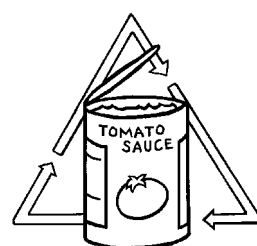
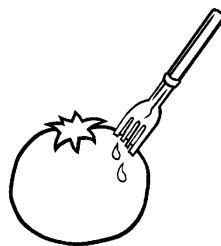
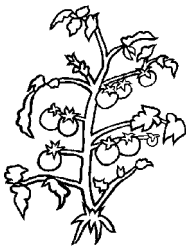




# Year 1

## Introductory Lessons







Dear Teacher,

Welcome to the year 1 introductory lessons of the Linking Food and the Environment Program! These lessons introduce: studying science through learning about food and the LiFE QuEST Learning Cycle. We hope by the end of these lessons both you and your students are enthusiastic about continuing your LiFE endeavor to learn more about food, the food system and how our current food system impacts the natural environment.

*The color of the pages has been coded to facilitate use of this curriculum guide.*

**Blue** pages are introductory and overview pages or pages that divide the units within modules.

**Goldenrod** pages introduce each lesson. On these pages you will find: the title of the lesson, the aim of the lesson, an overview of the lessons, the science and nutrition concepts taught in the lesson, the scientific processes the students will gain from the lesson, the objectives for the lesson, the materials and preparation needed for the lesson, and a list of key terms and their definitions.

**Light yellow** pages include background information for the teacher and the step-by-step lesson procedure.

**White** pages are copies of the student handouts that accompany the lessons with sample students' answers on some of the worksheets. Black master copies of these handouts are at the back of the curriculum guide.

We hope you and your students find the LiFE program educational and enjoyable!

*-- The developers of the LiFE Program -- Programs of Nutrition Education and Science Education at Teachers College, Columbia University, New York City.*



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## Lesson 1: Beginning our study of food

### AIM

To introduce the LiFE Program as a science and nutrition program about the study of food.

### OVERVIEW

In this lesson students will be introduced to the LiFE curriculum. They will do a kick-off activity where they look at a cob of corn and think about how that corn might get turned into corn syrup, corn meal and corn oil. This will get them to think about what it will be like to be food scientists during the LiFE curriculum. In this lesson they will also learn : (1) the topics of the modules of the LiFE program, (2) the key questions they will study throughout the program and (3) what it means to take part in a science program framed around driving questions. In their LiFE Logs they will explore their thoughts about what it will be like to study science through food.

### SCIENCE AND NUTRITION CONCEPTS

- basic foods, such as corn can get transformed into food products such as corn oil, corn syrup and corn meal
- inquiry-based science starts with questions--both the students' own questions and those the curriculum provides--and through research and experiments related to the questions students construct theories about how the world works

### SCIENTIFIC PROCESSES

- through thinking about how corn get turned in other products they will begin to understand what it means to be a food scientist
- through reviewing the topics and questions studied in the modules of the LiFE curriculum, the students will begin to appreciate the investigative, inquiry-based process they will use throughout the LiFE program

### OBJECTIVES *Students will be able to:*

- speculate on how corn gets transformed into corn oil, corn syrup and corn meal.
- articulate the topics studied in LiFE and that the LiFE curriculum is based on the study of questions.
- describe that science is about doing investigations when framed around driving questions.
- write what they think it will be like to study science through learning about food.

---

## Introductory Lessons, Lesson 1

---

### MATERIALS

- A cob of corn (either an edible cob bought fresh or frozen, or a cob of Indian corn if fresh corn is not available)
- Bottle of corn syrup
- Bottle of corn oil
- Bag of corn flour
- (Optional) A few kernels of popcorn to cut in half to view the husk, starch and germ of the corn
- Copies of the LiFE Module icons and names from the end of this lesson plan

For each student

- LiFE Overview handout
- Composition notebook for each student (LiFE Log) -- they will use their LiFE Log in every LiFE lesson

### PREPARATION

- Cut popcorn in half if you are using it. If you want, put a little corn syrup, corn oil, and corn flour in cups to pass around to your students.

### KEY TERMS AND DEFINITIONS

- **science inquiry** -- Using one's own curiosity about a topic to guide learning in a way that will allow the learner to synthesize what they already know with what they are learning and to create new pieces of knowledge they can use in their daily lives

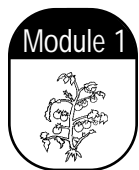


## BACKGROUND INFORMATION FOR THE TEACHER

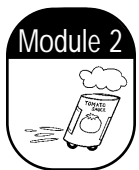
You and your students are about to begin learning science through the study of food and the food system. Because of its familiarity, food is an excellent medium for learning science. The science education in the LiFE Program is about questioning, experimenting and researching topics in ways that will enable students to build theories they can use in their everyday lives. If you have not already read the introductory section of this manual, please read it before you teach this lesson.

A key feature of the LiFE curriculum is that the module and units are framed around key questions (see the student handouts at the end of this lesson plan for a list of these questions). We have developed the curriculum in this way because we feel it is important for urban teachers, children, and their families to gain knowledge, skills, and practices to make environmental and dietary choices that will lead to nutritional well-being, healthy cities, and empowered families. This kind of science education requires thoughtful, relevant, and worthwhile investigations. Driving questions provide a framework for investigation along with the motivation for being scientists. In other words, they drive the modules and units by directly connecting the scientific and nutritional ideas to be explored with what kids find to be important.

