

“Organic Gardening with Worms: They Can Dig It!”

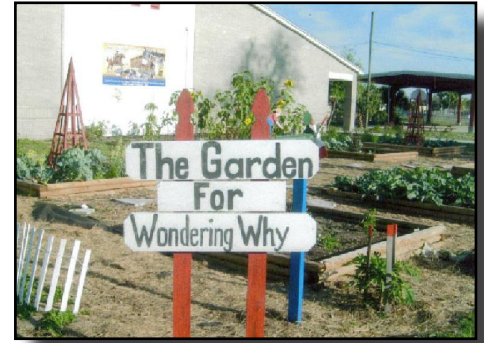


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2008 - 2009 IDEA CATALOG OF EXCELLENCE

■ PROGRAM OVERVIEW

A garden is a living laboratory for learning real-world skills, and Thematic Explorations opens the door to a green curriculum. Gardening with worms is engaging, educational fun and yes creepy and crawly! Keeping a worm ecosystem can strengthen a child's problem solving skills and scientific methodology. Worms consume and recycle organic material and make the greatest natural fertilizer or "Brown Gold" for our community garden. The children K-5 discover how to keep, feed and maintain worms while having numerous related science projects throughout the school year.

One of the most important school activities for growing organic gardens with worms is taking care of the worm ecosystems. Each Grade level has a Worm Composting Bin that they are responsible for feeding and maintaining the mini worm ecosystem. The worm castings or natural fertilizer are then used to make a compost tea for our organic community garden. This can be done with any size garden big or small. We started off with a small garden and then added on with each grade level. The harvested herbs and vegetables are used in the cafeteria, in a local restaurant that we partner with, and a soup kitchen that feeds the homeless. The students helped to prepare the worm beds and learn about the worms habitats. They learned what kinds of food the worms will eat and what not to feed them. They then saved appropriate food from the cafeteria to feed the worms and make sure they have the right environment to reproduce. After many months we collected the compost and made a compost tea for our garden and the students watered the garden with the

tea. This is a project that is ongoing and will continue on with future garden goals. We feel this is innovative because it is all part of our School Going Green.

■ LESSON PLAN TITLES

- Looking for Life
- Worm Hole

■ OVERALL VALUE

We want to teach our children to use organic resources instead of pesticides to grow our plants and vegetables. Organic gardening with children helps establish healthy eating habits, as children are more prone to taste and enjoy foods they have grown themselves. In fact, *the best natural toy* for children is a garden. Through our Community Organic Garden Project and efforts to have a Green campus the students have a sense of ownership and belonging. They see the end product or results from their hard work and are proud to be a part of our school project. Other schools could easily adapt this project because it can be integrated into every other subject. Math: Think of all the charts, graphs, measuring and analyzing data that comes along with gardening and worms. Language Arts: There are countless children's books about gardening. Connecting literacy to the garden will not only teach our children about growing food, but it will make them excited to work in the garden. My favorites are *How Groundhog's Garden Grew* by Lynne Cherry, and *Tops and Bottoms* by Janet Stevens. Also any school that would like to start a project about Thinking Green, Environmental Awareness or Building a Community in the School could easily adapt this project.

Instructional objectives covered in this project are as follows

Gain knowledge of...

- ...the principles of basic scientific research and application through the creation, observation and maintenance of a worm bin and organic gardening.
- ...Green Awareness with hands on real world experiences by understanding and following the national trends of the Greening of America.

■ MATERIALS

See the attached budget for a list of needed materials

■ ABOUT THE DEVELOPERS

Melissa Kelly is a National Board Certified Teacher she has a B.A. in Early Childhood Education from Warner Southern College and has taught for 15 years. She has taught Technology classes, Special Education, First Grade, and is now teaching K-5 Science Lab.

Joyce Bachman is a National Board Certified Teacher with a BA in Psychology and MA in School Counseling. She is certified to teach K-6, ESOL, and as a Guidance Counselor. She has taught in Florida for 6 years and 2 in Kentucky, 3rd grade, 4th grade science, and 5th grade.

Elizabeth H. Hughes has a BS in Exercise and Sport Sciences with certifications in Elementary Education and ESOL. She has been teaching for 7 year six of the years in 2nd grade and one in 4th grade.



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Lesson Plan No 1: Looking for Life



■ SUBJECTS COVERED

Science

■ GRADES

Kindergarten - Five

■ KEY QUESTION / OBJECTIVE

How can you tell if something is living?

