

## **FOSS® NATIONAL PLANTS AND ANIMALS TEACHER PREPARATION VIDEO TRANSCRIPT**

**<Larry Malone: Narrator: Module Introduction>** Hi. I'm Larry Malone. And I'll be your guide as we take a brief excursion through the Plants and Animals module.

This module is built on the premise that no individual plant lives forever. And in order to guarantee that we live in a world filled with plants, there has to be a steady supply of new plants coming along. In addition, many creatures depend on plants for their survival. Students will see how plants can contribute to a habitat for numerous soil animals. We'll also explore some of the many strategies plants and animals have for propagating and surviving.

Now, here on the table in front of me you see the kit for this module, Plants and Animals. In it you'll find most of the equipment needed to conduct all of the activities with up to 32 students.

### **<Teacher Guide Introduction>**

Narrator: You'll need to check the inventory sheet in the Materials folio to see which materials are consumable and which are permanent. Before you begin teaching this module, it is important to look through the entire Teacher Guide.

The FOSS teacher guide for this module includes these folios: Overview, Materials, Investigation Folios, Science Notebook Masters, Teacher Masters, Assessment, Assessment Masters, Science Notebooks, Reading Extensions, FOSS Website, and Investigation Outline by Session.

Be sure to read the overview folio before you begin teaching the module. It contains many helpful suggestions for getting started. In it are an overview matrix, the standards that are addressed in this module, background information, ideas for teaching science to young children, and suggestions for scheduling the activities.

In the Materials folio you'll find an inventory list for the kit, lists of any materials you'll need to provide for the investigations, directions for preparing the materials and information on ordering any replacements.

Next are the investigation folios. These are at the heart of the program and will be described in detail in this video. The first page gives overview information. The At a Glance chart summarizes the investigation, and helps you plan for assessments and extension activities. Next you'll find the background information specific to the investigation.

There is a section called Teaching Children About, which gives you some insight into the research on how children think and learn. Each investigation has several parts. For each part you'll find a materials list, Getting Ready section, and step-by-step directions for conducting the activity with your students. Step 2 in each of the Getting Ready sections includes assessment opportunities found in that part. The interdisciplinary section at the end of each investigation has many ideas for extending the activity into other areas of your curriculum.

The next sections contain the Science Notebook Masters and the Teacher Masters. Here you'll find all of the student sheets used in the investigations. There are also masters for math extensions and Home/School Connections for each investigation.

There are many ways to assess your students' learning as they progress through the investigations. Read through the Assessment section at the back of the guide for more information about formative and summative assessments. After the assessment section, you'll find the Assessment Masters. On the anecdotal notes sheet you can record your students' insights or the difficulties they run into. You'll use the assessment checklist and the summative assessment chart when assessing specific skills and concepts. End-of-module assessments provide performance and written assessments to assess student learning.

The Science Notebooks folio describes the benefits of using science notebooks with FOSS. It offers a detailed discussion of using notebooks with your grade level.

Check out the Reading Extensions. This annotated list includes both nonfiction books, and fiction books for student reading, along with teacher resources.

The FOSS Website folio introduces you to the interactive, multimedia website for teachers, parents, and students.

In the Investigation Outline by Session folio, you'll find a complete outline of the module.

In the kit, you'll find a class big book and 32 matching student books, the FOSS Science Resources for Plants and Animals. These are designed to be read periodically throughout the module, after students have had the hands-on experience of the activities.

### **<Before You Begin>**

Narrator: There are a few things to get ready that you will use throughout the module. Make copies of the Anecdotal Notes and Assessment Checklist sheets for assessing student understanding during the investigations. Many teachers write the students' names before making copies. Word Bank and content charts are used to help students remember the new vocabulary and concepts they've learned, while the module progresses. Students will add to these charts at the end of each session.

Before you begin teaching, be sure to put up the FOSS Safety poster where it can be easily seen by students. The poster is included in your kit.

### **<Investigation 1, Part 1>**

Narrator: In this investigation, students investigate grass and grain seeds.

In the first part, they're going to grow some weedy lawns, planting rye grass and alfalfa. In Part 2, they'll mow those lawns to see what happens to the two different plants after mowing. In Part 3, the students will grow a very important grain, an individual wheat seed in a straw. And they'll observe what happens to it over time.

Let's see what equipment we need for Part 1. We've got our basin for soil. We need two of those. We've got the tray that the plants will be put in as they grow.

We have rye grass seeds. And over here are the alfalfa seeds that will function as weeds in the lawns. In the Teacher Guide the alfalfa seeds are not referred to as weeds. But nonetheless, that is their role.

We'll use these plastic cups to distribute the seeds to the students. These small spoons will be used to measure the seeds into the planter cups. And here are the little planting cups, holes in the bottom and the labels that we put on there to identify them.

You'll also get from the kit the half liter container and the small vials so that the students can water their lawns. And for watering the lawns after they're established, we need the liquid fertilizer.

You will need to copy two science notebook sheets for each student, Growing a Lawn and Plant Picture. They'll use the sheets to record the changes in their lawns over time. Additional materials supplied by the teacher include scissors, paper towels, soil, and a supply of water. Each student will need a sheet of paper for the preassessment activity.

Part 1 of the activity starts by calling the students to the rug to have a discussion about lawns to find out what they know about them. In the course of the discussion, the students will probably say that lawns are made out of grass. And you can introduce them to the seeds of the grass plants. You should then be prepared to demonstrate the procedure the students will follow when they plant their lawns and introduce some weed seeds in, as well.