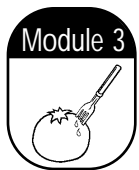
### Modules of the LiFE curriculum:



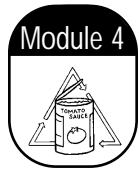
**Module 1 Food production** -- this module explores how nature provides us with food. It begins with learning about nature's complex biological system through first investigating plants and their role as producers of the energy that sustains life (through photosynthesis) and then learning about the role of plants and animals (consumers) and about a special class of consumers called decomposers that recycle nutrients in nature. Finally students learn about how humans interact with nature's intricate biological system and with agriculture to produce the plants and animals we desire for food.



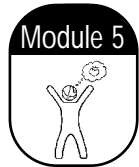
**Module 2 From farm to store** -- this module investigates what happens to food between the time it leaves the farm and the time it arrives at the store. This is a technological system designed by humans to preserve, process, package and transport food. At the end of this module students critically evaluate how our technological food system impacts nature's biological system they learned about in Module 1.



**Module 3 Food and Health: nourishing the body** -- this module studies the body's systems and how food provides our body with what it needs. Students learn what they can do in terms of eating and exercise to best care for their body. From here they investigate how scientists translate what they know about food into healthy eating guidelines such as the Food Guide Pyramid and the Dietary Guidelines for Americans. The module ends with a unit on food chemistry where students have several opportunities to cook and eat healthful foods with their classmates.



**Module 4 Handling food-related waste and pollution** -- this module investigates the waste and pollution that result from our food system and our options for handling it. As part of this module students critically look at the waste produced in their school cafeteria and come up with plans for waste reduction.



**Module 5 Food choices: thinking about food in a new way** -- this module reviews the first four and give students the opportunity to do a project to teach others what they have learned.

### PROCEDURE



#### Questioning

1. Introduce the LiFE curriculum. Explain that they are about to begin a science program that studies food!
  - **In the LiFE program the students are scientists--a special type of scientist called a FOOD SCIENTIST!**
  - Food scientist do all kinds of things with food, from understanding how it is produced, how food ingredients are changed and combined to make things such as cereal, cake, and pizza, how what we eat influences our personal health, and how the waste and pollution created through growing, processing and packaging our food influences our natural environment.
2. Show the cob of corn and the ingredients made from corn: corn syrup, corn oil, and corn flour.
  - Explain that the corn kernel on the cob are used to make the three ingredients they see. In the LiFE curriculum they will often be studying questions, for this activity the question is, "How do corn kernels get changed into corn flour, corn oil and corn syrup?" In their handouts they have a picture of the inside of a corn kernel to help them with their investigation.
  - The purpose of this activity is to get the students excited about the investigative and speculative processes they will use as they study science through learning about food. Therefore, they will speculate and try to construct simple theories on how corn kernels might get changed into these ingredients. In this activity they do not necessarily need to understand the fine details of what happens. *See the sample conversation below and the sidebar on the next page for background information that will help you guide this conversation.*
  - Sample of how this conversation might go in your class. This is the level of conversation we would like. Your class may need more or less questioning to get to this level.

*Teacher: Let's start with corn flour, look at the corn kernel compared to the flour. How might the corn kernel get changed into corn flour?*

*Student: The corn flour is powdery, it seems like the corn must have to get chopped up somehow.*

## PROCEDURE (CONTINUED)

Teacher: Yes, the corn is chopped into very tiny pieces.

Student: But corn kernels are wet and the flour is dry, maybe the corn is dried out before they chop it. We have some dried corn at my home. It is hard and it is not wet and sticky like fresh corn. My mom says it is called Indian Corn.

Teacher: Those are some good ideas about how corn flour might get made. First the corn is dried out then it is chopped up, or ground into very tiny pieces. How about the corn oil, that is a little harder, any ideas about how that is made?

Student: One time I noticed that we had sunflower oil at my home. Since I love to eat sunflower seeds I asked my dad how the sunflower oil gets made from the seeds. He said that the sunflower seeds are squeezed very hard and the oil comes out. Maybe if we squeeze the corn kernels very hard oil will come out.

Teacher: I like that comparison to sunflower seeds. We can try squeezing one of our corn kernels. What do you think would happen?

Student: I don't know if that would work, sunflower seeds seem oily to me but corn just seems wet. I think if we squeeze a corn kernel we would get wet, juicy stuff out not oil.

Teacher: Does anyone know how we might be able to tell if what we get is "wet juicy stuff" or oil?

Student: If we squeeze it onto a piece of paper oil would stain the paper, but if it was just juicy stuff it would dry.

Teacher: Good idea. Let's try it and see if what comes out stains the paper or not. (do this simple experiment) Now, let's try cutting open the popcorn kernel and see what is inside the corn. (After students look at inside of popcorn kernel). The small core part near the bottom is called the germ, there is oil in that and it is that part that is squeezed to get out the oil. How about corn syrup, first does anyone know how corn syrup tastes. (If no students know, you may have a few students sample it so the class understands that corn syrup is sweet).

### Information about corn to help guide the conversation in your class

A corn kernel has three parts: the outer layer--**husk**; the "meaty" part of the inside--**starch**; and the core of the inside near the pointy end of the kernel--**germ**. If you cut a popcorn kernel in half you will see all three parts.

#### Making corn flour:

Corn flour is made from grinding dried corn. The students will grind dried corn and use the corn flour they make to cook pancakes in Module 2.

#### Making corn oil:

Corn oil is made by pressing the corn germ to release the oil within it. If you can get a corn germ out of a popcorn kernel you may be able to see the oil by squeezing the germ over a sheet of paper.

#### Making corn syrup:

Corn syrup is made by adding enzymes to corn starch, the enzymes break down the starch into a syrupy mixture of the sugars glucose, dextrose and maltose.

