Interdisciplinary Connections

See pages 26-29 for the complete wording of the Texas Essential Knowledge & Skills for each content area addressed in this learning experience.

Language Arts TEKS

- Listening & speaking
- Vocabulary development
- Writing
- Connecting reading, writing, and inquiry

Social Studies TEKS

- Identification of historical figures
- Location of places on maps

Properties, Patterns, & Change

Mathematics TEKS

- Comparison of shapes
- Collect/organize data
- Communicate observations

Art TEKS

- Organizes information from environment
- Creation of artworks

Overview of Learning Experiences

TEKS	**1.5** The student knows that objects and events have properties and patterns. The student is expected to: (A) sort objects based on properties and patterns. **1.7** The student knows that many types of change occur. The student is expected to: (A) observe and record changes in size. ***To read the complete TEKS student expectations for 1.5 and 1.7, see page 26.***
Engage	✦ Students observe and describe the property of an object to allow light to pass through it thus making it see-through. ✦ Students observe changes in the appearance of objects placed behind a container of water.
Explore	✦ Students manipulate various materials to test their effect on changing the appearance of objects placed behind them.
Explain	✦ Students communicate and analyze their results for patterns. ✦ Students connect the words "magnifier" and "transparent" to their concrete experiences. ✦ Students sort magnifiers and non-magnifiers on a Venn diagram based upon their properties.
Elaborate	✦ Students identify the parts of a hand lens, classify it as a magnifier, and use it to observe and draw details of both manmade and natural objects. ✦ Students compare and contrast the properties of a hand lens to other objects that magnify. ✦ Students create an analogy based upon their observations with the hand lens.
Evaluate	**SUMMATIVE ASSESSMENT** ✦ The student uses writing and selected response items to demonstrate his/her ability to observe and record change, sort objects based on properties, and use information to make and justify a decision.

ENGAGE

Materials (details p. 23)

For the class:
- ☐ clear, round jar filled with water
- ☐ painted, round jar filled with water
- ☐ 2 pictures of bird, Master A
- ☐ flashlight or laser pen

ENGAGE

1. Place the jar on a demonstration table. Gather students around the site and conduct the following discussion:

Questioning Strategies

- When I look at you through this jar, what do you notice? Can you see me? How do I look? *(acknowledge all responses)*
- What will happen if I place this picture behind the jar? Will the bird look different? In what way? *(acknowledge all responses)*
- Hold up both of the pictures placing one behind the jar. This will allow students to compare any changes they observe.
- Do all jars of water make things look bigger? *(acknowledge all responses)*

The picture of the bird placed behind the jar appears bigger and stretched out sideways.

2. What about this one? Bring out the painted, round jar. Allow students to discuss that it does not make things look bigger because you cannot see through it.

Questioning Strategies

- Why can we see through this jar but not through that one? *(students may say because there is paint on that one)*
- What does the paint do to keep us from seeing through the jar? *(lead students to realize that light must pass through jar for us to see through it)*
- Use flashlight or laser pen to demonstrate that light passes through clear jar and makes a bright spot on your hand but does not pass through painted jar.
- What must go through an object for us to see through it? *(light)*
- What happens if light cannot go through an object? *(we cannot see through it)*

ENGAGE

3. By comparing our two jars, what is one property of objects that can make things look bigger? *(acknowledge all responses; students may or may not be able to tell you at this time that light must pass through the object causing it to be clear or see-through)*

Questioning Strategies

- What are some other objects that can make things look bigger? *(acknowledge all responses; Note: Based on the TEKS, students should have used hand lenses in kindergarten.)*
- Why would people want to make things look bigger? *(acknowledge all responses)*
- Ask students if they would like to test some objects to find out if they can make things look bigger and what materials they think they might need. During the discussion, ***make certain students do not leave out the fact that they will need light.***

Young children bring experiences, understanding, and ideas to school; teachers provide opportunities to continue children's explorations in focused settings with other children using simple tools such as magnifiers.

National Science Education Standards, p. 123

EXPLORE

1. Provide each group of students with a container of materials to test including some that will magnify and some that will not.

2. Explain to students that their job is to test the objects in the container to find out 3 things: Can you see through it? Is its top surface curved? Does it make things look bigger? Provide each student with a piece of cardstock that has a message printed in a font size that is small enough to cause difficulty in reading. A sample is provided in the Masters section or teachers may want to personalize the message for students.

3. Using an overhead transparency, discuss the format of the data sheet. Explain to students that the pictures of the objects are drawn from a side view. Have students place one of the objects on the table and get down eye level to examine it from the side. From this view, students should determine if the object's top surface is curved. In each box, students will circle yes or no to record their observations.

