Second Grade Companion Document

2-Unit 4: Uses and Properties of Water

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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.

Second Grade Unit:
Uses and Properties of Water

Content Statements and Expectations

2 – Unit 4: Uses and Properties of Water

Big Ideas (Key Concepts)

- Water can come from a variety of sources.
- Water has a variety of uses.
- Water on Earth can be described as a solid or liquid.

Clarification of Content Expectations

Standard: Fluid Earth

Content Statements

E.FE.E.1: Water – Water is a natural resource and is found under the ground, on the surface of the Earth, and in the sky. It exists in three states (liquid, solid, gas) and can go back and forth from one form to another.

Content Expectations

E.FE.02.11: Identify water sources (wells, springs, lakes, rivers, oceans).

Instructional Clarifications

1. Identify means to recognize wells, springs, lakes, rivers, and oceans as sources of water.
2. Water sources should be limited to wells, springs, lakes, rivers and oceans.
3. Water can be identified as being fresh or salty depending on which of these sources it is from.

Assessment Clarifications

1. Water sources should be limited to wells, springs, lakes, rivers and oceans.
2. Water can be identified as being fresh or salty depending on which of these sources it is from.

E.FE.02.12: Identify household uses of water (drinking, cleaning, food preparation).

Instructional Clarifications

1. Identify means to recognize drinking, cleaning and food preparation as uses of water.
2. Possible household uses of water are limited to drinking, cleaning various items and food preparation.
3. Identify what type of water (fresh or salty) would best suit each of these uses.

Assessment Clarifications

1. Possible household uses of water are limited to drinking, cleaning various items and food preparation.
2. Identify what type of water (fresh or salty) would best suit each of these uses.

E.FE.02.13: Describe properties of water as a liquid (visible, flowing, shape of container) and recognize rain, dew, and fog as water in its liquid state.

Instructional Clarifications

1. Describe means to tell or depict in spoken or written words the properties of water as a liquid.
2. The description of liquid water will be limited to its observable properties and where it may be found in nature.

Assessment Clarifications

1. The description of liquid water will be limited to its observable properties and where it may be found in nature.

E.FE.02.14: Describe the properties of water as a solid (hard, visible, frozen, icy) and recognize ice snow and hail as water in its solid state.

Instructional Clarifications

1. Describe means to tell or depict in spoken or written words the properties of water as a solid.
2. The description of solid water will be limited to its observable properties and where it may be found in nature.

Assessment Clarifications

1. The description of solid water will be limited to its observable properties and where it may be found in nature.

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

Inquiry Processes
S.IP.02.11 Make purposeful observations of water in solid and liquid states.
S.IP.02.12 Generate questions about water based on observations.
S.IP.02.13 Plan and conduct simple investigations into the properties of water as a solid and a liquid.
S.IP.02.14 Manipulate simple tools that aid in observations of water and models of sources of water, (hand lens, measuring cups, graduated cylinders)
S.IP.02.15 Make accurate measurements with appropriate units (centimeters, milliliters) for the measurement tool.
S.IP.02.16 Construct simple charts and graphs from data and observations of investigations into the properties of water as a solid and liquid.
Inquiry Analysis and Communication
S.IA.02.11 Share ideas about observations of the properties of water as a solid and a liquid through purposeful conversation.
S.IA.02.12 Communicate and present finding of observations and investigations into the properties of water as a solid and liquid.
S.IA.02.13 Develop strategies and skills for information gathering about sources and uses of water.
Reflection and Social Implications
S.RS.02.12 Use evidence from their investigations when communicating the properties of water as a solid and liquid.
S.RS.02.13 Recognize that when a science investigation is done the way it was done before, similar results are expected.
S.RS.02.14 Demonstrate the sources and uses of water through models or exhibits.

Vocabulary

Critically Important – State Assessable	Instructionally Useful
fresh water salt water flow food preparation well spring lake river ocean properties/property describe identify source	household uses

Instruments, Measurements, Representations

Measurements	Instruments	Representations
volume	graduated measuring cup	milliliter* (mL), liter* (L)
	graduated measuring spoon	milliliter* (mL)

*To be mastered and assessed in the 4th grade.

