San Diego Unified School District
Science Department

Grade Kindergarten – Animals Two by Two

Life Science

Unit of Study

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Science Vision for
San Diego Unified School District
Science is an integral part of the intellectual development of a child. Interest in science begins with attitudes and values established in the earliest years through daily experiences. Students graduating from high school must have a foundation in scientific knowledge and evidence based reasoning.

Updated versions of this unit of study can be found online at www.sandi.net/science.

San Diego Unified School District
Science Department

Grade Kindergarten – Animals Two by Two
Module Overview

Overview of the Unit

Animals Two by Two provides young students with close and personal interaction with some common land and water animals. Appropriate classroom habitats are established, and students learn to care for the animals. In four investigations the animals are studied in pairs. Students observe and care for one animal over time, and then they are introduced to another animal similar to the first but with differences in structure and behavior. The firsthand experiences are enriched with close-up photos of animals, some related to animals that students have observed in class and some animals that are new. This process enhances observation, communication, and comparison.

Grade Kindergarten Life Science Conceptual Flow

Concept #1:
Different types of plants and animals inhabit the earth.

Subconcepts Investigation #1: Goldfish and Guppies	Subconcepts Investigation #2: Land and Water Snails	Subconcepts Investigation #3: Big and Little Worms	Subconcepts Investigation #4: Pill Bugs and Sow Bugs
Fish have identifiable structures.	Snails have identifiable structures and behaviors.	Worms have identifiable structures.	Isopods have identifiable structures and behaviors.
Fish behavior is influenced by conditions in the environment	Snails have senses.	Worm behavior is influenced by conditions in the environment.	Animals have similar needs.
Fish have basic needs.	Snail behavior is influenced by conditions in the environment.	Worms have basic needs.	Each kind of isopod has unique structures and behavior.
Each kind of fish has unique structures and behaviors.	Snails have basic needs.	Each kind of worm has unique structures and behavior.	Isopod behavior is influenced by conditions in the environment.
Fish change their environment.	There is great diversity among snails.		
All animals deserve respect and gentle care.			

Kindergarten Science Content Standards Addressed in this Module

Life Science

LS2 Different types of plants and animals inhabit the earth. As a basis for understanding this concept:

- LS2a Students know how to observe and describe similarities and differences in the appearance and behavior of plants and animals (e.g., seed-bearing plants, birds, fish, insects).
- LS2b Students know stories sometimes give plants and animals attributes they do not really have.
- LS2c Students know how to identify major structures of common plants and animals (e.g., stems, leaves, roots, arms, wings, legs).

Investigation and Experimentation

I&E4 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

- I&E4a Observe common objects by using the five senses.
- I&E4b Describe the properties of common objects.
- I&E4c Describe the relative position of objects by using one reference (e.g., above or below).
- I&E4d Compare and sort common objects by one physical attribute (e.g., color, shape, texture, size, weight).
- I&E4e Communicate observations orally and through drawings.

Pacing the Unit as a Whole – Animals Two By Two

Day 1 Start Inv. 1 Part 1 A/W	**Day 2** Start Inv. 1 Part 2 A/W	**Day 3** R	**Day 4** Start Inv. 1 Part 3 A/W	**Day 5** Start Inv. 1 Part 4 A/W
Day 6 R	**Day 7** Interdisciplinary Extensions	**Day 8** Start Inv. 2 Part 1 A/W	**Day 9** Start Inv. 2 Part 2 A	**Day 10** W/R
Day 11 Start Inv. 2 Part 3 A/W	**Day 12** R	**Day 13** Start Inv. 2 Part 4 A/W	**Day 14** R	**Day 15** Interdisciplinary Extensions
Day 16 Start Inv. 3 Part 1 A/W	**Day 17** Start Inv. 3 Part 2 A/W	**Day 18** Start Inv. 3 Part 3 A/W	**Day 19** R	**Day 20** Interdisciplinary Extensions
Day 21 Start Inv. 4 Part 1 A/W	**Day 22** Start Inv. 4 Part 2 A/W	**Day 23** Start Inv. 4 Part 3 A/W	**Day 24** R	**Day 25** Start Inv. 4 Part 4 A/W
Day 26 R	**Day 27** Interdisciplinary Extensions			

Pacing the Unit as a Whole – Trees - *Please refer to the Earth Science Unit of Study for details*

Teach in the Spring				
Day 11 Start Inv. 2 Part 1 A/W/I	**Day 12** Start Inv. 2 Part 2 A/W	**Day 13** Start Inv. 2 Part 3 A/R/W/I	**Day 14** Start Inv. 2 Part 4 R	**Day 15** Start Inv. 2 Part 5 A/W
Day 16 Start Inv. 2 Part 6 W/I				
Day 24 Start Inv. 3 Part 7 A	**Day 25** Start Inv. 3 Part 8 A	**Day 26** Start Inv. 3 Part 9 A/W/R/I		

I-Individual Assessments The goals of FOSS assessment system fall into three categories called assessment variables; (1) contents knowledge, (2) conducting investigations, and (3) building explanations. **Content knowledge** reflects the "facts" of science that students learn throughout the module. **Conducting investigation** focuses on skills needed for a successful scientific investigation. **Building Explanation** refers to students' discourse – how they communicate observation and how they organize their observation and interpretations of them.