So this is that procedure: Each student gets a cup. Drainage holes. Puts on a label to identify it. And then scoops up a full measure of soil, leveling the soil, tapping it down a bit to make it nice and solidified.

Teacher: Okay, you can start passing them around.

Narrator: And now we're going to add one level spoon of grass seed. And then go to the weed seeds. We're using alfalfa as the weed seeds. And take one pinch and distribute those over the surface of the soil. Now the students return to the soil supply or use a supply that's been brought to their table. And just cover the seeds with a shallow layer of soil. And again, pat it down firmly. Take out one full vial of water and carefully pour it over the surface of the soil.

Now that all of the planting cups are in the tray, the students find a suitable location in the classroom for them to stay.

Distribute copies of the Growing a Lawn sheet and have students record the date their seeds were planted.

The students observe the emergence of the plants over time marking the calendar and keeping records on their individual sheets. The students should draw a picture of their lawn and they

should be invited to speculate about what they think might happen as the plants continue to grow.

In the Wrapping Up after each part you'll review the new vocabulary from the Word Bank and add concepts to the content chart, called What We Learned.

For Part 1, ask the prompts What will our seeds need to grow? Compare alfalfa and rye grass seeds. How are they different? You can also list student questions here.

In the Wrapping Up section of most parts, you'll use cloze review to reinforce new words.

Teacher: And we planted two types of seeds and they were...

Narrator: This is what a cloze review might look like for this part.

Teacher: And when you plant a whole bunch of grass seeds in one are that makes a...

Class: Lawn.

Teacher: Um, what we put in the cups to plant the seeds in was...

Class: Soil.

Teacher: And when a seed starts to grow it makes a...

Class: Sprout.

Teacher: And this was added to the water to help the plants grow...

Class: Fertilizer.

Narrator: At the end of Part 1, introduce What Do Plants Need?, the first reading in the Plants and Animals Science Resources book.

Give students a few minutes to look at and talk about the cover of the book. Introduce the table of contents... and the title of the article.

Teacher: Good. Let's see what the first story is called.

Narrator: Ask students to listen for ideas that may be new to them.

Teacher: Many people grow plants...

Narrator: Choose the best strategy for reading the article with your group. You can use the Big book with the whole group or have students read in small groups with the student readers.

Questions will be posed throughout each article. You can discuss these as you go along, or after you've finished reading the article.

After reading the article, have students respond to the questions on science notebook sheet no. 3 called What Do Plants Need? review.

**<Investigation 1, Part 2>**

Narrator: Part 2 starts when the plants have grown up to be about six to eight centimeters tall. And I've got a sample right here of what a typical planter might look like after perhaps a week or ten days. A discussion of the results of the growing so far might suggest that the lawn should be mowed. And that's a good idea. That's what we want the students to do.

So the students are invited to mow their weedy lawns. Armed with scissors they are then asked to cut the lawn right even with the top of the planter cup. The students should draw a picture of their mowed lawn and they should be invited to speculate about what they think might happen as the plants continue to grow.

Here is a sample of a lawn mowed yesterday. And the students will observe similar results in the classroom as they see the grass continue to grow quite rapidly even after being mowed. But there are no weeds in evidence. None of the broad leaf alfalfa plants. And after a week, they might see something that looks like this. The grass continues to grow. And a few weeds are still in evidence down in here. But nothing like they were before.

In fact, it's a good idea suggested in the manual that you keep a control, a weedy lawn that is never mowed, so that the students can refer back to what the lawn would have looked like had it never been mowed. If the students look closely, they'll see that there's an abundance of weeds growing down in among the grass plants so that the alfalfa plants are succeeding just fine in the environment where they've never been mowed.

The lawns can continue to grow as long as the students have interest in observing what happens each subsequent time they mow the lawn. Or the students might want to take their little lawns home to share with their parents or to plant.

It's easy to remove the lawn from the cup just by grabbing the plants firmly and lifting them right out of the cup. This can then be placed into a paper cup or plastic bag to be taken home. But be sure to keep the planter cups because these are not consumable items. They'll be used time and time again.

Watch the video How Plants Grow. After reviewing, lead a discussion about what plants need.

To assess progress, distribute the Growing and Mowing a Lawn sheets and sheets of blank paper. Have students cut the pictures on the dotted lines. Ask them to order the pictures that show what happened when a lawn is planted, grows, is mowed and then grows some more. When students finish sorting, distribute glue to finish the project.

In the Wrapping Up, use a cloze review to reinforce the new vocabulary, observe, leaves, mow, blades, stems.

Add to the content chart by using these questions as prompts: In what ways are grass plants and alfalfa plants different? What happened to the rye grass and alfalfa after we mowed them?

Add new concepts and questions to the content chart.

After 3 weeks, end the investigation. Save some lawns for the terrariums in Investigation 3 or let students take them home. Save the soil for later investigations.

### **<Investigation 1, Part 3>**

Narrator: Part 3 is called wheat. And in this activity, the students have a chance to have an up close and personal look at the development of an individual wheat seed. Let's take a look at those materials now and see what you'll need to get out of the kit.

Most important are the wheat seeds. Each student needs three seeds, two to plant in straws and one to glue on his or her record sheet. If you choose to do an extension activity investigating another grain seed, there are oats in the kit as well.

