unit 4

Seeing, Hearing, Smelling and Touching Like a Scientist
**Unit 4**

*Seeing, Hearing, Smelling and Touching Like a Scientist (Observing Properties of Materials)*

Visit the [Unit 4 Curriculum Page](http://schoolpartnership.wustl.edu/instructional-materials/mysci-unit-4/) for more resources.

**DESIGN CHALLENGE:**
How can we design an experiment about rocks?
## Unit 4 Teacher Preparation List

<table>
<thead>
<tr>
<th>Lesson</th>
<th>MySci kits include:</th>
<th>Items teacher must supply:</th>
<th>Prep time/copying:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lesson 1</strong></td>
<td><em>What is a Scientist?</em> by Barbara Lehn</td>
<td>Science notebooks &amp; internet access&lt;br&gt;Chart paper</td>
<td>Review <em>MySci Safety Guidelines</em>&lt;br&gt;Copy and administer pre-assessment&lt;br&gt;Reread <em>What is a Scientist</em> during reading time&lt;br&gt;Copies of Venn Diagram (Appendix i)&lt;br&gt;Ask students to bring a favorite rock from home</td>
</tr>
<tr>
<td><strong>Lesson 2</strong></td>
<td><em>Spenser and the Rocks</em> by Lawrence F. Lowery&lt;br&gt;30 assorted rocks and minerals&lt;br&gt;7 color pictures of scientific process</td>
<td>Science notebooks &amp; internet access&lt;br&gt;Chart paper</td>
<td>Copies of <em>My Rock Looks Like</em> observation sheet (Appendix ii)&lt;br&gt;Mark in Spenser where to stop reading, at the “I wonder “ page</td>
</tr>
<tr>
<td><strong>Lesson 3</strong></td>
<td><em>My Five Senses</em> by Aliki&lt;br&gt;<em>Listening Walk</em> by Paul Showers&lt;br&gt;15 hand lenses&lt;br&gt;5 jars, containing scents from lavender, cocoa, grapefruit, spruce tree, peppermint</td>
<td>Science notebooks &amp; internet access&lt;br&gt;Rocks from previous lesson</td>
<td>My Rock Looks Like observation sheet from previous lesson&lt;br&gt;Copies of <em>Which Sense Would I Use?</em> (Appendix iii)</td>
</tr>
<tr>
<td><strong>Lesson 4</strong></td>
<td>Station 1: 4 safety glasses, 1 spray bottle, 30 wipes&lt;br&gt;Station 2: 1 kitchen timer&lt;br&gt;Station 3: 4 magnifying glasses, 4 mini photos, 4 matching large photos (laminated)&lt;br&gt;Station 4: 4 droppers, 4 pennies, 1 small bowl for water&lt;br&gt;Station 5: 2 immersible thermometers, 2 small containers for water&lt;br&gt;Station 6: 1 balance, 2 plastic 9 oz. cups, 15 Unifix cubes, Rocks from previous lessons&lt;br&gt;Station 7: 1 set of measuring cups, 1 large measuring cup, 1 bag of sand, 1 aluminum pan to hold the sand and cups&lt;br&gt;Station 8: 1 Brock Microscope, 1 slide containing 4 different things.</td>
<td>Water&lt;br&gt;Rocks from previous lesson</td>
<td>Decide how and when you are going to do the stations, and set up accordingly&lt;br&gt;Copies of <em>Station Activity chart</em> (Appendix iv)</td>
</tr>
<tr>
<td><strong>Lesson 5</strong></td>
<td>6 bags each containing: 1 feather, 1 small bouncy ball, 1 swatch fabric, 1 piece of aluminum foil, 1 small marble, 1 small wooden block</td>
<td>Science notebooks</td>
<td></td>
</tr>
<tr>
<td><strong>Lesson 6</strong></td>
<td>One clear container for holding water&lt;br&gt;30 small clothes pins</td>
<td>Science notebooks&lt;br&gt;Rocks from previous lesson</td>
<td>Copies of <em>What Scientists Do</em> worksheets (Appendix v)&lt;br&gt;Copy and administer post-assessment</td>
</tr>
</tbody>
</table>
What Makes Me a Scientist?