A – Small-Group Centers Most of the observations and investigations with trees and leaves are conducted with small groups at a learning center. Limit the number of students at the center to six to ten at one time. When possible, each student will have his or her own equipment to work with. In some cases, students will have to share materials and equipment and make observation together.

As one group at a time is working at the center on a FOSS activity or talking a walk outdoors to visit trees or collect leaves, other students will be doing something else. Over the course of an hour or more, plan to rotate all students through the center, or allow the center to be a free-choice station. (Approximately 45 minutes)

W – Whole-Class Activities Introducing and wrapping-up the center activities require you to work for brief periods with the whole class. FOSS suggests for these introductions and wrap-ups that you gather the class at the rug or other location in the classroom where students can sit comfortably in a large group. (Approximately 45 minutes)

R – Reading sessions (*Science Resources* book) include interactive reading, answering review questions, and discussing the reading to ensure that students integrate the information.

Grade Kindergarten – Animals Two by Two
Pacing Guide – Investigation 1: Goldfish and Guppies

Investigation Overview

Investigation 1: Goldfish and Guppies
Concept: Different types of plants and animals inhabit the earth.
Students observe the structures and behaviors of goldfish. They feed the fish and enrich the environment in which the fish live. They compare the structures and behaviors of the goldfish to those of other fish, guppies.

Part 1: The Structure of Goldfish	**Part 2: Caring for Goldfish**
Summary Students observe goldfish livening in a simple aquarium. They look for and name different parts of the fish, such as fins, tail, mouth, and gills. They look to see if all the fish are alike, or if there are differences such as color and size. They draw a picture and dictate a sentence to record what they see.	Summary Students learn how to care for goldfish, giving them food and fresh water, and adding plants to the aquarium. With each addition, students describe the fish behavior they observe. Students read a fanciful story about a goldfish that was overfed. They discuss how the fish in the story has attributes that fish don't really have.
Subconcepts ▪ Fish have identifiable structures ▪ All animals deserve respect and gentle care	Subconcepts ▪ Fish behavior is influenced by conditions in the environment ▪ Fish have basic needs. ▪ Fish change their environment. ▪ Made-up stories may give fish attributes that they don't really have.
Time Allocation Active Investigation/Center: 1 day	Time Allocation Active Investigation/Center: 1 day Reading: 1 day
CA Science Standards LS2a, LS2c, I&E4e	CA Science Standards LS2a, LS2b, I&E4c
Part 3: Goldfish Behavior	**Part 4: Comparing Guppies to Goldfish**
Summary Students add a tunnel to the aquarium to observe how the fish respond. They make their own paper aquariums to model the fish behavior they have observed. They describe the position of the fish relative to the tunnel in the aquarium.	Summary Students compare the structures and behaviors of guppies to those of goldfish, and identify the guppies by gender. They read about and observe photos of a variety of fish and discuss how they are the same and how they are different, focusing on their appearance.
Subconcepts ▪ Fish have senses to help them detect objects in their environment. ▪ Fish behavior is influenced by conditions in the environment	Subconcepts ▪ Isopods have identifiable structures and behaviors. ▪ Animals have similar needs. ▪ Each kind of isopod has unique structures and behavior. ▪ Isopod behavior is influenced by conditions in the environment.
Time Allocation Active Investigation/Center: 1 day	Time Allocation Active Investigation/Center: 1 day Reading: 1 day Interdisciplinary Extensions: 1 day
CA Science Standards LS2a, I&E4c, I&E4e	CA Science Standards LS2a, I&E4e

Grade Kindergarten – Animals Two by Two
Pacing Guide – Investigation 1: Goldfish and Guppies

