

Kindergarten Companion Document

K-Unit 1: Observations with Senses

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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.

Kindergarten Unit: Observing with Senses

Content Statements and Expectations

Background –

The Kindergarten Unit 1: *Observations with Senses* is the only unit in the K-7 Science Curriculum that focuses entirely on inquiry and science skills rather than science content within inquiry. This unit presents the initial opportunity for young learners to explore their world and concentrate on the skills necessary to make good observations. The importance of the use of the senses for observation continues throughout the curriculum in grades first through fourth. In the Instructional Examples, students are guided in the process of scientific inquiry through purposeful observations, raising questions, making sense of observations, developing vocabulary, investigating, and making meaning of the experience.

Code	Statements & Expectations	Page
S.IP.E.1	Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.	1
S.IP.00.11	Make purposeful observation of the natural world using the appropriate senses.	1

K-Unit 1: Observations with Senses

Big Ideas (Key Concepts)

- The five senses are sight, sound, touch, smell, and taste.
- The senses aid in observation that helps us to understand our surroundings.
- Not all senses are used for all observations.

Clarification of Content Expectations

Standard: Inquiry Process

Content Statement – S.IP.E.1

Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.

Content Expectation

S.IP.00.11 Make purposeful observation of the natural world using the appropriate senses.

Instructional Clarifications

1. A purposeful observation is to look closely and carefully at something to learn more about it.
2. The senses include the sense of sight, sound, touch, smell, and taste.
3. Appropriate senses refer to limited and appropriate use of senses in science for safety.
4. The sense of taste is only explored in carefully supervised and controlled investigations. Permission is required to use the sense of taste.
5. The sense of smell is only explored using the “wafting” technique and not a direct smell or inhalation of the material.
6. Students recognize that good observations are not limited to the sense of sight, but include purposeful observations using all the appropriate senses within safety guidelines.

Assessment Clarification

1. The senses include the sense of sight, sound, touch, smell, and taste.
2. Appropriate senses refer to limited and appropriate use of senses in science for safety.
3. Students recognize that good observations are not limited to the sense of sight, but include purposeful observations using all the appropriate senses within safety guidelines.

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

Inquiry Processes
S.IP.00.11 Make purposeful observation of the natural world using the appropriate senses.
S.IP.00.12 Generate questions based on observations using the senses.
S.IP.00.13 Plan and conduct simple investigations using the senses.
S.IP.00.14 Manipulate simple tools (hand lens, balances) that aid observation and data collection.
S.IP.00.16 Construct simple charts from data and observations.
Inquiry Analysis and Communication
S.IA.00.12 Share ideas about the senses through purposeful conversation.
S.IA.00.13 Communicate and present findings of observations.
S.IA.00.14 Develop strategies for information gathering (ask an expert, use a book, make observations, conduct simple investigations, and watch a video).
Reflection and Social Implications
S.RS.00.11 Demonstrate science concepts about the senses through illustrations, performances, models, exhibits, and activities.

Vocabulary

Critically Important–State Assessable	Instructionally Useful
senses	hazardous
observation	safety
sight	magnifying glass
sound	microscope
taste	binoculars
touch	telescope
smell	sweet
feel	salty
	bitter
	sour
	eyes
	ears
	nose
	skin
	hands
	feet
	mouth
	tongue

Instruments, Measurements, Representations

Sense	Body Part	Other Tools	Importance
sight	eyes	Magnifying glass Microscope Binoculars Telescope Eye glasses	Helps us to see things in the environment and recognize others
sound	ears	Hearing aid	Helps us receive information by verbal as well as non-verbal communication
taste	mouth, tongue		Helps us select and enjoy food. There are four familiar tastes: sweet, salty, bitter, sour
touch	hands, feet, skin		Helps us learn by feeling the size, texture, shape, temperature
smell	nose		Helps us enjoy pleasant smells and recognize dangerous situations (i.e. smoke from fire)

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

Inquiry: S.IP.00.11, S.IP.00.13, S.IP.00.14, S.IP.00.16, S.IA.00.12, S.IA.00.13, S.IA.00.14

Objectives

- Students learn that there are five senses.
- Students use their senses to make purposeful observations about the world.
- Students will sort objects based on observable attributes including shape, size, color, sound, and smell.