You need clear plastic cups to distribute seeds. And these clear plastic straws are the chambers in which the seeds develop. Students keep their straws on their desks or on a counter in large plastic cups. A permanent marking pen is used to mark the straws at three inches. And labels are used to identify each students' straw. Extremely absorbent paper towels are in the kit. Use these to make the wicks that go in the straws.

Students record the growth of the seeds in their straws on this sheet, Growing Wheat. There's room for four entries as the seeds develop over time. In addition, you'll need to supply a few items from the classroom. A pair of scissors or a paper cutter to cut the paper towels, a ruler and some white glue.

Two items need to be prepared before you introduce the activity to the students. You'll need to cut some of this absorbent paper towel into some wicks. And you'll need to mark soda straws at three inches.

To start the preparation of the wicks, I'm first going to take the paper towel and fold it in half matching the ragged edges. I've chosen to use the paper cutter to cut the wicks because it will go much quicker. But it can be done with scissors.

First thing I need to do is cut this into three and a half inch strips. So I'm going to set the paper at ten and a half inches, which is three times three and a half, and cut off this little excess at the end. Now I'm going to advance the paper to seven inches. And finally three and a half inches.

Now I'll stack up the three strips. And I'm going to cut these now into one inch lengths. So by putting these into the paper cutter and finding the nearest whole inch, which is five inches, I'll cut off the little ragged edge and now advance to four inches, three inches, two inches and with a

magnificent guess, one inch.

I now have about 30 little strips that can be used as wicks. And I'll need to prepare two paper towels in this fashion. Now we'll move onto the straws.

I'm going to use the fence here on the paper cutter to assist me. I'm going to take a bunch of straws and push them all down here so they are all aligned. I'm then going to measure three inches on two of the straws and make a mark with my permanent pen.

Okay. Now I'm going to put one of those marked straws at each end of this set of straws making sure that all are pushed down against the fence. And I'm going to put my ruler now as a straight edge across the whole bunch of straws, hold it down securely and draw a line across all the straws right at three inches. I'm going to let them sit there and dry for just a few seconds and then I'll bring another batch of straws in until I've got a total of 72 straws marked.

Teacher: Anybody got an idea what kind of plant you actually eat the plant? Part of the plant. Michael?

Narrator: You begin Part 3 by calling the students to the rug and entertain a discussion about grain seeds. The wheat seeds are introduced and the students are challenged to plant a single grain of wheat and to observe it grow over time.

Each student gets a marked straw and a wick. The first part of the procedure is to twist the wick into a little stick. It needs to be twisted firmly enough so that it can be inserted into the straw from the marked end. Once the wick is inserted, you can pinch down on the straw and untwist the wick and that will help to hold the wick right in place. The top of the wick should be near the black mark on the straw. Now, the students are going to place a single wheat seed in there.

Teacher: I want you to be a scientist and observe the seeds. Look at them very carefully.

Narrator: When the students look at the wheat seeds, they'll notice that one end has an indentation kind of like a fingerprint. That's the end that should go into the straw first. And then the wheat seed should slide right down and sit on top of the wick. They can adjust the length of the wick so the seed is right at the black mark.

Teacher: Alright, does everyone have two seeds in?

Narrator: Each student prepares two straws like this. There's always the chance that one will fail and we want the students to have the opportunity to observe the growing seed. So each student sets up two.

Now, when all four students in a group have completed the assembly of their two straws, they'll put them all into this large cup. And the cup will be filled about one centimeter deep with water. The water will wick up and provide just the right amount of moisture for the seeds. And in time, they will be able to observe them grow.

After five days, this is what you might expect to see in the straws where the grain is growing successfully. You can see the seed right here at the black mark still. There's a nice green shoot extending up about three or four centimeters. And it's difficult to see against the white paper toweling. But the root is extending down through the bottom. And it's coming out clear at the very tip of the straw here. The root has been growing very rapidly.

This is the point at which the students select one of the plants to monitor continuously from this point on. Take one of these little labels and wrap it right around the straw and write their name on.

And here is a little collection of wheat seeds that have been growing for various number of days. This one over here has been going about five days. That's the one we looked at earlier. This one has been going about ten days. There are two leaves coming up and the roots have extended out quite nicely. Here's one 15 days. The vegetative growth has come up above the top of the straw and there's quite a bundle of roots down here.

And after 20 days we've got two leaves coming up the top and roots that extend well out the end of the paper down here. As we can see, they are about 10 or 12 centimeters long. Marvelous growth for the students to observe up close.

The record sheet can be maintained throughout the process of growth. And the students can lay their experiments right here on the paper to get a good idea of how they should represent the growth. And they'll see the advance in growth over time as the plants develop.

Students can glue a dry wheat seed to their Growing Wheat record sheet to compare with their sprouted seeds.

After one-week of growth, have students compare the growth of their roots and leaves by making bar graphs. Give each student a brown and green strip of construction paper. They should cut the brown strip the length of their root, and the green strip the length of their leaf. Have students assemble the strips on a class bar graph. With two more strips, each student can record the lengths in their own science notebook.

To Assess your student's Progress, visit the groups as they record. Ask, How are the roots and leaves different? Why do you think the roots grow down and the leaves grow up?

Wrapping Up this part includes doing a cloze review for the words wheat, grains, roots.

At the end of the session ask students for suggestions for the content chart. Ask, What did you observe in your straws? Do all leaves grow upward? Are seeds alive?

