

Structures of Life

Structures of Life > Investigation 1: *Origin of Seeds* >

Part 3: *Seed Soak*, page 28

Outdoor Seed Search

FOSS® Home/School Connection, page 36

When to Go Out

Following the breakpoint in Investigation 1, Part 3, go outdoors to collect seeds for a class seed collection and/or notebook samples.

Outdoor Objective

Students will observe the variety of seeds found in the schoolyard. Students will consider what the shape suggests about how the seed travels away from the parent plant.

Materials

For Each Student	Science notebook, or student sheet no. 28 <i>Home/School Connection</i>
	1 Clipboard
	1 Pencil
	1 Hand lens
For the Class	Glue or tape
	Extra pencils
	Display materials for seed collection: egg cartons, trays, or clear plastic bags

Getting Ready

Time: 15–45 min.

Site: Look at flowers, weeds, bushes, and trees in landscaped areas, garden beds, and in uncultivated “urban wilds.”

Seasonal Tips: In the winter, look for seeds still attached to plants, and for berries and pinecones. In the spring, students can take note of flowers and predict where they will later find seeds.

Safety Note: Familiarize yourself and your students with any noxious plants that may be in the schoolyard, such as poison ivy or stinging nettle. Caution students that “hitch-hiker” seeds have hooks that may be sharp.

Conservation: When you are finished with the seeds, have students disperse them outside.

Outdoor Activities At a Glance

Investigation 1

Outdoor Seed Search
(FOSS® Home/School Connection)

Seed Search
(FOSS® Home/School Connection)

Investigation 2

Search for Germinating Seeds
(BSI Extension)

Adopt a Plant (BSI Extension)

Investigation 3

Compare Arthropods
(FOSS® Home/School Connection)

Investigation 4

Snail Hunt

Investigation 5

Beetles in the Schoolyard

Priority activities appear in **green**.

What You Might Find:

Roadside *Brassica* seeds come in little pods and students may remember them from the FOSS® New Plants module.

“In October, we harvested marigold flowers we had planted in spring. I asked each student to count the seeds in a single flower. One student opened her flower in dismay, ‘No way am I counting all these!’ she moaned. ‘Oh yes, you are,’ I said, and used it as an opportunity to teach them how to count large numbers by arranging them in piles of ten or twenty. She had over a hundred seeds in one flower and was very proud of her work.”

Dean Martin
Science Specialist

Guiding the Investigation

1. Ask students where they think they are most likely to find seeds in the schoolyard, and set the boundaries for the search.
2. Instruct students to find at least 4 different types of seeds to draw in their notebooks, and glue or tape onto student sheet no. 28 *Home/School Connection* (see page 36).
3. Ask students to record in their notebooks: a) the plant the seed came from, b) a few words describing the shape of the seed, and c) how they think this seed travels from the parent plant. Students can raise the seeds over their heads and drop them to see if they “fly.”
4. Gather seeds to begin a class seed collection before going in. Students can continue to add to it throughout the module.
5. Back indoors, have students display their notebook pages and seed collections and tour the room to see the seeds their classmates found.
6. Discuss the structures of the seeds they found outdoors. Ask, *Do they differ from the seeds in common fruit? How and why?*
7. You might want to ask students to estimate and then count the number of seeds in a single flower. Many have a surprisingly large number of seeds. Discuss why this might be so.
8. Display the class seed collection in egg cartons, clear plastic bags, on trays, or on chart paper, so you can refer to it during the rest of the module.

Structures of Life > Investigation 1: *Origin of Seeds* >

Part 3: *Seed Soak*, page 28

Seed Search

FOSS® *Home/School Connection*, page 36

Students might bring in seeds from home to add to the class collection; or if you did not do the seed search as a class, assign it as homework.

Structures of Life > Investigation 2: *Growing Further* >

Part 1: *Germination*, page 8

Search for Germinating Seeds

Boston Schoolyard Initiative Extension

When to Go Out

Following Part 1, go outdoors to look for germinating seeds, or to mark out patches of soil to observe over time.

Outdoor Objective

Students will observe that the plant's life cycle is occurring at all times, all around them, and that the soil contains seeds not planted by humans.