Lesson 1: What is a scientist?

LEARNING TARGET
Describe what a scientist does using a drawing.

SUMMARY
Students draw a picture of a scientist.

ENGAGE
Ask the class: What do you think a scientist looks like? Have students draw a picture of a scientist. Ask students what their scientist is doing. Discuss the pictures. Students may share their drawing and thoughts with a partner. (Save these to compare with their final drawing.)

EXPLORE
Ask the students: Are you a scientist? Listen and write responses on a chart.

EXPLAIN
Ask the class: What is a scientist and what do they do? Read What is a Scientist? Discuss. Here are some websites about interesting scientists’ jobs. Preview them ahead of time and choose a couple a day to show to the students.

Scientists at the Smithsonian http://smithsonianeduction.org/scientist/index.html
Real Scientists http://pbskids.org/dragonflytv/scientists/
Sid the Science Kid http://pbskids.org/video/?category=Sid+the+-Science+Kid&pid=1QQbrHIKBg8x7VneK5NrlfiM_RCY39e

ELABORATE
Ask the class: How are you like a scientist? Make a Venn diagram of scientist and students. (Explain what a Venn diagram is). See Appendix i for an example.

EVALUATE
Ask: What is one thing that a scientist does? Have students draw a picture of one thing that a scientist does in their science notebook.
**Lesson 2: What makes Spenser a scientist?**

**LEARNING TARGETS**
Observe and record properties of a rock.

**SUMMARY**
Students hear a story about a boy who collects and studies rocks.

**ENGAGE**
Read *Spenser and the Rocks* by Lawrence F. Lowery. Ask the class: *How is Spenser like a scientist?* (Spenser has many questions about the rocks that he finds and asks questions about what he observes.)

**EXPLORE**
Have students draw a picture of the rock that they brought from home or chose a rock from the collection on the My Rocks Look Like observation sheet (Appendix ii). Ask students to observe their rock carefully and draw it.

**EXPLAIN**
Ask students: *What do you notice about your rock?* Draw a T-chart with Know and Wonder titles. Ask students what they know about rocks. Write responses on chart in the Know column.

Have students work with a partner. Explain that they are going to share with their partner questions that they might have about their rock. When students are finished, chart some or all of student generated questions in the Wonder column.

**ELABORATE**
Ask the class: *How do scientists learn things?* Watch video clip: http://www.pbslearningmedia.org/resource/75e3c673-b02d-4d7b-a490-8a943c013662/75e3c673-b02d-4d7b-a490-8a943c013662/

Show the 7 Scientific Process cards and discuss what they are doing in each picture. It might be helpful to number the cards from 1-7 for the next activity.

**EVALUATE**
Ask the class: *What three things did you do like a scientist today?* Ask them to write the numbers from the 7 Scientific process cards in their science notebook of three things they did like a scientist today. (They could copy the words if appropriate.)

**MYSCI MATERIALS:**
*Spenser and the Rocks* by Lawrence F. Lowery
30 assorted rocks and minerals
7 color pictures of scientific process

**TEACHER PROVIDES:**
Science Notebooks
Chart paper
Copies of My Rock Looks Like observation sheet (Appendix ii)
Internet access

**Teaching Tip:**
This lesson could take 3 separate sessions; Engage (1 session), Explore and Explain (1 session) and Elaborate and Evaluate (1 session).

**Teaching Tip:**
If your students have not had much experience with observing and drawing, it might be helpful to model, drawing a rock in front of the class.

**Teaching Tip:**
If your students are not familiar with think-pair-share please model. In Kindergarten it is best to identify partners ahead of time (teacher-chosen at first) and to have partners sitting side by side so that when sharing time arrives they are ready to turn and chat. Giving the “think time” first allows for best use of talk time since the students are prepared to talk and listen.
Lesson 3: What senses do we have?