### **<Reading in Science Resources>**

Narrator: At the end of Investigation 1, introduce The Story of Wheat.

Introduce the Glossary, and show the students how to identify the bold face words as glossary words.

As always, choose the best strategy for reading the article with your group. Questions are posed throughout each article. You can discuss these as you go along, or after you've finished reading the article.

For more on reading strategies, see the Reading and Writing in Science chapter in your Teacher Guide.

Students often become very attached to their wheat seeds and want to take them home, which they can do with straw and all. Plant it and hope for the best. Maybe get a wheat crop at the end of the activity.

At the end of each investigation, you'll find the interdisciplinary extensions and the home/school connection. The interdisciplinary extensions include language extensions, art extensions, science extensions, and math extensions.

The home/school connections provide activities for use at home. Look ahead to see when each activity should go home. Parents can also download the home/school connections from FOSSweb.

### **<Investigation 2, Part 1>**

Narrator: In this activity the students will be trying to generate new plants from old, mature plants. And the vegetative stems are the part that they will be investigating.

In Part 1, the students will be working with pieces of stem that you've brought in from house plants or garden plants that can be sacrificed as the students investigate new plants from stems. There are a few items we'll need from the kit so let's see what those are.

Each pair of students will need a plastic cup like this one and a lid that fits securely on top with two holes. The cups will be labeled with the usual removable labels. And once again, the students will have a recording sheet to keep track of the growth of the plant parts. This one is called Stem Cuttings.

The teacher will need to provide a few items: Water, scissors for cutting the stem samples, a container to put the cups that we'll prepare and, of course, some stems, some plant material. What I've got in here is English ivy. This is a good plant to use. It's very common. Found throughout the country. And it roots readily.

Over here I've got some other samples that would also be appropriate. Some of these are house plants. Some can be found out doors, depending on what part of the country you come from. This is Swedish ivy, sometimes known as Creeping Charlie. It's a member of the mint family. You can tell because it's got a square stem. Any of the mints, spearmint, peppermint or any of the other house plants like coleus that are in the mint family will work just fine for this.

This other plant over here is a Wandering Jew plant. It also roots quite readily. So any plant that will grow roots readily in a week or two is appropriate for use in this activity.

Part 1 starts with the students being given a section of stem much like this one. They observe it, they describe the parts that they see. In this case I can see leaves. And if I follow the stem clear down to the tip, I can see tiny leaves and a bud. I can see where these leaves join the stem and where these leaves join the stem. It seems like that's a distinct piece of the plant. And in fact, those areas where leaves or branches or flowers come off the stem are called nodes. And that will be an important concept for the students to develop.

Teacher: Today we are going to learn a new science word. Say node.

Class: Node.

Teacher: How many parts in the word node? Let's clap and find out. Node.

Class: Node.

Teacher: Do it again. Node.

Class: Node.

Teacher: How many parts?

Class: One.

Teacher: One, just one part. A node is the part of a stem where a leaf or a branch comes out. What is a node?

Class: A stem or a branch in a leaf comes out or a branch comes out.

Teacher: Okay, so a part of a stem where a leaf or a branch comes out. Good. So the place on a stem where a leaf or branch comes out is called a...

Class: Node.

Teacher: Today we are going to look at plants and we're going to look at the stems and we're going to find places where a leaf or a branch comes out so we will be look for...

Class: Nodes.

Teacher: Good.

Narrator: The idea of developing a new plant from a section of a stem is a novel one for most first and second graders but they are game to give it a try. You'll ask the students to work together to come up with a plan for what they'll do with a piece of stem to see if they can make a new plant from it. This is the point at which you can introduce the plastic cup as a container for attempting to grow a new plant from a piece of stem.

Students decide how they want to prepare their stem into cuttings and fill their cup most of the way with water. Snap the lid on and then insert the cutting, the piece of stem, in through the holes.

Now, occasionally you may find that some students will take their section of stem and chop it up into little bitty pieces like coleslaw and put that into the holes. I'm not sure exactly what this behavior is, but I think it might be that they are trying to make their stem into seeds and that seeds are the source of a new plant.

After two or three weeks, this is what the students may observe. You can see here that there's a nice growth of roots on the end of these cuttings.

Continue to observe and grow these cuttings. In part 3, students will plant these cuttings in soil to develop nice, new plants for the classroom.

In the Wrapping Up, use a cloze review to reinforce the new vocabulary.

At the end of the session, have the students suggest ideas for the content chart.

**<Reading in Science Resources>**

Narrator: At the end of Part 1, introduce How Seeds Travel.

Discuss the lawns students grew in Investigation 1 and what a “weed” is, and how weeds get into lawns.

You can discuss the questions posed throughout the article as you go along, or after you've finished reading.

Have students respond to the review questions on science notebook sheet no. 7 called How Seeds Travel Review.

**<Investigation 2, Part 2>**

Narrator: In this part, the students will plant pieces of potatoes which are really modified stems to see if they can grow a new plant from a piece of potato. Let's take a look at the materials that the students will need.

Each group of four students will get a half liter container like this that they'll fill with soil to plant their spuds. And as usual, they'll label it. And you'll also need to get out another half liter container and a vial so that the students can water their spuds.

And you'll need to supply water, the soil, a paring knife for cutting the spuds and, of course, the spuds themselves. You can get either the brown potatoes, russet type, or the red potatoes. We recommend the red. They seem to sprout a little bit better. Plus, it's best if you purchase your potatoes two, three weeks, even four weeks before you're going to use them so that there's the possibility that the eyes will be developing into sprouts already.