Pacing Guide – Investigation 1: Goldfish and Guppies

Day 1		Day 2		Day 3	
Prep	Instruction	Prep	Instruction	Prep	Instruction
❑ Read "Science Background" *TG p. 6-7* ❑ Read "At a Glance" *TG p. 40-41* ❑ Read "Background for the Teacher" *TG p. 42-45* ❑ Read "Teaching Children About Goldfish and Guppies" *TG p. 46-47* ❑ Watch Video demo of Inv. 1, Pt 1 ❑ Review "Materials" and "Getting Ready" *TG p. 48-52*	Guiding the Investigation ❑ "Part 1: The Structure of Goldfish; Wrapping up Pt 1" Steps 1-7 *TG p. 53-56* ❑ **Body of Evidence Prompt #1** ***TG p. 174 and 195***	❑ Review "Materials" and "Getting Ready" *TG p. 57-58* ❑ Watch Video demo of Inv. 1, Pt 2	Guiding the Investigation ❑ "Part 2 Caring for Goldfish; Wrapping up Pt 2" Steps 1-11 *TG p. 59-62*	❑	Read a Fictional Animal Story ❑ Steps 12-14 *TG p. 63-64* ❑ **Body of Evidence Prompt #2** ***TG p. 63-64***

Pacing Guide – Investigation 1: Goldfish and Guppies (continued)

Day 4	
Prep	Instruction
❑ Review "Materials" and "Getting Ready" *TG p. 65-66, 177-178* ❑ Watch Video demo of Inv. 1, Pt 3	Guiding the Investigation ❑ "Part 3: Goldfish Behavior; Wrapping up Pt 3" Steps 1-7 *TG p. 67-69*

Day 5	
Prep	Instruction
❑ Watch Video demo of Inv. 1, Pt 4 ❑ Review "Materials" and "Getting Ready" *TG p. 70-71*	Guiding the Investigation ❑ "Part 4: Comparing Guppies to Goldfish; Wrapping up Pt 4" Steps 1-6 *TG p. 72-74* ❑ **Body of Evidence Prompt #3** ***TG p. 74 or 195***

Day 6	
Prep	Instruction
	Reading in Science Resources ❑ Steps 7-9 *TG p. 75-76* Student Reading: Science Resources p. 3-7

Day 7	
Prep	Instruction
	❑ Interdisciplinary Extensions

Grade Kindergarten – Animals Two by Two
Pacing Guide – Investigation 2: Land and Water Snails

Investigation Overview

Investigation 2: Land and Water Snails
Concept: Different types of plants and animals inhabit the earth.
Students observe the structures and behaviors of land snails. They race the snails. Water snails are compared to land snails. Students work with a variety of shells, discussing similarities and differences in their size, shape, color, and texture. Students match shell pairs, make designs, and create patterns. They read about snails. Differences in the appearance and behavior of plants and animals (e.g., seed-bearing plants, birds, fish, insects).

Part 1: Land Snails	**Part 2: Snail Races**
Summary Students get to know one species of land snail. They handle the snails, observe their structures, and see how they interact with objects.	Summary Students observe one aspect of snail behavior, how land snails move. The investigation concludes with a snail race for the lettuce.
Subconcepts ▪ Snails have identifiable structures and behaviors. ▪ Snails have senses. ▪ Snails have basic needs.	Subconcepts ▪ Snail behavior is influenced by conditions in the environment. ▪ All animals deserve respect and gentle care.
Time Allocation Active Investigation/Center: 1 day	Time Allocation Active Investigation/Center: 1 day Reading: 1 day
CA Science Standards LS2c, I&E4c, I&E4e	CA Science Standards LS2a, I&E4e
Part 3: Observing Water Snails	**Part 4: Shells**
Summary Students are introduced to an aquatic snail. They investigate its characteristics and behaviors, and compare land and aquatic snails. Students read bout land and water snails and compare their appearance..	Summary Students observe seashells. Using their experience with living snails, they look for shells that they think might have belonged to relatives of the land snail they observed. They organize the shells into pairs or groups and give rationales for their decisions. Students read a fictional story about a slug and discuss how stories give animals attributes they don't have.
Subconcepts ▪ Each kind of snail has unique structures and behaviors. ▪ Different kinds of snails have similar structures and behaviors.	Subconcepts ▪ There is real diversity among snails. ▪ Made-pp stories may five animals attributes that they don't really have.
Time Allocation Active Investigation/Center: 1 day Reading: 1 day	Time Allocation Active Investigation/Center: 1 day Reading: 1 day Interdisciplinary Extensions: 1 day
CA Science Standards LS2a, I&E4e	CA Science Standards LS2a, LS2b, I&E4d

Grade Kindergarten – Animals Two by Two
Pacing Guide – Investigation 2: Land and Water Snails

