

Second Grade Companion Document

2-Unit 1: Measurement of Properties

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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:
Measurement of Properties**

Content Statements and Expectations

Code	Statements & Expectations	Page
P.PM.E.1	Physical Properties – All objects and substances have physical properties that can be measured.	1
P.PM.02.12	Describe objects and substances according to their properties (color, size, shape, texture, hardness, liquid or solid, sinking or floating).	1
P.PM.02.13	Measure the length of objects using rulers (centimeters) and meter sticks (meters).	2
P.PM.02.14	Measure the volume of liquids using common measuring tools (measuring cups, measuring spoons, graduated cylinders and beakers)	2
P.PM.01.22	Demonstrate that water as a liquid takes on the shape of various containers	2
P.PM.02.15	Compare objects using a balance.	3
P.PM.E.4	Material Composition – Some objects are composed of a single substance, while other objects are composed of more than one substance.	3
P.PM.02.41	Recognize that some objects are composed of single substances (water, sugar, salt) and others are composed of more than one substance (salt and pepper, mixed dry beans).	3

2 – Unit 1: Measurement of Properties

Big Ideas (Key Concepts)

- Objects and substances can be described by their properties and through measurement.
- Objects and substances can be classified as single substances or mixtures and single substances can be combined to make mixtures.

Clarification of Content Expectations

Standard: Properties of Matter

Content Statement - P.PM.E.1

Physical Properties - All objects and substances have physical properties that can be measured.

Content Expectations

P.PM.02.12 Describe objects and substances according to their properties (color, size, shape, texture, hardness, liquid or solid, sinking or floating).

Instructional Clarifications

1. Describe is to tell or depict in spoken or written words the properties of objects and substances.
2. Properties include color, size, shape, texture, hardness, liquid or solid, sinking or floating.
3. Texture descriptions include rough and smooth.
4. Hardness descriptions are limited to the sense of touch. Words that may be used to describe hardness may include: hard, soft, stiff, and flexible.
5. Second grade description of solids and liquids includes: solids keep own shape and liquids take shape of container.
6. Sinking or floating is limited to trial and error investigations of objects sinking and floating in water.

Assessment Clarifications

1. Properties include color, size, shape, texture, hardness, liquid or solid, sinking or floating.
2. Texture descriptions include rough and smooth.
3. Hardness descriptions are limited to sense of touch. Words that may be used to describe hardness may include: hard, soft, stiff, and flexible.
4. Sinking or floating is limited to trial and error investigations of objects sinking and floating in water.

P.PM.02.13 Measure the length of objects using rulers (centimeters) and meter sticks (meters).

Instructional Clarifications

1. Measure means to use standard units to determine the length of objects.
2. The metric system is the unit of measure most often used in science.
3. This physical science expectation is linked to two Inquiry Process expectations (S.IP.02.14 and S.IP.02.15). The emphasis at the second grade level is the ability to choose the appropriate tool and read the appropriate unit of measurement for the tool.
4. Students' practice of measurement is not limited to measuring the length of objects. Students' measurement abilities expand to measuring the distance something travels, the height of objects, etc.

Assessment Clarifications

1. Assessment is limited to measurement of length in meters and centimeters.
2. Use the appropriate tool (ruler or meter stick) to measure length and link the appropriate unit of measure (centimeter or meter) to the tool.

P.PM.02.14 Measure the volume of liquids using common measuring tools (measuring cups, measuring spoons, graduated cylinders and beakers)

Instructional Clarifications

1. Volume is the measurement of the amount of space taken up by a substance or an object regardless of its shape. All matter has volume.
2. Students at this age have issues with the conservation of liquids – specifically a liquid in a tall thin container versus a short squat container and will not recognize that they could be equal.
3. Common measuring tools for volume include but are not limited to measuring cups and measuring spoons. Students may benefit from the introduction of graduated beakers and cylinders in measuring volume.
4. Measuring the volume of solid objects through water displacement, such as marbles, washers, bolts, etc. is not expected at this grade. However, students can make comparisons and accurate measurement of volume of a liquid and a solid such as sand, sugar, or soil.
5. The expectation does not refer to the unit of measurement for volume. Students are expected to continue to measure in the metric system and measure the volume of substances using milliliters and liters.
6. The emphasis in this expectation is the ability to choose the appropriate tool to measure volume.
7. The expectation provides the opportunity to introduce measurement of volume of a substance using milliliters and liters. (The use of milliliters and liters is addressed in the 4th grade)

Assessment Clarification

1. Assessment is restricted to measurement of volume using graduated measuring cups and measuring spoons.

P.PM.02.15 Compare objects using a balance.

