

**City Schools
Model Curriculum Framework**

Common Misconceptions:

The process of science is purely analytic and does not involve creativity. (“When I work on a science investigation, I can only follow the directions, without adding any ideas of my own.”)

Investigations that don’t reach a firm, definite conclusion are useless and unpublishable. (“This investigation didn’t prove what I set out to prove, so it’s a waste of time.”)

Science is boring. (“Science is boring!”)

Daily “Thinking Like a Scientist” Lessons:

Day 1:	<ul style="list-style-type: none"> • Introduction to the year’s science class • “Tour the Room” • Assign class roles (e.g., Timer, Material Getter, Recorder)
Day 2:	<ul style="list-style-type: none"> • Introduction to Lab Safety, Procedures, and Supplies • Suggested read-aloud: <u>Lessons in Science Safety With Max Axiom, Super Scientist</u> by Donald B. Lemke • Students create a flip-book or brief skit about lab safety.
Day 3:	<ul style="list-style-type: none"> • Begin Lab, emphasizing Safety Procedures • “Which Tools Work?” • Process skills practiced: Observe, Compare, Communicate, Safety, Measure, and Problem Solving
Day 4:	<ul style="list-style-type: none"> • Complete Lab, emphasizing Safety Procedures

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Day 5:	<ul style="list-style-type: none">• Wrap up discussion of safety and its importance• Possible game, video, or song• Suggested UnitedStreaming video: “Professor Fritz” (a segment of “Timothy Goes to School”)
Day 6:	<ul style="list-style-type: none">• Introduce the new lab form• Review process skills
Day 7:	<ul style="list-style-type: none">• GOBSTOPPER LAB:<ul style="list-style-type: none">○ If your school does not permit food in the classroom, this lab can be done as a teacher-display lab.
Day 8:	<ul style="list-style-type: none">• Data Analysis: Discuss the changes seen in the investigation yesterday
Day 9:	<ul style="list-style-type: none">• Same GOBSTOPPER LAB, but with a change in variable. Have students brainstorm what variable change can be made.
Day 10:	<ul style="list-style-type: none">• Comparison of both labs’ data• Use a Venn Diagram to compare/contrast the different labs and their results
Day 11:	<ul style="list-style-type: none">• How Are We Going to Write in This Year’s Science Class?• Introduce journal writing in whole-class format

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Day 12:

- How Are We Going to Write in This Year’s Science Class?, continued
- Students work on journal template individually

Instructional Strategy Resource Guide (See Appendix)

Vocabulary

To strengthen science vocabulary skills teachers may select strategies from the *Instructional Strategies Guide: Enhancing Science Vocabulary Skills*. (Example: Pictionary, Scrabble, Sparkle, etc.)

Science Vocabulary Terms:

observe	classify	communicate	experiment	predict
problem solving	predict	problem solving	measure	infer
hypothesize	control variables	interpret data	design	representation
reasoning and proof	safety	connect	compare	draw conclusions

Enrichment

Activity: Complete the Gobstopper lab again, with a change in 2 variables. Write about the steps you followed and the effect you saw on the results of the lab, if any.

To further extend lessons teachers may select enrichment centers found in *Instructional Strategies Guide: Enrichment Centers Grades K-5*.

Content Statement-Related Enrichment Centers:

- Build Something New (2)
- Out of Gas (1)
- Fun Measuring (2)
- Create a Game Out of Recyclables (3)
- Measurement Center (4)

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Classroom Portals/Technology		
<p>Discovery Ed Streaming: http://streaming.discoveryeducation.com/</p> <ul style="list-style-type: none">• “Professor Fritz” (a segment of “Timothy Goes To School”)	<p>SMART: (Search the Smart Exchange site http://exchange.smarttech.com) for these specific titles:)</p> <ul style="list-style-type: none">• “Sorting” (SMART Notebook Lesson)	<p>Websites:</p> <p>“CSI: Tugboat Thug” http://www.pbs.org/teachers/connect/resources/6581/preview/</p> <p>“CSI: Squeak Sneak” http://www.pbs.org/teachers/connect/resources/6030/preview/</p> <p>“Robot Rover” http://www.pbs.org/teachers/connect/resources/3993/preview/</p>

Inquiry Minds Want to Know – Investigating Gobstoppers

GLI:
SI-1 to SI-10

Unit:
Scientific Inquiry

Grade:
2

Lesson Type:
Guided Discovery
Open Inquiry

Accessing Prior Knowledge:
Write everything you know or think you know about Gobstoppers.

