

FOSS® NATIONAL LIVING SYSTEMS TEACHER PREPARATION VIDEO TRANSCRIPT

< Module Introduction >

Narrator: The FOSS Living Systems module offers students an introduction to transport systems in multicellular organisms.

Students explore the circulatory, respiratory, digestive, and excretory systems in humans and the vascular system in plants. The three investigations allow students to conduct and analyze controlled experiments as they explore the basic unit of life, the cell, photosynthesis, and the various components of transport systems.

Most of the materials you will need to teach the Living Systems Module can be found in these two boxes. There are enough materials in the kit to teach a class of 32 students and enough consumable materials to teach the module twice before you need to replenish anything. Make sure you check the Kit Inventory List in the boxes and in the Materials folio of the Teacher Guide.

You will need to supply a few items. See the list in the materials folio of your teacher guide to see what you'll need to supply and when. We'll tell you more about the items you need to supply in the appropriate sections of this video.

In the kit you'll find the Teacher Guide. Before you begin teaching this module, it is important to look through the entire Teacher Guide.

<Teacher Guide Introduction >

Narrator: The FOSS Teacher Guides for this module include these sections: Overview, Materials, Investigation Folios, Science Notebook Masters, Teacher Masters, Teacher Answer Sheets, Embedded Assessment, Benchmark Assessment, Assessment Masters, Science Notebooks, Reading Extensions, FOSS Website, and Investigation Outline.

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 on preparing science notebooks, general safety information, 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 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 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. 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. Masters are included in both English and Spanish.

Following these two sections is the Teacher Answer Sheets section.

Assessment is built into all FOSS modules. In the Embedded Assessment folio you'll find information about FOSS formative assessment. There are suggestions for teacher observations, and how to use science notebook pages, and response sheets as evidence of student understanding. This folio also has answer sheets, a suggested teaching schedule, and an assessment summary for the module.

The Benchmark Assessment chapter has detailed information on FOSS summative assessment. Students take a pretest called a survey before beginning the module, and an identical posttest after the module is complete. At the end of each investigation, students also take I-Checks, which assess student understanding of the concepts contained in each investigation. Be sure to read through the ways to involve students in self-assessment of at least some of the items on each I-Check. Scoring guides are included in this folio.

After these two assessment folios, you'll find the Assessment Masters. Watch the Assessment section of this video for more information.

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 folio. This annotated list includes both non-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 kit, you'll find one copy of the FOSS Science Resources for Living Systems. The articles in this book are designed to be read periodically throughout the module, after students have had hands-on experience with the activities.

<Before You Begin>

Narrator: Before you begin teaching, be sure to read through the information in the Materials folio on preparing the kit for your classroom. Doing the preparation work outlined here will make daily setup quicker and easier.

Decide how you will use notebooks before beginning the module. There are two types of masters. Full-page masters and half-sheet masters. The half-sheet masters are designed to be copied and then cut apart and pasted into composition notebooks you provide. One strategy that works very well is having the students paste the notebook sheets on the left side of the composition books, leaving the right side open for any additional recording.

If your students are ready to take on the responsibility of what, how, and when they record information and process data, you may decide to have them work in blank composition books. Your students are usually ready for this version of a science notebook once they have worked through several more structured versions.

For more information about the use of science notebooks, read through the Science Notebooks folio in the Overview chapter in the teacher guide.

On large chart paper make a word bank. This is where you'll keep all the new vocabulary as it appears throughout the module. Also make a Content/Inquiry chart. Here is where you'll write statements that summarize what the students have learned. It's also a good place to record any questions that students may have at the end of each part.

Make copies of Teacher sheet number 1, Letter to Parents. Send the letter home with your students a few days before you begin the module.

As part of the FOSS assessment system, a pretest called a survey should be given to students before beginning the module. You will give the same test as a posttest at the end of the module, so you will be able to assess your students' progress after they engage in the investigations, readings, and other activities. Make copies and administer the survey before beginning the module.

Put the FOSS Safety Poster up in your classroom.

<Investigation 1, Part 1>

Narrator: In this investigation, students learn that the cell is the basic unit of life. They explore the basic needs of cells and learn how materials are transported to cells in multicellular organisms. They learn the structures and functions of the circulatory, respiratory, digestive, and excretory systems.

For this part, you will need: The Heart poster, The Respiratory System poster, and the video, Circulatory and Respiratory Systems from the kit. You'll need to provide a way to view the video.

You may also want to use plan on having access to the internet.

Make copies of Science notebook sheet number 1, Circulatory System Review. If you haven't already, make copies and send home the Letter to Parents and make copies and conduct the survey before beginning the module.

Be sure to check the getting ready section of each part to read about assessment for that part.

Teacher: People are alive, your pets are alive, the trees are alive, grass, flowers, insects are alive. We all need things to stay alive.

Narrator: Begin this part with a review of what students know about the needs of living organisms. Ask students to talk in their groups to make a list of needs shared by all organisms.

Student: Water. Food.

Student: Food.

Student: They need light.

Student: They need light because that light, the plants will grow –

Student: And we wouldn't have like that much um –

Student: Oxygen.

Teacher: So what are some of the things your group came up with?

Student: Water, light, food.

Narrator: Write students' ideas on the board.

Student: Oxygen.

Narrator: The list should include water, food, gas exchange, and waste removal. Ask students if they've heard of an amoeba, and use the mini-lecture from the teacher guide to introduce single-celled organisms.

Teacher: Single-celled organisms spend their whole lives surrounded by water. So they get everything they need from the water around them.

Narrator: Have students open their FOSS Science Resources books to the Living Cells article.

Teacher: I want you to point to the amoeba. In this picture this would be the cell membrane out here.

Narrator: Tell students that in the picture of the amoeba they can see how the cell membrane surrounds the cell like skin, and how the liquid cytoplasm fills the cell.

Teacher: All this stuff on the inside is the cytoplasm.

Narrator: Draw students' attention to the picture of the Elodea leaf and describe this multi-cellular organism.

Teacher: The Elodea is made up of many cells. We call that multi-cellular.

Narrator: Point out to students how in the Elodea, the cell membrane surrounds the cell, the cytoplasm fills the cell, and the green chloroplasts contain chlorophyll.

Teacher: Chloroplasts which contain the chlorophyll and that's what makes them green.