4. Allow ample time for students to manipulate materials and discuss observations with others. Monitor groups as needed and address any confusion concerning the observation of a "curved" surface from a side view.

Materials (details p. 23)

For the class:
- ☐ *Making Things Look Bigger Data Sheets,* Masters B-C

For each group:
- ☐ testing materials: plastic cube, foam ball, plastic cylinders, droppers, water, concentrated tea, plastic squares, clear marble, green marble, wooden ball

For each student:
- ☐ Secret message card, Master D
- ☐ *Making Things Look Bigger Data Sheets*, Masters B-C

EXPLORE

K through Grade 2:

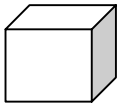
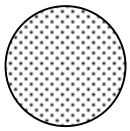
Students should know that in doing science, it is often helpful to work with a team and to share findings with others. All team members should reach their own individual conclusions, however, about what the findings mean.

Benchmarks for Science Literacy, p. 15

EXPLORE

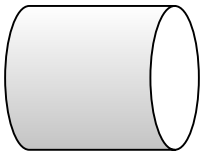
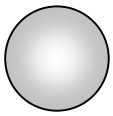
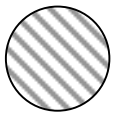
Making Things Look Bigger (See Master B)

Data Sheet 1

 plastic cube	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigge yes or no
 drop of water	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigge yes or no
 foam ball	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigger? yes or no
 drop of tea	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigger? yes or no
 plastic cylinder	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigger? yes or no

Making Things Look Bigger (See Master C)

Data Sheet 2

 plastic cylinder	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigg yes or no
 glass marble	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigger? yes or no
 green marble	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigger? yes or no
 green square	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigger? yes or no
 wooden ball	Can you see through it? yes or no	Is its top surface curved? yes or no	Does it make things look bigger? yes or no

EXPLAIN

1. To communicate their findings, gather students around a T-chart placed on the floor.

2. As you hold up each tested material, ask students to refer to their data sheets and discuss whether the object made things look bigger or not. Test any objects that had discrepant results as a class. Place objects that made things look bigger under the "Magnifier" column of the chart. Place objects that did not make things look bigger under the "Not a Magnifier" column. After all items have been discussed and placed in the proper column on the chart, ask the following questions:

Questioning Strategies

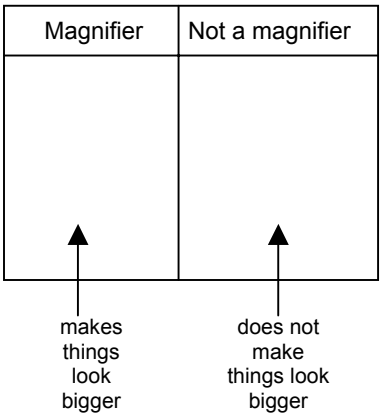
- All of the things in this column can do what? *(make things look bigger; write "makes things look bigger" at bottom of column)*
- The things in this column cannot do what? *(make things look bigger; write "does not make things look bigger" at the bottom of the column)*
- Point to the word "magnifier" at the top of the column. Can anyone say this word? Let's all say it together: "magnifier."
- What do you think this word means? *Point to "makes things look bigger" written at bottom of column)*
- Explain to students that we use this word to describe objects that make other things look bigger.
- Why would people want to make things look bigger? *(acknowledge all responses)*
- Point to the items in the second column.
- Why didn't we place these things in the "magnifiers" column? *(do not make things look bigger)*

Materials (details p. 24)

For the class:
- ☐ pre-labeled T-chart

For each group of students:
- ☐ testing materials used in Explore activity
- ☐ Venn diagram sorting mat, Master E

EXPLAIN



K through Grade 2:

Students should know that magnifiers help people see things that they could not see without them.

Benchmarks for Science Literacy, p. 111

Questioning Strategies

- Why can't the things in this column ("Not a Magnifier") make things look bigger? *(cannot see through them and/or shape not curved)*
- What properties do all of the things in this column have? *(can see through them and at least one side has a curved shape)*
- Another word that means "see-through" is "transparent."
- What are some objects in this room that are transparent or see-through?
- As a class, generate sentences that describe the properties of magnifiers. Example: A magnifier is transparent and has a curved shape. It makes things look bigger.

** Note:* The introduction of the words "magnifier" and "transparent" does not occur until *after* students explore and discuss the concepts in a concrete manner.