Purpose of Lesson:

To use a discrepant event (observing Gobstoppers in water) to spark students' interest in investigating. To develop and investigate student generated "how" questions. To conduct an inquiry investigation as a means to develop process skills.

Background Information:

Teaching science as inquiry provides teachers with the opportunity to develop student abilities and enrich student understanding of science. Conducting inquiry investigations is important because it allows students to **ask questions** driven by their own curiosity, **make predictions, develop procedures, participate in experiments, collect data, and make conclusions** based upon **evidence**. At this level, investigations are largely based upon systematic observations. As students develop, they may be able to design and conduct simple experiments to answer questions. Conducting a "fair" test may not be developmentally appropriate for most second graders.

This investigation primarily involves the use of observational skills. Gobstoppers are used in this investigation as a means to lessen the emphasis on content and focus specifically on scientific process skills. Students are given 4 Gobstoppers to be evenly placed in water in a shallow container to **observe** for a period of at least 15 minutes. Students should discover that as the candies dissolve, the layers of colors dissolve into the surrounding water. The colors contain a thin layer of wax that causes the adjoining colors to not readily mix when left undisturbed.

It is during the observational period that students begin to think about other possible investigative questions ("How does the type of liquid affect the dissolving of the Gobstoppers?" "How does the shape of the container affect the dissolving of the Gobstoppers?" "How does the temperature of the water affect the dissolving rate of the Gobstoppers?" "How does the color affect the rate of dissolving?"). After generating potential investigative questions, it is very important to allow students to **develop procedures and discover answers** to their questions.

Materials: (Groups of 3 to 4 work best for management and cost of materials)

Several boxes of Willy Wonka brand Gobstoppers (available where most candy is sold); crayons, water, and 15-24 clear, round, shallow plastic containers (the ½ pound deli containers from the grocery deli work well); "Science Inquiry Log" sheet; "Inquiry Minds Want to Know – Investigating Gobstoppers" observation sheet.

For the additional experiments, the needed materials will be based upon student generated questions. These materials may include thermometers, various liquids, stopwatches, different containers, and goggles.

Procedure:

1. Ask students to respond to the prompt, "Write everything you know or think you know about Gobstoppers".

2. Discuss student responses. Place students into groups of 4 or 5. Give each group a plastic container filled with water. Add 4 different colored Gobstoppers in the water evenly spaced on the outer edge. Explain that this initial investigation is simply an observational time and it is important to not disturb or bump the container.
3. Using the observation sheet, allow students at least 15 minutes to draw and write about their observations. Either during the investigation period or just after, ask students to write 3 observations and 2 “I wonder” sentences.
4. At the end of the observation period, discuss the observations and the “I wonder” sentences.
5. As a class, generate experimental “how” questions (“How does the type of liquid affect the dissolving of the Gobstoppers?” “How does the shape of the container affect the dissolving of the Gobstoppers?” “How does the temperature of the water affect the dissolving rate of the Gobstoppers?” “How does the color affect the rate of dissolving?”). Write the list on chart paper.
6. At this point, the class may select one question for all to investigate or the teacher may allow individual groups to select their own question from the list. Be sure that the questions from the list are ones in which the teacher can provide materials adequately for.
7. It is now up to the group to discuss how they will work together to answer their question. It is best for the teacher to provide guidance but avoid giving specific answers about how to set up the experiments. More than likely, the experimental designs will be flawed and have many uncontrolled variables. More importantly, groups are working together to solve a problem, regardless of any experimental flaws.
8. Provide the necessary materials for each group including a “Science Inquiry Log” sheet. Ask students to write down the question they are investigating on the log.
9. Allow students at least 30 minutes to complete their investigation and additional time to complete the Inquiry Log.
10. Process the experiments using the Concept Summary below.