Narrator: Show students the human-muscle cell image and describe humans as multi-cellular organisms made of trillions of cells.

Teacher: Those are human muscle cells.

Narrator: Every cell is alive, but most cells are deep inside our muscles, organs, and bones. Every human cell gets the resources they need. Ask students –

Teacher: How do human cells get the things they need to survive?

Narrator: Ask students to discuss the question in their groups for 5 minutes.

Student: And after we digest the food then we drink the water which the water goes down and gives it to the cells.

Teacher: So what did you come up with? What do – how do cells get the things they – human cells get the things they need to survive?

Student: When we breathe oxygen they get the oxygen that we –

Teacher: Breathing. Ok Carl.

Student: Well we digest the food, when we eat our food then we digest the food. Once we digest the food, the food goes out to the cells. And then we get the, then we get, then we drink any type of drink and then that drink goes to the cells.

Teacher: Ok so we've come up with some good starting points for finding out how our cells in our body are supplied with water, food, oxygen, and how waste products are removed.

Narrator: Guide students in locating their pulses.

Teacher: What I want you to do is put your hands in front of you and put your left hand inside of your right hand. You're going to wrap your fingers around your wrist. You have a tendon that runs down your arm. You need to make sure that your index, your fingers are touching that area. Now apply gentle pressure don't squeeze too hard, just gently. Can anybody feel anything? Yeah? What do you feel?

Student: What I feel is my blood pumping through all the veins and it's like popping out and its like booming.

Teacher: Ok. Dakota?

Student: It feels like your heart is pumping in your hand.

Teacher: Oh, it feels the same as when you put your hand over your heart and it's going ba-boom ba-boom and then you have the same thing. Ok. That's a good observation. Julisa?

Student: You can feel pressure like you're – like something moving really fast. Like your heart when you touch your heart.

Teacher: Ok.

Narrator: Confirm that the beating is called a pulse. Every time the heart beats, it pushes a pulse of blood through the blood vessels running through the body.

Teacher: Now why is blood being pumped through blood vessels all over your body? So just say -

Narrator: Record students' ideas on the board and propose reading an article to get more information about the heart and pulse. Have students read the article called Circulatory System in their FOSS Science Resources books. You may choose to assign the article as individual reading, or as a pair/share reading, or you may decide to read aloud as students follow along. Allow twenty to thirty minutes for students to read the article.

Student: Are made of living cells the simplest -

Narrator: After students finish reading, have them work alone to answer the questions on notebook sheet number 1, Circulatory System Review. You'll collect these sheets to use as an assessment.

Check the Embedded Assessment folio in your teacher guide for guidance while reviewing students' answers.

Return to the list of students' ideas about the function of blood being pumped through vessels throughout their bodies. Call on students to modify the list based on information from the reading. This is a possible place for a break.

Have the class watch the video, Circulatory and Respiratory Systems. In the middle of the 23-minute video is a short experiment done by two students with an adult supervising. This experiment is good for students to watch, but you don't need to do it in class.

After the video, ask the questions listed in the Teacher Guide to extend students' understanding of the circulatory system.

Teacher: So what happens to your heart rate during exercise? Mario?

Student: It starts to beat faster because you're moving a lot.

Teacher: Ok and why does that happen? Christian?

Student: Because your body – your body needs more energy because you're burning more when you're moving because you're moving faster.

Teacher: Ok. And so how does this help the cells in the body? Julisa.

Student: Well the blood helps them – the blood helps them get the water and the oxygen and the food around to the cells.

Narrator: The Mammalian Circulatory System activity found on FOSSweb will benefit students who still seem unclear about the process of human blood circulation.

Display the Heart poster and Respiratory poster for students to review.

At the end of this part, add new words to the word bank.

Add new concepts to the content chart. This is a good place to list student questions as well.

<Investigation 1, Part 2>

For this part, you will need the video, Digestive and Excretory Systems from the kit. You'll need to provide a way to view the video.

Make copies of Science notebook sheet number 2, The Disassembly Line Review.

Begin this part with a review of what students learned in Part 1. Tell students that the first part focused on the circulatory system's relationship with the respiratory system. They found out how cells get the oxygen they need and get rid of the waste gas carbon dioxide. Ask students to talk in their groups about how cells get the food they need and what kind of food cells use. Allow students 3 minutes to talk in their groups.

Student: They get it from the blood.

Student: When you eat the cells get the food that we get.

Student: You think the good gets transported to the blood.

Narrator: Call on students to share their ideas.

Teacher: Umberto?

Student: I think the cells get the food that they need when we eat. The blood transports that food to the cells.

Teacher: So they have to break it down into substances -

Narrator: Introduce the digestive system using the mini-lecture in the teacher guide. Tell students that the process that changes the food we eat into the simple substances that the cells can use for food is called digestion.

Teacher: Digestion actually takes a long time.

Narrator: Digestion is a long process. It's like a disassembly line. Complex food goes in at one end of the line, and it is taken apart bit by bit as it moves through the line. Have students read *The Disassembly Line* in their FOSS Science Resources book.

You may choose to assign the article as individual reading, or as a pair/share reading, or you may decide to read aloud as students follow along. Allow twenty to twenty-five minutes for students to read the article.

After students finish reading, have them work alone to answer the questions on notebook sheet number 2, *The Disassembly Line Review*. You'll collect these sheets to use as an assessment. This is a possible place for a break.

Have the class watch the video, *Digestive and Excretory Systems*. In the middle of the 23-minute video is a short experiment done by two students with an adult supervising. This experiment is good for students to watch, but you don't need to do it in class.

After the class watches the video, have groups discuss the experiment they just watched on what happens to food in the stomach.

Student: The other ones didn't help.

Narrator: After two to three minutes, lead a class discussion, reinforcing the experimental question, the variables, the procedure, and the results.

Teacher: Environment was the egg white broken down? Carl?

Student: The pepsin and the acid oil.

Teacher: The acid - the hydrochloric acid. That's right. So by itself the hydrochloric acid by itself did not break down the egg white. The pepsin by itself did not break down the egg white. They needed a combination of, that's right, of both the hydrochloric acid and the pepsin.

Narrator: To extend students' understanding of the digestive system, ask the class, how do the digestive and excretory systems interact? If you need to, clarify that the digestive system breaks the food into molecules that the blood transports to all the cells in the body. The cells produce waste, which enters the blood. There it travels to the kidneys, which filter it out, so the two systems interact where the cells exchange food and waste with the blood.