LEARNING TARGETS
Demonstrate how our 5 senses help us learn.

SUMMARY
Students will be able to identify the five senses and parts of the body associated with them.

ENGAGE
Ask the class: What do you know about the five senses? Ask for thoughts and record ideas on chart paper. Remind the students that they are scientists. Ask: How do you (as scientists) use your senses? Read My Five Senses by Aliki.

PART 1

EXPLORE
Ask the class: What tools do scientists use to observe or look carefully? Today we are going to use a hand lens to look at our rocks more closely.

Watch How to use a Magnifying Glass https://www.youtube.com/watch?v=2dz-pYo2V6eI. Demonstrate the correct way to use it, holding the lens near the object, not their eye. Show them how to bring it closer and farther from their rock.

Show one students’ drawing of their rock from Lesson 2. Ask students if they remember what they observed about their rock. Have them observe their same rock from the previous lesson and draw it on the second half of the My Rock Looks Like observation sheet.

EXPLAIN
Ask the class: How did the hand lens help gather more information about your rock? Ask the students to share one thing they noticed about their rock with the class. (Examples could be: I saw a jagged line, I noticed black specks.)

ELABORATE
Ask the class: What about our sense of touch? What can we find out about our rock through touching it? How does it feel? Have the students trade rocks with a partner. How does their rock feel different. Have them switch rocks again.

SAFETY TIP:
Sometimes scientists cannot use all their senses, for example it would not be a good idea to taste our rocks. They are not clean and could make us sick.
Lesson 3 continued: What senses do we have?

PART 2

EXPLORE

Ask the class: How do our senses help us? Review the five senses and parts of the body associated with each sense. Watch How Do Our Senses Help Us? https://www.youtube.com/watch?v=9Rf0f2-6c4I

Have the class sit in a circle. Ask: We smell with our noses, don’t we? I am going to pass some jars around for us to smell. See if you can recognize the smell, then pass the jar to your neighbor.

Discuss how some smells are pleasant and some are unpleasant. Brainstorm a few pleasant smells and a few unpleasant smells. Have students draw 1 or more items with a pleasant smell and an unpleasant smell in their science journals. Have a few students share an idea with the group and record on a t-chart. Pleasant/unpleasant or good smells/bad smells, etc. Ask: What does each smell make you think of? For example, Pizza cooking makes me think of lunch. Stinky trash makes me want to get away or take it out. Our senses help us by gathering information and to help us to make decisions.

EXPLAIN

Ask the class: How do scientists use their ears and their listening sense to learn or make decisions? Read Listening Walk.

Take a quiet walk around the school, outside or just sit quietly in the classroom. If walking outside of the classroom, pause at different places to sit quietly and record sounds that are heard in science notebooks. Have students bring their science notebooks on the walk (or with them in the classroom) and record with pictures or words any sounds that they hear. At the end of the activity, have a few students share a sound they heard with the class. Have the rest of the class give a silent signal (thumbs up, etc.), if they heard that same sound, too.

Go to freesound.org. Type in the searchbox for each new sound. With each sound, ask students: When your ears hear _____, what does it make you think of? Then play the sound. Possible sounds: children laughing, thunder, ambulance (siren), baby crying, dog barking, etc. Examples, children laughing = having fun. Baby crying = she’s unhappy. Siren = there’s a fire. Our senses help us by gathering information and to help us to make decisions.

ELABORATE (OPTIONAL)

Ask the class: Can you use your five senses to describe a marshmallow (or other food)? Give students a marshmallow. Have them use their five senses to investigate and document. They can break the marshmallow apart to determine texture inside and out.

EVALUATE

☐ Ask: Which sense would you use? Pass out the Which Sense Would I Use? (Appendix iii) and have them draw lines connecting the body part to the activity.
Lesson 4: What tools do scientists use to help their senses?