### PROCEDURE

*Student: Well, I am just guessing, but since corn tastes kind of sweet to me maybe they beat up the corn somehow to make it get liquidy and it changes into the syrup.*

*Another student: I am guessing too, but I have a different idea, maybe they mix something with corn flour to make it get sweet and syrupy.*

*Teacher: Those are both good ideas. Let's look at the corn diagram again. Making corn syrup is tricky, the starchy, inside part of the kernel is used. It is mixed with something called an enzyme. The enzyme breaks the starch down in a way that changes into a syrupy sugar, which is why corn syrup is so sweet. It is made of sugar!*

*Teacher: This was a good start to what we will do often in the LiFE program. We will start with a question and do some things that will allow us to try to create ideas or theories about what the answer to the question might be. We will often have class discussions to come up with ideas. Talking through our ideas, even if you have an idea that seems silly at first, is much more important than knowing the right answer. I hope you will find this type of science fun. Scientists do this type of thinking and discussing all the time. Don't worry if you don't completely understand how corn flour, corn oil and corn syrup get made from corn. But, be proud of how you were able to try to figure it out just by looking at a corn and a picture of the inside of corn. You all did some excellent thinking about how corn get changed. Part of your homework, which I will explain more later, will be to look at food labels at your home and see if you can find any ingredients made from corn. Now we will learn more about all of the topics we will study in LiFE.*

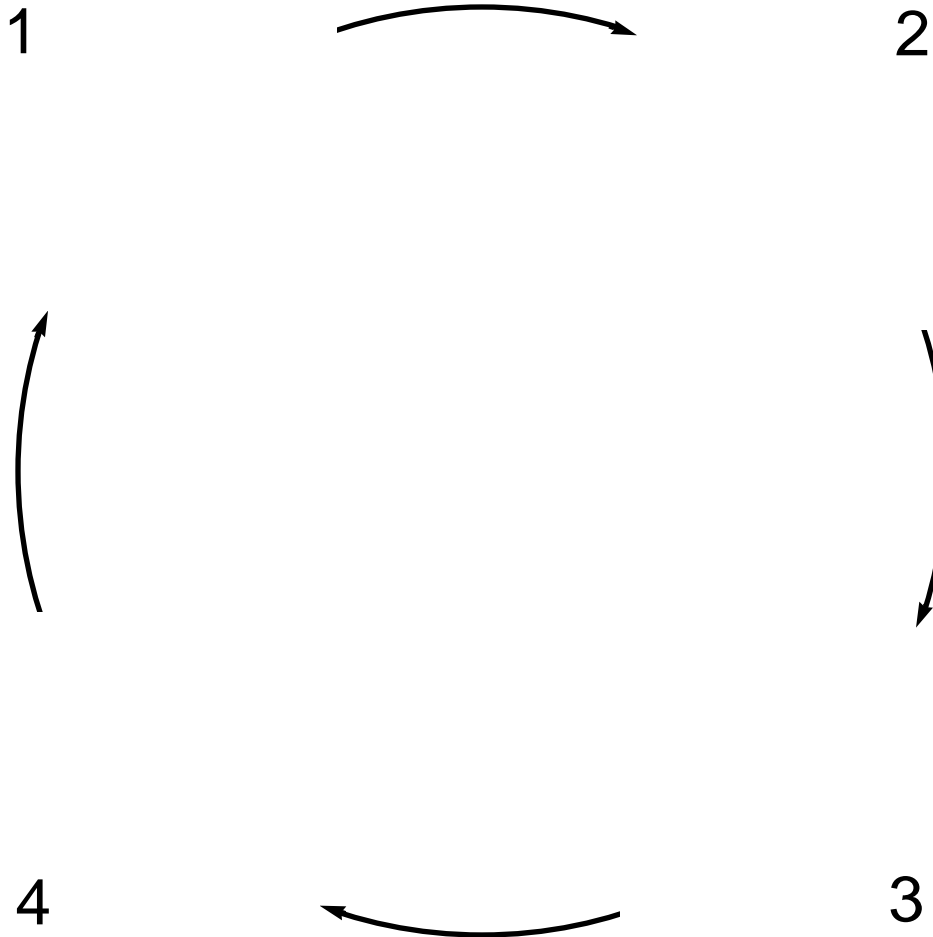
### 3. Overview the modules of the LiFE curriculum.

- Explain that the LiFE curriculum has modules that study food from how it is grown to the garbage produced.
- The modules in the LiFE program have pictures that represent what they will be studying.
- Draw the arrows on the board (as on the next page) and show the students the pictures that represent the first four modules. Ask for a few student volunteers to try to put these pictures in order. Once those students put the pictures up ask the others if they agree. With the help of the class adjust the pictures until they are in the right order.

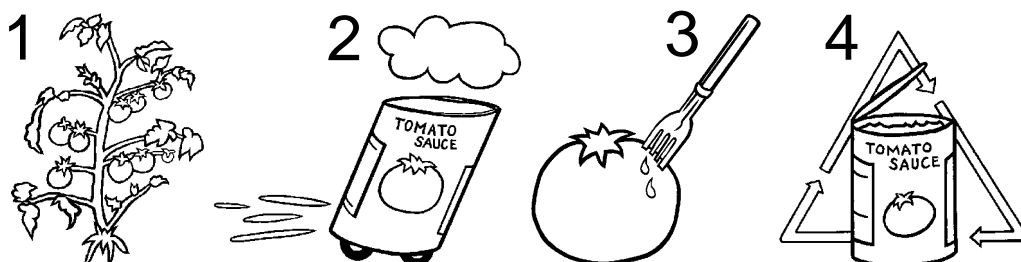
**PROCEDURE (CONTINUED)**

- Draw this on the board:

## The Modules of the LiFE Program



- Have student volunteers try to put these module 1-4 pictures in the proper order.