Instructional Clarifications

1. Compare is to note similarities and differences of objects using a balance.
2. The use of the balance as a tool for measurement collection is to compare the mass of different objects
3. The use of the term weight with the balance perpetuates the misconception that weight and mass are interchangeable or are measuring the same thing. A better way to introduce the students to the balance is to introduce the term mass.
4. Mass is defined as the amount of matter in an object. Weight is the force on an object due to gravity.
5. The emphasis in this expectation is the ability to use the balance to compare objects and recognize objects that are heavier (because of more mass), lighter (because of less mass), or the same on the balance.

Assessment Clarification

1. Compare the mass of objects using a balance. (Heavier-more mass, lighter-less mass, the same-equal mass)

Content Statement - P.PM.E.4

Material Composition – Some objects are composed of a single substance, while other objects are composed of more than one substance.

Content Expectation

P.PM.02.41 Recognize that some objects are composed of single substances (water, sugar, salt) and others are composed of more than one substance (salt and pepper, mixed dry beans).

Instructional Clarifications

1. Recognize is to identify or point out single substances or mixtures through observation.
2. Each substance has its own chemical composition and physical properties.
3. Single substances are made up of only one thing, such as water, salt, and sugar.
4. Combining single substances can make mixtures and the substances that make up a mixture keep their physical properties.
5. Mixtures can be separated into their single substances.

Single substances	Mixture
Water	Salt and pepper
Sugar	Beans and peas
Salt	Salt water
Pepper	Sugar water

Assessment Clarification

1. Recognition of objects that are made up of single substances and objects that are made up of more than one substance.

**Inquiry Process, Inquiry Analysis and Communication,
Reflection, and social Implications**

Inquiry Processes
S.IP.02.11 Make purposeful observations of various objects according to their properties.
S.IP.02.12 Generate questions based on observations of objects according to their properties and of single substances and mixtures.
S.IP.02.13 Plan and conduct simple investigations of objects or substances to determine whether they sink or float and to compare objects using a balance.
S.IP.02.14 Manipulate simple tools (metric rulers and meter sticks) to determine the length of objects and the volume of liquids (measuring cups and measuring spoons)
S.IP.02.15 Make accurate measurements of length of objects in appropriate units (meter, centimeter)
S.IP.02.16 Construct simple charts and graphs from data and observations of properties of objects and substances.
Inquiry Analysis and Communication
S.IA.02.12 Share ideas about the properties of objects and the classification of single substances and mixtures.
S.IA.02.13 Communicate and present findings about the properties of objects or substances and the classification of single substances and mixtures.
S.IA.02.14 Develop strategies and skills for gathering information about the properties of objects or substances.
Reflection and Social Implication
S.RS.02.11 Demonstrate a means of classifying objects as single substances or mixtures through various illustrations, performances, exhibits, or activities.
S.RS.02.13 Recognize that when a science investigation on sinking and floating of objects or substances is done the way it was done before, similar results are expected.
S.RS.02.15 Use evidence when communicating ideas about the classification of single substances and mixtures.
S.RS.02.16 Identify technology used to compare objects that is used in everyday life.

Vocabulary

Critically Important – State Assessable	Instructionally Useful
balance classify color liquid mixture properties ruler shape size texture hardness solid sink float length meter stick centimeter (cm) meter (m) volume measuring cup measuring spoon compare single substance mass	chart data observations weight liters (L) milliliters (mL)

Instruments, Measurements, and Representations

Measurement	Tools	Units
length	ruler	centimeter (cm)
	meter stick	centimeter (cm), meter (m)
volume	measuring cup	milliliter* (mL), liter* (L)
	measuring spoon	milliliter* (mL)
weight (mass*)	balance	heavier, lighter, same

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

Instructional Framework

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Instructional Examples

Physical Properties: P.PM.02.12, P.PM.02.13, P.PM.02.14, P.PM.02.15

Material Composition: P.PM.02.41

Objectives

- Make observations of a variety of objects and describe the objects by their physical properties.
- Focus on the property of size and introduce the measurement of length, volume, and mass of objects to add quantitative data for the size of objects.
- Make observations of a variety of objects and classify them as single substances and mixtures.

Engage and Explore

- Before attaching the criteria of properties of matter, students observe, sort, and describe a variety of objects based on their own classification. (P.PM.02.12, S.IP.02.11)
- Only after students have sorted and described the objects on their own, introduce the terms color, size, shape, texture, hardness, liquid or solid, sinking or floating. (P.PM.02.12, S.IP.02.11, S.IA.02.12)
- Students repeat their descriptions using the properties listed by constructing a chart that organizes the objects by their properties, share ideas about properties through purposeful conversation and communicate and present their findings. (P.PM.02.12, S.IP.02.11)
- Students brainstorm the meaning of the term property. (P.PM.02.12, S.IA.02.12)