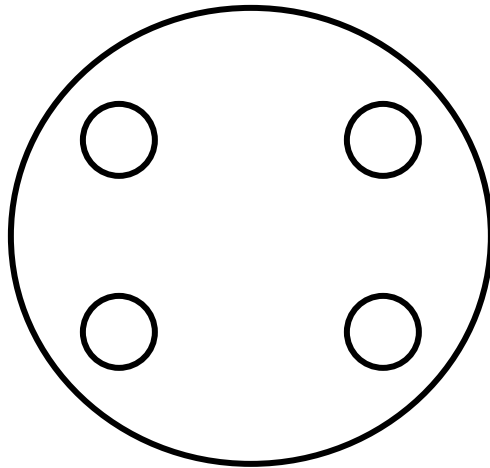
Concept Summary: (To be used for discussion at the end of the lab)

1. What scientific tools were used to carry out our investigations? **(SI-7)**
2. How were the tools used safely? **(SI-4)**
3. Using the observations that your group collected, what do you think is the answer to your question? How do you know? **(SI-5) (SI-6)**
4. Get together with another group. Share your procedures, observations and results. Ask one another questions about their work? **(SI-10) (SWK-4)**
5. Why is this sharing of information important? **(SWK-2)**
6. Compare this experiment to others that you have done. How did generating and answering your own questions in this experiment feel different from when the teacher gives you questions and a set of directions to follow?

Name: _____

Inquiry Minds Want to Know... Investigating Gobstoppers

1. Draw and color your Gobstopper observations



2. Write at least 3 observations about your Gobstoppers.

3. Write at least 2 "I wonder" sentences about your Gobstoppers.

Science Inquiry Log

Date:

Topic:

Names:

What question are you investigating?

Explain what you did to answer your question.

What did you discover today?

Are you pleased with your work today?

Yes	No	Not Sure
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How would your group rate this activity?

Great					Terrible
1	2	3	4	5	

What new question are you curious about?

Youngstown City Schools Model Curriculum Framework Grade 2 Quarter 1: Life Science

Grade Band Theme: Observations of the Environment		
<i>This theme focuses on helping students develop the skills for systematic discovery to understand the science of the physical world around them in greater depth by using scientific inquiry.</i>		
Topic: Interactions With Habitats		
<i>This topic focuses on how ecosystems work by observations of simple interactions between the biotic/living and abiotic/nonliving parts of an ecosystem. Just as living things impact the environment in which they live, the environment also impacts living things.</i>		
<p>Condensed Content Statements:</p> <p>Living things cause changes on Earth.</p> <ul style="list-style-type: none"> • I can observe simple interactions between biotic/living and abiotic/nonliving parts of an ecosystem. 	<p>Time Frame: 6 weeks</p>	<p>Science Inquiry and Application</p> <p>During the years of PreK-4 all students must become proficient in the use of the following scientific processes, with appropriate laboratory safety techniques, to construct their knowledge and understanding in all science content areas:</p> <ul style="list-style-type: none"> • I can plan and conduct simple investigations. • I can employ simple equipment and tools to gather data and extend the senses. • I can use appropriate mathematics with data to construct reasonable explanations. • I can communicate about observations, investigations, and explanations. • I can review and ask questions about the observations and explanations of others.
<p>Common Misconceptions:</p> <ul style="list-style-type: none"> • Behavior and habitat are criteria for classification. (“Whales must be fish, because they live under water.”) • Plants have multiple sources of food, heterotrophic as well as autotrophic. (“Plants get their food from the sun.”) • Larger organisms cause bigger changes to their environment. (“Humans are stronger than ants.”) 		
Prior Knowledge	Current Content Elaboration	Future Application of the Concept
<p>Pre-K-1: Observations of some of the macroscopic characteristics of living things; observation of the basic survival needs of living things; living things get resources from the environment; available resources vary throughout the course of a year.</p>	<p>The environment is a combination of the interactions between living and nonliving components. Living things can cause changes in their environment, which can be observed. These interactions can cause changes in groups of organisms and the physical environment. Some of the changes that can be observed are beavers building a dam, plants growing in cracks of sidewalks, and soil formation. The focus should not be limited to human interaction with the environment. Students can observe earthworm compost bins, ant farms, and weeds growing on a vacant lot.</p>	<p>Student mastery will include understanding of the following:</p> <p>Living things function and interact with their physical environments. Living things cause changes in the environments where they live; the changes may be very noticeable or slightly noticeable, fast or slow.</p> <p>Grades 3-5: Changes that occur in an environment can sometimes be beneficial and sometimes harmful.</p> <p>Grades 6-8: Matter is transferred continuously between one organism to another and between organisms and their physical environment.</p>