LEARNING TARGET
Demonstrate how using different tools enhances ability to learn new things.

SUMMARY
Students will be introduced to and investigate different tools that scientists use.

ENGAGE
Tell the class: We know that scientists use their senses to help them gather information. What else do scientists use to help their senses? Remember the hand lens we used to see the rock better? Scientists use tools. Display the tools of each station. Ask if anyone has ever used any of these tools before and what they used them for.

EXPLORE
Explain that there are 8 different stations around the room with specific tasks.

The students will rotate through each station. Show the Station Activity Chart (Appendix iv) as you are explaining what they will do at each station. The students will put an X on each station picture after they complete the activity at the station.

Station 1: Students need to put on their safety glasses. Then one student uses the squirt bottle to put one squirt of water on their own face, and pass the bottle to the next person. The students observe and discuss how the safety glasses helped keep water out of their eyes.

Station 2: The teacher sets the timer for 1 minute. In that time the students need to jump, or clap, or do something until the timer goes off.

Station 3: The students use the magnifying glasses to examine the very small pictures and match them to the larger pictures.

Station 4: The students use the droppers to carefully put drops of water on the penny.

Station 5: The students compare the temperature of the two thermometers, one in cold water and the other in warm water.

Station 6: The students compare their rock with the number of counting cubes on the balance. The students can also compare their rock with other student’s rocks on the balance to see whose is heavier.

Station 7: The students take turns filling up the large measuring cup using the smaller ones.

Station 8: The students look through the scope at the different items on the slide.

MYSCI MATERIALS:
*What is a Scientist?* by Barbara Lehn, from Lesson 1

Station 1
- 4 safety glasses and 1 spray bottle
- 30 wipes

Station 2
- 1 kitchen timer

Station 3
- 4 magnifying glass
- 4 mini photos
- 4 matching large photos

Station 4
- 4 droppers
- 4 pennies
- 1 small bowl for water

Station 5
- 2 immersible thermometers
- 2 small containers for water

Station 6
- 1 balance
- 2 plastic cups (to hold the cubes on the balance)
- 15 Unifix cubes
- student rocks (from Lesson 2)

Station 7
- 1 set of plastic measuring cups
- 1 clear plastic large measuring cup
- 1 bag of sand
- 1 aluminum pan to hold the sand

Station 8
- 1 Brock Microscope
- 1 slide with 4 different things to observe

TEACHER PROVIDES:
Copies of Station Activity chart (Appendix iv)

Teaching Tip:
Teachers can set these stations up a few at a time during center/choice time and have students rotate through. Have the students bring their rock to the stations.
Lesson 4 continued: What tools do scientists use to help their senses?

EXPLAIN
☑ Ask the class: How did we use the tools at each station? Take students' responses and record them. How do scientists use tools to help them?
Reread the book: What is a Scientist? Point out the different tools in the book and how they are used.

ELABORATE
Ask the class: Did anyone use any of the tools in a different way? For example, what else can you use a thermometer for?

EVALUATE
☑ Ask students: How does a magnifying glass, microscope or goggles help your sense of sight when doing an investigation? Tell students to draw a picture of themselves as a scientist using one of these science tools and explain how it helps their sense of sight.
Lesson 5: What do scientists learn by sorting?

LEARNING TARGET
Observes and describes objects by physical properties.

SUMMARY
Students sort their rocks and then sort other materials as well.

ENGAGE
Reread the rock sorting page of Spenser and the Rocks, about 1/3 the way through the book. Discuss the different ways Spenser “arranged’ his rocks.

EXPLORE
Ask the class? What about our class rocks? How can we arrange these rocks? Divide the class into groups of 4 students. Give each group 6 rocks. Ask them to “arrange,” or put the rocks into groups.

EXPLAIN
Ask each group, Why did you sort that way? If any group said they put all the “pretty” rocks together, ask them if everyone agrees which ones are “pretty”. Scientists use the “properties” or characteristics of rocks to sort them, things that can be measured or agreed on, like size, shape, color, etc.