- Add the module 5 picture and arrows from the module 5 figure to all the other pictures (see diagram on the bottom of the next page) and explain that module 5 is about putting together everything they will learn and deciding how they will use what they have learned in LiFE through the rest of their life.

## PROCEDURE (CONTINUED)

- With the help of the students, add the module names. Review how the pictures represent what they will study in each module:

**Module 1-Food production:** A picture of a tomato plant represents how food is produced--plants and animals are grown and raised on farms.

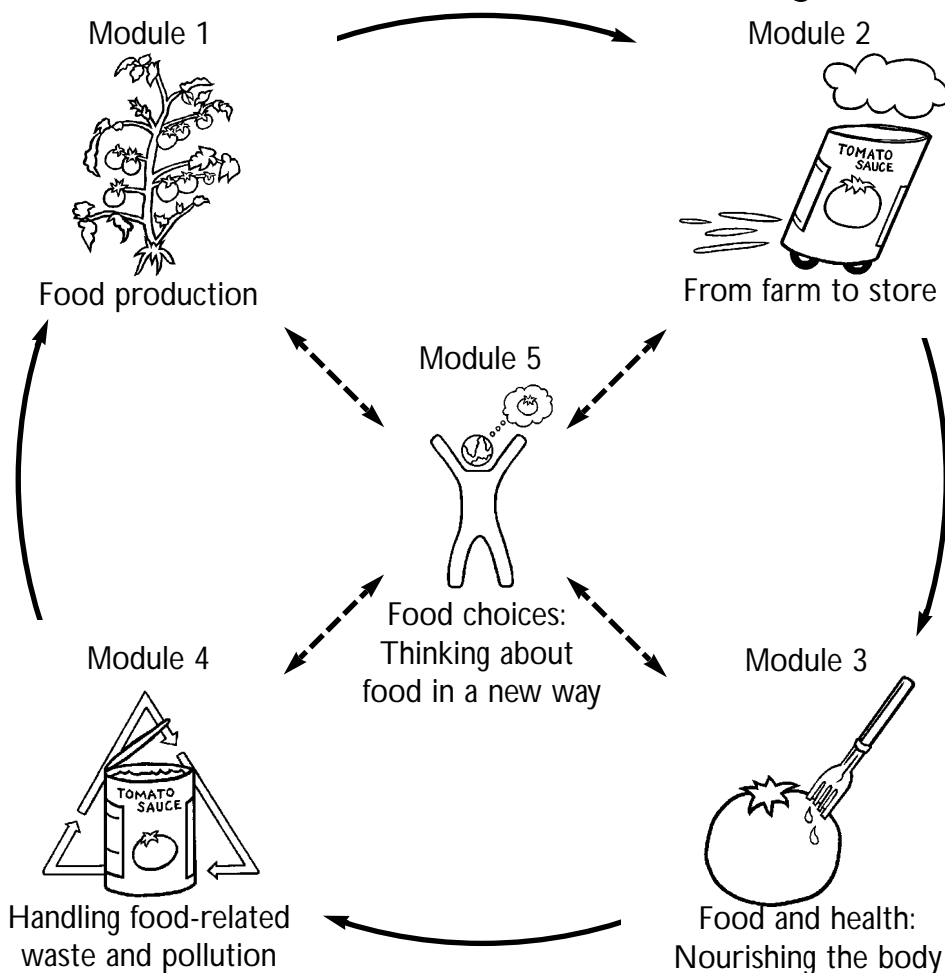
**Module 2-Farm to store:** A picture of a can of tomato sauce represents how fresh foods are processed (changed), preserved (made to last longer than it would fresh) and packaged. The slanted can with wheels represent transportation. The pollution cloud represents the waste produced by our farm to store system.

**Module 3-Food and health: nourishing the body:** A fork in the tomato represents eating and reminds us to enjoy eating and choose food that will nourish the body.

**Module 4-Handling food-related waste and pollution:** The opened can of tomato sauce surrounded by recycling arrows represents that we have to carefully consider our options for handling the waste and pollution created by our food system.

**Module 5-Food Choices: thinking about food in a new way:** The person with a globe head represents us using our knowledge about our food system and our personal health every time we choose foods.

## The Modules of the LiFE Program



## PROCEDURE (CONTINUED)

4. Explain that each module of the LiFE curriculum has a key question. As they move through the modules they will deepen their answer to the module questions.
  - Similar to the question that framed the breakfast cereal activity they did earlier in the lesson, the entire LiFE curriculum uses questions as the focus of all their studies. This includes both their own questions and questions provided by the curriculum.
  - The inquiry-based experiments combined with reflective theory-building activities will hopefully allow them to put together what they already know about food with the new things they are learning in order to create new pieces of knowledge they can use everyday when they choose what to eat.
  - Explain that in each lesson you will remind them of the module question to help them understand why they are doing the activities they are doing.
  - Review the module questions on the student handout and tell the students they will complete Modules 1 and 2 this year and 3-5 next year.

### Year 1:

#### Module 1-Food production

*How does nature provide us with food?*

#### Module 2-Farm to store

*What is the system that gets food from farm to store and how does this system affect the environment?*

### Year 2:

#### Module 3-Food and health: Nourishing the body

*How does food provide our body with what it needs?*

#### Module 4-Handling food-related waste and pollution

*How do waste and pollution from our food practices affect the earth and future generations?*

#### Module 5-Food Choices: thinking about food in a new way

*How do my food choices affect my health and the natural environment?*

Throughout the LiFE curriculum remind the students that they will be food scientists!

In the preassessment of each module there pages with the module and unit questions for you to post in your classroom.