Student: Because it gets rid of all the waste.

Add new words to the word bank.

Add new concepts to the content chart.

<Investigation 1, Part 3>

Narrator: For this part, you will need the dice from the kit.

Make copies of Science Notebook sheet number 3, Support-System Quiz and I-Check 1.

Begin this part by reviewing the different transport systems in the human body as described in your teacher guide. This information will be used in a group quiz activity.

Distribute science notebook sheet number 3, Support-System Quiz, and point out the twelve organs and tissues listed at the bottom of the page.

Explain the rules as students look over their sheets.

Student 1 rolls a pair of dice. The number on the dice refers to one of the organs or tissues on the list.

Student 1 identifies the support system that organ is a part of, the location of the organ in the system, and what it does in that system to support cells.

After the rest of the group agrees that student 1's answer is correct and complete, the person on student 1's left rolls the dice and repeats the process. If student 2 rolls the same number as student 1, student 2 should roll again.

The play continues in this manner until everyone has had at least two turns.

Use item 1, artery, to demonstrate how students should use the incomplete sentences on the Support-System Quiz sheet to describe the roll of the organ they end up with.

Show students what the completed sheet would look like for artery.

Let the getters get a pair of dice and start the quiz. You may want students to record the information in the blanks on their sheets or not. The quiz will go faster if it's just a verbal exercise.

Student: The digestive system.

Narrator: After completing one item, students roll again.

Student: Eleven. Eleven.

Student: See its right there. It's between that and that.

Student: Did you get it? It's right here. See it? You see that whole sentence? You have to read that.

Narrator: Play continues until each student has had at least two turns.

Teacher: What are the teeth and mouth between?

Narrator: Review the quiz with the class.

Teacher: Jocelyn?

Student: Between the esophagus and the environment.

Teacher: Good. What is the bladder between? Go ahead.

Student: The kidneys and the environment.

Teacher: Good. What are the lungs between?

Narrator: Students often have a hard time considering that organs, like the bladder and lungs, can be between another organ and the environment. Consider this when you are introducing this activity. Ask students to share any items they thought that were difficult. Summarize the activity by pointing out that each of the four systems is involved in the transportation of substances that contribute to the support of living cells.

After completing all the activities and readings in this investigation, have students read the article called Summary: Living Cells in the FOSS Science Resources book.

Have students answer the summary questions at the end of the article, and ask them to share their ideas in a class discussion.

This Investigation concludes with an assessment, I-Check 1. Students work on their own to complete this assessment.

Use the scoring guide in the Benchmark Assessment folio to score students' work, and then plan your next steps based on the assessment. Don't write scores or comments on the I-Checks, but return them for self-assessment and discussion.

Refer to your teacher guide and watch the "assessment" section of this DVD for more information.

At the end of each investigation, you'll find the interdisciplinary extensions. The interdisciplinary extensions include science extensions, language extensions, social studies extensions, and math extensions.

You'll also find the Home/School connection at the end of each investigation. The Home/School connections provide activities for use at home. You'll want to look ahead to the Home/School connections before beginning an investigation for notes on when each activity should go home. Parents can also download these Home/School connections from FOSSweb.

<Investigation 2, Part 1>

Narrator: In Investigation 2, students investigate the vascular system in plants. They design and conduct a scientific investigation and discover that leaves play an important role in the transport of water to cells in vascular plants. They gather information about plants and collect and classify plant leaves.

For Part 1, here's what you'll need from the kit. Each group needs 1 self-stick note, 4 12-dram vials, a vial holder, and a ½-liter container. For the class you will need 4 balances, 8 250-milliliter cups, 200 gram pieces, 8 syringes, 8 graduated cylinders, 5 12-dram vials and a vial holder, red food coloring, and the video, Plant Structure and Growth. You'll need to provide a way to view the video.

You'll also need to provide enough celery so that each group has 2 stalks with leaves and 2 stalks without leaves, 4 more stalks of celery with leaves for the class, 1 jar, a plastic bag, water, and a knife, for teacher use only.

Make copies of Science notebook sheet number 4 Celery Experiment A, number 5, Celery Experiment B, and number 6, Response Sheet – Vascular Plants. You'll use the response sheet for assessment.

To prepare the celery, first purchase at least four bunches. Celery with narrow stalks is preferred. The stalks must fit inside the 12-dram vials. The celery can be prepared the night before it will be used. First separate and inventory the stalks. Make sure you have enough stalks with leaves, usually the inner stalks, to provide each group with two leafy stalks and still have four leafy stalks for yourself. Cut the stalks so they are all about the same length. A good length is 20 to 25 centimeters. Give the cut-off broad end to classrooms in need of food for living organisms or compost if possible. Stand the stalks in a jar of water. Cover them with a plastic bag and keep them in the refrigerator.

For the color demonstration, plan to place four leafy stalks in vials containing water dyed red with food coloring. Put five vials into a vial holder. Measure 25 milliliters of water into each vial. Put two drops of red food coloring into four of the vials. The fifth vial contains plain water. It will serve as a control so students can see how much water is lost to evaporation.

The FOSS balance has three parts: The base, the beam, and the pointer. When the kit arrives new, the pointers will be in this small plastic bag. To insert the pointer, put the rounded end into the beam so that the flat edge hangs down in front of the raised line on the base. Place a cup on the two ends of the beam and then zero the balance by moving the plastic slider to one side or the other until balance is achieved. Check to make sure that the pointer lines up with the line on the base.

Begin this part with a class discussion to find out what students already know about plants.

Teacher: So tell me some things you already know about plants. Amber?

Student: They give us good oxygen to breathe.

Teacher: Sure plants do give us oxygen to breathe. Kevin?

Student: Some plants have roots.

Teacher: So plants can have roots. So animals including humans are living organisms and they need certain things in order to survive. Plants also need certain things in order to survive and we can look at what their cells need in order to survive and learn a little but more about the needs of the whole organism. So let me ask you are plants living organisms?

Class: Yes.

Teacher: Are plants made of cells?

Class: Yes.

Teacher: Good. And so are plant cells alive?

Class: Yes.