Pacing Guide – Investigation 2: Land and Water Snails

Day 8		Day 9		Day 10	
Prep	Instruction	Prep	Instruction	Prep	Instruction
❑ Read "At a Glance" *TG p. 82-83* ❑ Read "Science Background" *TG p. 84-87* ❑ Read "Teaching Children About Snails" *TG p. 88* ❑ Watch Video demo of Inv. 2, Pt 1 ❑ Review "Materials" and "Getting Ready" *TG p. 89-90*	Guiding the Investigation ❑ "Part 1: Land Snails; Wrapping up Part 1" Steps 1-10 *TG p. 91-93* ❑ **Body of Evidence Prompt #4** ***TG p. 181 and 195***	❑ Watch Video demo of Inv. 2, Pt 2 ❑ Review "Materials" and "Getting Ready" *TG p. 94-95*	Guiding the Investigation ❑ "Part 2: Snail Races" Steps 1-7 *TG p.* 96-97		Guiding the Investigation ❑ "Part 2: Snail Races; Wrapping Up Part 2" Steps 8-9 *TG p.* 98 ❑ "Read *The Snail's Spell*" Steps 10-12 *TG p. 98-99*

Pacing Guide – Investigation 2: Land and Water Snails (continued)

Day 11		Day 12		Day 13	
Prep	Instruction	Prep	Instruction	Prep	Instruction
❑ Watch Video demo of Inv. 2, Pt 3 ❑ Review "Materials" and "Getting Ready" *TG p. 100-101*	Guiding the Investigation ❑ "Part 3: Observing Water Snails; Wrapping up Pt 3" Steps 1-10 *TG p. 102-104* ❑ **Body of Evidence Prompt #5** ***TG p. 104 and 195***		Reading in Science Resources ❑ Steps 11-12 *TG p. 105* Student Reading; Science Resources p. 8-11	❑ Watch Video demo of Inv. 2, Pt 4 ❑ Review "Materials" and "Getting Ready" *TG p. 106-107*	Guiding the Investigation ❑ "Part 4: Shells; Wrapping up Pt 4" Steps 1-9 *TG p. 108-110*

Day 14		Day 15	
Prep	Instruction	Prep	Instruction
	Read a Fictional Animal Story ❑ Steps 10-11 *TG p. 111*		❑ Interdisciplinary Extensions *TG p. 112-116*

Grade Kindergarten – Animals Two by Two
Pacing Guide – Investigation 3: Big and Little Worms

Investigation Overview

Investigation 3: Big and Little Worms
Concept: Different types of plants and animals inhabit the earth.
Students dig for red worms, rinse them off, and look at their structures. They study their behavior. They compare the red worms to night crawlers, which are much larger. Students compare photos and read about worms.

Part 1: Structures of Red Worms	Part 2: Red Worm Behaviors	Part 3: Comparing Red Worms to Night Crawlers
Summary Students dig through a terrarium to Discover red worms living in the soil. They look for some of the structures they have seen on other animals they have studied so far. They rinse the worms in water to remove the soil and to get a better view.	Summary Students focus on the movement and behavior of red worms. They notice how the worm's body contracts and stretches to move forward. They observe the worm to see if it can move forward. They observe the worm to see if it can move in other directions. They try blocking the worm's path to see what it does.	Summary Students discover a new kind of worm in their terrarium – night crawlers. The new worms are much longer and fatter than the red worms. Students observe the two kinds of worms and compare the structures and behaviors of the two animals. Students read about a variety of different worms and compare their appearance.
Subconcepts ▪ Worms have identifiable structures. ▪ Worms have basic needs. ▪ All animals deserve respect and gentle care.	Subconcepts ▪ Worm behavior is influenced by the conditions in the environment.	Subconcepts ▪ Each kind of worm has unique behaviors and structures. ▪ Different kinds of worms have similar structures and behaviors.
Time Allocation Active Investigation/Center: 1 day	Time Allocation Active Investigation/Center: 1 day	Time Allocation Active Investigation/Center: 1 day Reading: 1 day Interdisciplinary Extensions: 1 day
CA Science Standards LS2a, LS2c, I&E4e	CA Science Standards LS2a, I&E4c	CA Science Standards LS2a, I&E4c

Grade Kindergarten – Animals Two by Two
Pacing Guide – Investigation 3: Big and Little Worms

Pacing Guide – Investigation 3: Big and Little Worms

Day 16		Day 17		Day 18	
Prep	Instruction	Prep	Instruction	Prep	Instruction
❑ Read "At a Glance" *TG p. 118-119* ❑ Read "Science Background" *TG p. 120-122* ❑ Read "Teaching Children About Earthworms" *TG p. 123* ❑ Watch Video demo of Inv. 3, Pt 1 ❑ Review "Materials" and "Getting Ready" *TG p. 124-125*	Guiding the Investigation ❑ "Part 1: The Structure of Red Worms; Wrapping up Part 1" Steps 1-12 *TG p. 126-128*	❑ Review "Materials" and "Getting Ready" *TG p. 129-130*	Guiding the Investigation ❑ "Part 2: Red Worm Behavior; Wrapping up Pt 2" Steps 1-9 *TG p. 131-132*	❑ Review "Materials" and "Getting Ready" *TG p. 133-134*	Guiding the Investigation ❑ "Part 3: Comparing Red Worms to Night Crawlers; Wrapping up Pt 3" Steps 1-8 *TG p. 135-137* ❑ **Body of Evidence Prompt #2** ***TG p. 137 and 195***