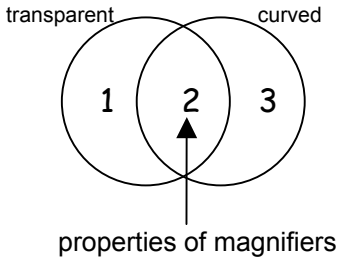
3. Distribute to each group of students a Venn diagram mat. Have students place the 10 objects from the Explore activity into the correct section of the diagram. The plastic cube and green disc belong in Section 1, the two cylinders, glass marble, green marble, and water drop belong in Section 2, and the wooden ball, tea drop, and foam ball belong in Section 3. Conduct a formative assessment by visiting each group and having students explain their placement of objects on the Venn diagram.

K through Grade 2:

Young children should have many experiences in working with different kinds of materials, identifying and composing their properties and figuring out their suitability for different purposes.

Benchmarks for Science Literacy, p. 188

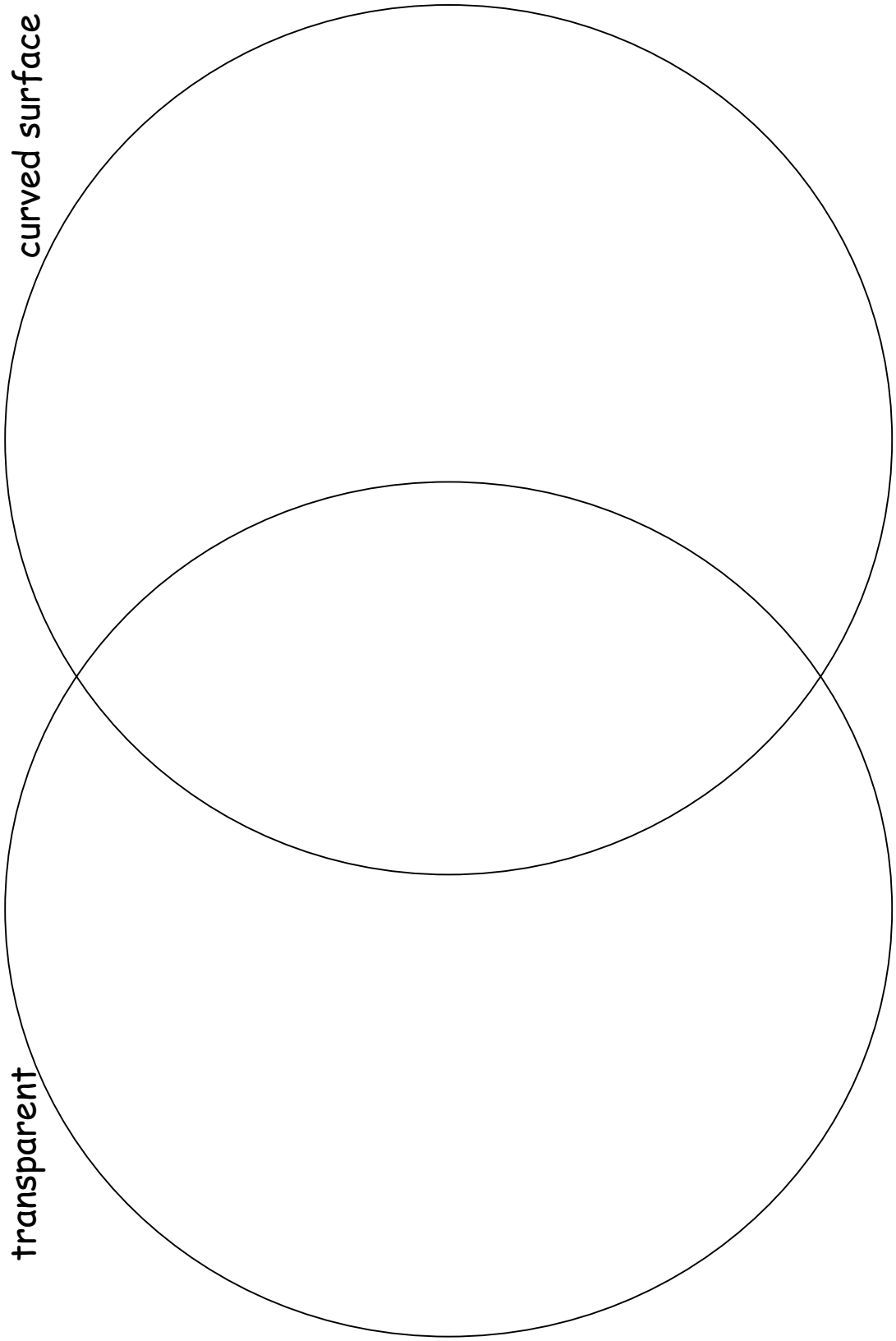
EXPLAIN



EXPLAIN

(See Master E)

Properties of Magnifiers



ELABORATE

Materials (details p. 24)