Teacher: Exactly. Good. So what do you think plant cells need to stay alive? What are some of the things cells need? What are the basic needs of living cells including those in plants? Raymond?

Student: Food and water and waste disposal.

Teacher: Very good. There's something else that cells also need. Those three are essential but without this other fourth thing the plant cells still would not live. Plant cells also need a kind of gas exchange. How do plant cells get these resources that they need to stay alive? What are the sources of these things that plant cells need to stay alive?

Narrator: Students should know that plants are alive, are composed of living cells, and need water. They may not be sure about how plants get food, get gases, and attend to waste disposal. Ask students to think about a garden plant they know. Ask, How does the garden plant you are thinking about get the water it needs? How does the water get from the roots to all the plant's cells? How does the water get from the roots to all the cells in the plant?

Teacher: Alright class here's a garden plant and it has stems and leaves but something is missing from this plant. Who can tell us what is missing? Henry?

Student: The root.

Teacher: Right the roots are missing. Will this plant be able to get water to all the cells without roots?

Narrator: Distribute notebook sheets four and five, and tell the class that you want them to design an experiment to get information that will help them find out how water gets to all the cells in a celery plant. Notebook sheet four has a list of materials that are available. Students will work in groups to come up with a question and then design an experiment that will answer the question.

Teacher: As your designing you experiment, please keep these three things in mind: First, the leaves might affect how the celery interacts with water. In other words the celery stalks with leaves might interact with water differently than the stalks without leaves. Second, the mass of the celery might change during the experiment but how might it change and what do you think would change that mass. And third, the volume of water in the vial might change as well so consider these three important points when designing your experiment.

Narrator: Give students 15 minutes to come up with their testable question and a plan for answering it. Visit the groups as they work. If necessary, help them focus on an experimental setup that will compare leafy and leafless stalks. Refer to your teacher guide for things to think about as you help students focus. Call on a group to read its question and experimental design. Give other groups the opportunity to ask questions and make suggestions. After two or three groups have shared, give the groups five more minutes to make final adjustments to their plans.

Teacher: So class we have -

Narrator: This class came to a consensus on the experimental design.

Teacher: Four stalks of celery -

Narrator: This teacher is reviewing the agreed upon design.

Teacher: Two stalks will have leaves -

Narrator: You may have variation between groups in your class.

Teacher: But the other two will have no leaves. We're going to place a stalk in each vial. We want to see the difference between celery stalks placed in water versus celery stalks which are in empty vials with no water at all. We're going to, after we place the celery in the vials we will measure out 25 milliliters of water and place 25 milliliters of water in each of these vials but leave these dry. No water added. And then we'll weigh each of the stalks using balances to find out their initial weights.

Narrator: Monitor the groups as they set up their experiments. Make sure no groups use more than their share of the materials and that they record accurate measurements of the starting conditions. Ask students to note the position their celery is in when they weigh it. They'll want to weigh it in the same position next time so that they get an accurate comparison.

Student: How much?

Student: Thirty-three.

Student: Yeah you did.

Narrator: Students record the starting data in their science notebooks, on a blank page or on notebook sheet number 5.

When groups have set up their experiment, have them label their setup with a self-stick note and set it in a place where it will be safe from tipping. Set up the color demonstration in front of the class as described in the materials prep section of this part. Put this setup with the student setups. Students will observe the experimental results after about 24 hours.

The next day, have students retrieve their setups. Give them 2 minutes to observe the condition of the stalks and to note generally the amount of water in each vial.

Teacher: What was the general condition of the celery stalks?

Student: Um, the water in the celery makes the celery in the water look healthier than the ones without any water.

Teacher: Did anyone else see that in their celery too?

Student: The leaf with the – the celery with leaves and the ones without leaves – the ones without water they look dead.

Teacher: They look dead. Hmm, what do you mean by they look dead?

Student: Some are limped over like that.

Teacher: Some of the celery without the water looks limp compared to the celery that have been sitting in water overnight. That's an interesting observation. Another question I have is how did the water in the vials change? Kevin?

Student: The ones with leaves got more water than the ones without leaves.

Teacher: So the ones with leaves contain more water than the vials without leaves? Or do they contain less water?

Student: Less.

Teacher: If there's a difference in the amount of water in the 2 vials then what do you think happened to that water? Why is there a difference in the amount of water left in the two vials? Wilson?

Student: Maybe the plant absorbed some of the water?

Teacher: Maybe the plant absorbed some of the water; maybe the plant took the water into it.

Student: Yes.

Teacher: Ok, why do you think one of the stalks took in more water than the other one?

Student: Because one of the plants has leaves so the leaves need more water.

Teacher: Alright, so now that we've made our initial observations its time to make some additional measurements of the celery and the vials.

Narrator: Remind students that when they weigh the celery, they should place it in the same position they weighed it on the previous day. Their answers may change significantly if they aren't consistent. Have students get the measurement tools they need and begin weighing the celery and finding the volume of water left in each vial. Groups will need to share balances.

Student: 32. 33. Keep it still. 33.

Student: It's definitely not 23 anymore. I got it. It looks like 22 and $\frac{2}{3}$.

Narrator: While groups work, have one of the groups measure the amount of water from the vial of plain water. You'll record this number on the board.

Student: Is it 25?

Student: Yeah it looks just like 25.

Narrator: Discuss a useful way to organize the data. Use chart paper or the board to replicate the data table on notebook sheet number 5. Guide student suggestions to come up with these headings.

Teacher: As you can see we have a celery condition column, a starting volume of water column, ending water volume, starting mass of celery, and ending mass of celery. So we have all four

conditions in our experiment being represented here in the table and let's see what kind of data we have here and how we can fill in the rest of the – the values right now. So here we have the celery with leaves condition in which 25 milliliters of water was added to the vial. We have the celery without leaves condition where also 25 milliliters of water was added. But we also have the two conditions celery with leaves with no water, and celery without leaves also with no water. Ok? At this time I think we should fill in the rest of these values using data from one of the tables. So is there a table that would like to report their findings to me so we -

Narrator: This teacher has decided to use one group's data to create a sample chart for the class.

Student: 23 milliliters.

Teacher: Good. Can anyone tell us how much water is left in these?

Class: Zero.