Day 19		Day 20	
Prep	Instruction	Prep	Instruction
	Reading Science Resources ❑ Steps 9-10 *TG p. 138* Student Reading; Science Resources p. 12-15		❑ Interdisciplinary Extensions TG p. 139-141

Grade Kindergarten – Animals Two by Two
Pacing Guide – Investigation 4: Pill Bugs and Sow Bugs

Investigation Overview

Investigation 4: Pill Bugs and Sow Bugs
Concept: Different types of plants and animals inhabit the earth.
Students begin by observing structures of the two kinds of isopods. They learn to identify which are pill bugs and which are sow bugs. They may have isopod races. Students make a terrarium in which all the land animals live together. Students compare photos and read about isopods. They read about and compare illustrations of a variety of animals.

Part 1: Isopod Observations	**Part 2: Identifying Isopods**
Summary Students begin by investigating two kinds of isopods (sow bugs and pill bugs). They draw upon knowledge and experience gained from the previous activities to investigate the structures and behavior of isopods.	Summary Students compare the isopods and sort them into two groups based on the different structures and behaviors they observe.
Subconcepts ▪ Isopods have identifiable structures and behaviors. ▪ All animals deserve respect and gentle care.	Subconcepts ▪ Each type of isopod has unique structures and behaviors. ▪ Different kinds of isopods have similar structures and behaviors.
Time Allocation Active Investigation/Center: 1 day	Time Allocation Active Investigation/Center: 1 day
CA Science Standards LS2a, LS2c, I&E4e	CA Science Standards LS2a, I&E4c
Part 3: Isopod Races	**Part 4: Animals Living Together**
Summary Students conduct isopod races as a way to focus observation on isopod movement. Students read about different isopods and compare their appearance. Students also read about different birds and compare them.	Summary Students build a class terrarium to observe how several animals live together. They put the isopods and a few snails into the earthworm terrarium, then add objects from the natural environment to create an appropriate habitat for the animals. Students read *Animals Two by Two* and compare a variety of different animals.
Subconcepts ▪ Isopods behavior is influenced by conditions in their environment.	Subconcepts ▪ Animals have similar needs. They all need food, water, and space.
Time Allocation Active Investigation/Center: 1 day Reading: 1 day	Time Allocation Active Investigation/Center: 1day Reading: 1 day Interdisciplinary Extensions: 1 day
CA Science Standards LS2a, I&E4c	CA Science Standards LS2a, I&E4e

Grade Kindergarten - Animals Two by Two
Pacing Guide – Investigation 4: Pill Bugs and Sow Bugs

Pacing Guide – Investigation 4: Pill Bugs and Sow Bugs

Day 21		Day 22		Day 23	
Prep	Instruction	Prep	Instruction	Prep	Instruction
❑ Read "At a Glance" *TG p. 144-145* ❑ Read "Science Background" *TG p. 146-148* ❑ Read "Teaching Children About Isopods" *TG p. 149* ❑ Watch Video demo of Inv. 4, Pt 1 ❑ Review "Materials" and "Getting Ready" *TG p. 150-151*	Guiding the Investigation ❑ "Part 1: Isopod Observation; Wrapping up Pt 1" Steps 1-10 *TG p.152-154*	❑ Review "Materials" and "Getting Ready" *TG p. 155-156* ❑ Watch Video demo of Inv. 4, Pt 2	Guiding the Investigation ❑ "Part 2: Identifying Isopod; Wrapping up Part 2" Steps 1-8 *TG p. 157-158* ❑ **Body of Evidence Prompt #7** ***TG p. 158 and 195***	❑ Watch Video demo of Inv. 4, Pt 3 ❑ Review "Materials" and "Getting Ready" *TG p. 159-160*	Guiding the Investigation ❑ "Part 3: Isopod Races; Wrapping up Part 3" Steps 1-6 *TG p. 161-162*

Day 24		Day 25		Day 26	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	❑ Reading in Science Resources Steps 7-10 *TG p. 163-164* Student Reading; Science Resources p. 16-23	❑ Watch Video demo of Inv. 4, Pt 4 ❑ Review "Materials" and "Getting Ready" *TG p. 165-166*	Guiding the Investigation ❑ "Part 4: Animals Living Together; Wrapping up Pt 4" Steps 1-8 *TG p. 167-168* ❑ **Body of Evidence Prompt #8** ***TG p. 169 and 195***		Reading in Science ❑ Steps 9-11 *TG p. 169* Student Reading; Science Resources p. 24