**Youngstown City Schools Model Curriculum Framework
Grade 2 Quarter 1: Life Science**

Expectations for Learning: Cognitive Demands and Visions into Practice			
<i>Recalling Accurate Science (Quadrant A)</i>	<i>Interpreting and Communicating Science Concepts (Quadrant B)</i>	<i>Demonstrating Science Knowledge (Quadrant C)</i>	<i>Designing Technological/Engineering Solutions Using Science Concepts (Quadrant D)</i>
<p>Recognize scientifically accurate facts in stories about environmental changes caused by living things.</p> <p>(Example Questions: Think of the stories we've read. Can you list 3-5 environmental changes that you saw in these stories that were caused by living things? Were these changes things that could happen in the real world? How do you know?)</p>	<p>Represent data obtained from classroom investigations or real world examples in a chart, table, or pictograph. For example, make a table of data obtained from soil samples with earthworms as compared to soil samples without earthworms.</p> <p>(Example Questions: Examine the data you've recorded on your table. What can you conclude from the results? Can you explain why this happened?)</p>	<p>Plan and conduct an investigation that will compare identical soil samples, one with earthworms and one without earthworms over an extended period of time. Include data about temperature, amount of moisture, appearance, and materials added, materials removed, or odor.</p> <p>Note: For this grade level the presence of bacteria and fungi are not included. Students may be able to see fungi fruiting bodies, but would not be able to see the fungal cells without using grade-inappropriate tools and content knowledge.</p> <p>(Example Questions: Why are earthworms beneficial for soil? Use evidence to justify your opinion.)</p>	<p>Design and build (with teacher help) a working worm composting bin or an ant farm (whichever is more appropriate for the classroom) that can be used to observe activity and actions of the worms or ants.</p> <p>(Example Question: In your opinion, will this composting bin work? Why or why not?)</p>

Youngstown City Schools Model Curriculum Framework Grade 2 Quarter 1: Life Science

Resources:	
<p><u>Textbook Lessons</u></p> <ul style="list-style-type: none"> • What Do Living Things Need? • How Are Living Things the Same and Different? • What is An Environment? • How Do Living Things Survive in Different Places? • How Do Living Things Get What They Need? • How Do Plants and Animals Need Each Other? 	<p>Lessons</p> <ul style="list-style-type: none"> • Meltdown • Basic Needs—Earthworms • Effects of Acid Rain <p>Literature</p> <ul style="list-style-type: none"> • <u>Animal Life</u> by Robin Kerrod • <u>Environment At Risk</u> by Louise Spilsbury • <u>How People Affect Other Living Things</u> by Cindy Grigg • <u>The ABC's of the Environment</u> by Bobbie Kalman <p>Science In Storytown Connections:</p> <ul style="list-style-type: none"> • Lesson 1 (Q1) Lesson 2 (Q2) • Lesson 3 (Q3) Lesson 4 (Q4) • Lesson 8 (Q2) Lesson 13 (Q2) • Lesson 14 (Q2) Lesson 15 (Q3) • Lesson 19 (Q3) Lesson 29 (Q4)
<p>Instructional Strategies and Resources</p> <p><i>This section provides additional support and information for educators. These are strategies for actively engaging students with the topic and for providing hands-on, minds-on observation and exploration of the topic, including authentic data resources for scientific inquiry, experimentation and problem-based tasks that incorporate technology and technological and engineering design. Resources selected are printed or Web-based materials that directly relate to the particular Content Statement. It is not intended to be a prescriptive list of lessons.</i></p> <ul style="list-style-type: none"> • Design build and maintain a worm-composting bin. Journal changes in the system and make connections on what is happening in the bin to what is happening in nature. • Design and maintain an ant farm. Journal changes in the system and make connections on what is happening in the ant farm to what is happening in nature. • Observe a plot of land that has been abandoned and make predictions about how the appearance of that property will change if there is no human intervention. If possible, document the changes throughout the year. • Explore a beaver's habitat in nature or through media. Document observations of the beaver's habitat. Encourage children to ask questions about the impact of the dam on the ecosystem. Ask: <i>How many other organisms are impacted by the presence of the dam? How does the dam impact the river or stream?</i> 	

Youngstown City Schools Model Curriculum Framework Grade 2 Quarter 1: Life Science

Scientific Literacy (Reading, Writing, Speaking, and Listening Like a Scientist)

Vocabulary (words that should be fluently used by the student in writing and speaking during this unit)

To strengthen science vocabulary skills teachers may select strategies from the *Instructional Strategies Resource Guide: Enhancing Science Vocabulary Skills* (Example: Pictionary, Scrabble, Sparkle, etc.).

adaptation	oxygen	pollen	food chain	nutrients	survive	shelter
crop	environment	habitat	adapt	extinct	desert	rain forest
grassland	tundra	ocean	pond			

Opportunities for Speaking

Scientific literacy in regards to speaking means that students are able to debate with, explain to, and question themselves and peers regarding concepts addressed in the unit. Students fluently use the appropriate scientific terms and unit vocabulary. Students understand the importance of questions – both as a thinking process and as an investigative tool.