■ BACKGROUND INFO

Everything with which students come into contact can be classified as either living or nonliving. All these things exist and interact to make up the ecosystem. There are five basic processes of living things:

- Metabolism: getting & using food
- Respiration: releasing energy
- Elimination: removing waste
- Growth
- Reproduction

Earthworms are flexible, elongated bundles of muscle, efficiently evolved for life underground. Earthworms help the soil by mixing up the different layers of the soil and letting air in as they crawl around. They add nutrients to the soil by depositing their waste products (called castings) in the soil. Earthworms also help decompose dead plant and animal material, turning it into simpler parts that can be used again by new organisms. Worms eat some of the decaying matter.

Earthworms have two kinds of muscles. When the short muscles that encircle each segment contract, the worms get thinner and longer. When the long muscles that connect the segments contract, the worm becomes shorter and fatter.

■ SUNSHINE STATE STANDARDS

SC.A.1.1.1: The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

SC.F.1.1.2: The student knows how to apply knowledge about life processes to distinguish between living and nonliving things.

SC.G.1.1.1: The student knows that environments have living and nonliving parts.

- The student identifies objects as living or nonliving.
- The student recognizes that most living things, including humans, need water, energy, air, shelter, and space.
- The student observes that there are similarities and differences between living and nonliving things.

■ MATERIALS

Teacher

for the worm habitat:

- leaves
- pebbles
- several earthworms
- plastic wrap
- rubber band
- black construction paper
- clear plastic container, aquarium or tennis ball container

Per student or pair of students

- worm in a cup of soil
- soil
- hand lenses
- gummy worms
- *What Do You See?* student sheet (optional)
- *All About Worms* class chart
- Rigby Big Book *Wiggly Worm* by Jill Eggleton

■ DIRECTIONS & TEACHING TIPS

1. Purchase earthworms at a local bait shop. Red wigglers are best for these activities. Earthworms must stay cool! Do not leave them in a car.
2. Construct a worm environment.
 - a. Place a layer of pebbles on the bottom of the container. Next, place a layer of soil (not potting soil) over the pebbles. Finally, add a layer of leaves on top of the soil.
 - b. Add several worms to the container.
 - c. Place plastic wrap over the opening of the container. Punch several small holes in the plastic wrap. Use rubber bands to secure the plastic wrap. (If you choose not to make this right away, the worms will last in a refrigerator for a few days.)
 - d. Tape black construction paper around the outside of the container.
 - e. Feed the worms by placing slivers of potatoes (no eyes) in the soil.
3. Keep soil moist at all times. Spray it lightly with water from a plant mister as often as necessary.
4. Prepare the *All About Worms* class chart.
5. Talk to students about the humane treatment of all living things.
6. When you are finished with the worms, take them outside to a cool, moist, dark place to release them.
7. For hygiene reasons, you may want to do the gummy worm exploration before the earthworm exploration.



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Lesson Plan No 1: Looking for Life (cont.)



■ ENGAGE

Read and discuss *Wiggly Worm* by Jill Eggleton.

■ EXPLORE PART 1

1. Distribute a worm in a cup and hand lens to each student or pair of students. Let students remove the plastic wrap and observe the earthworms.
2. Allow students plenty of time to discover the characteristics of an earthworm, noticing such things as the way it moves, its texture, etc.
3. (Optional) Have students use their senses to fill out their What Do You See? student sheet.

■ EXPLAIN

1. Discuss their observations and record on the class *All About Worms* chart.
2. Ask:
What do the earthworms feel like when you gently touch them?
How do the earthworms react to being touched?
How would you describe their movements?
How are the earthworms alike and how are they different?
Did you see lines or grooves on the worms?
Did you see eyes on the earthworms?
Did you see a mouth on the earthworms?
3. Introduce the term *segment* to the students.

■ EXPLORE PART 2

1. Collect the live worms and distribute the gummy worms. (If you plan to let the students eat the gummy worms, be sure they have time to wash their hands before you distribute them.)
2. Have students observe the gummy worms just like they did the earthworms.

■ EXPLAIN

Compare and contrast the student responses to the earthworms and the gummy worms.

Ask:

How were the earthworms and gummy worms alike?

How were they different?

Which one was living?

Which one was nonliving?

How can you tell when something is living?

