MIGHTY MAGNIFIERS

BIG IDEA 5: EARTH IN SPACE AND TIME

BENCHMARKS AND TASK ANALYSES

SC.1.E.5.3 Investigate how magnifiers make things appear bigger and help people see things they could not see without them.
The student:

- observes various objects with and without magnifiers and discusses how observations differ.
- observe the differences in observations when using a variety of magnifiers (including hand lenses, telescopes, binoculars, microscopes).

SC.1.N.1.1 Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.
The student:

- raises questions about the natural world.
- explores questions about the natural world with a team of students through free exploration and generates appropriate explanations for what was observed.

SC.1.N.1.2 Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.
The student:

- uses the five senses as tools to:
    - make careful observations.
    - describe objects in terms of number, shape, texture, size, weight, color, and motion.
    - compare own observations with observations of others.

SC.1.N.1.3 Keep records as appropriate - such as pictorial and written records - of investigations conducted.
The student:

- keeps records, such as student-drawn illustrations, science notebooks, or digital media, of investigations conducted.

SC.1.N.1.4 Ask "how do you know?" in appropriate situations.

KEY QUESTION

How do magnifiers change the way we see objects?

TEACHER BACKGROUND INFORMATION

Magnifiers are tools used to enlarge what a student sees. Students need to be able to demonstrate that magnifiers help people see things they could not see without them.
Not all magnifiers are alike and it is important to present students with a variety of types and strengths of magnifiers so that students gain an understanding how different magnifiers can be used for different tasks.

MATERIALS

Teacher/Class

chart paper, markers
microscope
binoculars

Per student

science notebook and pencil
magnifying lens
2-inch square of fabric

telescope (if possible)
various magnifiers
various objects to observe
observation chart

SAFETY

- Always follow OCPS science safety guidelines.

TEACHING TIPS

- Provide an assortment of magnifiers which should include Fresnel lenses, hand lenses of various sizes and degrees of magnification; magnifiers used for different purposes: reading glasses, binoculars, microscopes, etc.
- Provide an assortment of items to be observed.

ENGAGE

1. Show a magnifying lens to students. Ask students to describe where they have seen this tool and how it was being used.
2. Give each student a magnifying lens and ask students to explore items throughout the classroom with their magnifying lenses. Allow five minutes for student exploration.
3. Bring students together and discuss student discoveries about using the magnifiers. To guide student discussion, ask the following questions:
    - *What things did you look at with the magnifying lens?* (List items on chart paper.)
    - *Which items were easier to see using the magnifying lens?*
    - *Did you find anything surprising when you were using the magnifying lens?*

EXPLORE

1. Distribute a hand lens and a fabric square to each student.
2. Direct students to look at their fabric squares and draw what they see without the magnifying lens in their science notebook.
3. Have students write words that describe what the fabric looks like on the lines to the right of their drawings.
4. Discuss the properties of the fabric.
5. Direct students to look carefully at the fabric again, only this time using a magnifying lens.
6. Have students draw what they see and write descriptive words on the lines next to this drawing.

EXPLAIN

1. Ask: *What were you able to see without the magnifier?*
2. Ask: *What were you able to observe using the magnifier?*
3. Ask: *What is the difference between looking at the fabric without a magnifier and with a magnifier? How do you know?*
4. Ask: *What do you think you would see if you looked at the fabric under other magnifiers?*
5. Ask: *What do you think scientists use magnifiers for? How would that tool help them?*

EXTEND AND APPLY

1. Provide students time to explore looking at the fabric under other magnifiers such as microscopes and with binoculars.
2. Ask: *How are your observations different with and without a magnifier?*

ASSESSMENT

Teacher assessment through observation should include the following criteria:

- Tasks have been completed by the student.
- Student answers to questions should show evidence of conceptual knowledge.
- Student questions should be probing, on task, or reflect the processing of an essential understanding.

MAGNIFYING STARS

BIG IDEA 5: EARTH IN SPACE AND TIME

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KEY QUESTION

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Magnifiers are tools used to enlarge what a student sees. Students need to be able to demonstrate that magnifiers help people see things they could not see without them.
Not all magnifiers are alike and it is important to present students with a variety of types and strengths of magnifiers so that students gain an understanding how different magnifiers can be used for different tasks.

MATERIALS

Teacher/Class

chart paper, markers
microscope
binoculars

Per student

science notebook and pencil
magnifying lens
2-inch square of fabric

telescope (if possible)
various magnifiers
2 sheets of black paper
glitter glue

SAFETY

- Students should wear goggles when handling glitter.
- Always follow OCPS science safety guidelines.

TEACHING TIPS

- Provide an assortment of magnifiers which should include Fresnel lenses, hand lens of various sizes and degrees of magnification; magnifiers used for different purposes: reading glasses, binoculars, microscopes, etc.
- For the glitter, get the finest grains as possible or use glitter glue. The students should not be able to count the number of grains of glitter on the paper.