- Students prepare a “How-to” show on making a composting bin or ant

Writing

Remember that scientific literacy is not simply having students write in science but that the writing is meaningful, and with purpose. Students are expected to fluently use appropriate topic vocabulary, scientific terms, as well as show evidence that they understand scientific practices.

- Students write an argumentative piece over an issue studied in the unit such as “Why Everyone Should (Should Not) Compost”.

Enrichment

Activity: Observe plants NOT growing in their natural environment (e.g., weeds in a vacant lot, plants growing through cracks in the sidewalk, etc.) Describe how this can be beneficial and/or harmful for both the plant and its new environment.

Content Statement-Related Enrichment Centers (in the *Instructional Strategies Resource Guide*):

- Build a Habitat (1)
- Build an Insect (1)
- What Do You See? (1)

Youngstown City Schools Model Curriculum Framework Grade 2 Quarter 1: Life Science

Classroom Portals/Technology		
<p>Streaming: (http://streaming.discoveryeducation.com/)</p> <ul style="list-style-type: none"> • “Habitats: Homes For Living Things” • “Changes In Habitats” (a segment of “Habitats: Homes For Living Things”) • “Layers of the Forest” (a segment of “Forest Habitats”) • “Everybody Needs Food” 	<p>SMART: (Search the Smart Exchange site (http://exchange.smarttech.com) for these specific titles:)</p> <ul style="list-style-type: none"> • “Animal Habitats” (SMART Notebook Lesson, submitted by LFleenor) • “Habitat Rummy” (SMART Notebook Lesson, submitted by J. Lere) • “Animals and Their Habitats” (SMART Notebook Lesson, submitted by Kathryn Anderson) • “Plant Needs” (SMART Notebook Lesson, submitted by Coralie Oleson) • “The Teeth Detectives” (SMART Notebook Lesson, published by SMART Technologies) • “Where Are The Animals?” (SMART Notebook Lesson, published by SMART Technologies) • “Labeling A Green Plant” (SMART Notebook Lesson, published by SMART Technologies) • “Animal Needs” (SMART Notebook Lesson, submitted by Jessica Jenkin) 	<p>Websites:</p> <ul style="list-style-type: none"> • “A Walk in the Woods” http://urbanext.illinois.edu/woods/naturenotes.html • “World Book Kids”(Go to home page and click on “Worlds of Animals”) http://www.worldbookonline.com/kids/home • “Science Up-Close” (http://www.harcourtschool.com/menus/science/up_close2.html) “How Do Fish Get Oxygen?” “Life Cycle of a Frog”



Meltdown

Grade 2

Suggested Time Frame:

1 day

Materials:

- *What Do Animals Do In Winter? How Animals Survive The Cold*, by Melvin and Gilda Berger
- 2 large glass jars with lids that are the same size
- 2- ½ cups of butter
- hot and cold water
- paper
- pencil
- KWL chart

Vocabulary:

Active
Hibernate
Hibernation
Habitats
Survive
Adapt
Observation
Data

Process Skills:

Compare
Communicate
Hypothesize
Observe

Condensed Content Statement

Living things function and interact with their physical environments.

Living things cause changes in the environments where they live; the changes can be very noticeable or slightly noticeable, fast or slow.

Lesson Summary:

Students will understand how body fat helps animals prepare for the winter. Students will apply this knowledge to discuss how animals change in Ohio during the winter months.



Meltdown

Grade 2

Teacher Background

- Hibernation is one way animals cope with the winter months. When an animal hibernates, its heart rate, body temperature and other life processes slow down. The animal goes into a “deep sleep.”
- Ohio has many types of animals that hibernate in the winter months. Groundhogs, also known as woodchucks, are one of Ohio's true hibernating animals. They hibernate almost the entire winter. They will not come out of hibernation until the first few weeks of February, when some signs of spring appear. Their hibernation lasts about 5 months. Black bears are also hibernators that live in Ohio. In 1999, 56 sightings of black bears were reported, mostly in eastern Ohio counties. Skunks, raccoons, chipmunks and opossums can go into temporary hibernation when temperatures drop extremely low. They will seek shelter in logs, trees, underground or beneath large rocks for about 5 to 6 days or until the weather breaks. Frogs, snakes and turtles hibernate by crawling into burrows or holes and remain inactive for the winter. Some gather in groups and weave together to help insulate them.
- Whether hibernating or staying active, body fat is an important factor in how an animal survives the winter. In the fall, mammals and birds eat extra food for their bodies to draw energy from when food is scarce. The following activity shows the students how when energy is burned this body fat is used or if energy is conserved the body fat is not used as quickly.