For each student:
- ☐ hand lens
- ☐ coins
- ☐ variety of natural objects
- ☐ *Hand Lens Data Sheet,* Master F
- ☐ *Magnifying Nature Data Sheet,* Master G
- ☐ collection of natural materials

ELABORATE

1. Provide each student with a hand lens. In small group discussions, have students share as many observations as they can about properties of the hand lens. In a whole group setting discuss the following:

Questioning Strategies

- Does anyone know the name of this tool?
- *Write "hand lens" on class chart. Draw a diagram of the hand lens.*
- Why do you think the word "hand" is in the name of this tool? *(demonstrate that we use our hand to hold that part; called handle; label handle on diagram)*
- What do you think the other end of this tool is called? *(lens; point to word on chart title; label lens on diagram)*
- Can you see through this tool? Why? *(yes; light passes through)*
- Look closely at the surface of the lens. Feel its shape. How would you describe its shape? *(curved; fatter in middle, thinner on edges)*
- What do you think this tool could be used for? *(make things look bigger)*
- Does this tool have the properties of a magnifier? Why? *(yes; transparent and curved)*

Hand lens

2. Give each student a penny and a *Hand Lens Data Sheet.* Have students trace their hand lens and label its parts.

ELABORATE

3. Walk students through the following steps to introduce or reinforce the use of a hand lens.

- Place the penny on a flat table or desk with the head side up.
- Hold the hand lens just above the penny.
- Looking through the lens, slowly move the lens away from the penny.
- Keep moving the lens slowly away from the coin until the penny looks blurry. Stop.
- Now slowly move the lens toward the coin until it is in clear focus.

K through Grade 2:

Students should begin to inspect things with a magnifying glass to discover features not visible without it.

Benchmarks for Science Literacy, p. 76

4. Have students study their penny using the hand lens and add details to the diagram on their data sheet. Encourage them to look at the coin with the hand lens several times so that they can include as many details as possible.

5. Discuss how the penny looked under the hand lens. On the class chart, draw items discussed by students inside a circle that represents the field of view. Explain that scientists often make drawings of what they see under a magnifier to help them remember the details. Keep adding details to the class drawing as students tell you what they drew. Discuss the following:

Questioning Strategies

- What did you see on the "heads" side of the penny? *(man's head, numbers, letters, etc.)*
- Who is the person pictured on the penny? *(Abraham Lincoln)*
- What do you know about Mr. Lincoln? *(president of U.S.; wanted equal rights for all Americans)*
- What do the numbers on the penny stand for? *(date/year penny was made)*
- Do you see the letter "D" under the date? The D stands for Denver, which is a city where the coin was made. If you can't see a D, it means that the coin was made in Philadelphia. Both Denver and Philadelphia are cities in the United States. *Point out the two cities on a U.S. map.*

ELABORATE

- Are these two cities in Texas? What states are they in? *(CO and PA)*

6. Practice with students the use of a hand lens as they observe both sides of nickels, dimes, and quarters for details. Allow students to discuss with each other things they have observed. Discuss the following:

Questioning Strategies

- Did you notice any patterns about where things such as the head of president, the date, or the letter of the city are placed? *(heads side of coin)*
- A penny is worth how many cents?
- What evidence did you find to prove your answer? *("one cent" printed on coin)*
- A nickel is worth how many cents?
- A quarter is worth how many cents?

K through Grade 2:

Students should know that patterns may show up in many places in nature and in the things people make.

Benchmarks for Science Literacy, p. 217

7. Bring out the objects from the Explore activity and have students compare the objects to the hand lens. How are the objects like the hand lens and how are they different? Which one is easiest to use? Which one makes things look the biggest, most stretched, brightest, etc.? Have students generate observations in small groups and then share in large group setting.

K through Grade 2:

Students should know that people can learn from each other by telling and listening, showing and watching, and imitating what others do.

Benchmarks for Science Literacy, p. 140

ELABORATE

SAFETY FIRST ALERT

Prior to taking students outside, preview the schoolyard area locating safety concerns that must be addressed with students.

7. Provide students with an interesting collection of natural materials such as leaves, flowers, pill bugs, soil, rocks, etc. If possible, allow students to go on a schoolyard safari with cups to collect the materials.

8. Have students use the hand lens to observe the samples from the collection. Selecting one sample they find most interesting, have students draw their observations on the first circle of the *Magnifying Nature Data Sheet.* Encourage the use of details.

9. Have students carefully observe their completed drawings and ask themselves "What does this remind me of?" and "What other object or material does this look like?"

10. In the second circle, have students draw something that "is like" or "looks like" the first drawing. For example, students may have observed the vein pattern in a leaf and decided that it reminded them of roads. Students are making one of their first analogies as they connect their current observation with a prior experience.