ELABORATE
In their same groups, this time pass out the bags with the 6 different items in them. Ask the students to sort these items into groups. Possible sorting could include color, softness, uses, etc. Repeat the process they went through with the rocks. If no students noticed that some items were nature made and others were people made, bring it up.

EVALUATE
Have each group of four explain how they sorted the items, either from the bag or the rocks, making sure the students describe the properties.

MYSCI MATERIALS:
Materials form previous lessons
Spenser and the Rocks (from previous lessons)
Student rocks (from previous lessons)
6 bags each containing:
1 feather,
1 small bouncy ball,
1 swatch fabric,
1 piece of aluminum foil,
1 small marble,
1 small wooden block

TEACHER PROVIDES:
Science notebooks

Teaching Tip:
The lesson can be separated into Engage, Explore and Explain (1 session); and Elaborate, Evaluate (1 session).
Lesson 6: What is an experiment?

LEARNING TARGETS
Use a scientific process to make a prediction, design a fair test, record data, and share results.

SUMMARY
Students explore whether their rock sinks or floats, using the scientific method.

ENGAGE
Ask the class: How do scientists learn things? We have observed and sorted. We have asked questions, now we are going to talk about testing our hypothesis or predictions. Pass out the What Scientist Do worksheet (Appendix v) and have them practice moving their clothes pins through the different steps. Have a discussion on what each step means.

EXPLORE
Ask the class: When we sorted our rocks, did anyone put them in groups of “heavy” and “light”? Does anyone wonder if their rock can float? How would we test our hypothesis?
After discussion, and recording their predictions or hypothesis on a piece of chart paper. The chart paper should have a float and a sink column, and the students can put their name under which one they think their rock is going to do. Bring out the clear container, fill with water and let each student drop their rock in the water and observe the results.

EXPLAIN
Ask: Were our predictions right? Review the prediction chart and the results. Have each student write their prediction and result in their science notebook.

ELABORATE
Ask: Remember the objects we observed that were in the paper bags? DO you think any of those objects can float. Make a list of the objects and have the students vote on weather they will float or sink. Test each object in the container of water, and review the results in comparison with their predictions.

EVALUATE
Draw a picture of yourself as a scientist in your science notebook.

MYSCI MATERIALS:
1 clear container for holding water
30 small clothes pins

TEACHER PROVIDES:
Rocks from previous lesson
Copies of What Scientists Do worksheet (Appendix v)
Copy and administer post test
Science notebooks

Teaching Tip:
More about using predictions for sink and float are in this article: http://static.nsta.org/files/sc1404_18.pdf
Key to Understanding the NGSS Codes

NGSS codes begin with the grade level, then the “Disciplinary Core Idea code”, then a standard number. The Disciplinary Core Ideas are:

**Physical Sciences**
- PS1: Matter and its interactions
- PS2: Motion and stability: Forces and interactions
- PS3: Energy
- PS4: Waves and their applications in technologies for information transfer

**Life Sciences**
- LS1: From molecules to organisms: Structures and processes
- LS2: Ecosystems: Interactions, energy, and dynamics
- LS3: Heredity: Inheritance and variation of traits
- LS4: Biological evolution: Unity and diversity

**Earth and Space Sciences**
- ESS1: Earth’s place in the universe
- ESS2: Earth’s systems
- ESS3: Earth and human activity

**Engineering, Technology, and Applications of Science**
- ETS1: Engineering design
- ETS2: Links among engineering, technology, science, and society

For more information, visit [http://www.nextgenscience.org/next-generation-science-standards](http://www.nextgenscience.org/next-generation-science-standards)

---

**NGSS PERFORMANCE EXPECTATIONS**

---

**K-2-ETS1-1**
Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

**K-2-ETS1-2**
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

**K-2-ETS1-3**
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
### SCIENCE AND ENGINEERING PRACTICES

#### Asking Questions and Defining Problems:
- Ask questions based on observations to find more information about the natural and/or designed world(s).
- Ask and/or identify questions that can be answered by an investigation.