Materials

For Each Student	Science notebook
	1 Clipboard
	1 Pencil
	1 Hand lens
	Student sheet no. 7 <i>Comparing Germinated Seeds</i> chart
For the Class	1 Trowel if collecting soil for a class terrarium

Getting Ready

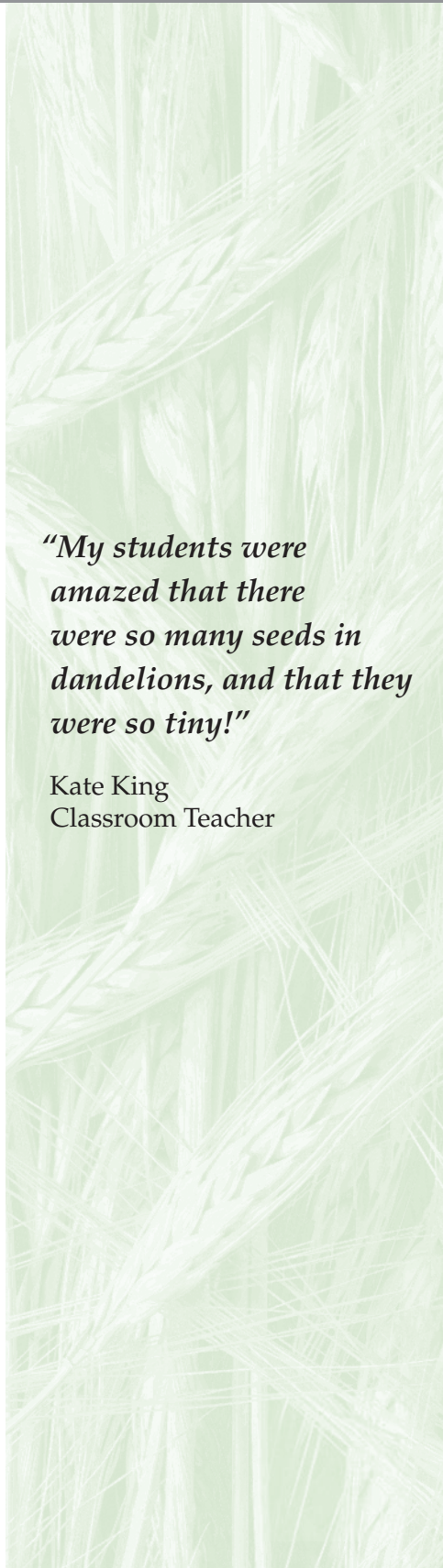
Time: 20–30 min. several times during the module.

Site: Look for germinating seeds at: the base of trees, such as maples, or oak; in garden soil or a compost pile; or on the ground near a bird feeder. Put newspaper or cardboard over damp ground and check underneath them after a few days. Try turning the soil over with a shovel to bring weed seeds to the surface.

Seasonal Tips: In the fall, look for germinating seeds that may be found under fallen leaves, and for acorns near oak trees. In the winter, dig up some soil and bring it indoors to watch the warmed seeds sprout. In the spring, dig down into the soil to find germinating seeds.

Guiding the Investigation

1. Discuss where you might find germinating seeds in the schoolyard. Ask, *What conditions do seeds need to germinate?* Take students out to the schoolyard to look for germinating seeds.
2. Gather students to look at any germinating seeds that have been found and discuss what stage of growth they represent.
3. Ask students to look for four types of germinating seeds and to record their findings on the *Comparing Germinated Seeds* chart.
4. Before going back indoors, let a few students show the class the germinating seeds they found.
5. In colder months, bring some soil indoors to observe what happens. Keep it moist, and students may see seedlings emerge as the soil warms up over the next days and weeks.



"My students were amazed that there were so many seeds in dandelions, and that they were so tiny!"

Kate King
Classroom Teacher

“After a week, plants began to sprout in the dirt we had brought inside. My students were amazed that plants could grow out of the soil where there seemed to be no seeds. All their questions were a variation of ‘How did those plants get there?’ It helped them realize that plants have their own lives that are completely independent of people and that plants don’t need people to put their seeds in the ground.”