11. Have students think about WHY the object in their first picture "is like" the object in their second picture. For example, the veins in the leaf may act like roads for something to travel. This can be written in words or pictures after the WHY? on the data sheet.

12. Have students share their analogies with the rest of the class.

K through Grade 2:

Students should know that one way to describe something is to say how it is like something else.

Benchmarks for Science Literacy, p. 268

Imagery, metaphor, and analogy are every bit as much a part of science as deductive logic, and as much at home in science as in the arts and humanities.

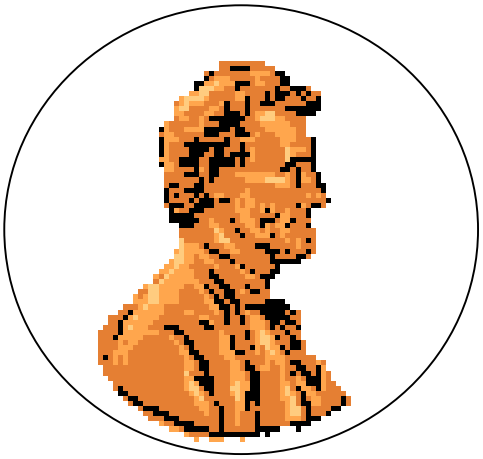
Benchmarks for Science Literacy, p. 267

ELABORATE

Hand Lens (See Master F)
Data Sheet

Trace and label
a hand lens. →

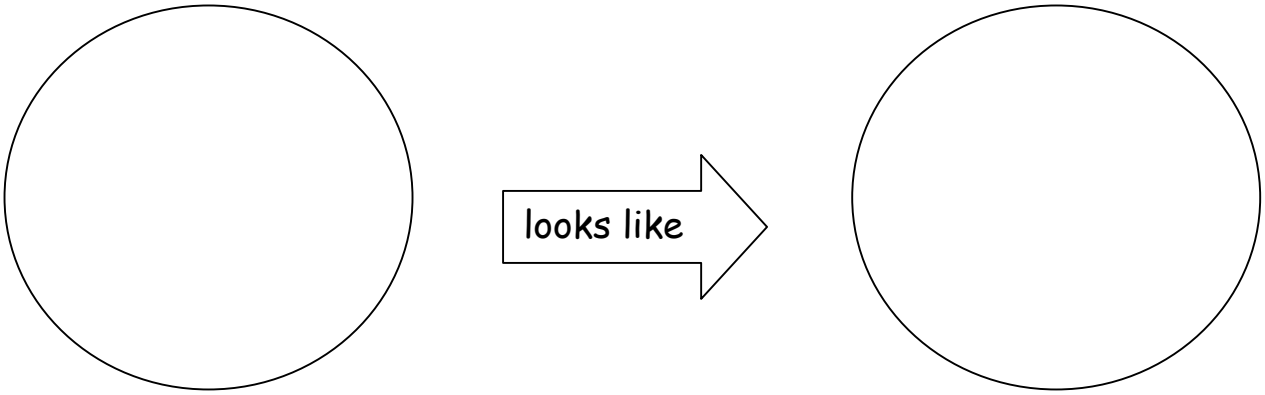
Use the hand lens to observe the penny. Add details of what you see in the circle. →

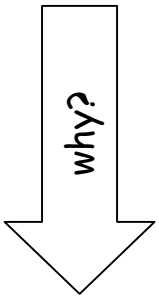


ELABORATE

Magnifying Nature (See Master G)

Data Sheet





EVALUATE

Set the stage for the summative assessment by explaining the instructions and expectations. Below is a general guide that may be modified to meet individual needs.

Administration Procedures:

1. Arrange students into groups of 4 but make sure each student has an individual workspace and copy of the performance task. Place a container of testing materials in the center of each group of students.

2. Remind students that you have been studying about magnifiers and how some objects can make things look bigger but some objects cannot. Emphasize that you expect them to listen carefully and follow all instructions exactly as you say them. As you give instructions, monitor students closely allowing adequate time for them to follow.

3. Have one student from each group remove the bag of 4 objects from the container. Have student remove the objects from the bag placing them in the center so that everyone in the group can reach them. ***The hand lenses should not be out of the container at this time.***

4. Tell students to imagine that we have lost all our hand lenses but we need to look closely at the pictures located on their sheet. Their job is to test the 4 items on the table and decide which one would be best to help us see the details of the pictures.