■ EXTEND/APPLY

1. Have students compare and contrast the characteristics of earthworms to themselves.
2. Share the following poem:

*Earthworms have two types of muscles
To help make them move.
They live under the soil and form
A tunnel called a groove.
Earthworms have no eyes or ears
And they cannot see or hear.
When a gardener sees them in his soil,
He hollers out a cheer.*

Melissa Runge

3. After reading the poem, discuss why a farmer would cheer if he saw an earthworm in his garden.

■ EVALUATION/ASSESSMENT

Through observation assess the following criteria:

- Student demonstrates understanding through completion of the activities and participation in class discussions.
- Student uses science tools appropriately and observes science safety rules.



All About Worms	
Earthworms	Gummy Worms

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Lesson Plan No 1: Looking for Life – Additional Information



What do you see?



Observe your worm with the magnifier. Draw your worm and color it.

How does the worm feel when you gently touch it?



How does the worm smell?



How does the worm sound? Does it make any noise?



“Organic Gardening with Worms: They Can Dig It!”

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Lesson Plan No 2: Worm Hole



■ SUBJECTS COVERED

Science

■ GRADES

Kindergarten - Five

■ KEY QUESTION / OBJECTIVE

What kind of environment do earthworms prefer?

■ SUNSHINE STATE STANDARDS

SC.F.1.1.1: The student knows the needs of all living things.

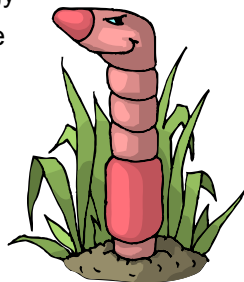
SC.G.1.1.1: The student knows that environments have living and nonliving parts.

- The student recognizes that most living things, including humans, need water, energy, air, shelter, and space.
- The student investigates living and nonliving things in the environment.

■ BACKGROUND INFO

Everything with which students come into contact can be classified as either living or nonliving. All these things exist and interact to make up the ecosystem. There are five basic processes of living things:

- Metabolism: getting & using food
- Respiration: releasing energy
- Elimination: removing waste
- Growth
- Reproduction



Earthworms are flexible, elongated bundles of muscle, efficiently evolved for life underground. Earthworms help the soil by mixing up the different layers of the soil and letting air in as they crawl around. They add nutrients to the soil by depositing their waste products (called castings) in the soil. Earthworms also help decompose dead plant and animal material, turning it into simpler parts that can be used again by new organisms. Worms eat some of the decaying matter.

Earthworms have two kinds of muscles. When the short muscles that encircle each segment contract, the worms get thinner and longer. When the long muscles that connect all the segments contract, the worm becomes shorter and fatter.

■ MATERIALS

Teacher

- *Wonderful Worms*, Houghton Mifflin

Per group

- earthworms in a cup
- moist and dry paper towels
- dirt
- 2 trays with sides one inch high, cardboard to cover half of the tray
- pebbles or fish tank gravel

■ DIRECTIONS & TEACHING TIPS

1. Review humane treatment of all living things discussion from previous lesson.
2. Prepare the rough/smooth trays for each group by placing pebbles in one half of the tray and dirt in the other half of the tray.
3. Prepare the light/dark trays for each group by covering the entire bottom of the tray with dirt. Distribute the cardboard cover with the tray.
4. Make certain that the ½ sheet cardboard cover is wider than the tray.
5. Vanilla pudding and vanilla wafers (“Nilla” Wafers) can be substituted for students who do not like or are allergic to chocolate in the extension activity.

■ ENGAGE

Read *Wonderful Worms*, Houghton Mifflin

■ EXPLORE

1. Ask: *Are earthworms living or nonliving? How do you know?*
2. Ask: *Since earthworms are living, they need a special space in which to live. What kind of home (environment) might they like?*
3. Have students predict whether worms prefer a wet or dry, light or dark, or a rough or smooth environment.

(See bottom of next page for this chart)

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Lesson Plan No 2: Worm Hole (cont.)



4. Distribute worms and allow 5 – 10 minutes for the students to interact with the worms.
5. Distribute a moist and a dry paper towel to each group for wet/dry experiment. Have students test the prediction. Have the wet and dry paper towels overlap. (See illustration #1 on page 14.) Place worm where the wet and dry paper towels meet. Observe to see where the worm goes.
6. Repeat procedure for light/dark (illustration #2) environments. Place worm in the middle of the tray. Cover one half with the cardboard cover. Observe to see where the worm goes.
7. Repeat procedure for rough/smooth (illustration #3). Push the dirt to one side and put pebbles on the other side. Place the worm in the middle of the tray. Observe to see where the worm goes.