You can see on this potato here that I've got early growth from this eye. And on this brown one, I can also see a few little locations where it looks like action is about to begin.

Part 3 starts at the rug. The teacher introduces the potato as a modified stem and the students observe it closely and notice the eyes. The eyes are actually the nodes on this section of stem. The students then go into their groups of four, pass the potato around, observe even more closely and then we have to decide how we're going to cut the potato into pieces.

I've brought a paring knife from home. Certainly you wouldn't want students to use this one. It would be far too dangerous. In some classes the teachers choose to do the potato cutting themselves. However, if you would like the students to cut the potatoes trying to get a node or an eye on each piece, provide some plastic knives for them to do that.

Let's see how that planting might advance in the classroom. In this class, I'm going to cut the potato. So I've got my paring knife. I see a nice eye right here. And I'm going to just cut down so that I've got that cut off with a substantial piece of potato, as well. I'm now going to fill the half liter container with soil following the usual procedure, filling it up, leveling it off. But this time I don't want to pat it down because I want to be able to push the piece of potato into the soil.

Now, I don't want to push it down so that this is buried because this is going to be the leaves. But this is also where the roots will come out, too. So rather than having that up or down, I want to insert the piece of potato sideways pushing it into the soft soil. I want to cover it over. And now I'm all set. Now, bear in mind that in the classroom, each of the four students in the group would have a piece of potato in here. So I would have four chunks ready to grow.

The last part is to water the potato pieces in the usual fashion using the little vial to measure water. Now we're going to set them in a nice place in the classroom where they'll be warm and perhaps in the light as soon as something starts to happen so that we can observe the growth of this particular stem into a new plant.

And after three or four weeks a nice new plant is emerging from our potato eye. Leaves, more leaves along the stem, nodes clearly visible along the stem and emerging from the soil. Over here a second spud starting to put up its roots. And if we poke around down in the soil, maybe a harvest of new potatoes.

You can assess your students' progress by conducting short interviews. Ask, Do your potato plants have the same parts as other plants you have grown? What are they? As the potatoes grow, hold discussions at the rug.

Student: Um, I saw on the...

Narrator: For the Wrapping Up, review the new vocabulary using a cloze review...

Ask: What part of the plant is a potato? Where do the stems and roots grow on a potato?

Add new concepts to the content chart. Ask students if they have any questions they would like to add to the content chart.

**<Investigation 2, Part 3>**

Narrator: In this part the students will take their rooted cuttings and transfer them to a flower pot or perhaps a discarded ice cream container to have a nice house plant for the classroom. The container is filled with soil; holes poked down for the rooted stems inserted it in, the soil pulled around and the plant put into a nice sunny place in the classroom.

Here is an example of one that some students put together earlier this week. It looks a little ragged right now. But as it takes hold and the plants start to grow, this will be a lovely possession for the students in the classroom.

Explain to the students that Animals eat food to stay alive and grow. Plants can't eat food. Instead, plants make food from light , air, water , and nutrients in the soil.

Watch the video, How Plants Get Food. Afterwards, hold a short discussion on the importance of plants.

For Wrapping Up, Part 3, review key vocabulary added to the word bank earlier.

Add any new concepts or questions to the content chart using these prompts: Did your cuttings produce healthy new plants? How can you tell? What part of the stem should you use to make a new plant? What do plants need to make food and keep growing?

As the plants grow, continue to hold discussions. Ask questions as prompts for writing in science notebooks.

**<Investigation 3, Part 1>**

Narrator: In Activity 3, parts 1 and 2, students build a terrarium using soil, seeds, and plants from earlier activities. They add local soil animals such as pill bugs, sow bugs, and earthworms. Caring for the habitats over time, they observe the changes in the terrarium and record observations in their science notebook.

Here's what you'll need to begin this investigation. For each group you'll need two plant cuttings from investigation 2, four large self-stick notes, one plastic teaspoon, which you'll provide, plastic cups, containing 10 wheat seeds, one vial of alfalfa seeds, and one vial of grass seeds respectively. Each group will also need one vial, a basin cover, a half-liter container of water, and a 6-liter basin. You'll also want to pour half of an 8-liter bag of potting soil into each of the 8-liter basins and place a cup in each.

You will need a supply of items for the terrariums, such as earthworms, pill bugs, sow bugs, dried leaves, pieces of apple, carrot sticks, small rocks, and seeds. You can ask students to bring in food and living animals, or you can purchase live organism coupons from Delta Education. Be sure to plan ahead and if you're using coupons, allow at least four weeks to receive your

organisms. Label each cup of seeds by writing the name of the seeds on a self-stick note and placing the note inside the cup.

Teacher: We're very lucky that we have a garden right here at school, so I want you...

Narrator: Ask students what they know about gardens.

Teacher: ...what you might find in the garden. We're going to start with plants. Who can think of a plant that we might find in a garden? Maryheim?

Student: You can find weeds in a garden.

Teacher: Weeds are in the garden. Sometimes we go out and pull weeds, don't we? Tammy?

Student: Tomatoes.

Teacher: Tomatoes and we will be planting tomato plants in our garden very soon.

Narrator: Introduce the terrarium, a small garden in a container where plants and animals live in soil.

Teacher: It's going to be this size.