Explain and Define

- Students will come to consensus on the term property and the descriptive terms used to describe properties of objects (color, size, shape, texture, hardness, liquid or solid, sinking or floating). (P.PM.02.12, S.IA.02.12, S.IA.02.13)
- Students present their sorting and descriptions of a variety of objects to the class. Collectively the class makes sense of identifying objects by their observable properties. (P.PM.02.12, S.IA.02.12, S.IA.02.13)
- Explain the term size and introduce measurement tools and units that give quantitative data to the properties of the objects. (Length, weight, and volume) (P.PM.02.13, S.IP.02.14, S.IP.02.15)
- Demonstrate and practice using the measurement tools to measure a variety of objects and materials. (P.PM.02.13, S.IP.02.14, S.IP.02.15)

Elaborate and Apply

- Organize a measuring scavenger hunt and have students work with a partner to find objects that measure specific lengths in centimeters and meters. (P.PM.02.13, S.IP.02.14, S.IP.02.15)
- Expand the measurement of centimeters and meters and students measure distance of objects that have moved. Construct simple charts and graphs from data and observations through measurement of distance. (P.PM.02.13, S.IP.02.16, S.IP.02.14, S.IP.02.15)
- Using a variety of measurements and measuring tools, students measure the volume of liquids. Expand their measurement of volume to the volume of solids, such as flour, sand, soil, and pebbles. Have students experiment with conservation of liquids by pouring 100mL from a graduated cylinder into a graduated beaker and draw a conclusion about the comparative volume. (P.PM.02.14, S.IP.02.14, S.IP.02.15)
- Make observations comparing objects using a balance. Construct simple charts and graphs from data and observations of the comparison of objects. (P.PM.02.15, S.IP.02.11, S.IP.02.12, S.IP.02.13, S.IP.02.14, S.IP.02.16)
- Introduce the concept of identifying substances as solids and liquids. Explore liquid water as it takes the shape of a variety of containers and solid water keeps its own shape. Elaborate on the concept of liquid and solid. Observe how liquid water takes the shape of its container using a variety of volumes of water. (P.PM.02.14, P.PM.02.15, S.IP.02.11, S.IP.02.14, S.IP.02.15)
- Expand student thinking about the properties to include mixtures and single substances. Students observe substances and objects and classify them as single substances and mixtures. Using a variety of single substances (salt, pepper, beans, peas, paper clips, water, etc.), students combine single substances to make mixtures. (P.PM.02.41, S.IP.02.11, S.IP.02.12, S.IP.02.13)

- Introduce students to soil as a mixture and given the opportunity to observe and identify the single substances that make up soil as a mixture. (P.PM.02.41, S.IP.02.11, S.IP.02.12)
- Students generate questions regarding the separation of mixtures based on their observations of single substances and mixtures. Students plan and conduct simple investigations into separating their mixtures to single substances to answer their questions. Introduce simple tools, such as filter paper, sieves, magnets, and forceps for students to use to separate mixtures. Identify technology used to separate mixtures that is used in everyday situations. (P.PM.02.41, S.IP.02.11, S.IP.02.12, S.IP.02.13, S.IP.02.14, S.IP.02.15, S.IA.02.13)
- Demonstrate the student separation procedures through illustrations and models and communicate and present findings to others. (P.PM.02.41, S.IA.02.12, S.IA.02.13)
- Plan and conduct a sink and float investigation and identify sink or float as a property of objects. Students predict and test their items for the ability to sink or float in water. Students perform multiple trials and recognize that when a science investigation on sinking and floating of objects or substances is done the way it was done before, similar results are expected. (P.PM.02.12, S.IP.02.11, S.IP.02.13, S.IP.02.16)

Evaluate Student Understanding

Formative Assessment Examples

- Use the student presentations and discussion to assess the students' ability to describe objects by their properties. (P.PM.02.12)
- Use the students' sink and float investigations to assess student ability to raise questions and plan simple investigations. (P.PM.02.12)
- Use student investigations into the separation of mixtures to assess their ability to raise questions based on observations. (P.PM.02.41)

Summative Assessment Examples

- Circle the objects that have the same texture. (P.PM.02.12)
- Circle the objects that have similar properties. Write what properties are the same and what properties are different. (P.PM.02.12)
- Jane wanted to measure the length of her desk. Circle the BEST tool for Jane to use. Circle the best unit of measure for Jane to use. (P.PM.02.13, P.PM.02.14)
- Choose the best measuring tool for John to measure the amount of water to place in the pot. (P.PM.02.13, P.PM.02.14)
- Circle the object that is the heaviest. Write how you know which object is heaviest. (P.PM.02.15)
- Circle the picture that BEST shows a mixture. Write how you know that. (P.PM.02.41)
- Choose the tool that you would use to separate the mixture. (P.PM.02.41)

Enrichment

- Students plan and conduct simple investigations into separating mixtures to single substances, including the use of evaporation to separate water from salt.
- Investigate, using the balance, measuring cup, and measuring spoon if different substances with the same volume have the same mass.
- Students combine their measurement skills by measuring the same volume of two substances (water and sand) and making a comparison using the balance.
- Students use magnetic and nonmagnetic to describe properties.