Day 27	
Prep	Instruction
	❑ Interdisciplinary Extensions, *TG p. 170-171*

San Diego Unified School District
Science Department

Grade Kindergarten – Animals Two By Two
Recommended Body of Evidence

Overview
This guide is intended to support the collection of a Body of Evidence. A student's Body of Evidence should, at a minimum, include work from the listed prompts and in-class investigations. Other class work and assessments that demonstrate a student's level of proficiency may be included. Download samples of proficient work @ https://eteams.sandi.net/sites/sbrc

Note: Observing and questioning will give you information about what individual students can and can't do, and what they know or don't know. Use Assessment Checklist (TG p. 223 & 224) to keep a record of observations and oral responses to questions.

Recommended Body of Evidence – Grade K Life Science

Concept #1 Different types of plants and animals inhabit the earth. (CA Standards LS2a, LS2b, LS2c)
***Prompt #1*: (I&E) FOSS: Animals Two By Two Investigation 1: Goldfish and Guppies Part 1: The Structure of Goldfish** **(TG p.174 – Fish Outline – No. 2 – Student Sheet *and* TG p. 195 – Science Notebook Questions - No. 23 - Teacher Sheet)** Inv. 1 Part 1: What are the parts of the goldfish? ***Prompt #2*: FOSS: Animals Two By Two Investigation 1: Goldfish and Guppies Part 2: Caring For Goldfish** **(TG p.63-64 #12 -14 - *A FISH OUT OF WATER*)** Notebook Prompt: Chart real and made-up events in the story. Give examples of why the story is considered make-believe. ***Prompt #3:* (I&E) FOSS: Animals Two By Two Investigation 1: Goldfish and Guppies Part 4: Comparing Guppies to Goldfish** **(TG p.74 #6 Make Content Chart Entries - TG p. 195 – Science Notebook Questions - No. 23 - Teacher Sheet)** Inv. 1 Part 4: How are guppies and goldfish different? How are they the same? ***Prompt #4:* (I&E) FOSS: Animals Two By Two Investigation 2: Land and Water Snails Part 1: Land Snails** **(TG p.181 –Land Snail Outline – No. 9 – Student Sheet *and* TG p. 195 – Science Notebook Questions - No. 23 - Teacher Sheet)** Inv. 2 Part 1: What are the parts of the land snail? ***Prompt #5:* (I&E) FOSS: Animals Two By Two Investigation 2: Land and Water Snails Part 3: Observing Water Snails** **(TG p.104 #10 Make Content Chart Entries - TG p. 195 – Science Notebook Questions - No. 23 - Teacher Sheet)** Inv. 2 Part 3: How are land snails and water snails different? How are they the same?

Concept #1 (continued) Different types of plants and animals inhabit the earth. (CA Standards LS2a, LS2b, LS2c)
Prompt #6: **(I&E) FOSS: Animals Two By Two Investigation 3: Big and Little Worms Part 3: Comparing Red Worms To Night Crawlers** **(TG p. 137 #8 Make Content Chart Entries – TG p. 195 – Science Notebook Questions – No. 23 – Teacher Sheet)** Inv. 3 Part 3: How are red worms and night crawlers different? How are they the same? ***Prompt #7:*** **(I&E) FOSS: Animals Two By Two Investigation 4: Pill Bugs and Sow Bugs Part 2: Identifying Isopods** **(TG p. 158 #8 Content Chart Entries – TG p. 195 – Science Notebook Questions – No. 23 – Teacher Sheet)** Inv. 4 Part 2: How are pill bugs and sow bugs different? How are they the same? ***Prompt #8:*** **(I&E) FOSS: Animals Two By Two Investigation 4: Pill Bugs and Sow Bugs Part 4: Animals Living Together** **(TG p. 169 #8 Content Chart Entries – TG p. 195 – Science Notebook Questions – No. 23 – Teacher Sheet)** Inv. 4 Part 4: What do our animals need to live?

Grade Kindergarten – Animals Two by Two
Module Materials and Equipment

Materials Provided
The FOSS kit comes with most of the supplies that are needed to teach the unit. The kits will be delivered to the school site prior to the start of the 12-week unit of instruction. At the end of the 12-weeks, the kit will be returned to the Science Resource Center where it will be refurbished and prepared for its next use. Please review the refurbishment calendar for kit drop-off and return dates. Kits must be returned according to the refurbishment calendar to ensure that all kits are checked and restocked with consumable materials.