#### Developing and Using Models:
- Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).
- Develop a simple model based on evidence to represent a proposed object or tool.

#### Planning and Carrying Out Investigation:
- With guidance, plan and conduct an investigation in collaboration with peers (for K).
- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.
- Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.
- Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.
- Make predictions based on prior experiences.

#### Analyzing and Interpreting Data:
- Record information (observations, thoughts, and ideas).
- Use and share pictures, drawings, and/or writings of observations.
- Compare predictions (based on prior experiences) to what occurred (observable events).
- Analyze data from tests of an object or tool to determine if it works as intended.

#### Using Mathematics and Computational Thinking:
- Use counting and numbers to identify and describe patterns in the natural and designed world(s).
- Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs.

### DISCIPLINARY CORE IDEAS

**Engineering Design**

ETS1.A: Defining and Delimiting Engineering Problems

Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)

### CROSSCUTTING CONCEPTS

**Patterns**
- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

**Cause and Effect: Mechanism and Prediction:**
- Events have causes that generate observable patterns.
- Simple tests can be designed to gather evidence to support or refute student ideas about causes.

**Scale, Proportion, and Quantity**
- Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower).
- Standard units are used to measure length.

**Systems and System Models**
- Objects and organisms can be described in terms of their parts.
- Systems in the natural and designed world have parts that work together.

**Energy and Matter: Flows, Cycles, and Conservation**
- Objects may break into smaller pieces, be put together into larger pieces, or change shapes.

**Structure and Function**
- The shape and stability of structures of natural and designed objects are related to their function(s).

**Stability and Change**
- Some things stay the same while other things change.
- Things may change slowly or rapidly.
Key to Understanding the GLE Codes

GLE codes are a mixture of numbers and letters, in this order: Strand, Big Idea, Concept, Grade Level and GLE Code.

The most important is the strand. The strands are:
1. **ME**: Properties and Principles of Matter and Energy
2. **FM**: Properties and Principles of Force and Motion
3. **LO**: Characteristics and Interactions of Living Organisms
4. **EC**: Changes in Ecosystems and Interactions of Organisms with their Environments
5. **ES**: Processes and Interactions of the Earth’s Systems (Geosphere, Atmosphere and Hydroshpere)
6. **UN**: Composition and Structure of the Universe and the Motion of the Objects Within It
7. **IN**: Scientific Inquiry
8. **ST**: Impact of Science, Technology and Human Activity

For more information, visit [http://dese.mo.gov/college-career-readiness/curriculum/science](http://dese.mo.gov/college-career-readiness/curriculum/science)
My Rock Looks Like — Observation Sheet

Section 1, Lesson 2

<table>
<thead>
<tr>
<th>MY ROCK LOOKS LIKE THIS:</th>
<th>MY ROCK LOOKS LIKE THIS UNDER A HAND LENS:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Which Sense Would I Use?

Section 2, Lesson 3

Draw a line from the body part to the object that uses that sense. Can some be for more than one object?
Station Activity Chart
Section 2, Lesson 4

1 SQUIRT

HOT OR COLD?

HOW LONG?

HOW HEAVY?

WHAT MATCHES?

HOW MUCH?

HOW MANY?

WHAT IS IT?
Vocabulary Words

All Sections and Lessons

RECOMMENDATION
We recommend that students participate in investigations as they learn vocabulary, that it is introduced as they come across the concept. MySci students work collaboratively and interact with others about science content also increasing vocabulary. The hands-on activities offer students written, oral, graphic, and kinesthetic opportunities to use scientific vocabulary and should not be taught in isolation.

scientist
taste
rocks
tongue
observe
ears
wonder
hear
questions
senses
see
tools
eyes
hand lenses
smell
microscope
nose
balances
touch
measure
skin