Intervention

- Students are given the opportunity to explore a variety of solids to make mixtures and use different tools to separate a variety of solids of different shapes and sizes.
- Students use non-standard units for measurement to begin thinking in terms of quantitatively measuring objects and then relate to metric units of measurement.
- Set up stations in the classroom for students to continue their explorations into measurement.

Examples, Observations, and Phenomena (Real World Context)

Classification and measurement are everyday skills. Students are involved in measurement of growth (height and weight), recipes, and distance. They classify common objects by color, shape and size at an early age; the stop sign, yield sign, traffic signals, toy blocks, dishes, pencils, crayons, etc. all provide real world opportunities to use their sorting by properties skills. The recognition of sinking and floating as an important property is demonstrated through the material used in life jackets, life rings, and boat building. Students recognize that a rock will sink and a piece of wood will float.

Mixing materials (single substances to make a mixture) is a common activity for young learners. They mix their morning cereal with milk and fruit, mix foods on their plates, make instant fruit flavored drinks, create a mixture of blocks and toys in the toy box, and a mixture of crayons, markers, and pencils in their school supplies.

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 properties of matter and measurement:

Measuring Penny, Loreen Leedy, 1998

How Big Is A Foot?, Rolf Myller, 1991

- Activate prior knowledge of measurement before reading the book, *Measuring Penny*.
- Connect personal knowledge, experience, and understanding of measurement to ideas in the text and through oral and written response.
- Retell relevant details of the units of measurement, measuring tools, and length, volume, and weight 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 measuring experience (similar to the experience in *Measuring Penny*) and why the use of measurement helped in understanding a concept or answering a question.
- Include the measuring tool and unit of measurement that were used and display the measurement in the form of a graph. Tell why you chose that tool and unit of measurement.

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 remaining focused on the subject matter, with interchange building on prior responses, and in the context of the book discussion and the scientific investigations.

Mathematics Integration

M.UN.02.01 Measure lengths in meters, centimeters, inches, feet, and yards approximating to the nearest whole unit and using abbreviations: cm, m, in, ft. yd.

M.UN.02.02 Compare lengths; add and subtract lengths (no conversion of units).

M.PS.02.10 Solve simple word problems involving length and money.

- Connect the writing experience and math skills (See Writing)

Second Grade Companion Document

2-Unit 2: Plant Life

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**Second Grade Unit:
Plant Life**

Content Statements and Expectations

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L.OL.E.1	Life Requirements – Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.	1
L.OL.02.14	Identify the needs of plants.	1
L.OL.E.2	Life Cycles – Plants and animals have life cycles. Both plants and animals begin life and develop into adults, reproduce, and eventually die. The details of this life cycle are different for different organisms.	1-2
L.OL.02.22	Describe the life cycle of familiar flowering plants including the following stages: seed, plant, flower, and fruit.	1-2
L.HE.E.1	Observable Characteristics – Plants and animals share many, but not all, characteristics of their parents.	2
L.HE.02.13	Identify characteristics of plants (for example: leaf shape, flower type, color, size) that are passed on from parent to young.	2

2 – Unit 2: Plant Life

Big Ideas (Key Concepts)

- Plants need air, water, and sunlight to survive.
- Plants have a life cycle that includes seed, seedling or young plant, adult plant, flower, fruit and seed.
- Plants have characteristics that are passed from the parent plant.

Clarification of Content Expectations

Standard: Organization of Living Things

Content Statement: L.OL.E.1

Life Requirements – Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.

Content Expectation

L.OL.02.14 Identify the needs of plants.

Instructional Clarifications:

1. Plants need air, water, and light to survive.
2. Plants use air, water, and sunlight to make their own food.
3. Plants store their own food in various plant parts.
4. Plants do not get their food from the soil.

Assessment Clarifications

1. Identify means recognize the things that plants need to stay alive.
2. Plants need air, water, and light to survive.

Content Statement – L.OL.E.2

Life Cycles – Plants and animals have life cycles. Both plants and animals begin life and develop into adults, reproduce, and eventually die. The details of this life cycle are different for different organisms.

Content Expectation

L.OL.02.22 Describe the life cycle of familiar flowering plants including the following stages: seed, plant, flower, and fruit.

Instructional Clarifications:

1. Describe is to tell or depict in spoken or written words how the life cycle of plants can include various stages.
2. Plants have a life cycle.
3. The plant life cycle includes seed-> plant -> flower -> fruit -> seed
4. Seeds need water and temperature to begin to grow.
5. All flowering plants produce seeds and have a fruit.
6. Seeds, fruits, and flowers come in a variety of shapes, sizes, and colors

Assessment Clarifications:

1. Plants have a life cycle.
2. The plant life cycle includes seed-> plant -> flower -> fruit -> seed

Standard: Heredity**Content Statement – L.HE.E.1**

Observable Characteristics – Plants and animals share many, but not all, characteristics of their parents.