Narrator: Discuss how they're going to add plants from earlier investigations, along with seeds, and animals. They'll take care of their terrariums and watch for changes.

Teacher: Then another thing you're going to be putting in your terrarium are plants and you're going to have a piece of a plant like this. Pathos, can you say Pathos?

Class: Pathos.

Teacher: And everybody will have a plant to put in their terrarium and also some seeds. There are seeds for growing alfalfa. Can you say alfalfa?

Class: Alfalfa.

Teacher: And seeds for growing rye grass.

Class: Rye grass.

Teacher: And seeds for growing wheat.

Narrator: To record the changes they observe, students are going to use a map to mark where they put the seeds and plants.

Teacher: When you make your map you're going to have a key. We've seen in books before where they have a key. Instead of writing the whole word you just write a letter that represents that word or a symbol. So where you put alfalfa – what letter does alfalfa start with?

Class: A.

Teacher: A. Pathos we'll do a P. So the first thing every group will do is make their map and show where you're going to put the different kinds of plants and seeds.

Tell them they are going to work as a group and plan where to plant everything first before getting the soil, seeds, and plants.

Student: I would like um ray.

Student: Ray?

Student: Yeah.

Student: Rye.

Student: Rye, yeah rye.

Student: And where will we put it?

Student: Um, on the top?

Student: Okay...wait!

Teacher: You all need to work together. You're making one terrarium. So yours can't be different than yours. You all started out with P. Well you know you started out with P in the middle. You need to have it the same. Well yours is the same and theirs are the same, but all four of you have to be the same.

Student: Oh.

Teacher: Remember one terrarium per table.

Student: Oh.

Teacher: Okay, so let's...

Narrator: Circulate through out the class, helping students to mark their maps, use the key, and write new words.

Student: How do you spell Pathos?

Student: Look up at the board.

Student: P...

Student: Wait his is different, see? So this is wrong.

Student: No wait, wait. That's good. That's good. It's almost at the top like mine. That's good. That's good. Now R. That's good, that's really good. Now put, wait wait. How many Rs do you have?

Student: So we need another R here.

Student: 1, 2, 3, 4...

Student: That's good! That's good. That's good. We're done, we're done.

Student: Wait, wait, wait. Let me make two Ws.

Narrator: When ready, have getters get the basin, soil, seeds, plants, and labels and begin making their terrariums.

Teacher: Alex, Alex go get the cuttings. Get the whole cup honey. Get a cup.

Student: You gotta get the whole cup.

Teacher: Max and Owen.

Student: Just put one right there in the corner. Yeah put one right there.

Student: Good.

Student: Two right there.

Student: I know! First you put there, then there. So you put one scoop right there.

Student: Then another one.

Student: Then another one right on the bottom.

Student: Okay.

Student: Right there...

Narrator: Visit the groups as they work. Encourage them to plant carefully and to follow what they marked on their maps.

Student: Keep going, come on, come on, good. Let's see. Now what else?

Student: We need to check it off. We did rye grass, check. We did wheat.

Student: Now how do you plant it? Pathos goes here.

Student: One goes here and the other one goes there. Yeah we're done.

Student: Oh yeah we are.

Teacher: One vial filled all the way up. One vial for each person.

Narrator: Have students water their terrariums and put them somewhere where they'll get indirect sunlight.

Teacher: Okay, you should have the lid on your terrarium and your terrarium is a place where plants and small animals live and another name for that is a habitat. Can you say habitat?

Narrator: Introduce the word "Habitat" as a place where living things live.

Teacher: Habitat, so we've made a habitat. On the bottom of your paper there are two questions will you read them with me please?

Teacher/Class: What do you observe?

Narrator: To assess your students' progress, visit the groups as they record.

Teacher: Where are they?

Student: Under the soil.

Teacher: Oh good, would you write that? I see seeds under the soil.

Narrator: Have students put their terrariums where they'll get indirect sunlight.

For the Wrapping Up, use a Cloze review to reinforce key vocabulary, terrarium, map, and habitat.

Ask: What will our seeds and plants need to grow? What changes will we see in our terrariums?

Add new concepts and questions to the content chart.

**<Reading in Science Resources>**

Narrator: At the end of Part 1, introduce What Do Animals Need?

Have students respond to the review questions on science notebook sheet no. 9 What Do Animals Need Review.

**<Investigation 3, Part 2>**

Narrator: In Part 2, students observe their terrariums closely after five days or more. Have them discuss the changes they see and record them on a new terrarium map. When finished, hand out the first map and discuss how the two are different. Ask, Which seeds have sprouted? Which have grown the most? Can you see any roots in the soil? Tell the students they're now going to add some animals to live in their terrariums. Have them observe the animals and then add them carefully to their terrariums.

Student: I see them. I see them.

Narrator: They can also add other items for shelter and food. Introduce watering by having each student add 1 vial of water to an area in the terrarium and mark it their maps using a W for Wet or a D for Dry.

At the end of Part 2, introduce Plants and Animals Around the World.

Have students respond to the review questions on science notebook sheet no. 10 Plants and Animals Around the World Review.

For the Wrapping Up, use a Cloze Review to reinforce the words, rain forest, tundra, desert, temperate forest, grassland, and pond.

Ask: How did our terrariums change? What lives in habitats? What do all plants and animals need to live in their habitat?

Add new concepts and questions to the content chart.

**<Investigation 3, Part 3>**

Narrator: In Part 3, students use plant and animal cards and match them to various habitats.