Engage and Explore

- Take a walk outside to make purposeful observations. If feasible and the area is safe, have students walk barefoot. Encourage students to share with a partner, while on the walk, some of the things they observe. Ask students questions during the walk to help them focus on their senses. What do you hear, smell, feel, or see? (S.IP.00.11)
- Make purposeful observations from one place by placing a hula-hoop or tied string in a circle and sit very quietly in the middle. Have students cover their ears and make observations, then close their eyes and make observations. (S.IP.00.11)
- Engage the students in a whole group discussion about their observations. Identify the senses they needed to make the observations. (S.IP.01.11, S.IA.00.12, S.IA.00.13)
- Set up science exploration centers with activities that explore the senses. Include objects that make different types of noise; swatches of materials with different textures to feel; plastic bottles with familiar scents to smell by the wafting method and identify; objects of various shapes, colors, and

sizes to sort. (Note: Children should not be allowed to put things in their mouth to taste unless closely supervised.)(S.IP.00.11, S.IP.00.12, S.IP.00.13, S.IA.00.14, S.RS.00.11)

- Give students sets of blocks, toy cars, buttons, shells, or other materials that have various attributes to sort. The attributes include size, color, shape, thickness, flexibility, type of material (i.e. wood, metal, or plastic), number of holes, or others. After sorting objects, ask students to describe how they sorted them. (S.IP.00.11, S.IP.00.12, S.IP.00.13, S.IA.00.14, S.RS.00.11)
- Have students sit quietly for two minutes and listen to all the noises they hear. First have them predict what they think they will hear. Afterwards, make a class list of all the noises and the things they think made them. (S.IP.00.11, S.RS.00.11)

Explain and Define

- With the whole group, share students' ideas for sorting objects. Brainstorm different ways the objects were sorted to show that there is more than one way to sort them. Show students how to use a graphic organizer such as a chart, or a one or two circle Venn diagram to record how they sorted their objects. (S.IP.00.11, S.IA.00.12)
- Go on a blindfolded walk with a partner. Taking turns, one child will lead another through a specified area. After the blind-fold walk, have the student re-take the walk without the blindfold. In a large group discussion, let children describe how they felt when they were blindfolded compared to when they were not. Talk about what they are able to observe when they do not have their eyes to see. (S.IP.00.11, S.IA.00.13, S.RS.00.11)
- Read the book, *Through Grandfather's Eyes*, and compare the feelings experienced by John and his Grandpa to the ones they may have experienced in this activity. S.IP.00.11, S.IA.00.14)
- What color of eyes is the most common in the classroom? Give children a small mirror to look at their eyes. Make a graph of the color of eyes of all the children in the classroom.
- Put various shaped blocks in a bag. Ask the children to find a block with a certain shape or size. Can they find a block of a certain color? Discuss what information the senses can and cannot provide. (S.IP.00.11, S.IA.00.12)
- Identify food by only using the sense of taste. Cut up an apple, pear, and potato. With eyes closed, hold your nose and taste the pieces. Record whether or not you were able to identify the food correctly using only the sense of taste. (S.IP.00.11)
- Identify food with the sense of smell. Pop popcorn and keep it out of sight. Ask students how they know you popped popcorn. Ask for their evidence the popcorn has been popped. (S.IP.00.11, S.IA.00.12)

Elaborate and Apply

- Elaborate on observations with senses by introducing observation tools. Give students hand lenses or simple microscopes to observe small things, like grains of sand, swatches of different materials, leaves, small insects, coins, and other very small objects. Give students binoculars to use when they are outside. Compare how hand lenses can help the eye see things that are small and binoculars can help students see things better when they are very far away. (S.IP.00.11, S.IP.00.14, S.IP.00.15)
- Discuss with the children the size of objects such as an airplane when it is close and when it is far away. Have them draw pictures to show the difference. (S.IP.00.11, S.RS.00.11)
- Working with a partner or small group, one student sorts a small set of objects by an attribute of their choice. The partner must guess the attribute their partner used to sort the objects. (S.IP.00.11, S.RS.00.11)
- Are two ears better than one? Investigate this by choosing a child to go to the center of a circle. This child will close his eyes while the teacher points to one of the other children in the circle who will snap their fingers or lightly clap. The child in the center points to where he hears the sound coming. Do this two more times. Then try it again, but have the child in the center cover one ear with his hand, thus using only one ear to hear the snap or clap. Is the child as accurate as before? Repeat two more times. (S.IP.00.11, S.IP.00.12, S.IP.00.13, S.RS.00.11)
- The teacher or a student stands behind the door or a screen. Make noises for other students to guess. For example, ring a bell or open the drawer. Include an activity that does not make noise, for example, writing on paper. This will show that sometimes you need to use more than one sense to better interpret an event. (S.IP.00.11, S.RS.00.11)
- Review all five senses and how they help by reading the big book students put together during the unit (see Writing Integration activity). (S.IP.00.11, S.IA.00.14)
- Make a texture graph and select from many articles to glue them into categories that make them similar. After students have classified their articles, label them with color, hard, soft, rough, smooth, etc. (S.IP.00.16)