Teresa Strong
Science Specialist

Optional: Have students select a patch of earth to observe over time, keeping track of the number and type of plants that are visible in their patch over a period of a few weeks. Keep track of the weather conditions during this time and discuss how temperature and precipitation may affect seed germination.

Structures of Life > Investigation 2: *Growing Further* >

Part 1: *Germination*, page 8

Adopt a Plant

Boston Schoolyard Initiative Extension

When to Go Out

Following Investigation 1, or as early as possible in the module since this is a longer-term observation.

Outdoor Objective

Students will observe that plants in the schoolyard have the same characteristics and structures of the plants they have been studying in class.

Materials

For Each Student	Science notebook
	1 Clipboard
	1 Pencil
	1 Hand lens
	1 Craft stick (with name written in permanent marker)
For the Class	Extra pencils, craft sticks, permanent marker
	Field guides (to identify plants)
	Camera (to photograph plants)

Getting Ready

Time: 10–25 min. At least three times during the module.

Seasonal Tips: In the fall, students will see plants die, or go into dormancy, leaving the seeds to go on. In the winter, students will observe plants in a dormant state. Some plants may be found under the insulating cover of snow, leaves, or compost. In early spring, there may be little to see the first time out. This will increase the excitement the next time students are out and plants are visible where there had only been dirt.

Safety Note: Be aware of any harmful plants in your schoolyard, such as poison ivy or stinging nettle.

Guiding the Investigation

1. Ask students to select a plant or tree to observe over the next few weeks. They will keep careful track of these changes through drawings and words in their science notebooks.
2. Have students mark their plants by: a) gently pushing a craft stick with their name on it into the earth under the plant; b) making a simple map in their notebook showing the plant relative to landmarks, or c) photographing each plant.
3. Ask students to describe their plants in pictures and words, labeling as many parts of the plants as they can. Draw the whole plant and a close-up of a leaf, branch, bud, flower, or seed.
4. Remind students that they will be observing the same plants several more times during the module.
5. Each time they visit their plant, ask them to draw it, label the drawing, and record any changes they observe. Ask, *Which part of the plant has changed? Is it larger or smaller than it was? Why do you think it changed?*

Structures of Life > Investigation 3: *Meet the Crayfish* >

Part 3: *Crayfish at Home*, page 20

Compare Arthropods

FOSS® *Home/School Connection*, page 32

When to Go Out

Following Part 3 or 4, go outside as a class to search for arthropods. You may also want to assign the activity as homework.

Outdoor Objective

Students will find living organisms, decide whether they are arthropods, and compare their structures to those of the crayfish.

Materials


For Each Student	Science notebook, or student sheet no. 30 <i>Home/School Connection</i>
	1 Clipboard
	1 Pencil
	1 Hand lens
	1 Cup or plastic tank for holding arthropods

Getting Ready

Time: 15–45 min. Flexible—depending on how much time you want to devote to it.

What You Might Find:

Students will discover aspects of their plant that they would never notice at a glance: bugs crawling on, under, or in the plant; color variations in the leaves; fragrances; and the appearance or disappearance of buds, leaves, flowers, or seeds.



Site: Look under rocks, leaves, logs, trees, bushes, and other plants. You may find arthropods on pavement, play structures, or even on the side of your school building. Look on the surface of pooled water, in the water under rocks, and in leaf debris. Try shaking a tree branch over a white sheet laid on the ground.

Seasonal Tips: In the winter, arthropods are hard to see because they are not moving. Try bringing in a small sample of leaf litter. As the animals warm up, they will begin to move.

Safety Note: Refer to the safety tips on student sheet no. 30 *Home/School Connection*.

Conservation: Teach students how to look carefully for animals under rocks, logs, and leaves without disturbing their habitat.