Teacher: Today we are going to review the habitats that you read about in the Plants and Animals book. And in the pocket chart I have picture maps that show the six different habitats that we're going to talk about. I'm gonna say the name; I want you to say it after me. Forest.

Class: Forest.

Teacher: Grassland.

Class: Grassland.

Teacher: Rainforest.

Class: Rainforest.

Teacher: Desert.

Class: Desert.

Teacher: Pond.

Class: Pond.

Teacher: Tundra.

Class: Tundra.

Teacher: Okay, I'm gonna give a clue and I want you to say which habitat I'm describing. This habitat is dry and windy and cacti and lizards live here. Wyatt?

Student: The desert.

Teacher: Desert. Good. Now the next one. This habitat is very wet and warm and tall palm trees and frogs live here. Sophia?

Student: Pond.

Teacher: Pond. There are frogs in the pond, but let's listen to the clues again. Wet and warm and tall palm trees and frogs live here. Another place that frogs can be, that the other clues apply to as well. Alex?

Student: Forest?

Teacher: It's a kind of a forest. Dennis?

Student: Rainforest.

Teacher: Rainforest. Listen to the clues again. I'm gonna pass out cards to everyone. Everybody will get one card and it will have something that lives in one of these habitats. So when you get your card, you're going to look at the picture and there's some reading on the card on the front and the back. And you're going to think about which one of these habitats you're living thing will go in and then we'll do one habitat at a time and if you have something in that habitat, you'll come put the picture up here. For now, you're just gonna look at the card and think about where you think it belongs. Please put your fingers in your lap so I don't step on your fingers when I walk by.

Student: I'm over here thinking mine will go in the forest grasslands.

Student: It could eat you.

Student: I've got two snails.

Student: No, I live in water, so you can't get me.

Teacher: ...rainforest; this is the temperate forest. If you think your living thing lives in the temperate forest, please come stand up in front.

Narrator: They learn that plants and animals have structures and behaviors that help them live in their habitats. Later, students watch a video that compares a rain forest and desert.

Let students come up and match their cards to the correct habitat mat.

Teacher: What do you have?

Student: I have a lizard.

Teacher: What kind of lizard?

Student: Um...

Teacher: Horned lizard. And where does the horned lizard live? What's its habitat?

Student: Desert.

Teacher: In the desert, so put it up here in the desert. And let's see yours Duran. We're onto the pond habitat. Let's see, what's this?

Student: An aquatic snail.

Teacher: We say aquatic. Can you say it that way?

Student: Aquatic.

Teacher: Aquatic snail.

Student: It is in the pond and wetlands.

Teacher: The pond and wetlands. Great. Will you put it over there in the pond?

Student: I want to do it in the wetlands.

Teacher: That's actually not; that's the rainforest.

Student: Where's the...

Teacher: Right there. You're gonna be our desert expert here. So there's your desert cards. You're gonna be our grassland expert.

Narrator: Use the Center Instruction Cards A and B: Habitat Match to set up activities using the cards and mats at centers.

Teacher: So look at your cards, see which plants and animals go in your habitat.

Student: This can't go in this.

Teacher: As you look through I want you to be thinking of your two favorites that you want to share with the group. So look through and pick two favorites.

Student: Perfect.

Teacher: Oh look at that, you got it again. The turtle must like you. Okay, so pick two.

Student: I got three.

Student: I've found four.

Teacher: Okay, two or three at the most. That one says lemming, yeah. It's cute, isn't it? Alright, now when it's your turn, you're going to say "My habitat is" and then you'll say what your habitat is and then you'll say that two animals or plants or plant and then animal live in this habitat are and then you tell us about it. Alex, would you go first?

Student: My habitat is a pond, and this is a fish that is a brook trout, brook trout?

Teacher: A brook trout, let's see. Okay.

Narrator: Guide your students in the various activities, noting if they are using the vocabulary and matching the cards and mats correctly. Later, the cards and mats can be used as writing prompts for describing a particular habitat and its living things.

Show the video *How Plants Live in Different Places*. It discusses the different structures of plants that help them survive in their habitats. Ask questions to get them thinking: How is a desert habitat different from a rain-forest habitat? Why can't rainforest plants live in the desert?

For the Wrapping Up, review shelter and predator using the Cloze review technique. Add them to the word bank.

Ask: What can animals do to protect themselves from predators? What parts of a plant or animal's body help it live in its habitat?

Add new concepts and questions to the content chart.

**<Investigation 4, Part 1>**

Narrator: In Part 1, Bulbs, the students will be planting onion starts or perhaps garlic to see if they can generate a new plant from this new and novel structure. They start at the rug, have a discussion about bulbs, discuss whether they think they're alive or not.

By this point in the module, the students are just about convinced they can make a new plant out of anything so they will plunge in with great enthusiasm. Let's see what we've got here for the students to work with for the Bulbs activity.

You'll want to find the cups with the snap-on lids with the holes on the top and labels so the students can identify their cup. Cotton balls. These the students will tease apart and put in the bottom of the cup to grow their bulbs. They don't use soil in this activity. The half liter containers with the vials once again for watering the plants.

Here's the Growing Bulbs recording sheet which provides a record of the changes observed. And there are a few items that you'll provide including water, scissors to cut the labels apart, a knife to cut some of the bulbs so the students can see what's going on inside and then the bulbs themselves. We recommend either onion starts or garlic. But some have found that shallots are nice, too. In fact, I can see that this one is starting to grow already. I can see a green shoot coming out.