Materials (details p. 24)

For each group of students:
- ☐ container of testing materials: clear marble, clear cylinder, glue stick, clear flat marble, 4 hand lenses

For each student:
- ☐ *Magnificent Magnifiers Performance Task,* Master H-J

5. Have each student pick up one of the 4 objects from the table and place it in the box with the matching drawing on their paper. Remind students that the drawings were made from the side view and they need to get down eye level with the object to see it from this view.

6. Have students test their object and record their observations by circling "yes" or "no" for the two questions.

7. Have students pass the object to the student on their right.

8. Place the new object in the box with the matching drawing on their paper. Test the object and record observations by circling "yes" or "no" for the two questions.

9. Repeat steps 7and 8 two more times so that each student tests all 4 of the objects.

10. Read the instructions on the second page aloud. Make sure students circle their choice before they begin writing.

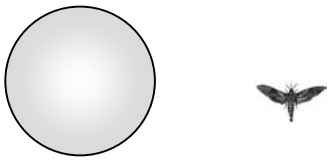
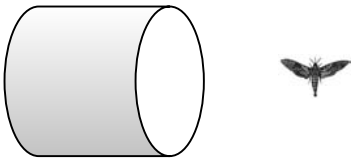
11. Have a student in each group distribute the hand lenses. Have students write their answers to the two questions on the third page.

* NOTE: For some students it may be more appropriate for the teacher to record the student's oral responses to the questions.

EVALUATE

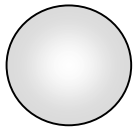
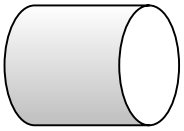
Magnificent Magnifiers (See Masters H-J)

Performance Task

	Does it make things look bigger? yes no	Is it a magnifier? yes no
	Does it make things look bigger? yes no	Is it a magnifier? yes no
	Does it make things look bigger? yes no	Is it a magnifier? yes no
	Does it make things look bigger? yes no	Is it a magnifier? yes no

EVALUATE

Which of the 4 objects that you tested makes the best tool for looking at the details in the drawing? Circle your answer.

Why did you pick that object?

What are some properties of an object that make it a magnifier?

How is your object like a hand lens?

How is your object different from a hand lens?

Magnificent Magnifiers Performance Task

Scoring Rubric

TASK	CRITERIA	LEVELS OF PROFICIENCY		
		Basic	**Proficient**	**Advanced**
TEKS 1.7 Observe and record change	Correctly identifies change in size of object's image	Correctly identifies less than 3 of 4 changes	Correctly identifies 3 of 4 changes	Correctly identifies all 4 changes
TEKS 1.5 Sort objects based on properties	Sorts objects as magnifiers	Correctly sorts less than 3 of 4 objects	Correctly sorts 3 of 4 objects	Correctly sorts all 4 objects
	Identifies properties of magnifiers (curved and transparent)	Correctly identifies 0 properties	Correctly identifies at least 1 property	Correctly identifies at least 2 properties
	Compares properties of objects	Describes less than 1 way object is like a hand lens and 1 way it is different	Describes at least 1 way object is like a hand lens and 1 way it is different	Describes at least 2 ways object is like a hand lens and 2 ways it is different
TEKS 1.3 Use information to make and justify decisions	Selects an object as a magnifier and explains why	Selects object that does not magnify	Selects object that magnifies but provides little or no evidence to support choice	Selects object that magnifies and provides evidence to support choice

Materials Detail Sheet

ENGAGE

For the class:

- ☐ 1 clear, round jar filled with water
- ☐ 1 painted, round jar filled with water
  Both jars need to be the same shape and size. Use spray paint to completely cover the outside of one of the two jars. Fill both with water.
- ☐ 2 pictures of bird
  Copy Master A and cut in half.
- ☐ 1 flashlight or laser pen

EXPLORE

For each group:

Testing materials: Place the following objects into a container for each group.

- ☐ 1 plastic cube; available from Carolina Biological
- ☐ 1 foam ball; available in craft and discount stores
- ☐ 1 plastic cylinder (large); available from Carolina Biological
- ☐ 1 plastic cylinder (small); available from Carolina Biological
- ☐ 1 clear, spherical marble; available in floral department of craft and discount stores
- ☐ 1 green flat-bottomed marble that you can see through; available in floral department of craft and discount stores
- ☐ 1 wooden ball; available in craft or discount stores
- ☐ 1 green plastic disc that you can see through; math manipulative used for counting
- ☐ 1 soda bottle cap filled with tap water
- ☐ 1 soda bottle cap filled with concentrated tea; mix instant tea powder into small cup of water until you cannot see through it
- ☐ 2 droppers
- ☐ clear transparency sheet cut into 10cm x 10cm squares (1 per student)
- ☐ transparency, *Making Things Look Bigger Data Sheet 1 and 2,* Masters B-C