Teacher: Zero, right there's still zero. There still should be zero milliliters of water left in these vials since there was none to begin with. So we'll put zero here. Great. So that column is finished. Oh, but everyone should remember yesterday we filled a vial just by itself. We filled it full of 25 milliliters of water with the red dye celery. Does everyone remember when we did that? Dominic's table measured this vial again and we've all agreed and we found out that it contains still 25 milliliters of water. So apparently no change.

Narrator: Give students a few minutes to fill in the data tables on their notebook sheets. Once all the data is recorded, it's time to for the class to analyze the results of the experiment.

This teacher is choosing to use the class sample chart to analyze the results; you can also have students discuss their individual group's results.

Teacher: A possible explanation for why this stalk of celery with leaves but not in water actually gained 1 gram of weight. I think it's an interesting result. Because how could celery stalk not in water gain 1 gram overnight?

Student: Someone just miscounted because one or you could increase or decrease 1 gram but it could just look the same on the scale.

Teacher: So what you're saying is they might have been a measurement error on account of a person misreading?

Student: It could be misreading but –

Teacher: The balance.

Student: Um, one or two doesn't look very exact on the balance so you never know.

Teacher: Right, ok we're working with whole grams so there might be fractions of grams that could go one way or the other accounting for the difference in weights from the beginning of the experiment to our observations today. Why do you think this celery did not show a change in weight from one day to the next? Ok Sammy?

Student: It doesn't have any leaves?

Teacher: And how does that explain –

Student: Like the celery without leaves – with leaves it might have lost some weight because the leaves need more water.

Teacher: Ok. The celery with leaves in the vial full of water started out with 25 milliliters of water but then ended with 18 milliliters of water. So overall it lost 7 milliliters of water, but the mass of the celery actually increased by 1 gram. There's a decrease of 7 milliliters of water but only 1 gram increase of celery weight. What might of happened here? Who has an idea?

Narrator: Students may suspect that the water evaporated, that the water spilled, or that the water went into the celery. Ask them to compare the starting and ending masses of the celery to see if the ending mass could account for the missing water, which it won't.

Bring out the celery stalks in red water. Give students three minutes to examine the results.

Teacher: Is there anything interesting that you notice about this celery?

Student: The top leaves are changing color.

Teacher: The leaves are changing color. What color are the leaves changing to?

Student: Red.

Teacher: Right the leaves are actually turning red.

Narrator: Visit each group and cut a thin slice of the stalk so students can see a cross section. After everyone has had time to study a cross section, discuss student observations using the

questions from the teacher guide.

Teacher: So Bonnie observed that the leaves are turning red in the celery. Why do you think the leaves are turning red?

Student: The celery sucks up the water.

Teacher: Because the celery is taking in the water and then the water is going to the –

Student: The leaves.

Teacher: Going to the leaves. What did you observe on the cross section of the stalk? Yes Kimberly –

Student: The inside when it was on the bottom the other side it was red but when you cut it the other side only the tubes are red.

Narrator: Have students discuss in their groups, what is the relationship between the red dots and water in the celery stalk?

Students should be beginning to develop a mental model for the tubes that carry water through the stalk and into the leaves of the plant. The tubes are analogous to blood vessels. Students may not yet connect the movement of water with the delivery of resources to cells, but that's okay. This model will be developed in greater detail later.

Ask students to review the question that they wrote at the beginning of the experiment and the data they gathered, and record their conclusions. Give them about 10 minutes. You'll collect and review these sheets for assessment.

Have students read Vascular Plants in the FOSS Science Resources Book.. Have students answer the review questions at the end of the article, and ask them to share their ideas in a class discussion.

Add new words to the word bank.

Add new concepts to the content chart. This is a possible place for a break.

Have students watch the 23-minute video called Plant Structure and Growth. Tell students to watch and listen for information that confirms what they know about the transport system in plants. The video has additional information about photosynthesis that takes place in the leaf. It

introduces a topic that will be further explored in investigation 3.

After the class has watched the video, use the questions in the teacher guide to discuss the video with the class.

Teacher: What are the two types of vascular tissue in plants that make up the vascular bundle? What are those called, Jesse?

Student: Xylem and phloem.

Teacher: Right, xylem and phloem. Who can compare the roles of xylem and phloem in plants? What are the roles of xylem and phloem, Dominic?

Student: The xylem only goes up but the phloem goes – transports sugar – food everywhere while the xylem takes water up, only up.

Narrator: After students have completed all of the activities in this part, have them complete Response Sheet – Vascular Plants. After you have reviewed students' responses, have your students share their ideas in class and revise their responses as their ideas change.

These ideas should come up in the class discussion: Both plants and people have specialized structures for transporting nutrients to cells—in that way they are similar. Only animals have circulatory systems with blood that goes around. Vascular plants have a one-way transportation system for water and minerals going up, and a second one-way system for sugar going down. People have arteries, capillaries, and veins for transportation of nutrients; plants have xylem and phloem.

<Investigation 2, Part 2>

Narrator: For this part, each group will need 2 hand lenses, and a plastic bag to use to put leaves in. Put up the 3 posters Palmate, Pinnate, and Parallel in an accessible part of the classroom. Make copies of I-check 2 for assessment.

Begin this part with a review of what students learned in the first part of the investigation.

Teacher: What things in order to survive. Yes Raymond?

Student: Food.

Teacher: And what kind of food do plants need?

Student: Sugar.

Teacher: Sugar. Exactly. What's another thing that those cells need? Think about the tube system that runs through these plants. What do they carry to the cells? That should give you a strong hint about what the cells need in order to survive. Kimberly?

Student: Water.

Teacher: Ok, so today I'd like to see what we can find out more about the place where xylem ends and phloem begins which is the leaf. So if we're going to find out more about leaves then we need to go gather some real leaves to bring them back to the classroom and examine them more closely. So let's go outside and gather some leaves.

Narrator: Before going outside, describe a procedure for collecting samples, and review your rules for going outside. When you go out to collect leaves, stay with your group. Collect one leaf from as many different plants as you can in 5 minutes. Get leaves of all sizes. Keep your samples in a bag. Give each group a plastic bag and head out. This excursion should take no longer than 15 minutes.

When you return to the classroom, have students sort their leaves into 2 piles: a pile of leaves that show evidence of xylem and phloem and a pile of those that don't. Allow 5 minutes for this sort. Ask students to share leaves they think show evidence of xylem and phloem.