Teacher Notes

This lesson demonstrates to students how animals use or conserve the fat that they store in their body for the winter. People and animals get the energy they need from the foods that they eat. They store this energy in their bodies as fat. When animals are active, they burn this fat and their body temperature rises. When sitting or sleeping, less energy is burned and body temperatures cool off. Before animals hibernate, they eat large amounts of food to store energy to live off of during their winter sleep. They can do this because they are not active and burning fat quickly. If an animal stays active during the winter, they use this extra fat for energy when food is scarce.

Engage (Warm-up)

Complete the “K” section (what we know) of a KWL chart with the class about what animals do in the winter, especially Ohio animals. Students can also complete the W section (what we want to know) at this time.

Explore (Instructional Strategies)

1. Share the book *What Do Animals Do In the Winter?* Discuss information found in the book and add to the "L" section (what we learned) of the chart.
2. Label one jar with the word *active* and the other jar with the word *hibernation*.
3. Fill the jar labeled *active* with hot water and the jar labeled *hibernation* with cold water.
4. Explain that the temperature of the water simulates the body temperature of the animal.
5. Have students hypothesize (if...what then) what will happen to the butter.
6. Drop $\frac{1}{2}$ cup of butter into each jar. The exact measurement in each jar represents a fair test. Tightly close the lid on each jar.
7. Gently shake the *active* jar to simulate an animal's activity. Let the *hibernation* jar sit still.
8. Have the students observe each jar. Have students draw and label the jars in a science journal and record their observations. The hot, *active* jar will use up the stored energy (the butter) very quickly. The cold, still water will not use up the energy as quickly. The butter in this jar will not melt as fast. Compare this to the energy used while animals are staying active or while they are hibernating.
9. As you read other books and obtain new information, add it to the L section of the KWL chart.

Interdisciplinary Connections

Review and use of KWL chart as an effective graphic organizer that can be used to document scientific data and experimental results.

Assessment

1. How do you make observations?
2. In what other ways can you record or document your data?

Reteach Ideas

1. Brainstorm a list of Ohio animals and describe what each does to survive the winter. (Hibernate, migrate, stay active)



Meltdown Grade 2

2. Have students draw and explain what observations they made.

Closure

1. How do you know that animals use the fat stored in their body as energy? (The butter melted when the animal was active)
2. How do you think animals that stay active during the winter adapt to the weather? (Grow more fur, eat more food in the fall to store energy, change their diet)
3. Which animal will use energy more quickly, one that stays active or one that hibernates?

Extensions/Additional Resources

Classroom Portals:

Discovery Ed **Streaming:**

[🔗 The Quiet Room: A Reptile's Hibernation](#)

Website:

[🔗 www.ohiohistorycentral.org](http://www.ohiohistorycentral.org)

Literature:

[🔗 Animals That Hibernate](#) by Phyllis J. Perry

[🔗 Do Polar Bears Snooze in Hollow Trees?: A Book About Animal Hibernation](#) by Laura Purdie Salas

Name _____

What Do Animals Eat?

Choose 4 of the animals from the video. Write the animal's name in the first column. Write what it eats in the second column.

Animal We Observed	What It Eats

Plant Eaters

Meat Eaters

What Do Animals Eat?

Teacher's Answer Key

Animal We Observed	What It Eats
Giraffe	Leaves
Panda	Bamboo
Yellow bird (canary)	Leaf
Fish	Smaller fish
Squirrel	Nut
Woodpecker	Bugs or worms
Sharks	Fish
Camel	Grass or hay
Orange bird (liwi)	Nectar from flower
Anteater	Ants
Elephant	Grass
Bear	Fish
Caterpillar	Leaf

*Use the following page, blown up to poster size, to record student responses.

What Do Animals Eat?

Let's see if we can list all of the animals from the video and what we observed them eating.