For each student:

- ☐ 1 *Secret Messages* card, Master D
  Copy and cut into squares.
- ☐ *Making Things Look Bigger Data Sheets*, Masters B-C

Materials Detail Sheet

EXPLAIN

For the class:

☐ 1 sheet of large chart paper
Draw a T-chart on large paper. Label columns "Magnifier" and "Not a Magnifier"

For each student:

☐ container of testing materials used in Explore activity
☐ Venn diagram sorting mat, Master E

ELABORATE

For each student:

☐ 1 hand lens
☐ 4 coins (penny, nickel, dime, quarter)
☐ *Hand Lens Data Sheet,* Master F
☐ *Magnifying Nature Data Sheet,* Master G

For each group of students:

☐ collection of natural materials

EVALUATE

For each group of students:

Testing materials: Place the following objects into a container for each group.

☐ bag of 4 testing materials:
  ☐ 1 clear marble; ($1 for 30)
  ☐ 1 clear cylinder
  ☐ 1 hot melt glue stick; available from craft and discount stores; can be cut into desired length ($1.75 for 30)
  ☐ 1 clear flat-bottomed marble; available from craft and discount stores ($1 for 30)
☐ 4 hand lenses in a separate plastic bag ($1.75 each)
Available from vendors of science teaching supplies by catalog order.

For each student:

☐ *Magnificent Magnifiers Performance Task,* Masters H-J

Background Information for Teachers

Children in the early grades are often taught to sort using buttons or blocks. The following learning experience allows students to explore the behavior of light as well as develop classification and process skills. Sorting or classifying objects by observable properties or characteristics is an important skill for children in the first grade. Most first graders are in a stage of cognitive development that focuses on sorting all of the objects in a set by one property or pattern. Children should be given the opportunity to sort a variety of materials that have different properties to maximize observation and classification skill development. After sorting and grouping objects, students should be encouraged to communicate their classification system verbally, in drawings, charts, and graphs. Sorting transparent plastic objects by shape, and testing them for magnification properties allows students to explore physical science concepts as well as develop classification and process skills.

Many curved, transparent objects can magnify, especially if they are filled with water. If the magnifier is only curved in one dimension, however, it may make magnified objects appear stretched out to the sides rather than magnifying them in height as well as width like a hand lens. A lens stretches the object out uniformly because it is curved on all sides rather than in just one dimension. Lenses change our perception of objects because they bend or refract the light that passes through them, and fool our eyes into thinking the object is bigger because the light from the object enters our eye at a different angle. What we see through a magnifier is actually an enlarged image of the actual object.

The surface shape of a lens determines its magnification power. The magnification power of a lens is determined by the curve of its surface. A steeply curved lens is a more powerful magnifier than a more flattened lens. A lens that makes an object seem ten times larger is said to magnify 10 times, or 10X. A lens that makes an object seem two times larger magnifies two times, or 2X. A 10X lens is more steeply curved than a 2X lens. The curvature of a lens determines its magnification power.

Targeted  Texas Essential Knowledge & Skills

Science TEKS

1.1 The student conducts classroom and field investigations following home and school safety procedures. The student is expected to:

(A) demonstrate safe practices during classroom and field investigations.

1.2 The student develops abilities necessary to do scientific inquiry in the field and the classroom. The student is expected to:

(A) ask questions about organisms, objects, and events;
(B) plan and conduct simple descriptive investigations;
(C) gather information using simple equipment and tools to extend the senses;
(D) construct reasonable explanations and draw conclusion;
(E) communicate explanations about investigations.

1.3 The student knows that information and critical thinking are used in making decisions. The student is expected to:

(A) make decisions using information;
(B) discuss and justify the merits of decisions.

1.4 The student uses age-appropriate tools and models to verify that organisms and objects and parts of organisms and objects can be observed, described, and measured. The student is expected to:

(A) collect information using tools including hand lenses, clocks, computers, thermometers, and balances;
(B) record and compare collected information.

1.5 The student knows that organisms, objects, and events have properties and patterns. The student is expected to:

(A) sort objects and events based on properties and patterns.

1.7 The student knows that many types of change occur. The student is expected to:

(A) observe, measure, and record changes in size, mass, color, position, quantity, sound, and movement.

Language Arts TEKS

1.1 Listening/speaking/purposes. The student listens attentively and engages in a variety of oral language experiences. The student is expected to:

(A) determine the purpose(s) for listening such as to get information, to solve problems, and to enjoy and appreciate.
(C) participate in rhymes, songs, conversations, and discussions
(D) listen critically to interpret and evaluate

1.4 Listening/speaking/communication. The student communicates clearly by putting thoughts and feelings into spoken words. The student is expected to:

(B) use vocabulary to describe clearly ideas, feelings, and experiences
(C) clarify and support spoken messages using appropriate props such as objects, pictures, and props
(D) retell a spoken message by summarizing or clarifying

1.11 Reading/vocabulary development. The student develops an extensive vocabulary. The student is expected to:

(A) discuss meanings of words and develop vocabulary through meaningful/concrete experiences.