ENGAGE Day 1

1. Share the book *How Much is a Million* by David Schwartz and Steven Kellogg.
2. Ask: *Is a million of something easy to see?*
3. Ask*: Is a million of something easy to count*?
4. Ask: *If we wanted to count all the stars in the sky, could we*?

EXPLORE Day 1

1. Pass out 2 pieces of black paper, a white crayon, and glitter glue to students.
2. Have students spread some glitter glue on one sheet of the black paper.
3. On the other sheet of black paper, tell students to use the white crayon and draw stars. Ask them to draw as many stars as they think there are in the sky.
4. Collect the papers and allow the glitter glue to dry. These will be used the next day.

ENGAGE Day 2

1. Remind students of the activity that they did with the fabric and the magnifier.
2. Ask: *How are observations different when we look at objects with and without magnifiers?*

EXPLORE Day 2

1. Distribute the black paper with glitter glue and the black paper with the stars from the previous day.
2. Ask students to look at both pieces of paper with their eyes and draw observations in their science notebooks.
3. Once students have made their observations with their eyes, allow them to use the magnifier and make observations in their notebook.
4. Allow student pairs or groups to share with each other their observations.
5. Ask: *What was the difference when you looked at your paper with and without the magnifier?*
6. Tell students to count the number of stars they drew on the one piece of black paper and write the number in their notebook.
7. Ask: *How can we count the number of pieces of glitter on our glitter glue paper?* (try to use the magnifier)
8. Ask: *Why would we want to use a magnifier?* (because the pieces of glitter are very small and it would be easier to count them with a magnifier)

9. Tell students to count the pieces of glitter. (NOTE they should not be able to do this, just give them a few moments for them to understand that this is a fairly impossible task.)
10. If possible, have students take turns looking through the telescope and another student's black glitter glue paper from across the room. Note the difference in observations.

EXPLAIN

1. Ask: *What was the difference when you looked at your glitter glue paper with and without the magnifier?*
2. Tell students that the glitter glue paper is a model of the night sky. Tell them that each piece of glitter represents a star.
3. Ask: *How would a magnifier help people see the stars when looking in the sky?*
4. *Ask: Were you able to count all the pieces of glitter?*
5. *Ask: Do you think you could count all the stars in the sky if you had a magnifier?* (tell them you could not and that often magnifiers only help us see things and do not enable us to see things that are really small or really far away)

EXTEND AND APPLY

1. Move into the next lesson, Night Journals, to extend the concept of stars in the sky.
2. Allow students various experiences using magnifiers to look at objects.

ASSESSMENT

Teacher assessment through observation should include the following criteria:

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NIGHT JOURNALS

BIG IDEA 5: EARTH IN SPACE AND TIME

BENCHMARKS AND TASK ANALYSES

SC.1.E.5.1 Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.
The student:

- records personal observations of the sky during the night hours focusing on the placement and amount of stars (many or few).
- discusses personal observations emphasizing that there are more stars in the sky than one can easily count and they are not scattered evenly.

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SC.1.N.1.4 Ask "how do you know?" in appropriate situations.

KEY QUESTION

What observations can be made about stars?

TEACHER BACKGROUND INFORMATION

The Earth makes a complete revolution on its own axis every twenty four hours and rotates around the sun in 365 days. Daytime occurs when a portion of Earth is facing toward the Sun during rotation. Nighttime occurs when the portion of the Earth is facing away from the Sun. To the young child, it seems that the Sun is moving when in fact, it is the Earth's movement that makes the Sun appear to move.

MATERIALS

Teacher/Class

binoculars
photographs of the night sky with stars visible
access to the Internet with projection capability

Per student

night journal

telescope (if available)

SAFETY

- Students should not look directly into the Su n.
- Always follow OCPS science safety guidelines.

TEACHING TIPS

- Make one journal for each child prior to the lesson. Use newsprint cut in half for a ten page journal. Staple on the left hand side and write *Night Journal* on the cover.
- Send home a note with the journal on the first day of the lesson for parents instructing them:
    - To go outside with their child to observe the stars at night and then have the child draw what he/she saw in the journal.
    - To allow students the opportunity to look at the sky with binoculars at least a few times. (provide access to binoculars for those that do not have access)
    - Be sure to tell parents in the note that the journal is to come back to school each day.
    - Note that it would beneficial, if possible, for parents to take their child to the Orlando Science Center one night to experience looking at the sky with a telescope.
- The teacher should keep a class journal, also.
- The night before teaching this lesson, make the first observation in the class Night Journal.
- Record data for the next three weeks while students are also recording data (to total one month of observations).