### PROCEDURE (CONTINUED)

#### 5. Introduce the LiFE Logs.

- Explain that throughout the LiFE curriculum the students will keep a log that will record their own thoughts about what they are learning. They will be able to look back at the log to see how their thinking changes as they move through the curriculum. Tell them they will write in the Log during each LiFE lesson. Please make sure the students understand that the LiFE Log is about writing reflections about what they have learned. There are no right and wrong answers, but what is expected of them is to seriously and carefully think about the question and write their personal thoughts. A few words of encouragement could make this first experience with their LiFE Logs a fruitful learning experience that will help the students look forward to writing in their Logs throughout the curriculum.

#### 6. LiFE Logs: have students write a paragraph about, "What I think it will be like to be a food scientist."

- The reflective writing the students will do in their LiFE Logs may be challenging for your students if they have not done this type of writing before. Help the students understand that it is fine to sit in front of a blank page for a few moments as they think about what they want to write.
- If you think it would be helpful, brainstorm a list of ideas (as a whole class or individually) and then the students can use this list as they write their paragraph.

#### 7. Assign homework:

1. Have the students write down 2 questions they would like to learn about food in their LiFE Logs.
2. Have the students look at the ingredient list of five foods in their home and see if they can find any ingredients made from corn. They can make a simple table in their LiFE Logs:

<u>Name of the food</u>	<u>Ingredients from corn in this food</u>
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Sample sentence  
starter: "I think it will  
be \_\_\_\_\_ to be a food  
scientist because. . ."

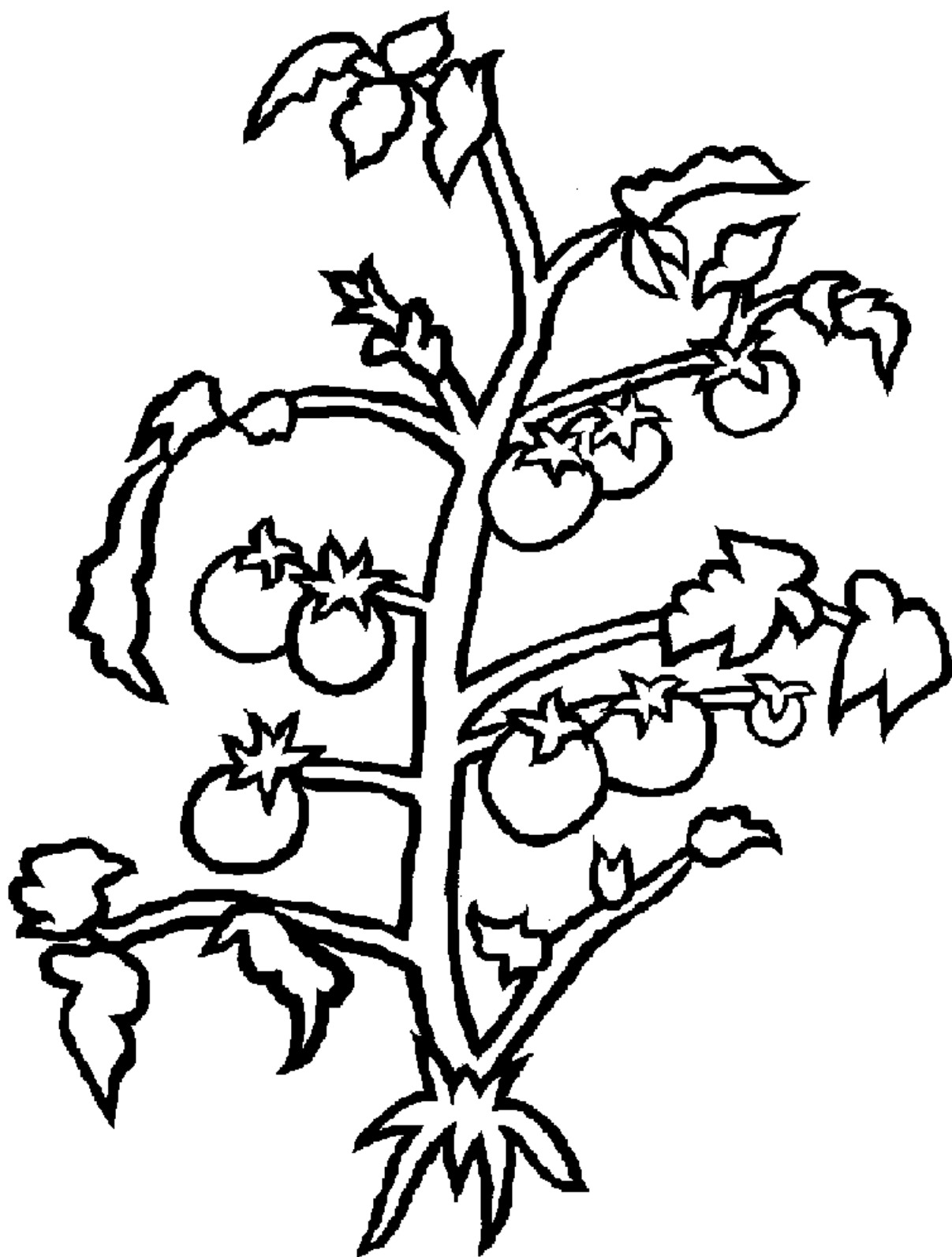


## SAMPLE STUDENT LIFE LOG ENTRIES

My thoughts on what it will be like to study science through learning about food are that maybe food has to do with science for lots of reasons because science has to do with calories, potassium, carbohydrates and food has to do with almost the same things. My other thought is how do people study food? I knew that scientists do it in many different ways but how. My third thought is that studying science through learning about food is a bit difficult. That is what I think. I think that studying science through learning about food is going to be interesting and fun. So those are my thoughts on what it will be like to study science through learning about food.