■ EXPLAIN

Ask and record their responses on the *Earthworm Environment* chart.

Did your earthworm prefer the wet or dry paper towel? Did the result match your prediction?

Did your earthworm prefer a dark or light area? Did the result match your prediction?

Did your earthworm prefer the rough or smooth surface? Did the result match your prediction?

Since earthworms are living things, what else do they need besides a special place to live? (air, food)

■ EXTEND/APPLY

Have students compare the earthworm environment with the environment of other animals such as themselves, a pet, birds, ducks.

■ EXTENSION

Make “ *pudding Dirt Cups.*” Pour 2 cups of cold milk into a large bowl and add instant chocolate pudding mix. Beat until well blended. Let it sit for 5 minutes. Stir in Cool Whip and ½ of the cookies (1/2 of a 16 oz. package of chocolate sandwich cookies). Place 1 tablespoon into cups; fill cups ¾ full with pudding mixture. Top with remaining crushed cookies. Refrigerate one hour. Decorate with a gummy worm half buried in the “dirt.”

■ EVALUATION/ASSESSMENT

Ask the students to draw a picture of an environment that their earthworm would like. Was their environment drawing reasonable?



Earthworm Environment

	wet	dry
predict		
actual		
	light	dark
predict		
actual		
	rough	smooth
predict		
actual		

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Lesson Plan No 2: Worm Hole – Additional Information



Illustration #1 Wet and dry

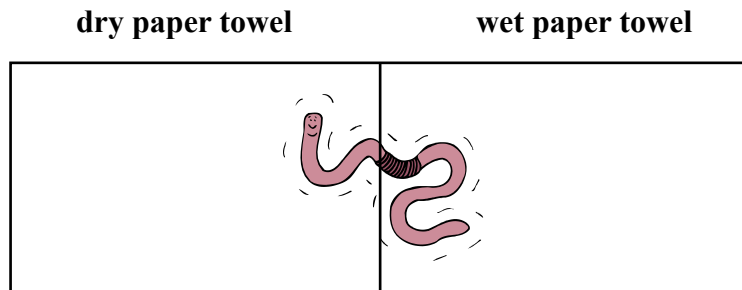
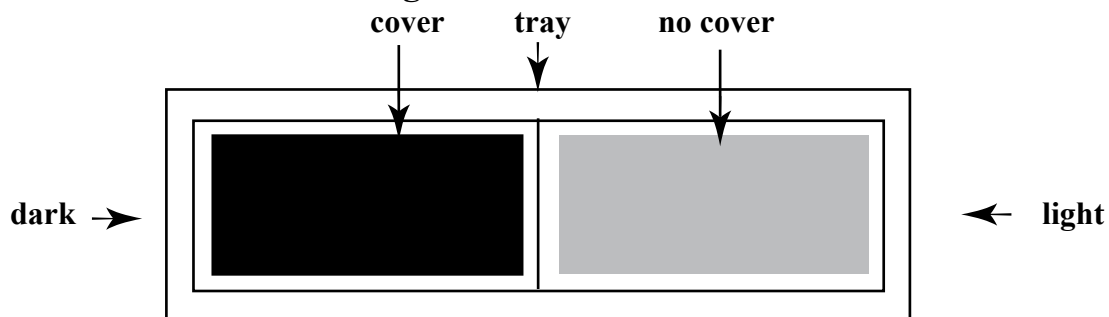
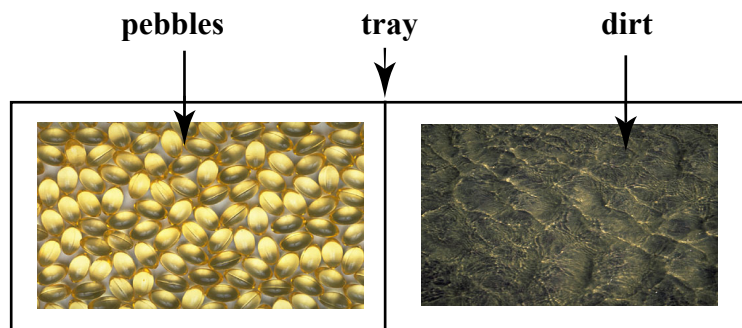