Animal We Observed	What It Eats



Basic Needs – Part 2

Earthworms

Grade 2

Suggested Time Frame:

1-2 days

Materials:

- Clear container for worms (2 liter bottle with the top cut off, large jar, or a fish bowl)
- Loose soil such as potting soil
- Sand
- Vegetable peelings
- Grass and leaves
- Earthworms (can be purchased from a bait store or dug from the ground)
- Black paper

Vocabulary:

Basic needs
Habitat
Predict
Night crawler
Observations

Process Skills:

Observe
Communicate
Predict
Infer
Control Variables
Draw Conclusions

Condensed Content Statement

Living things function and interact with their physical environments.

Living things cause changes in the environments where they live; the changes can be very noticeable or slightly noticeable, fast or slow.

Lesson Summary:

Earthworms are fascinating to students and easy to find for the teacher. Providing all the basic needs for the earthworms will help the students better understand the concept.



Basic Needs – Part 2

Earthworms

Grade 2

Teacher Background

- Earthworms are invertebrates, animals without backbones. Their long, thin bodies are soft, covered by moist skin and made up of many ring-shaped segments (annelids). Young earthworms are white, while adults are pinkish-brown and two to three inches long. They have mouths and tails, but no eyes, ears, noses, or legs. Earthworms absorb water through their skin and use small hairs called chaetae to hold onto the ground to help them move. Their heads always point forward when they crawl.
- Earthworms spend the majority of their lives underground. They work like small plows, burrowing and tunneling through soil. Worms eat soil that contains bits of leaves and plants. After the material passes through their bodies, earthworms excrete piles of waste called castings which contain nutrients that help plants grow. Not only are earthworms natural fertilizers, they also loosen the soil (aerate) while crawling and burrowing which helps roots spread and grow. Gardeners and farmers benefit from earthworm activities.
- Earthworms dig all year round. They dig deep into the ground in the summer to find wet soil and migrate deeper in the winter to find warm soil. Some earthworms live under rocks, logs or rotting leaves. After heavy rains, earthworms often come to the surface because water floods their homes and they would suffocate otherwise. When they find drier places they dig new tunnels and burrows. Earthworms are invaluable to the environment.
- It is expected that first graders understand the basic needs of organisms. In Part 1, students learned about the basic needs of living things and the connection between needs and habitats. In this lesson, Part 2, students will construct an earthworm habitat that provides for the basic needs of the worms. Also, they will observe the changes to the habitat over time. This lesson also lends itself to the introduction of interdependence between plants and animals.

Teacher Notes

- This lesson will allow students to discover how earthworms loosen the soil in their habitat to help plants and people. However, students may wonder “what happens when worms don’t get light?” If you choose to explore that question, make more than one habitat (Ex. in three spaghetti jars) so that students can compare data. Put dark paper around one, put another in a dark closet and the third would receive light. The only variable is the amount of light the worms receive. Have students record any data collected.
- Students may want to investigate which habitat material the earthworms prefer. Put the materials side by side (Ex. potting soil, cornmeal and clay soil) and observe over time (at least from morning to afternoon) which material the worms prefer. Be sure to moisten each of the substances, adding water each day.



Basic Needs – Part 2

Earthworms

Grade 2

Engage (Warm-up)

1. Review the basic needs of living things (food, water, space, shelter, and air). These needs must be met in order for organisms to survive.
2. Brainstorm how these needs could be met for worms (your new class pets!).

Explore (Instructional Strategies)

1. Begin a KWL chart about earthworms by recording students' answers into the What do you Know section. Put a few worms out for each small group of children to observe. Then bring students together and generate a list of questions about worms for the What do you want to know section of the KWL chart.
2. Use a non-fiction book from the literature section as a read aloud. As questions are answered from the text, record the answers on the chart.
3. Show the class the materials you have brought for the earthworm habitat. Make a prediction, "What will happen when we place these materials in a container for a week along with the earthworms and leave it undisturbed? Together build the habitat.
4. Put 3 cm of potting soil in the bottom of the container. Moisten the layer.
5. Add 3 cm of sand. The sand adds color contrast to the soil so students can see the tunnels the worms will make and how they mix the soil. Moisten the sand.
6. Repeat the layers until the materials are about 6 cm. from the top. Be sure to moisten each layer.
7. Fill in the top with fruit and vegetable peelings and grass and leaves.
8. Add the earthworms to the very top.
9. Tape black paper around the container and put the container in a dark place.
10. Leave the container undisturbed for a week.
11. After a week remove the black paper and make observations about the worm habitat.
12. The point of this lesson is for students to understand that all living things must have all basic needs met to survive. This understanding is essential to this lesson.