Content Expectation

L.HE.02.13 Identify characteristics of plants (for example: leaf shape, flower type, color, size) that are passed on from parent to young.

Instructional Clarifications

1. Identify means recognize the observable physical features of plants that are passed from parent to young.
2. Plants of the same type have the same leaf shape, flower type, color, and size.
3. Leaf shape, flower type, color and size are passed from the parent plant to the young produce from its' seeds.

Assessment Clarifications

1. Plants of the same type have the same leaf shape, flower type, color, and size.
2. Leaf shape, flower type, color and size are passed from the parent plant to the young produce from its' seeds.

**Inquiry Process, Inquiry Analysis and Communication,
Reflection and social Implications**

<i>Inquiry Processes</i>
S.IP.02.11 Make purposeful observations of various objects according to their properties.
S.IP.02.12 Generate questions based on observations of objects according to their properties and of single substances and mixtures.
S.IP.02.13 Plan and conduct simple investigations of objects or substances to determine whether they sink or float and to compare objects using a balance.
S.IP.02.14 Manipulate simple tools (metric rulers and meter sticks) to determine the length of objects and the volume of liquids (measuring cups and measuring spoons)
S.IP.02.15 Make accurate measurements of length of objects in appropriate units (meter, centimeter)
S.IP.02.16 Construct simple charts and graphs from data and observations of properties of objects and substances.
<i>Inquiry Analysis and Communication</i>
S.IA.02.12 Share ideas about the properties of objects and the classification of single substances and mixtures.
S.IA.02.13 Communicate and present findings about the properties of objects or substances and the classification of single substances and mixtures.
S.IA.02.14 Develop strategies and skills for gathering information about the properties of objects or substances.
<i>Reflection and Social Implication</i>
S.RS.02.11 Demonstrate a means of classifying objects as single substances or mixtures through various illustrations, performances, exhibits, or activities.
S.RS.02.13 Recognize that when a science investigation on sinking and floating of objects or substances is done the way it was done before, similar results are expected.
S.RS.02.15 Use evidence when communicating ideas about the classification of single substances and mixtures.
S.RS.02.16 Identify technology used to compare objects that is used in everyday life.

Vocabulary

Critically Important-State Assessable	Instructionally Useful
flowering plants needs of plants air water light food life cycle seed plant flower fruit characteristics leaf shape flower type color size parent young	makes its own food food storage

Instruments, Measurements, Representations

Instrument	Measurement/Observation	Representation
Metric ruler/tape	Plant growth	Centimeters
Measuring cup, measuring spoons, graduated cylinders and beakers	Soil, water	milliliters
Hand lens	Plant parts, seeds, plant growth	Drawings and observations

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

Life Requirements: L.OL.02.14

Life Cycles: L.OL.02.22

Heredity: L.HE.02.13

Objectives

- Make observations of plants and their interactions within habitats.
- Focus on their needs and how they help them survive.
- Make observations on the patterns plants follow from being born to growing up and getting old.
- Make observations on parental and young characteristics.
- Compare the physical characteristics of offspring and parent.

Engage and Explore

- Students study a plant's growth from seed to seed. L.OL.02.22, S.IP.02.11, S.IP.02.12
- In pairs, have students observe a variety of seeds using the hand lens. Allow sufficient time for students to sort, discuss, and ask questions about the seeds. S.IP.02.11, S.IP.02.12, S.IP.02.14, S.IA.02.12, S.IA.02.13
- Go outside on a seed hunt. Using the plants in the schoolyard, observe and collect a variety of seeds in the wild. S.IP.02.11, S.IP.02.12, S.IP.02.14, S.IA.02.12, S.IA.02.13
- As a class, brainstorm student ideas of where seeds come from. Ask students to apply what they know about living and non-living things to seeds. S.RS.02.15, S.IA.02.14
- Discuss what the students think seeds need to sprout and grow. L.OL.02.14, S.IA.02.12, S.IA.02.13

- Have students choose seeds to plant and grow in the classroom. S.IP.02.13

Explain and Define

- Record students' initial ideas about the stages in the growth of a plant on chart paper. Ask students for their ideas of how they can find out if their ideas are correct. L.OL.02.22,
- Have students plan an observation and recording schedule to observe the growth of their seeds/plants in the classroom. S.IP.02.13, S.IP.02.14, S.IP.02.15, S.IA.02.12, S.IA.02.13, S.IA.02.14
- Plant a baggie seed garden to observe and record the growth of a seed. Graphs should be made to display data. S.IP.02.14, S.IP.02.15, S.IP.02.16
- Review the needs of plants and have students decide on a watering schedule and where the plants should be located to grow. L.OL.02.14, S.IP.02.13
- Write the term life cycle on the board. Brainstorm for student ideas of the meaning of the term. Explain that all living things start from an egg or a seed, grow into an adult, and then have babies or offspring. Note: This may be a review from the life cycle of animals unit in the first grade. L.OL.02.22
- Read a book about the life cycle and growth of a plant from seed to seed, such as *The Pumpkin Circle*. L.OL.02.22