ENGAGE

1. Read *Harold's Trip to the Sky* by Crockett Johnson (or another book about the sky)
2. Ask*: When you look into the sky, what do you see?*
3. Ask*: If we looked at the sky at night, what might you see?*
4. Share images of the night sky:
    - If possible, use the document camera to project the Internet and go to http://www.fourmilab.ch/yoursky/. You can look at images of the sky as if you were looking up at it in our area. The nearest area is St. Petersburg, FL. Select that area and share with students the images.
    - If no document camera is available or you cannot go to a computer lab, share photographs of the sky with students.
5. Ask: *What do you see?*
6. Ask: *Are there a lot of stars in the sky or are there a few?* (a lot) *How would you know?*

EXPLORE

1. Share the class Night Journal. Tell students that last night you looked up into the sky and observed the stars. Tell them that you made observations of where the stars were and how many there were.
2. Ask: Do you think I was able to draw all the stars in the sky last night? (no, there are too many than anyone can count)
3. Remind students of the glitter glue paper they created in the OCPS Magnifying Stars lesson.
4. Ask: Were you able to count all of the pieces of glitter on your glitter paper? (no)

5. Tell students that the stars in the sky are similar. There are so many that they cannot be counted easily.
6. Tell students that they are going to begin observing the stars themselves. Tell them that every night they are to look at the sky and make an observation in their *Night Journal* of what stars they see and how many they can count.
7. Use the class *Night Journal* and model how you made the observations.

EXPLAIN

Throughout the month, take moments to discuss student observations from the night before. During various class periods:

- Have students share their observations and discuss the differences in observations. Prompt students to ask their colleagues, "How do you know?" about their observations.
- Share the class observations with a focus on the placement of the stars and the fact that they are scattered unevenly in the sky.
- Remind students that there are too many stars to count.
- Ask: *Do your observations look the same each night?* (they should not)
- Ask: *Are the stars scattered evenly across the sky? Do they make a pattern?* (no)
- Ask: *Are you able to count the stars each night?*

ASSESSMENT

As you observe your students, look for the following behaviors:

- Are they making realistic observations and recording them in their journals?
- Are they able to determine that there are many stars in the sky and they are not scattered evenly?

THE SUN PROVIDES LIGHT AND HEAT FOR EARTH

BIG IDEA 5: EARTH IN SPACE AND TIME

BENCHMARKS AND TASK ANALYSES

SC.1.E.5.4 Identify the beneficial and harmful properties of the Sun.
The student:

- identifies the beneficial and harmful properties of the Sun through discussion, experimentation, and literature experiences.

KEY QUESTION

Why is the sun important to earth?

TEACHER BACKGROUND INFORMATION

The sun provides us with heat and sunlight which are necessary for plants and animals to survive. Extended exposure to the sun could cause damage to living organisms.

MATERIALS

Teacher

umbrellas,
extra thermometers
construction paper

Per student

2 pieces of construction paper (white),
2 sets of objects which include a piece of candy, crayon, candle, metal washer and a piece of wood
two thermometers
student science notebooks

SAFETY

Be extremely careful handling melted objects. Students will be careful to not get burned by materials left in the sun for long periods of time.

TEACHING TIPS

Make sure materials that are left in the sun are placed on construction paper to avoid a mess. Set up areas with the umbrellas to provide shaded areas at least an hour before the activity in order to allow the area to have a lower, constant temperature than the unprotected areas.

ENGAGE

1. Read to the students a piece of literature that focuses on the Sun, such as the RedBrick book, *The Sun*.
2. Ask, "*Why is the sun important to Earth?"*
3. Use guided questions to explain that plants need light to grow; people and animals need plants for food; without heat from the sun earth would be too cold for people, plants and animals to live.
4. Ask the students what happens if an object is left in the sunlight for very long.

EXPLORE

1. Take the students outside and place materials (chocolate, candle, crayon, metal washer and wood) on construction paper in the shaded area and the un-shaded area.
2. Place a thermometer on the construction paper with each of the two groups of materials.

3. In the student science notebooks draw a picture of each of the materials as the activity begins.
4. Leave the materials alone for 30 minutes.
5. Return periodically and observe the changes.
6. After 30 minutes return to the materials and observe and draw pictures depicting any changes observed.
7. With each drawing write the temperature recorded at the area.

EXPLAIN

1. Ask students to report on what they have observed and to share their before and after drawings.
2. On a chart, record the temperatures measured as the activity began and the final temperature measured.
3. Ask: *What changes did you observe?"*
4. Ask: *Why do you think changes took place?*
5. Ask: *Would the results have been the same at different times of the day or night? Why or why not?*
6. Ask*: How can too much sun be harmful to you?*
7. Ask*: What do you think would happen on a cloudy day?*

EXTEND AND APPLY

1. Repeat the activity using a different group of materials (jelly beans, clay, plastic fork, shell, etc.) and ask the students to make a prediction on the changes they predict might take place with each of the individual objects, based upon the past activity.
2. Participate in the first grade activities found in the *Sunwise* Program created by the Environmental Protection Agency. This program includes lessons, contests, challenges and videos focusing on how to protect from the harmful effects of over exposure to the sun. (http://www.epa.gov/sunwise/resources.html)

ASSESSMENT

Teacher assessment through observation should include the following criteria:

- Tasks have been completed by the student.
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