.31, P.EN.07.32, P.EN.07.33, P.EN.07.61, P.EN.07.62)
- Each student designs a poster, brochure, or power point that shows either movement of sound or water waves or how seismic waves are produced. Students present the project to the class. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- Each student writes a report on solar energy and how solar energy can be used as a renewable resource. Students present the report to the class. The class takes notes on the different reports. (P.EN.07.61)

Enrichment

- Sound Waves: Have two students go outside the classroom and close the door. Have students inside the classroom tap on the door, then on the wall with various objects. Bring the students back into the room and have the students describe what they heard. Discuss how the sounds were different from what was heard inside the classroom. (S.IP.07.11)

Intervention

- Students work in small groups to create instruments and "band" to share with the class. Each group will present their "band" and then each person in the group will share about his/her instrument. How was sound produced? Discuss the amplitude and wave patterns each instrument produces. (P.EN.07.31, P.EN.07.32, P.EN.07.33)
- Pairs of students measure the distance from one end of the sports field to the other. One student stands at one end of the field holding two wooden blocks, while the other student is at the other end holding a stopwatch. The student with the blocks strikes them together sharply. When the other **sees** the blocks hit, the stopwatch is started. When the sound reaches the student, the stopwatch is stopped and the time recorded to the nearest tenth of a second. Repeat the experiment two or three times and calculate the average. How would this apply to a race when the starter shoots off the starting gun? (S.IA.07.14)

Examples, Observations, and Phenomena (Real World Context)

Waves are everywhere in nature, including sound waves, visible light waves, radio waves, microwaves, water waves, and seismic waves. Sound waves from popular bass tracks can be heard and felt by motorists in automobiles surrounding the stereo system making the sound. Sound travels through the solid automobile and air and transfers sound energy from one car to another. Loud sounds can cause hearing loss through vibrations to the eardrum. Sounds are measured in decibels.

Tsunami and tidal waves are caused by large disturbances in the ocean. Earthquakes on the ocean floor produce tsunami waves. The energy from the earthquake on the floor of the ocean is transferred to the ocean's water and travels in the form of a tsunami wave.

Catastrophic events, such as volcanic eruptions and earthquakes show evidence of how waves travel and can cause great destruction in the path of the waves.

Modern society has developed the use of waves for radio signals, television signals, cellular phones and different communications, wireless Internet, etc. Sometimes disturbances on the sun, such as sunspots and solar flares cause disturbances in the radio, television, and/or communication waves. Sunspots are magnetic regions on the Sun with magnetic field strengths thousands of times stronger than the Earth's magnetic field. Solar flares are tremendous explosions on the surface of the Sun. In a matter of just a few minutes they heat material to many millions of degrees and release as much energy as a billion megatons of TNT. They occur near sunspots, usually along the dividing line (neutral line) between areas of oppositely directed magnetic fields.

Literacy Integration

Reading

R.IT.07.01 Students will analyze the structure, elements, features, style, and purpose of informational genre including persuasive essay, research report, brochure, personal correspondence, autobiography and biography.

R.CM.07.01 Students will connect personal knowledge, experiences, and understanding of the world to themes and perspectives in text through oral and written responses.

R.CM.07.02 Students will retell through concise summarization grade-level narrative and informational text.

R.CM.07.04 Students will apply significant knowledge from grade-level science, social studies, and mathematics texts.

Read with the class the book, *Volcano: The Eruption and Healing of Mr. St. Helens* by Patricia Lauber, 1993.

- Discuss the effects of the eruption of Mt. St. Helens. Was the eruption predicted? How has the land healed? Is there still seismic activity going on in the area? Have the student research other volcanoes in the United States, be sure to include Alaska and Hawaii.

Writing

W.GN.07.02 Students will write a research report using a wide variety of resources that includes appropriate organizational patterns (e.g., position statement/supporting evidence, problem statement/solution, or compare/contrast), descriptive language, and informational text features.

W.GN.07.03 Students will formulate research questions using multiple resources, perspectives, and arguments/counter-arguments to develop a thesis statement that culminates in a final presented project using the writing process.

W.PR.07.01 Students will set a purpose, consider audience, and replicate authors' styles and patterns when writing a narrative or informational piece.

W.PR.07.02 Students will apply a variety of pre-writing strategies for both narrative (e.g., graphically depict roles of antagonist/protagonist, internal/external conflict) and informational writing (e.g., position statement/supporting evidence, problem statement/solution, or compare/ contrast).

W.PR.07.03 Students will revise drafts to reflect different perspectives for multiple purposes and to ensure that content, structure, elements of style and voice, literary devices, and text features are consistent.

W.PS.07.01 Students will exhibit personal style and voice to enhance the written message in both narrative (e.g., personification, humor, element of surprise) and informational writing (e.g., emotional appeal, strong opinion, credible support).

- Research how people in different cultures and parts of the world have used different methods and materials for transmitting sound to send messages. Write a report on one of these methods to present to the class.

Speaking

S.CN.07.01 Students will adjust their use of language to communicate effectively with a variety of audiences and for different purposes by using specialized language related to a topic and selecting words carefully to achieve precise meaning when presenting.

S.DS.07.02 Students will respond to multiple text types in order to anticipate and answer questions, offer opinions and solutions, and to identify personally with a universal theme.

- Choose a method that people in different cultures used to transmit and send messages. Demonstrate by examples or pictorially how the method is used.

Mathematics Integration

N.MR.07.04 Convert ratio quantities between different systems of units.

N.MR.07.02 Solve problems involving derived quantities such as density, velocity, and weighted averages.

A.PA.07.01 Recognize when information given in a table, graph, or formula suggests a directly proportional or linear relationship.

A.PA.07.11 Understand and use basic properties of real numbers.

D.RE.07.01 Represent and interpret data using graphs.

D.AN.07.03 Calculate and interpret relative frequencies and cumulative frequencies for data sets.