Elaborate and Apply

- Ask students to compare and contrast the life cycle of a plant to the life cycle of an animal. L.OL.02.22
- Share multiple examples of passed characteristics and life cycles with the students. L.HE.02.13.RS.02.15
- Students talk about characteristics passed from parent to offspring, such as leaf shape, size and color, flower color, shape, and size, stems, roots, and seeds. L.HE.02.13, S.RS.02.11

Evaluate student understanding

Formative Assessment Examples

- Check student observation/picture journal to determine if observations are appropriate/applicable. L.OL.02.14
- Student conversations in their groups can be used as basis for monitoring understanding. L.OL.02.14

Summative Assessment Examples

- Circle the needs of plants. L.OL.02.14
- Draw a picture of a plant and its seeds. L.HE.02.13
- Circle a characteristic that is shared by these plants. L.HE.02.13
- Draw the next stage of life for this plant. L.OL.02.22

Enrichment

- Students study another plant of their choice to show in a drawing the life cycle, characteristics passed from parent to offspring, life needs and habitat should be incorporated for their chosen plant.

Intervention

- Break students into research groups that focus on one aspect of the life cycle e.g. Seed group, Plant group, flower group, fruit group, and have students cycle through each of these groups studying many different plants. Students will then rotate through the other groups to experience all of them.

Examples, Observations, and Phenomena (Real World Context)

Most students, at this time in their education have had some experiences with planting seeds and growing plants. They observe plant life cycle and characteristics of plants without attaching scientific terms or observations. The purposeful study of the plant life cycle in the classroom relates to the planting of gardens and farmland. Through comparison of students' outdoor experiences and observations to the in class investigations, students gain an understanding of the life cycle of all living things.

In first grade, students learned about the life cycle of animals. Comparison between the life cycle of all living things, plants and animal, is the first introduction into cycles throughout nature. Students recognize that all living things start as a seed or egg, grow to an adult, reproduce, and then die.

Young learners build understanding of life science concepts through direct experience with living things, their life cycles, and long-term observations.

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 plants, their life cycle, and characteristics passed from parent to young:

The Pumpkin Circle, George Levenson, 1999

The Tiny Seed, Eric Carle, 1970

Jack's Garden, Henry Cole, 1997

- Activate prior knowledge about plants, seeds, and growing gardens.
- Connect personal knowledge, experience, and understanding of plants and growing plants to ideas in the text and through oral and written response.
- Retell relevant details of the life cycle of a plant 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 planting experience and use data from observations in the writing piece.
- Write an article about the importance of plants and how the life cycle of plants ensures the re-growth of plants.
- Write a story about a seed from the time it was planted to the time it produced seeds of its own. Include illustrations and labels. Write the story from the point of view of the seed and describe its surroundings.

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.

- Present their stories to different audiences beyond the classroom. Write and perform a play about the life cycle of a plant from seed to seed.

Mathematics Integration

M.UN.02.01 Measure lengths in meters, centimeters, inches, feet, and yards approximating to the nearest whole unit and using abbreviations: cm, m, in, ft. yd.

M.UN.02.02 Compare lengths; add and subtract lengths (no conversion of units).

M.PS.02.10 Solve simple word problems involving length and money.

- Measure plant growth in centimeters.

- Measure water and soil in cups and milliliters when planting seeds and seedlings.

Second Grade Companion Document

2-Unit 3: Earth's Surface Features

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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:
Earth's Surface Features**

Content Statements and Expectations

Code	Statements & Expectations	Page
E.SE.E.2	Surface Changes –The surface of Earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.	1
E.SE.02.21	Describe the major landforms of the surface of the Earth (mountains, plains, plateaus, valleys, hills).	1
E.FE.E.2	Water Movement – Water moves in predictable patterns.	1-2
E.FE.02.21	Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground.	1-2
E.FE.02.22	Describe the major bodies of water on the Earth's surface (lakes, ponds, oceans, rivers, streams).	2

2 – Unit 3: Earth’s Surface Features

Big Ideas (Key Concepts)

- Earth surface has many major landform types.

Clarification of Content Expectations

Standard: Solid Earth

Content Statement - E.SE.E.2

Surface Changes –The surface of Earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

Content Expectation

E.SE.02.21 Describe the major landforms of the surface of the Earth (mountains, plains, plateaus, valleys, hills).