Basic Needs – Part 2

Earthworms

Grade 2

Interdisciplinary Connections

Writing: Make worm journals. Record the steps of making the worm habitat and also observations about the worms as time goes on.

Assessment

1. What are the basic needs of all living things?
2. What happens when one or more of the basic needs are not met? (Possible responses may include death, sickness, and not growing properly.)
3. How does the earthworm use its habitat to meet its basic needs?
4. Could your basic needs be met in the same way as the earthworm's basic needs? Tell why or why not.

Reteach Ideas

1. Read other non-fiction books about worms. Have students make a fold book about the basic needs of worms.
2. Have students make flash cards with the basic needs written on each card along with a drawing of the basic need. If 2 students combine their cards, they could play a game of Memory, being sure to name the basic need as they match.

Closure

1. Students will be assessed on the basic needs of living things. First they will list all the basic needs they can recall.
2. Students will write the basic needs for the earthworms on the "Earthworms" worksheet.

Extensions/Additional Resources

Classroom Portals:

 [N is for Nightcrawler](#)



Basic Needs – Part 2

Earthworms

Grade 2

Literature:

- 1. [Earthworms](#) by Kevin Holmes
- 2. [Wormology](#) by Michael Elsohn Ross
- 3. [Toil in the Soil](#) by Michelle Myers Lackner
- 4. [An Earthworm's Life](#) by John Himmelman
- 5. [Wiggling Worms at Work](#) by Wendy Pfeffer
- 6. [Earthworms: Underground Burrowers](#) by Adele Richardson
- 7. [Diary of a Worm](#) by Doreen Cronin and Harry Bliss



Effects of Acid Rain Grade 2

Suggested Time Frame:

2-10 days

Materials:

- Two 2 liter bottles with the tops cut off
- Potting soil
- Gravel (optional)
- Two or Three small plants for each bottle
- Vinegar
- Warm water
- Chart Paper
- Science Journal Template

Vocabulary:

Living Things
Terrarium
Acid Rain

Process Skills:

Observe
Communicate
Contrast
Compare

Condensed Content Statement

Living things function and interact with their physical environments.

Living things cause changes in the environments where they live; the changes can be very noticeable or slightly noticeable, fast or slow.

Lesson Summary:

Students will observe the effects acid rain has on living things.



Effects of Acid Rain

Grade 2

Teacher Background

- The environment is a combination of the interactions between living and nonliving components. Living things can cause changes in their environment, which can be observed.

Teacher Notes

- Prepare the acid rain by pouring vinegar in a container for 3 days (this will turn to carbon dioxide). After three days pour warm water into container and it will dissolve with the carbon dioxide to form acid rain.

Engage (Warm-up)

1. Read What Causes Acid Rain by Isaac Asimov; Acid Rain (Earth Watch) by Sally Morgan; or The Acid Rain Hazard by Judith Woodburn.
2. Discuss the effects of acid rain and list them on chart paper.

Explore (Instructional Strategies)

1. Set out the materials and review safety procedures with the class.
2. Have students come up one at a time putting gravel, soil, and plants in the terrarium.
3. Have students illustrate both terrariums in their science journals.
4. The next day, have students write or illustrate in science journals their hypothesis addressing the question: What will happen to the terrarium that undergoes acid rain?
5. After students have written their hypothesis, share with the class.
6. Add the acid rain to one terrarium. Labeling this terrarium, "Acid Rain"
7. Observe daily until changes are obvious. Continue recording result in science journals.



Effects of Acid Rain Grade 2

Interdisciplinary Connections

Which math tools could be used?

Assessment

1. What changes were observed in the terrarium with the acid rain?
2. How does acid rain impact living things?
3. How do you think acid rain would effect animals?

Reteach Ideas

1. Observe the two terrariums. Name one effect acid rain had on the plants.

Enrichment

Create another terrarium adding different plants and an insect or worm. Observe and record effects of acid rain.


Closure

Compare and contrast the changes in the terrariums using a Venn Diagram or illustration.

Extensions/Additional Resources

Classroom Portals:

Discovery Education:

-  [TLC Elementary School; People and the Environment](#)

Literature:

- ④ [What Causes Acid Rain](#) by Isaac Asimov
- ④ [Acid Rain \(Earth Watch\)](#) by Sally Morgan
- ④ [The Acid Rain Hazard](#) by Judith Woodburn