Materials Supplied by the Teacher or School Site
Be aware that the classroom teacher or school site must supply a few items. These are indicated in the materials list for each part of the investigation with an asterisk (*). Here is a summary of those items.

Investigation 1: Goldfish and Guppies	**Investigation 2: Land and Water Snails**	**Investigation 3: Big and Little Worms**
▪ Aged or treated water ▪ Bunch of Elodea- 6-8 sprigs ▪ 32 Envelopes ▪ 1 Paper cutter (optional) ▪ Pencils, Crayons, or markers ▪ 1 Pitcher or water container ▪ 10 scissors ▪ 4 Sheets of chart paper ▪ Transparent Tape ▪ White paper	▪ Aged or treated water ▪ 1 book about Snails (optional) ▪ Chalk or egg shells ▪ Lettuce or carrot ▪ Paper towel ▪ Pencils, crayons, or markers ▪ 10 pieces of construction paper ▪ 1 Pitcher or water container ▪ 2 sheets of chart paper ▪ 12-20 water snails	▪ Book about worms (optional) ▪ Leaf litter ▪ Oatmeal ▪ Paper Towels ▪ Pencils, crayons, markers ▪ 1 Pitcher or water container ▪ Sheets of chart paper ▪ 8 small objects, such as blocks, pencils and centimeter cubes.

Live Materials Used in This Module

Elodea
Goldfish and Guppies
Land Snails
Aquatic Snails
Red Worms and Nightcrawlers
Pill Bugs and Sow Bugs

Introduction to Life in the Classroom

In several of the FOSS modules and courses, living organisms are brought into the classroom to be cared for and observed by K-5 students. Through the direct experience with organisms provided by these modules, we hope to engender in students a sense of respect for all life and to spark a desire to understand the complex systems that support life on Earth.

The FOSS program endorses the National Science Teachers Association Guidelines for Responsible Use of Animals in the Classroom as they apply to elementary and middle school classrooms.

The FOSS program provides detailed information on how to obtain organisms, how to prepare for their arrival, how to care for them in the classroom, and how to instruct students to properly handle each animal. The animals in the modules were selected because they are abundant, safe for students, easy to care for, and hardy and well-adapted to classroom environments. FOSS selected organisms that were nonexotic, commonly available from local and regional suppliers, and, in some cases, found in the natural environments in many regions. When investigations are carried out as described in the FOSS teacher guide, the insects, worms, crustaceans, snails, and fish are not harmed in any way.

ELODEA (ANACHARIS)

Plants occupy the base of the food pyramid in aquatic systems just as they do in terrestrial systems. Inconspicuous single-celled algae that turn your aquarium green capture the sun's energy and provide food for countless minute animals in the water. If you want to stimulate an algae bloom (population explosion), put a goldfish in an aquarium, place it where it will get direct sun several hours a day, and provide the fish with plenty of food. When you see the water turn green, it's a sign that your aquatic plants are growing beautifully.

FOSS activities also use vascular aquatic plants. The popular goldfish-bowl plant that looks like a green feather boa is Elodea (or sometimes Anacharis). In nature it is usually rooted to the bottom of a stream or pond, but in your aquarium it can just float around. It is a good food source for amphipods, fish, and crayfish and will contribute to the oxygen in the water as it photosynthesizes. It also provides crannies where small animals can hide from predators.

What to do when the plants arrive. Open bag and rinse plants in dechlorinated or spring water. Keep Elodea floating in bowl of dechlorinated or spring water to avoid drying out until it's ready to use.

FOSS does not advocate the release of organisms (plant or animal) into the environment if they were not collected from that environment. In some states, it is illegal to release organisms, even those indigenous to the area, without a permit. For the most humane disposal of the live organisms it is suggested that you place this organism into a paper bag and into the freezer over night, and then discarded into the trash.

GOLDFISH AND GUPPIES

Plants and animals that live in water make up the majority of biomass. They have so much more space in which to live. Life undoubtedly originated in the water, and many life-forms have never left it. Living in a dense fluid like water provides a lot of support for organisms, and the free-swimming forms have three-dimensional mobility. And, of course, they never have to worry about where their next drink is coming from.

Guppies are small fish that bear live young. The feeder-guppy females are larger and usually a uniform beige or silver gray. Their abdomens become quite large when they are gravid (carrying young). The males are smaller and have longer, flowing tails. Males are the ones with spots of multiple colors. Fancy guppies that have been bred for showy colors can be dazzling.

Guppies are quite prolific and will probably give birth during their stay in your classroom. In fact, you may observe the arrival of baby guppies a day or two after the adults are put in their basin aquarium. The stress of transportation may induce a gravid female to release the babies. Adult guppies will eat the young, so you should supply the aquarium with plenty of Elodea in which the babies can hide, or move the adults to a separate tank. Students will enjoy watching the baby guppies grow.