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

Water: E.FE.02.11, E.FE.02.12, E.FE.02.13, E.FE.02.14

Objectives

- Make observations and compare sources of water
- Make observations and compare uses of water.
- Investigate properties of water in the solid and liquid state.

Engage and Explore

- Students brainstorm uses of water in school and at home. Students classify uses as cleaning, food preparation, drinking and other. Students walk through the school making a tally of uses of water that they see in each category. Students discuss reasons for different student results. Students create a class pictograph of the data collected. (E.FE.02.12, S.IA.02.12, S.IP.02.16)
- Students identify household uses of water in different cultures through books and videos. (See Reading Integration) (E.FE.02.12, S.IA.02.14)
- Engage student thinking by finding evidence that the Earth is made up of water and land. Use an inflatable globe and toss the globe to each student. Have students tell if their thumbs landed on land or water. Collect class data using tally marks. (E.FE.02.11, S.IP.02.16, S.RS.02.11)
- Students make observations using maps and globes to identify sources of water on the Earth (lakes, rivers, oceans, snow on mountains, icebergs, rain, sleet, hail). Students classify water found on the earth as salt and fresh and solid and liquid. (E.FE.02.11, S.IP.02.11, S.IA.02.14)
- Students make models of wells and springs. Models can be made from sand and gravel in a clear cup of water, using a clear straw pushed down

in the cup to model a well. Students generate questions from observations of their models. (E.FE.02.11, S.RS.02.11, S.IP.02.12)
- Students explore properties of water by pouring water in different shaped containers and observing the changes in size and shape. Students measure the volume of the water with a measuring cup after each observation. (E.FE.02.13, S.IP.02.15, S.IP.02.14)
- Students plan and conduct an investigation of how water flows over different surfaces such as cloth, plastic, paper, etc. (E.FE.02.13, S.IP.02.13)
- Students plan and conduct investigations in the melting and freezing of water. Students investigate melting with ice cube melting races. Students compare the volume of water before freezing and after melting and share findings from their investigations. (E.FE.02.13, E.FE.02.14, S.IP.02.13, S.IA.02.12, S.IA.02.13)
- Students observe the properties of water as a solid. Students compare different shaped ice cubes, crushed ice, and snow if available. (E.FE.02.14, S.IP.02.11)

Explain and Define

- Students use observations and models to compare and contrast different sources and uses of water. Students present findings to the class. (E.FE.02.11, E.FE.02.12, S.IP.02.11, S.RS.02.11 S.IA.02.13, S.IA.02.12)
- Students use findings from investigation to compare properties of water as a solid and liquid through drawings, written or oral reports. (E.FE.02.13, E.FE.02.14, S.RS.02.15)
- Students share finding from observations and other sources on information regarding household uses of water through drawings, written or oral reports. (E.FE.02.12, S.IA.02.12, S.IA.02.13, S.RS.02.11)
- Students explain data from pictographs and tally sheets regarding the most frequent uses of water and the largest sources of water. (E.FE.02.11, E.FE.02.12, S.IP.02.16)
- Students use observations from investigations to describe melting and freezing. (E.FE.02.13, E.FE.02.14, S.IP.02.11, S.RS.02.15)

Elaborate and Apply

- Students plan and conduct investigations of salt and fresh water, such as sink and float, effects on ice, and effect on plants. (E.FE.02.11, E.FE.02.12, S.IP.02.13)
- Students generate questions through observations of models of the water cycle. (E.FE.02.11, S.IP.02.12, S.IP.02.11, S.RS.02.11)
- Students use observations to describe and classify sources of water as above ground, in the air and underground. (E.FE.02.11, S.IP.02.11)
- Students use observations of properties of water to classify different types of precipitation as solid or liquid. (E.FE.02.13, E.FE.02.14, S.IP.02.11)

Evaluate Student Understanding

Formative Assessment Examples

- Use the student models, presentations and discussions to assess the students' ability to describe sources and uses of water. (E.FE.02.11, E.FE.02.12)
- Use the students' water investigations to assess student ability to raise questions and plan simple investigations. (S.IP.02.12, S.IP.02.13)
- Use student drawings, written and oral reports to assess students' ability to describe properties of water as a solid and liquid. (E.FE.02.13, E.FE.02.14)