Evaluate Student Understanding

Formative Assessment Examples

- Evaluate students' use of terms, knowledge of all five senses, and ability to observe with them during the small group activities and whole group discussions. (S.IP.00.11)
- Evaluate students' ability to sort and describe the attribute used to sort objects during sorting activities and discussions about the sorting activities. (S.IP.00.11)

Summative Assessment Examples

- Which sense do you use to identify the color of a Teddy Bear? (sight) (S.IP.00.11)
- Which senses can you use to observe the size of a Teddy Bear? (sight and touch) (S.IP.00.11)

- Which sense do you use to know that something is burning on the stove in the kitchen when you are in another room? (smell) (S.IP.00.11)
- Which sense do you use to observe that your milk is cold? (touch) (S.IP.00.11)
- Which sense do you use to tell if a candy is sweet or sour? (taste) (S.IP.00.11)
- Which senses can you use to tell if a car is coming down the street? (sound, sight) (S.IP.00.11)
- Which sense do you use to know if the water is running in the bathroom sink but you are in the bedroom? (sound) (S.IP.00.11)
- Show a picture of objects in a one-circle Venn diagram. Large 2-D shapes of various kinds are inside the circle and small 2-D shapes of the same various shapes are outside the circle. Circle the way these shapes were sorted. (color, shape, size) (S.IP.00.11)

Enrichment

- Explore the parts of the eye and ear and how they work.
- Describe ways to care for the eyes, ears, and nose.
- Research physical impairments related to the senses and how people learn to cope.

Intervention

- Some students may be color-blind and have difficulty with certain colors. If you notice this in a student, you may wish to discuss this with a parent. Use attributes other than color to evaluate that child's ability to sort.
- When sorting objects by attributes, it helps to have the attribute name or picture (or both) on a card or sentence strip to be placed by that set of objects.
- Word cards and pictures of the sense that is in focus for the lesson posted on the blackboard will help struggling readers relate the word to the concept.

Examples, Observations, and Phenomena (Real World Context)

All the information we receive as humans comes to us through our senses. Each sense is important, but each has its limitations. People who do not have the use of one sense are able to compensate with another. The best way to receive information is by using all the senses together.

All the information we receive from our senses of sight and hearing comes to our brain through special nerve endings. The epidermis, or top layer of the skin, has many nerve endings and these send messages to the brain so that we can tell what we are feeling. We can feel hot or cold, wet or dry, hard or soft, rough or smooth, strange or familiar. Your brain then figures it out and lets us know what to do with it.

In humans, the sense of smell is weak. As humans evolved they developed reasoning skills and did not depend as much on the sense of smell as other animals. Some people develop their sense of smell for a special use, i.e. wine makers and perfume makers. The tongue is covered with taste buds that have many nerve endings. We can only taste four flavors – sweet, salty, sour, and bitter. Different parts of the tongue have receptors for certain flavors. Saliva plays a role in tasting. The food must get wet with the saliva before we can taste it. Our sense of smell helps us taste the food we eat.

Animals have enhanced senses that help them survive. The owl and other nocturnal animals have special eyes that allow them to see in the dark. Deer, rabbits, and foxes are examples of animals with large ears to help them hear predators, prey and other dangers.

Literacy Integration

R.IT.00.04 Respond to individual and multiple texts by finding evidence, discussing, illustrating, and/or writing to reflect, make meaning, and make connections.

R.CM.00.04 Apply significant knowledge from grade-level science, social studies, and mathematics texts.

Examples of trade books available for learning about the individual senses:

The Five Senses, Alik, 1989

The Five Senses, Margaret Miller, 1998

- After reading or listening to the reading of both texts that describe the five senses, students discuss how they use their senses. They discuss how the two books are the same and how they are different.

Writing

W.GN.00.03 Write a brief informational piece such as a page for a class book using drawings, words, word-like clusters, and/or sentences.

- Students cut and paste magazine pictures of people using their senses. They write a word or phrase about the picture for a classroom big book.

Speaking

S.CN.00.01 Explore and use language to communicate with a variety of audiences and for different purposes including problem solving, explaining, looking for solutions, constructing relationships, and expressing courtesies.

S.DS.00.03 Respond to multiple text types by reflecting, making meaning, and making connections.

- Students explain their thinking during the observation and sorting activities.
- Students engage in conversation about the readings from the suggested books and explain the connections they are making between the activities and the readings.

Mathematics Integration

G.GS.00.01 Relate familiar three-dimensional objects inside and outside the classroom to their geometric name, e.g., ball/sphere, box/cube, soup can/cylinder, ice cream cone/cone, refrigerator/prism

G.GS.00.02 Identify, sort, and classify objects by attribute and identify objects that do not belong in a particular group.

- Students use their senses to sort objects by shape, size, color, texture, etc.