What to do when the fish arrive. Float the unopened bag in aquarium of dechlorinated or spring water for about 15 minutes to equalize the temperature. When temperatures are equal, pour contents of bag through a dip net into another container and transfer fish from net to the aquarium. Discard shipping water. DO NOT USE CHLORINATED TAP WATER!!!

Maintain aquarium at room temperature out of direct sunlight, adding and/or changing water with treated water as necessary to reduce the concentration of nitrogen-containing chemicals naturally occurring in the water.

LAND SNAILS

The land snail is one of nature's marvels. But many of its finer attributes go unrecognized because of its reputation as a garden raider. Because it takes a toll on our spinach, cabbage, and lettuce as it goes about its business of survival, we find ourselves in a conflict relationship. In the classroom, however, traditional animosities are put aside in the interest of learning more about the diversity of life.

What to do when they arrive. The largest and friendliest land snail for the classroom is the escargot snail that is naturalized in California, Helix aspersa. If you live in a region where Helix has become established in local gardens, collect them locally. If you cannot collect them locally, order them from Delta Education. Land snails are quite hardy and can survive for many days with little food or water. In your classroom, they will live in two clear terrariums with covers (the same type of basins as used for the hydroponic plants). Once the snails arrive, place moist paper towels on the floor of each terrarium and spray the interior walls with water. Distribute the snails into the terrariums and provide a few small pieces of carrot or other vegetable for them to eat. Snails are strong! Secure the cover with two large rubber bands stretched around the terrariums.

The question of what to do with the snails when the investigations are complete is a sensitive one and in part is determined by where and how you obtained the land snails. Potentially, the best solution is to keep them in the classroom and institutionalize their care, continually creating an ever more complex and interesting environment for them to live in. Continue informal investigations, particularly watching for life cycle. If you obtained the land snails from a supplier out of state with a USDA permit process, you must comply with the federal regulations on what to do with the snails. For snails that are not collected locally, release into the environment is never an option. If no other option is possible, the most humane thing to do is euthanize the snails by collecting them in a bag and placing them in the freezer. Then dispose of them in the trash.

AQUATIC SNAILS

Many kinds of aquatic snails make excellent additions to an aquarium. All snails have spiral shells that get bigger toward the opening as the snail grows. The snail secretes new shell around the opening and moves in, abandoning the narrow reaches at the tip of the spiral in which it lived as a youth.

What to do when they arrive. Immediately upon arrival, open bag and place in cup or similar upright container to prevent tipping. Rinse snails with dechlorinated or spring water prior to transferring to aquarium. Snails will feed on algae or decaying plant matter naturally found in the aquarium.

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RED WORMS AND NIGHTCRAWLERS

Worms are a varied lot. You may have heard of roundworms, flatworms, tapeworms, earthworms, and who knows what other kinds of worms. None of them conjures up a particularly warm or pleasant feeling in most people. Worms have low reputations in human circles, often associated with some not-so-pleasant circumstances. But this activity may turn all that around as you dig into the subject of earthworms.

What to do when they arrive. Worms may be kept in shipping container for short periods. Upon arrival, mist with water to moisten, but do not make soil wet. Worms can be kept in the refrigerator for short periods of time. To maintain worms for a longer period of time, keep at room temperature in diffused light, feeding crushed dead leaves or cornmeal sprinkled over the surface of the soil. Add rich soil (preferably humus) as needed, and remove any mold as it appears.

PILL BUGS AND SOW BUGS

Iso is Greek for "similar or equal." Pod means "foot." Put them together and you have the isopod, an organism that has an equal number of feet or legs on both sides with all legs similar to one another. Isopods have 14 legs that all function the same. This distinguishes them from closely related organisms that have legs that are modified to perform different functions, such as walking, feeding, feeling, grasping, and so on.

Classroom habitat. Isopods are excellent classroom animals—they exhibit interesting behaviors, they are small but not tiny, they don't bite, smell, fly, or jump, and they are easy to care for. Isopods can live in just about any vessel, from a recycled margarine tub to a 50-liter aquarium. If the container is smooth-sided, it doesn't even have to be covered, because isopods can't climb smooth surfaces at all. A layer of soil covered with some dead leaves, twigs, and bark is great, but isopods will be comfortable with some paper towels or newspaper laid on the soil. They do like to have some structure to crawl under.

Food and water. The most important thing to remember is that the soil must be kept moist at all times—not wet, but moist—so that the isopods don't dry out. A chunk of raw potato in the container with the isopods serves as a source of both food and moisture. Otherwise they will eat the decomposing leaves and twigs or the paper towels and newspaper.