Identify the lines, which are often raised, as leaf veins, and confirm that the veins are bundles of xylem tubes and phloem tubes. Ask students, How many of your leaves have veins? Are veins all the same size? Do the veins branch? Leave these questions on the board and ask students to come up with a new way to classify their leaves.

Student: Every one of them has veins.

Student: No those are not veins these are veins.

Student: It has spiky edges.

Student: Oh.

Student: I don't know it's like cactus.

Student: This is pointy. I think it is phloem. I can't even tell it doesn't have – I can guess this these are veins.

Narrator: After 10 minutes, ask a couple of groups to share their sorting criteria. Use the mini-lecture in the teacher guide to introduce classification to the class. Show students the three leaf-vein posters and point out the identifying features of each leaf pattern.

Teacher: The first kind of vein pattern is called palmate here. And as you can see palmate leaves have several main veins radiating through the leaf. There are also smaller veins that – that branch out from the main veins as well, but there are several main veins on a palmate leaf.

Narrator: Students can remember palmate by thinking of the palm of their hands and their fingers as the main veins.

Teacher: Pinnate leaves have one main vein and what do you see extending from that one main vein. You see other smaller –

Class: Veins.

Teacher: Veins. And this is different from a palmate because palmate leaves have more than one main vein whereas a pinnate leaf has only one main vein usually running right through the middle of the leaf.

Narrator: Pinna means feather, and a pinnate leaf might be considered to resemble a feather.

Teacher: A third type of leaf is called a parallel and you might see these types of veins on grass – on some types of grasses for example. Parallel leaves have many small veins running across the length of the leaf. And as you can see this type of leaf actually lacks main veins. It only has small veins.

Narrator: Ask students to classify their leaves based on venation pattern.

Teacher: Now you will make three different groupings of leaves at your table according to which vein structure the leaves fall under. Ok? So let's get started with that?

Student: Right here?

Student: No, not even close.

Student: These are pinnate, I'm not sure.

Student: It has uh, three sides. See?

Student: What's this Mr. Fong?

Teacher: Let's take a look. Actually you don't look at all three; I believe you only look at one of these leaves. I think these are all separate leaves. What does that look like now?

Student: Pinnate.

Teacher: It has one main vein down the center.

Student: Yay!

Teacher: With smaller veins you can barely see. I think they're there though. I see them. That's a pinnate leaf, I believe.

Narrator: When they're done, encourage students to visit other groups to see the results of their leaf classification. Ask the class, are there other ways to classify your leaf collection?

Teacher: What's another way besides vein structure that leaves can differ from each other?
Alvin?

Student: Shapes.

Teacher: Shape. So does anybody see different shapes of leaves in their collections right now? I mean it's really clear that this leaf is a different shape compared to this leaf here. Alright you'd never mistake one for the other based on their shape. Besides shape is there anything else that might be different from leaf to leaf? Jesse?

Student: The margins?

Teacher: The margins or the – what's another word for margins?

Student: Edges.

Teacher: The edges of the leaf can be different. For example some edges of leaves are smooth while some other leaves might have edges that are maybe jagged.

Narrator: If time permits, have students reclassify their leaves.

Student: Hey these are also with this.

Student: How?

Student: Yeah because it's curved.

Narrator: Add new words to the word bank.

Add new concepts to the content chart.

Have students read the article Classification in the FOSS Science Resources Book followed by the final reading in the investigation: Summary: Vascular Plants.

Have students answer the review questions at the end of the articles, and ask them to share their ideas in class discussions.

Consider using the Plant Vascular Activity on FOSSweb for students who are still unclear about the transport systems of vascular plants.

The investigation concludes with a benchmark assessment: I-Check 2.

Use the scoring guide in the Benchmark Assessment folio to score students' work, and then plan your next steps based on the assessment. Don't write scores or comments on the I-checks, but return them for self-assessment and discussion.

If there's time after you finish the investigation, be sure to check out the Interdisciplinary Extensions in the Teacher Guide

<Investigation 3, Part 1>

Narrator: In Investigation 3, students analyze an experiment to determine the conditions under which plants produce food. They design and conduct an experiment to determine the sugar content of common foods.

For Part 1, all students will need are their FOSS Science Resource Books and copies of Science Notebook sheets, number 7, Making-Food Experiment A, and number 8, Making-Food Experiment B.

This investigation begins with a review of food chains and trophic levels.

Student: Eats another fish, and then that fish eats another fish, and then it just goes on.

Teacher: So what are the animals that eat other animals called?

Narrator: This prepares students to think about where food comes from.

Student: It's called uh – carnivore.

Teacher: Ok. A carnivore is an animal that eats other animals. Animals that eat plants are called – Jesse?

Student: They're called herbivores.

Teacher: Good you're right. And what's the role that all the organisms that eat plants and animals play in the ecosystem? Julisa?

Student: A consumer.

Teacher: Good you're right a consumer. What role to the plants play in the ecosystem? Umberto?

Student: It's called a producer.

Teacher: You're right. So we talked about how plants make the sugar in the leaves

Narrator: Tell students that all cells need energy to do the things they do. They get energy from food. Ask students to consider: What is the food produced by plants made of? Where does the matter come from? What kinds of raw materials do plants use to make food? Introduce the experimental challenge outlined in the article Making Food in the FOSS Science Resources Book.

Have students read the article. You may choose to assign the article as individual reading, or as a pair/share reading, or you may decide to read aloud as students follow along. Allow fifteen to twenty minutes for students to read the article.

Distribute science notebook sheets 7 and 8 and read through them as a class.

Teacher: They took 500 grams of bean seeds and planted them -

Narrator: As you review the sheets, emphasize each section: Question, Experimental Design, Data, Results, and Conclusion. Students transcribe data from the article for the Design and Data sections of the sheet. Students work in groups to record and discuss the results.

Student: It never changed. What variables must be present for plants to make food? There has to be water, light, and carbon dioxide.

Narrator: Allow about 15 minutes for groups to work.

Teacher: I want you to talk in your group about conclusions. What does this tell you?

Student: Well it says on here it says do plants gain mass? It doesn't gain mass when, when there's no water because water weighs mass. Light has no mass but it needs light to grow. It doesn't need nitrogen to grow, because it stops it from growing.

Student: So um, so the plant needs water, light, and carbon dioxide.