Guiding the Investigation

1. Read about arthropods on student sheet no. 30 *Home/School Connection* together as a class. Ask students what types of arthropods they think they are most likely to find in the schoolyard, and where.
2. Assign (or allow students to select) the areas that they will search in small groups. Ask each student to search for an arthropod and to record their observations.
3. Allow a few students to show the class the organisms they found, and explain where they found it, and how they know whether or not it is an arthropod.
4. In small groups, or as a class, use Venn diagrams to group the organisms found into those that are arthropods and those that are not. Ask students why they placed each animal in the group they did.
5. Compare and contrast the structures of the animals found living in the same spaces.

Structures of Life > Investigation 4: *Meet the Land Snail* >

Part 1: *Land Snails at Home*, page 8

Snail Hunt

When to Go Out

Prior to Part 1, look for snails to collect for this investigation.

Note: The United States Department of Agriculture (USDA) requires a permit for the purchase of *Helix aspersa* and other land snails. For more information, go to Delta Education’s website at www.deltaeducation.com.

Outdoor Objective

Students will learn where to look for snails, observe them in their natural habitat, and then collect a class sample to use for this investigation.

Materials

For Each Student	Science notebook
	1 Clipboard
	1 Pencil
	1 Hand lens
For the Class	1 Container for collected snails

Getting Ready

Time: 15–20 min.

Site: Look for snails in shady, moist, wooded areas, such as under logs, on tree trunks, or on cool, damp concrete walls. Snails are nocturnal and easiest to find early in the day.

Seasonal Tip: Snails hibernate in the winter, so they dig down into the soil five inches or more to stay warm.

Guiding the Investigation

1. Discuss where students think they are most likely to find snails. Have students spread out and search.
2. If and when the first snail is found, gather around to look at where it was found and observe what it is doing.
3. Have students continue to look for snails. Students should record in their science notebooks where they found their snail, on what surface, and what it was doing. Students who do not find a snail should record where they looked, and the fact that there were no snails.
4. To bring snails indoors, have students gently pick them up and place them in containers with soil, leaves, or other materials from the spot they were found. It is essential to keep the snails moist or they will die.
5. Refer back to students' outdoor observations as they learn about snail habitats and behavior in class. Ask, *Do your classroom observations about snail habitats and behavior match what you observed in the schoolyard?*

“They saw that there really were animals living there in the leaves on the edge of the schoolyard, all having different structures to help them survive in the same place: wet skin, exoskeleton, curling behaviors.”

Teresa Strong
Science Specialist

“I think my students understood the needs of the land snails better, after unsuccessfully searching for them in our schoolyard, searching for them at home, and then thinking about how to transport them from home to school.”

Kate King
Classroom Teacher

“Students were able to compare structures across all sorts of animals: millipedes, beetles, worms, spiders, ants. It really reinforced their understanding that living things have different structures that they use for different reasons.”

Erin Hashimoto
Science Specialist

“Some of my students saw the schoolyard habitat as dirty and dangerous and to be avoided at all costs. After holding back for a while and just watching, they built up confidence. Now some of these students are bringing in more bugs and critters for us to observe than anyone else.”

Teresa Strong
Science Specialist

Structures of Life > Investigation 5: *Bess Beetles* >
Part 2: *Comparing Crayfish and Beetles*, page 13

Beetles in the Schoolyard

When to Go Out

Following Part 2, take students outside to search for other types of beetles. Read *The Life of Bess Beetles* in the Language Extension on page 30 to help guide your search.

Outdoor Objective

Students will search for beetles and observe the similarities and differences between the beetles they find and bess beetles.

Materials

For Each Student	Science notebook
	1 Clipboard
	1 Pencil
	1 Hand lens

Getting Ready

Site: Anytime of year, beetle larvae can be found in the top five inches of soil as white grubs. Look for intricate etchings that larvae will leave as they eat their way under the bark of logs and branches on the ground. Look for adults on flowers, trees, or under debris.

Guiding the Investigation

1. Discuss where students might find beetles. Have students spread out and search.
2. When someone finds a beetle, gather around to observe it. Ask, *How big is it? How fast is it? What colors, patterns, or structures does it have? Where was it? Was it eating anything? How does it compare to the bess beetle?*
3. Have students spread out to look for beetles and record their observations in their science notebooks.
4. Return inside to discuss your findings. If there is time, have students share their notebook entries with each other.