Illustration #2 Dark and light



cover entire bottom with dirt

Illustration #3 Rough and smooth



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Rubric for Activities in Primary Science



Rubric For Activities in Primary Science



	Using Tools	Doing Science	Understanding Science
Starting Out	I didn't try to use the tools, like rulers, thermometers and such. I just guessed.	Where do I start? I got mixed up. I made mistakes.	I don't get it. Why are we doing this?
Getting Going	I tried to use some of the tools, like rulers, thermometers and so on. I wrote some things down carefully.	I got started OK I sort of know what to do. I can do it with a little help.	I understand the science part of what we do.
Got It!	I used all of the tools. I wrote down what I measured. I checked my work. I didn't make any mistakes.	I figured it out and I can do it all. I can explain it to others.	I understand the science part of this. I can connect what we do with other things. I can explain what I know to others.

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 Scientific Thinking Rubric



Scientific Thinking Rubric

	1	2	3	4	5
Critical Thinking	<ul style="list-style-type: none"> Often requires help in order to critically examine information Support, if provided, is irrelevant or based on personal opinion, disregarding scientific principles and knowledge 	<ul style="list-style-type: none"> Requires teacher prompting to examine information using scientific principles Generalized supporting example is somewhat relevant May use some scientific knowledge 	<ul style="list-style-type: none"> Mostly works independently to examine information using scientific principles and knowledge 1 or 2 somewhat generalized but relevant examples 	<ul style="list-style-type: none"> Independently examines information using scientific principles and knowledge Provides 2 or 3 relevant examples to support or refute ideas 	<ul style="list-style-type: none"> Independently examines information using scientific principles and knowledge Will provide 3 or 4 specific and relevant examples to support or refute ideas
Problem Solving	<ul style="list-style-type: none"> Is not able to recognize or understand problem without teacher instruction Is not able to use scientific process without teacher help 	<ul style="list-style-type: none"> Often requires teacher prompts to recognize and understand problem Often requires teacher help to begin using scientific process 	<ul style="list-style-type: none"> Generally able to recognize and understand problem Able to use scientific process to attack problem Will on occasion get help from peers to use scientific process to seek solutions 	<ul style="list-style-type: none"> Independently recognizes and understands problems Uses scientific process to seek solutions Will sometimes develop new questions 	<ul style="list-style-type: none"> Independently recognizes and understands problems Readily uses scientific process to seek solutions Will often develop new, original questions
Reflection upon Scientific Ideas and Principles	<ul style="list-style-type: none"> Requires teacher help to examine ideas Disregards the ideas of others 	<ul style="list-style-type: none"> Requires teacher prompts to examine ideas Has difficulty accepting the ideas of others 	<ul style="list-style-type: none"> Will generally reflect on ideas There may be some gaps in logic Will accept other ideas 	<ul style="list-style-type: none"> Will, on most occasions, reflect on ideas Logic is generally sound Recognizes value of other ideas 	<ul style="list-style-type: none"> Will consistently reflect on ideas Logic is sound and provided with sufficient detail Recognizes value of other ideas
Creative Thinking	<ul style="list-style-type: none"> Has difficulty seeing paths to possible solutions Often requires teacher significant help to recognize connections in ideas 	<ul style="list-style-type: none"> Generally will follow established path to possible solutions On occasion becomes sidetracked, losing path Requires teacher prompts to recognize connections 	<ul style="list-style-type: none"> Will generally generate a logical path to a possible solution May require some help to recognize connections between own ideas and those of others 	<ul style="list-style-type: none"> Generally recognizes 1 or 2 paths for possible solutions Is capable of connecting own ideas with those of others to find solutions to problems 	<ul style="list-style-type: none"> Consistently sees several paths for possible solutions Adapts and connects own ideas and those of others to develop unique questions and solutions to problems

TOTAL POINTS _____

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Additional Information



COMPOST TEA

Compost tea is a great way to feed your plants the natural way. Compost tea is simple to make. All you need are some worm castings, burlap, and a bucket of water. Take the burlap and form a sack. Fill the sack with worm castings, and place the sack filled with castings in the water. Let soak over night.

The next day you will have some great liquid fertilizer when you remove the sack from the water. Pour the water in your house plants and on your vegetables.