I will be excited because in this Science Program we will learn what food is healthy for you. Another thing is that we will learn how food get to the food machine and then to the store and how it get to us. We will learn what food could make you good and what food could make you sick. In this Science program we will learn what the food have inside. In this program will be teacher to help us recognize that some food we throw to the garbage and the resources get more bigger and we have a lot of garbage. In this program could make change the world.

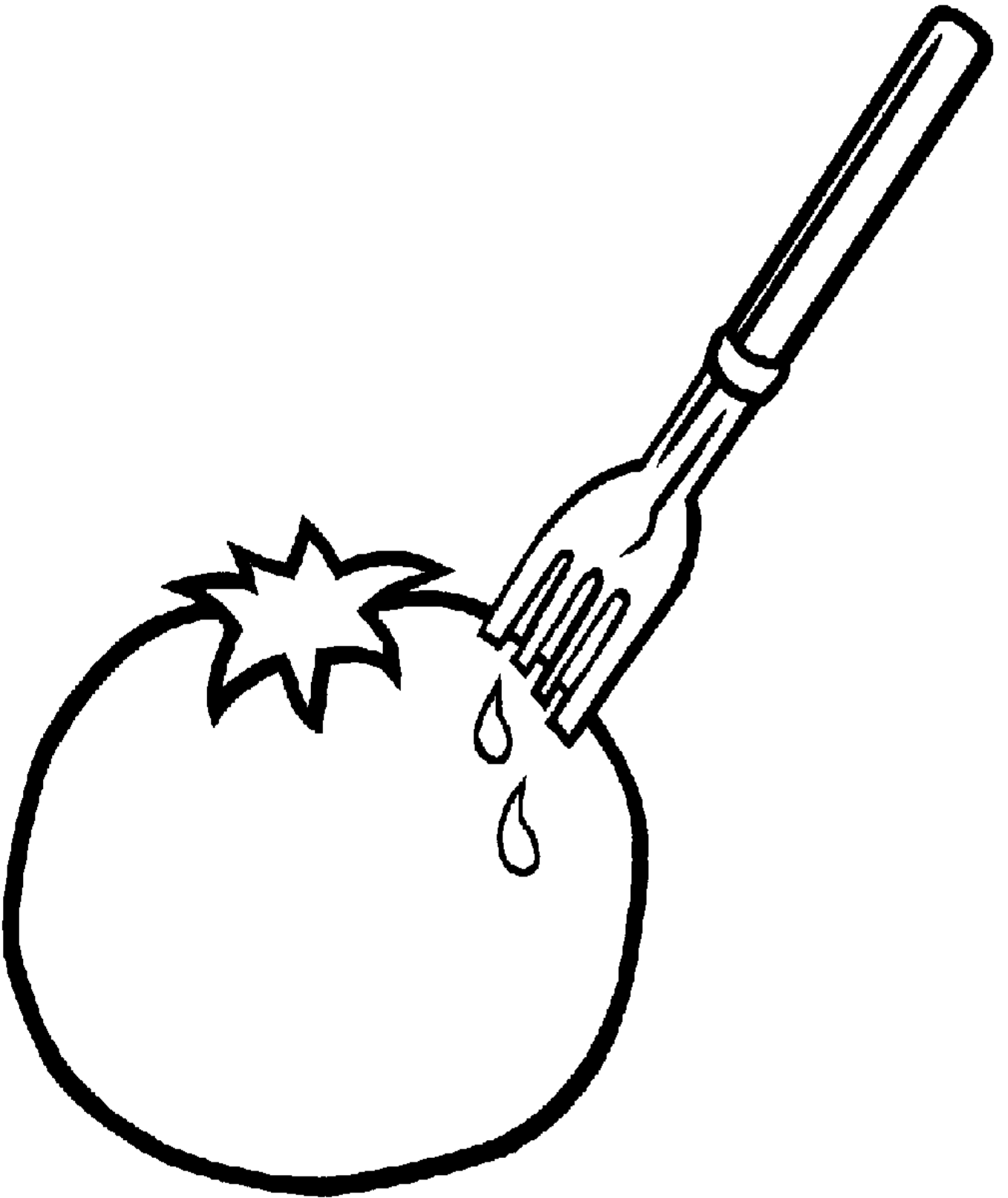




# Food Production

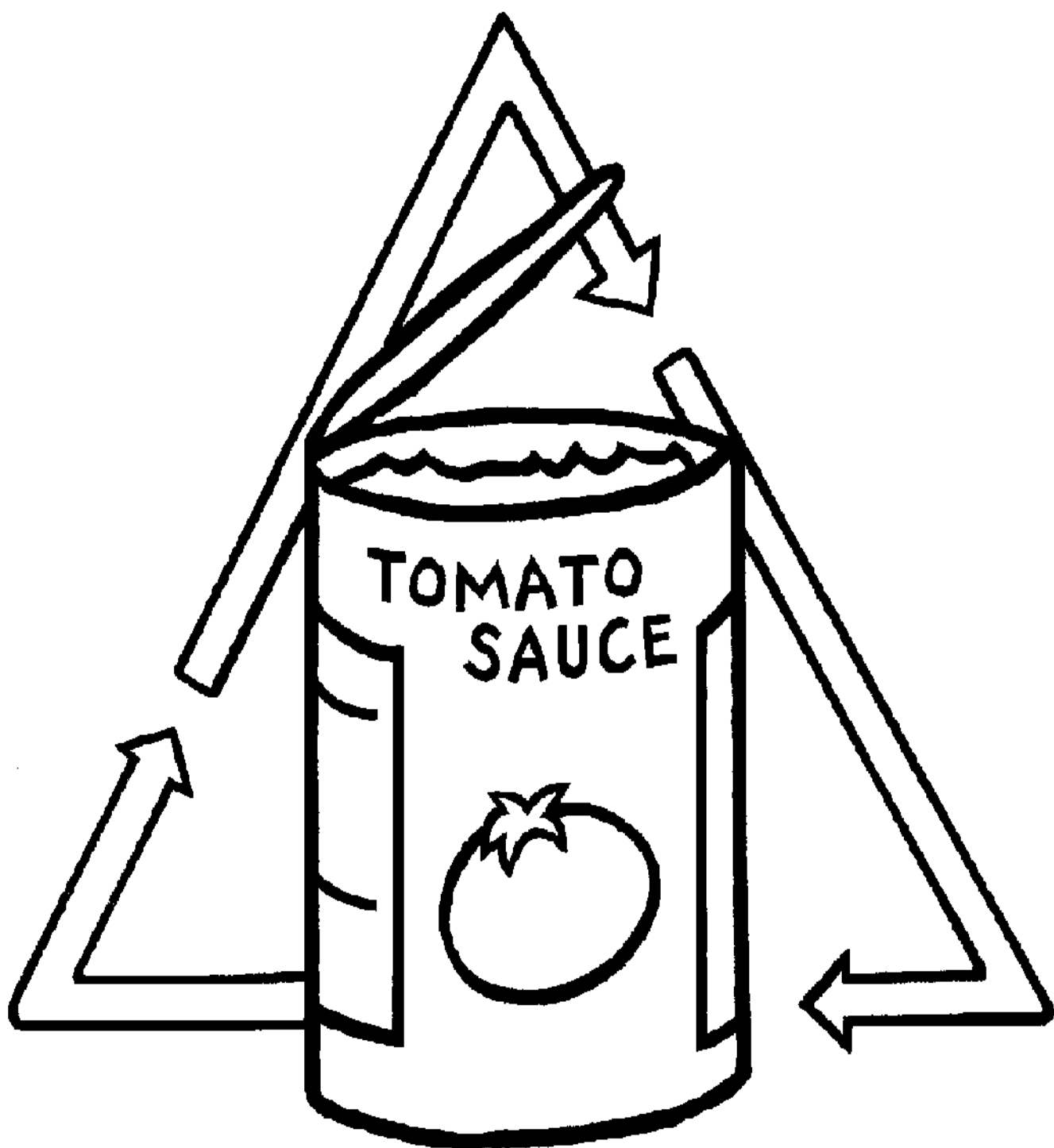


# From Farm to store

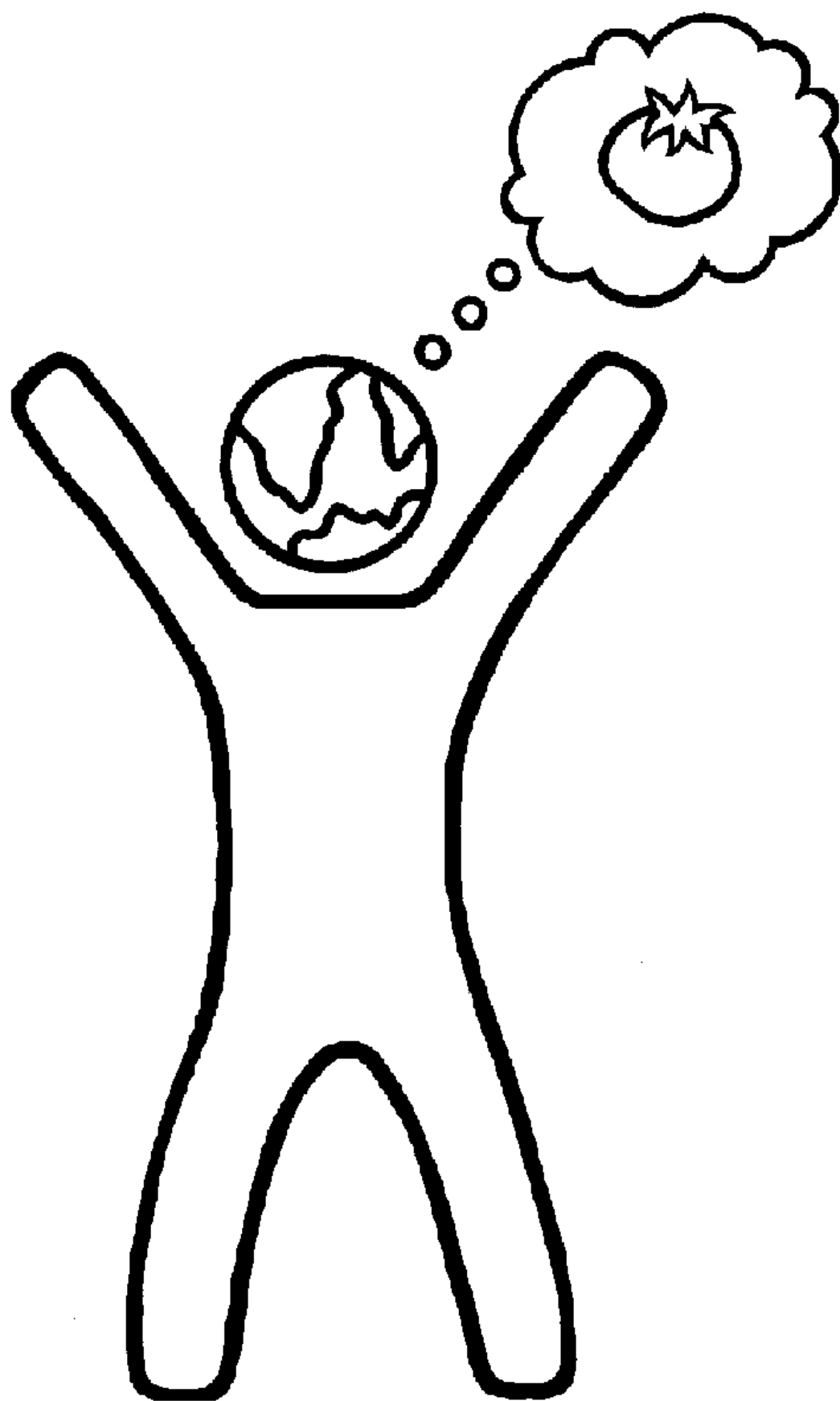


# Food and health: Nourishing the body





# Handling food-related waste and pollution



# Food choices: Thinking about food in a new way

# Module 1

# Module 2

# Module 3

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# Module 4

# Module 5

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# Student Year 1 Worksheet Packet, page 1

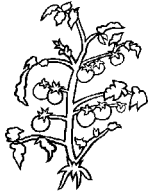
Name \_\_\_\_\_

Date \_\_\_\_\_

## Module Questions in the LiFE Curriculum

### MODULE 1 - FOOD PRODUCTION

Y



***How does nature provide us with food?***

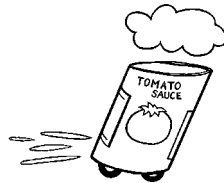
E

A

### MODULE 2 - FROM FARM TO STORE

R

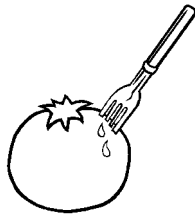
1