Instructional Clarifications

1. Describe is to tell or depict in spoken or written words about the major landforms on the Earth’s surface.
2. Major landform descriptions are limited to mountains, plains, plateaus, valleys and hills.

Assessment Clarification

1. Major landform descriptions are limited to mountains, plains, plateaus, valleys and hills.

Content Statement – E.FE.E.2

Water Movement – Water moves in predictable patterns.

Content Expectations

E.FE.02.21 Describe how rain collects on the surface of the Earth and flows downhill into bodies of water (streams, rivers, lakes, oceans) or into the ground.

Instructional Clarifications

1. Describe means to tell or depict in spoken or written words how rain collects and flows on the Earth's surface.
2. Rain collection can become run-off as water flows downhill over impervious surfaces.
3. Rain collection can become ground water as water lands on and enters porous surfaces.

Assessment Clarifications

1. Students can describe how rainwater flows downhill over parts of the Earth into bodies of water. (Assessment clarification went beyond the GLCE)
2. Students can describe how rainwater lands on and soaks into the soil.

E.FE.02.22 Describe the major bodies of water on the Earth's surface (lakes, ponds, oceans, rivers, streams).

Instructional Clarifications

1. Describe is to tell or depict in spoken or written words about the major bodies of water on the surface of the earth.
2. Major bodies of water descriptions are limited to lakes, ponds, oceans, rivers and streams.

Assessment Clarification

1. Major bodies of water descriptions are limited to lakes, ponds, oceans, rivers and streams.

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

Inquiry Process
S.IP.02.11 Make purposeful observations of how rain collects on models of major landforms and bodies of water.
S.IP.02.12 Generate questions about the flow of water over land and into the ground based on observations.
S.IP.02.13 Plan and conduct simple investigations into the flow of water downhill into bodies of water, or into the ground.
S.IP.02.14 Manipulate simple tools that aid in observations of models, (hand lens, meter sticks, 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 flow of water downhill into bodies of water or into the ground.
Inquiry Analysis and Communication
S.IA.02.11 Share ideas about observations of how water flows downhill through purposeful conversation.
S.IA.02.12 Communicate and present finding of observations and investigations into the flow of water downhill into bodies of water, or into the ground.
S.IA.02.13 Develop strategies and skills for information gathering about landforms, bodies of water, and how water flows downhill into bodies of water or into the ground.
Reflection and Social Implications
S.RS.02.12 Use evidence from their investigations when communicating how rain water collects on the Earth's surface, flows downhill into bodies of water, or into the ground.
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 landforms, bodies of water, how rain collects on Earth's surface, and flows downhill into bodies of water or into the ground through models or exhibits.

Vocabulary

Critically Important – State Assessable	Instructionally Useful
plateau valley hill mountain plain lake pond river stream ocean downhill soak	impervious porous flow gravity

Instruments, Measurements, and Representations

Measurement	Instruments	Representations
Rate of water flow	senses, stream tables, watersheds models	Fast, slow
Shape of landforms	3-D models of landforms, relief maps	Flat, high, low

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

Surface Changes: E.SE.02.21

Water Movement: E.FE.02.21, E.FE.02.22

Objectives

- Describe major landforms (mountains, plains, plateaus, valleys and hills).
- Describe major bodies of water (lakes, ponds, oceans, rivers, streams).
- Describe how water flows over the Earth's surface into bodies of water and into the soil.

Engage and Explore

- Students walk around their schoolyard and observe land for changes in shape such as raised flowerbeds, small hills, slope of driveways, etc. (E.SE.02.21, S.IP.02.11)
- Students investigate the flow of water over different surfaces in their schoolyard (driveway, soil, grass, playground, street) based on their questions from observations. (E.FE.02.21, S.IP.02.11, S.IP.02.12, S.IP.02.13)
- Students use observations to generate questions about changes in shape of land and water flow. The teacher will record questions for future reference. (E.SE.02.21, E.FE.02.21)
- Students use observations of pictures, videos, relief maps, or globes to describe characteristics of different landforms and bodies of water. (E.SE.02.21, E.FE.02.22, S.IP.02.11)
- Students build models of different landforms using a variety of materials. (E.SE.02.21, S.RS.02.11)

- Students investigate the flow of water using a watershed model made out of paper crumpled inside of a tin pan and sprayed with water. Students make observations of water flowing over with different shapes and slopes. Students observe the formation of different bodies of water as well as the rate and direction of water flow in the model. (E.SE.02.21, E.FE.02.21, E.FE.02.22, S.IP.02.13)
- Students observe water soaking into the soil using stream tables with mixtures of sand and soil. Students also observe the formation of different landforms as the water moves the soil. Students use observations to generate more questions about the flow of water. (E.SE.02.21, E.FE.02.21, E.FE.02.22, S.IP.02.11, S.IP.02.12)