1.15 Reading/inquiry/research. The student generates questions and conducts research about topics using information from a variety of sources, including selections read aloud. The student is expected to:

(B) uses pictures, print, and people to gather information and answer questions
(C) draw conclusions from information gathered

1.18 Writing/purposes. The student writes for a variety of audiences and purposes and in a variety of forms. The student is expected to:

(B) write labels, notes, and captions for illustrations, possessions, charts, and centers
(C) write to record ideas and reflections

1.23 Writing/inquiry/research. The student uses writing as a tool for learning and research. The student is expected to:

(B) record or dictate his/her own knowledge of a topic in various ways such as by drawing pictures, making lists, and showing connections among ideas

Mathematics TEKS

1.1 Number, operation, and quantitative reasoning. The student uses whole numbers to describe and compare quantities. The student is expected to:

(C) use words and numbers to describe the values of individual coins such as penny, nickel, dime, quarter, and their relationships

1.6 Geometry and spatial reasoning. The student uses attributes to identify, compare, and contrast shapes and solids. The student is expected to:

(A) describe and identify objects in order to sort them according to a given attribute using informal language

(B) identify circles, triangles, and rectangles, including squares, and describe the shape of balls, boxes, cans, and cones

1.9 Probability and statistics. The student displays data in an organized form. The student is expected to:

(A) collect and sort data

1.11 Underlying processes and mathematical tools. The student communicates about Grade 1 mathematics using informal language. The student is expected to:

(A) explain and record observations using objects, words, pictures, numbers, and technology

Social Studies TEKS

1.1 History. The student understands how historical figures helped to shape our community, state, and nation. The student is expected to:

(A) identify contributions of historical figures such as Sam Houston and Abraham Lincoln who have influenced the community, state, and nation

1.5 Geography. The student understands the purposes of maps and globes. The student is expected to:

(B) locate places of significance on maps and globes such as the local community, Texas, and the United States

Art TEKS

1.1 Perception. The student develops and organizes ideas from the environment. The student is expected to:

(A) identify similarities, differences, and variations among subjects, using the senses

(B) identify color, texture, form, line, and emphasis in nature and in the human-made environment

1.2 Creative expression/performance. The student expresses ideas through original artworks, using a variety of media with appropriate skill. The student is expected to:

(C) identify and practice skills necessary for producing drawings, paintings, prints, constructions, and modeled forms, using a variety of materials.

Reading Connections

The following books are recommended as literary resources for teachers to share with grade 1 students. **Teachers are cautioned, however, to remember that "reading about science" is not "doing science."** These books can enhance students' study of magnification but cannot replace the learning that occurs by active engagement in the learning experiences.

Bug Boy. Sonenklar, Carol. Holt Publishers, New York, 1997.

Looking Down. Jenkins, Steve. Houghton Mifflin, Boston, 1995.

The World of Small. Ross, Michael Elsohn. Yosemite Association, Yosemite, California, 1993.

The World Up Close. Packard, Mary. Watermills Press Associates, 1991.

References

Ardley, Neil. *The Science Book of Light*. Gulliver Books, New York, 1991.

Benchmarks for Science Literacy. Oxford University Press, New York, 1993.

Eggen, Paul, and Main, June. *Developing Critical Thinking Through Science*. Critical Thinking Press and Software, Pacific Grove, CA, 1990.

Hewitt, Paul G. *Conceptual Physics*. Little, Brown, and Company, Boston, 1987.

Martin, David Jerner. *Elementary Science Methods: A Constructivist Approach.* Delmar Publishers, New York, 1997.

McIntyre, Margaret. *Early Childhood and Science*. National Science Teachers Association, Washington D.C., 1984.

Ruef, Kerry. The Private Eye. The Private Eye Project, Seattle, Washington, 1998.

National Science Education Standards. National Academy Press, Washington, D.C., 2001.

Sneider, Cary, and Gould, Alan. *Magnifiers.* Lawrence Hall of Science, Berkley, CA, 1991.

Wood, Robert. *Physics for Kids – 49 Easy Experiments with Optics.* TAB Books, Blue Ridge Summit, PA, 1990.

Websites:

http://www.timss.org

http://nces.ed.gov/nationsreportcard/science/achieveall.asp

http://www.learningresources.com