Summative Assessment Examples

- Circle the picture that shows hard, visible water. (E.FE.02.14)
- Circle the picture that does not show an everyday use of water. (E.FE.02.12)
- Circle the picture that shows a source of water that flows. (E.FE.02.11, E.FE.12.13)
- Circle the picture that shows an underground source of water. (E.FE.02.11)

Enrichment

- Students investigate other uses of water such as transportation by designing foil boats and measuring their ability to float pennies.
- Students will plan and conduct investigations of the best methods for cleaning materials with water.
- Students will plan and conduct investigations of how water interacts with other materials such as making bubbles, water droplets, freezing different concentrations of saltwater.
- Students investigate and share information about the causes and effects of water pollution on living things.

Intervention

- Students investigate other uses of water such as transportation by designing foil boats and measuring their ability to float pennies.
- Students will plan and conduct investigations of the best methods for cleaning materials with water.
- Students will plan and conduct investigations of how water interacts with other materials such as making bubbles, water droplets, freezing different concentrations of saltwater.
- Students investigate and share information about the causes and effects of water pollution on living things.

Examples, Observations, and Phenomena (Real World Context)

People use water everyday of their lives. Young children are curious about water and play and interact with water in their playtime. Students are not usually aware of all of the different sources of water and do not make careful scientific observations of the properties of water. They make observations in their own environments. They see their parents cook or clean, play in water on trips to lakes and ponds at local parks, observe different forms of water when looking at the weather, and read about water in books. Taking a walk around the block during a rainstorm gives children the opportunity to observe precipitation and flowing water as well as observe the feel and smell of water.

Literacy Integration

Reading

R.WS.02.11 in context, determine the meaning of words and phrases including objects, actions, concepts, content vocabulary, and literary terms, using strategies and resources including context clues, mental pictures, and questioning.

R.IT.02.02 discuss informational text patterns including descriptive, sequential, enumerative, and compare/contrast.

R.IT.02.04 respond to individual and multiple texts by finding evidence, discussing, illustrating, and/or writing to reflect, make connections, take a position, and/or show understanding.

R.CM.02.01 make text-to-self and text-to-text connections and comparisons by activating prior knowledge, connecting personal knowledge, experience, and understanding of others to ideas in text through oral and written responses.

R.CM.02.04 apply significant knowledge from grade-level science, social studies, and mathematics texts.

Examples of trade books available for learning about water:

A Drop of Water, Walter Wick, 1997
Ice, Helen Frost, 2004
Sources of Water, Rebecca Olien, 2005
Water Dance, Thomas Locker, 2002
A Cool Drink of Water, Barbara Kerley, 2002

- Connect personal knowledge, experience, and understanding of water to ideas in the text and through oral and written response.
- Retell relevant details of the sources of water as described in the book.

Writing

W.GN.02.03 write an informational piece including a magazine feature article using an organizational pattern such as description, enumeration, sequence, or compare/contrast that may include graphs, diagrams, or charts to enhance the understanding of central and key ideas.

W.GN.02.04 use the writing process to produce and present a research project, develop two research questions related to a teacher-selected topic; gather electronic or print resources and organize the information using key ideas with teacher assistance.

W.GR.02.01 in the context of writing, correctly use more complex complete sentences, nouns, and verbs, commas, contractions, colons to denote time, and capitalization of proper nouns.

- Write about a cooking experience and how water was used.
- Write about the weather and the forms of water in precipitation.

Speaking

S.CN.02.02 explore and use language to communicate effectively with a variety of audiences and for different purposes including questions and answers, discussions, and social interactions.

S.DS.02.01 engage in substantive conversations, remaining focused on subject matter, with interchanges building on prior responses in book discussions, peer conferencing, or other interactions.

S.DS.02.03 respond to multiple text types by reflecting, making connections, taking a position, and/or showing understanding.

- Engage in substantive conversation regarding the importance of water in our daily lives using information from investigations and other resources.

Mathematics Integration

RE.02.01 Make pictographs using a scale representation, using scales where symbols equal more than one.

D.RE.02.02 Read and interpret pictographs with scales, using scale factors of 2 and 3.

D.RE.02.03 Solve problems using information in pictographs; include scales such as each * represents 2 apples.

- Connect the writing experience and math skills