Explain and Define

- Students use observations and models to compare and contrast different landforms and bodies of water. Students present findings to the class. (E.SE.02.21, E.FE.02.22, S.IA.02.12, S.IA.02.13)
- Students use observations and models to explain how water collects on Earth surfaces after rain to form lakes, streams and rivers. (E.FE.02.21, E.FE.02.22, S.IA.02.13)
- Students use findings from investigations to explain the downhill flow of water using stream tables. (E.FE.02.21, E.FE.02.22, S.RS.02.15)
- Students use findings from investigation to explain how water soaks into the ground. (E.FE.02.21, S.RS.02.15)
- Students draw diagrams to demonstrate the downhill flow of water. (E.FE.02.21, E.FE.02.22, S.RS.02.11)

Elaborate and Apply

- Students investigate the relationship between the shape of landforms and the formation of bodies of water using watershed models. Students will observe the shape of the land where different bodies of water form, such as flat areas forming lakes and ponds and sloped areas forming rivers and streams. (E.SE.02.21, E.FE.02.21, E.FE.02.22, S.IP.02.13)
- Students investigate the relationship between the flow of water and the formation of landforms using stream tables. Students will observe how the speed of the flow of water changes the shape of rivers and streams produced. (E.SE.02.21, E.FE.02.21, E.FE.02.22, S.IP.02.11, S.IP.02.13)
- Students further investigate with stream tables by changing the slant of the stream table. Students can also change the surface that the water is flowing over by adding moss to the stream table for grass or plastic to represent pavement. (E.FE.02.21, S.IP.02.11, S.IP.02.13)
- Students plan and conduct investigations into how water soaks into different earth materials. (E.FE.02.22, S.IP.02.13)

Evaluate student Understanding

Formative Assessment Examples

- Use the student models, presentations and discussions to assess the students' ability to describe landforms and bodies of water. (E.SE.02.21, E.FE.02.22)
- Use the students' watershed and stream table investigations to assess student ability to raise questions and plan simple investigations. (E.FE.02.21, S.IP.02.12, S.IP.02.13)
- Use student diagrams assess students' ability to demonstrate the downhill flow of water over the Earth's surface. (E.FE.02.21, S.RS.02.11)

Summative Assessment Examples

- Circle the picture that shows a lake. (E.FE.02.22)
- Circle the picture that shows a plateau. (E.SE.02.21)
- Circle the picture that shows the path of rainwater after it reaches the Earth's surface. (E.FE.02.21)
- Circle the answer that shows bodies of water from biggest to smallest. (E.FE.02.22)

Enrichment

- Students plan and conduct sink and float activities in fresh and salt water to compare oceans to fresh bodies of water.
- Model ways that pollutants and other contaminants can flow through a watershed.
- Students build models of Michigan to show major landforms and bodies of water.

Intervention

- Students given an opportunity to explore interaction of water, sand and soil.
- Students use songs with hand motions or body movements to describe different landforms and bodies of water.

Examples, Observations, and Phenomena (Real World Context)

Children observe changes in the Earth's surface all the time without realizing it. They watch erosion and deposition take place at the edge of the grass after a rainstorm. They see the flow of water down the street and into the storm drain. They see sand castles at the beach washed away by a wave. Students need to connect these small-scale changes in the Earth's surface to larger scale changes. The Earth's surface features can be investigated during family vacations, by reading books and taking field trips to local parks.

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.

Paddle-to-the-sea, Clancy Holling, 1941

Where The River Begins, Thomas Locker, 1993

Hills, Christine Webster, 2005

Mountains, Christine Webster, 2005

Plains, Christine Webster, 2005

Valleys, Christine Webster, 2005

- Connect personal knowledge, experience, and understanding of rivers and hills to ideas in the text and through oral and written response.
- Retell relevant details of the flow of river 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 landforms using data from stream table observations in the writing piece.
- Write a story about a trip on a body of water or visiting a landform. Include illustrations and labels. Write the story from the child's point of view and they should describe their surroundings.

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.

- Present their landforms models to the class.
- Write and perform a skit, rap or song describing different landforms or the flow of water on the Earth's surface.

Mathematics Integration

M.UN.02.01 Measure lengths in meters, centimeters, inches, feet, and yards approximating to the nearest whole unit and using abbreviations: cm, m, in, ft. yd.

M.UN.02.02 Compare lengths; add and subtract lengths (no conversion of units).

M.PS.02.10 Solve simple word problems involving length and money.

- Compare the height of different landforms in student models.
- Compare the length of rivers produced in stream table models

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

Code	Statements & Expectations	Page
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.	1
E.FE.02.11	Identify water sources (wells, springs, lakes, rivers, oceans).	1
E.FE.02.12	Identify household uses of water (drinking, cleaning, food preparation).	2
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.	2
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.	2

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