Narrator: Discuss the results questions as a class.

Teacher: Do they gain mass when they have no carbon dioxide?

Class: No.

Teacher: So what must be present for plants to grow? Christian?

Student: CO₂, water, and light must be present so the plant can photosynthesize and make food.

Teacher: Ok, you're absolutely right.

Narrator: Allow students 5 minutes to individually review their conclusions and to make changes or additions. Collect the sheets for use as an assessment. This is a possible place for a break.

Confirm the results of Paco and Eva's experiment and begin to describe photosynthesis.

Teacher: The food produced by the plants is sugar and we're not talking about the kind of sugar that you put on your cereal. Ok, and the process that plants use to make the sugar is called photosynthesis, which some of you have already heard.

Narrator: Write the equation for photosynthesis on the board, and read it slowly, pointing to the molecules as you read.

Teacher: 6 CO₂ which is carbon dioxide, plus 12 H₂O which is water, they combine and turn into sugar. Which is – 6, C₆, H₁₂, O₆, plus some more oxygen and water. This is the sugar molecule right here. Right there. This is the left over oxygen atoms and the left over water which then get

released back into the air. The – there’s one thing missing though from this equation. We’ve got carbon dioxide and we’ve got water the – two of the three variables that we said plants need. What is that third variable that is missing? Kelly?

Student: Light.

Teacher: Light, exactly. Light from the sun and so we have to add that into our equation. And actually that’s why it’s called photosynthesis, because photo actually means light. And so we need to have in here right in this part right here, solar energy. And it’s usually sunlight.

Narrator: Explain that energy from the Sun changes into chemical energy in sugar during photosynthesis. That energy powers cells and makes it possible for them to do the things they do.

Teacher: And the sugar can then be changed into other substances such as starches, fats, and proteins.

Narrator: Tell students that starches, fats, and proteins are all made out of sugar, and, as they learned earlier, they have to change back into sugar through digestion before our cells can use them.

Add new words to the word bank.

Add new concepts to the content chart.

At the end of this part, have students read Photosynthesis in the FOSS Science Resources Book. Have students answer the review questions at the end of the article, and ask them to share their ideas in a class discussion.

<Investigation 3, Part 2>

Narrator: For this part, here’s what you’ll need from the kit. Each group needs 2 1-liter zip bags, 1 syringe, 1 1-liter container, and 1 thermometer. For the class, you’ll need 4 5- milliliter spoons, 4 volume tubes, 2 permanent marking pens, 4 ½-liter containers with lids, and baker’s dry yeast. You will need to provide a cup of sugar, a cup of flour, animal crackers, paper towels, and a source for hot water.

If you don’t have a large urn available, you can fill two 2-liter bottles with hot water, between 40 and 50 degrees Celsius, and place them in an insulated container, such as an ice chest, to keep them warm.

Make copies of Science notebook sheet number 9, Activating Yeast, and number 10, Response

Sheet-Sugar and Cells.

Here's how to use the volume tube. Add 50 milliliters of water to a plastic zip bag. Press to make sure that all of the air is out of the bag. Zip it shut. Place the bag in the volume tube. Place the piston in next followed by the cover. Now press down to measure the volume.

You might want to review with your students how to read a thermometer.

You will find two packs of dry yeast in the kit. Moisture is yeast's greatest enemy. Yeast is a living organism. It will die if it gets too hot or too moist. Be sure to keep bags tightly closed and stored in a sealed zip bag.

Teacher: What I have here is really a bunch of living organisms and it's called yeast. And right now it doesn't look like it could do much of anything because it's dormant. That means its resting. Just like a bear hibernates in the winter this is hibernating right now. It's all dried out and it's not doing anything. What do you think we need in order for it to become active? Vanessa?

Student: Water.

Teacher: Yes, water is something that we need in order to have yeast become active and out of its dormant state. Also we need to have warmth and some kind of food for the yeast to be using so it can become more active as well.

Narrator: After you describe the experimental procedure outlined in the teacher guide, have getters go to the Materials Station and get two one-liter zip bags in each of which they place two five-milliliter spoons of yeast. They also get a syringe and a liter container half filled with hot water. Using a permanent marker they label one bag Cookie.

After using the syringe to add 50 milliliters of water to a bag with no label, the students press the air out of the bag and seal it.

Student: Squeeze.

Narrator: Then the students measure another 50 milliliters of water and squirt it into the bag called Cookie. They place two animal cookies in the bag –

Student: Take out all the air.

Narrator: Press out the air –

Student: Don't touch it.

Narrator: and seal it.

Student: Crunch them up.

Narrator: They crunch the cookies.

Student: Oh that's warm.

Student: It feels good.

Narrator: The students place both bags in the warm bath. They will need to use a thermometer to monitor the temperature.

Student: It's between, its between 30 and 40.

Narrator: When the temperature falls below 35 degrees Celsius, more hot water needs to be added. Consider what might work best in your classroom. Have the students get more water or have an adult take the water to the students. While the bags are in the hot water, have students work on Notebook sheet number 9, Activating Yeast. This sheet also has an abbreviated procedure for this investigation. After ten minutes, ask the students to remove the bags from the warm water bath and observe any changes.

Teacher: Ok now what you're going to do is you're going to take your bags out of the warm water bath and lay them flat on your desk and observe what you see has happened as they've been sitting in that warm water bath.

Student: Let Adam do both of them.

Student: That looks strange.

Teacher: What did you guys notice happened?

Student: There's bubbles in that one.

Student: There's bubbles but not much air in this one.

Teacher: Now which bag – what is the different between these two bags?

Student: That one just had two cookies in it and this one just had the yeast and the water.

Teacher: Just the yeast and the water and that one didn't have much air in it. The cookie bag has some air in it doesn't it?

Student: Yup.

Teacher: Interesting. As you noticed one of the bags had air in it and was getting poofy and the other bag had some -

Narrator: After the students report that the cookie bags have puffed up, explain the bubbles and gas in the bag with the food are evidence that the yeast is alive and active. The cookie provides food for the yeast. Plain water does not. Ask the students to look at their student sheets and find the two main ingredients in cookies.

Teacher: It shows the list of ingredients. Brian?

Student: Wheat, flour, and sugar.

Teacher: Wheat, flour, and sugar.