Part 1 of Activity 4 starts with a discussion of what is a bulb? The students look at a few bulbs at the rug, pass them around, talk about bulbs that they've seen and prepare to see if they can grow a new plant from a bulb. So let's see how they do that.

Each student gets a cotton ball. And then in a group of four, they can decide whether they want to use their little mats to build a nest into which they will place the onion bulbs or some students choose to each individually use their cotton to make a little cozy with their bulb.

Teacher: Okay now we're gonna put that in there and pass the cup around, please.

Narrator: The end product is that the four bulbs are placed in cotton for support down in the cup. They then use the vial method to dip up one full vial of water, pour it in over the onions and cotton. Put the lid with the holes on top securely. And find a safe place in the classroom to place it.

After the students have their bulbs securely planted, it's a good idea to cut one of the bulbs in half so that the students can see the internal structure. By doing this, the students can see the concentric rings which are the leaves, the modified leaves that make up the bulk of a bulb.

You can also cut a second bulb along the other line of symmetry to see what it looks like when it's cut from top to bottom. And again, you can see the modified leaves inside the bulb. After a week we've got action. Indications are good that we're going to see a new plant.

Student: Look, the roots are all on the bottom.

Student: The roots sort of look like spaghetti.

Narrator: To assess progress, continue to have students observe and record their observations on the Growing Bulbs sheet. Note if students are making more detailed drawings of their changing bulbs. Hold discussions from time to time to listen to their ideas.

Here is an onion bulb that's been growing for a week. The roots that the student just referred to as spaghetti are well developed. And here comes the shoot up through the top.

After two weeks, even more growth. Roots are about the same. But the vegetative growth above ground, quite extensive.

And after three weeks, the growing leaves have even found the holes in the top of the container and are reaching up for light. At this point the students may want to take their onions home, find a place in their garden and plant their onions with the anticipation of an onion harvest.

With the completion of the work with the bulbs from the kitchen, the onions or garlic, the students might want to move onto flower bulbs. And there's a whole universe of bulbs available in this category.

This is a hyacinth that's coming along very nicely just planted in gravel. It makes a nice house plant. And if you time these activities right, your students might be able to plant some bulbs that will be ready to take home to their families around Mother's Day or perhaps May Day. So that makes a nice conclusion to Part 1 of this activity.

To wrap up this part, review the key vocabulary and add bulb, onion, and garlic to the word bank.

Ask: What did the bulbs need to start growing? What was the first change in the onions that you noticed?

Add new concepts to the chart.

#### **<Investigation 4, Part 2>**

Narrator: In Part 2, we return to the produce market to get some edible roots, radishes and the like. The students will cut up the roots into pieces to see if any part will produce a new plant. So let's see what materials we'll need for this.

The kit contains a couple of bags of vermiculite. This is used as a substitute for soil in this activity. And you'll need to get your basins. The vermiculite will be distributed in a fashion similar to what the soil was earlier on.

You need your container and vial for measuring water. And the students will plant their roots in the plastic cup which will be labeled in the usual way. The Cutting Roots sheet provides a little guidance to the students for how to prepare the roots for planting.

The more bulbous roots should be cut into three sections: Leaf, top of the stem and root section.

And longer roots should be cut into four sections: Two pieces of root, the top and the leaves. You'll need to provide, as usual, some water. This time you'll need to also provide some root vegetables, a knife for cutting them and scissors for preparing the labels.

I've selected radishes today. But on another day I might select some carrots, turnips, rutabagas, anything that looked good at the market that particular day. Or I might have a mix. Today it's radishes.

This final part of the activity starts at the rug where roots are introduced. And you can demonstrate a procedure for planting the root parts. Let's see how that procedure goes.

A pair of students working with in this case a single radish have to decide how they want to prepare it for planting, which part might produce a new plant. We decide to cut right here and then to cut off the greenery at the top. So we have three distinct portions. We then go to the vermiculite storehouse, fill our cup most of the way with vermiculite.

Teacher: Okay, are we ready for radishes to plant?

Narrator: And then work together to decide how we want to orient the parts of our plant.

Student: Bury them?

Teacher: Put them in the vermiculite.

Student: I know what to do.

Student: Put it on top of this one.

Narrator: Take two vials of water to irrigate the plants. We'll then find a suitable location in the classroom for nature to take its course. And we'll observe the possibility of a new plant emerging from a root.

Here is a carrot that some students planted a couple of days ago. I can see that things are looking fairly well in here. The leafy part is wilted. But the root parts have good color. And the portion of the carrot where the leafy part was previously attached is looking fine, too. So we'll need a little more time to tell if we're going to get a new plant from any part of this root.

Review key vocabulary, and add radish, carrot, and vermiculite to the word bank.

Ask: What parts of the plants seem to be developing into new plants? What evidence do you see that new plants are developing? Continue to discuss root growth and have students respond in their science notebooks.

Add new concepts to the content chart.

**< Reading in Science Resources >**

Narrator: In the next session, read and discuss the article in the Science Resources book called, Animal Teeth. After reading, have students look at their own teeth with a mirror to find canines, incisors, and molars. Let students eat a carrot or radish to note which teeth they use. Have students respond to the review prompts on science notebook sheet no. 13.

When you have completed the four investigations give your students the End-of-Module Assessment.