Narrator: Now the students need to find out whether it's the flour or the sugar that activated the yeast. Half of the groups add one level spoon of flour to their no cookie bags. And half of the groups add one level spoon of sugar to their no cookie bags. Groups put their bags in the warm bath for ten minutes. The students continue to monitor the temperature. While the bags are in the bath, tell students that the gas made by the yeast in the cookie bag is carbon dioxide or CO₂.

Teacher: CO₂ carbon dioxide. That's the same gas that we breathe out when we metabolize. We bring in oxygen it goes through our blood and we take out carbon dioxide we breathe that out.

Narrator: The amount of CO₂ that forms in the bags is an indication of the amount of metabolism that is taking place. Introduce the volume tube as a tool to measure the amount of CO₂ produced. Demonstrate how to use the volume tube using a bag with only 50 milliliters of water in it. The students practice using the volume tube with their cookie bag. The students with flour in their bags find there's little or no gas in their bags.

Make sure students don't wait longer than ten minutes, or they'll have a hard time fitting the bags into the tubes. If they work the bags very carefully, most students can fit them into the tubes. If they can't get a bag into the tube, they will record 600 plus milliliters as the volume.

Student: Yeah we have 600 or over.

Student: We had flower and we got zero.

Student: We had sugar and we got 600.

Narrator: Record the data given by the recorders on the board. It's easy to analyze these results because they are so consistent. Ask the students if it is the flour or the sugar that yeast metabolizes. The students report that based on the test results, it is sugar that yeast uses for food. Confirm that yeast uses sugar as a food source. All plant and animal cells use sugar as a food source. When cells use sugar, they get energy and produce carbon dioxide and water. This process is called cellular respiration. Cellular respiration breaks down sugar into carbon dioxide, water, and energy.

Add new words to the word bank.

Add new concepts to the content chart.

Have students complete the Response Sheet – Sugar and Cells. After you have reviewed students' responses, have them share their ideas in class and revise their responses as their ideas change.

These ideas should come up in the class discussion: Both plant and animal cells use energy that originated in the Sun. Both plant and animal cells get energy from food. Both plant and animal cells get energy by breaking down sugar molecules into carbon dioxide and water. This is called cellular respiration.

At the end of this part, have students read Cellular Respiration in the FOSS Science Resources Book. Have students answer the review questions at the end of the article, and ask them to share their ideas in a class discussion.

<Investigation 3, Part 3>

Narrator: For this part, here's what you'll need from the kit. Each group needs 2 1-liter zip bags, 1 syringe, 1 1-liter container, and 1 thermometer. For the class you'll need, 2 5- milliliter spoons, 4 Balances, Gram pieces, 8 plastic cups, 4 volume tubes, 2 half-liter containers with lids, 2 permanent marking pens, and Baker's dry yeast. You will need to provide paper towels and eight to ten different breakfast cereals. But you'll only need a half a cup of each. You might ask the students to bring in their favorites. You'll need hot water for this part. If you don't have a large urn available, you can fill two 2-liter bottles with hot water, between 40 and 50 degrees Celsius, and place them in an insulated container, such as an ice chest, to keep them warm.

Make copies of Science notebook sheet number 11 Sugar Test A, and number 12, Sugar Test B. Also make copies of I-check 3 and the Posttest.

Begin this session by showing the students the collection of breakfast cereals. Ask them how they would design an investigation to find out which cereal has the most sugar and which has the least. Give them a few minutes to outline an investigation and discuss their plans.

Teacher: Ryan?

Student: What we – what we could do is we could put yeast and water in two bags and then put one type of cereal in one bag and put the other type of cereal in the other bag and we could see which bag puffs up more. And the bag that puffs up more should have more sugar in the cereal.

Narrator: Help students refine their investigations and have students finalize and write their plans on the notebook sheets. Once groups have written their plans, the getters get two zip bags and put two level 5- milliliters spoonfuls of yeast in each. They also choose two labeled cups of cereal from the food station. Getters number 2 get the equipment they will need for this test at the Materials Station. One bag with 3g of pure sugar will be the control. Assign this task to one group or set it up yourself.

Each bag needs to be labeled with a permanent marker so that later the cereal can be identified. It is important that the students use exactly the same amount of cereal in each bag for the test to be valid. They use the balance to measure three grams of each cereal.

Student: That's good now.

Student: There's little air bubbles and I didn't get them out.

Student: There's air in it already. It must have way more than the –

Student: It's 45.

Narrator: After checking the temperature of the warm bath, the students place the bags in the water. They will monitor the temperature for ten minutes keeping it between 40 and 50 degrees Celsius.

Circulate from group to group assessing how the students are working. After ten minutes the students measure the volume and record it on their student sheets. The students put their bags back into the bath and measure the volume again after another ten minutes.

Student: 500.

Teacher: So higher than last time.

Student: Yeah last time it was 370.

Teacher: So what can you tell between the fruit loops and frosted flakes? Which one had the most sugar in it?

Student: I think the frosted flakes.

Teacher: Why do you said the frosted flakes?

Student: Because it got a higher CO₂.

Student: It was 500.

Student: 450.

Teacher: Okay table 1 lets get your first cereal and the 10 minute measurement.

Student: Fruit loops and 300 milliliters. Then 450 milliliters.

Teacher: Alright, we noticed a rise. How about your second cereal?

Student: Sugar pops, 400 –

Student: And for our second one frosted flakes it was in the first 10 minutes 370 milliliters and for the first 20 minutes it was 500.

Teacher: Alright. As you can see that waiting just 10 more minutes some of the cereals –

Narrator: Remind students that yeast breaks down sugar for energy and produces carbon dioxide as a by-product. After all the results have been gathered, have students rank the cereals on their sheets from most sugar to least and write their conclusions.

Have students read the article Living with Diabetes in the FOSS Science Resources Book.

Give students I-Check 3. After you have reviewed the papers, return them for self-assessment

and discussion.

After completing the I-Check discussion, have students read the article called Summary: Sugar and Cells in the FOSS Science Resources book.

Have students answer the review questions at the end of the article, and ask them to share their ideas in a class discussion.

When students have completed all parts of every investigation for this module, spend another session administering the posttest. See the assessment chapter of this DVD and the Benchmark Assessment folio of your teacher guide for more information.

If time is available, plan to do some of the science, math, language arts, and social studies extensions found at the end of this investigation.