***What is the system that gets food from farm to store and how does this system affect the environment?***

### MODULE 3 - FOOD AND HEALTH: NOURISHING THE BODY

Y



***How does food provide our body with what it needs?***

E

### MODULE 4 - HANDLING FOOD RELATED WASTE & POLLUTION

A

R

2



***How do waste and pollution from our food practices affect the earth and future generations?***

### MODULE 5 - FOOD CHOICES: THINKING ABOUT FOOD IN A NEW WAY



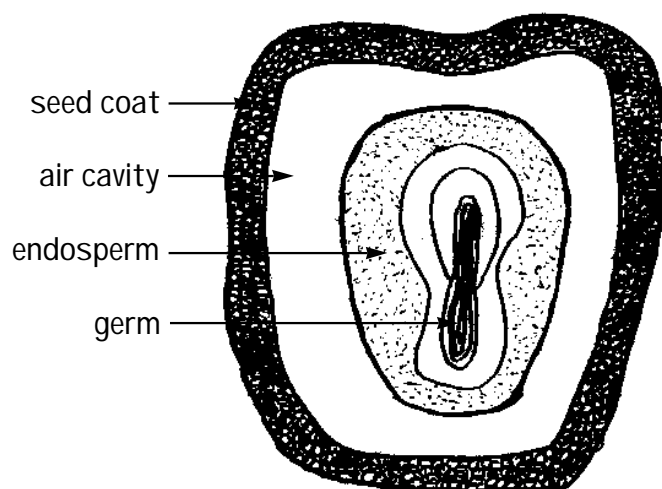
***How do my food choices affect my health and the natural environment?***

## Student Year 1 Worksheet Packet, page 2

Name\_\_\_\_\_

Date\_\_\_\_\_

### Corn Kernel



Write some things you learned about corn:

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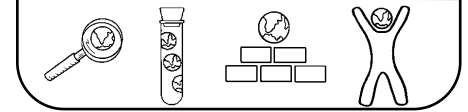
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Phases of learning is "A QuEST"



## Lesson 2: Making grape juice from grapes (two-part lesson)

### AIM

To demonstrate the QuEST Learning Cycle through learning about how grape juice is made from grapes.

### OVERVIEW

In this lesson students will increase their understanding of the QuEST Learning Cycle by participating in activities that will take them through all four phases of the cycle. They will question by trying to discover new things about grapes, experiment and search through developing an experiment to change grapes into grape juice, theorize through speculating on how store-bought grape juice is made, and apply to life by thinking about how they will view grapes and grape juice differently after this lesson.

### SCIENCE AND NUTRITION CONCEPTS

- In the LiFE curriculum students will learn about topics through the four phases of the QuEST learning cycle.

### SCIENTIFIC PROCESSES

- Through learning about grapes and grape juice the students will come to understand what types of activities will make up the four phases of the QuEST learning cycle.

### OBJECTIVES *Students will be able to:*

- Define the four phases of QuEST learning cycle in their own words.
- Demonstrate how their thinking about grapes changed as a result of this lesson.
- Explain what they think it will be like to learn using the learning cycle.

### MATERIALS

- 3-4 bunches of grapes (enough for all students to examine and taste a few in part 1 and for the making grape juice experiments they will do in part 2)

*For each student:*

- QuEST Learning cycle worksheet
- Learning about grapes worksheet

### PREPARATION

Part 1:

- divide the students into groups of 2-3

Part 2

- any preparation needed for your experiment

### KEY WORDS AND THEIR DEFINITIONS

The Phases of The Learning is A QuEST Cycle

- **Questioning** -- In this phase you will be introduced to the new topic you will be studying. You will think about what you already know about the topic and also think about what questions you have about the topic. The questioning phase as a time for exploration.
- **Experimenting/Searching** -- In this phase you will interact with the topic you are studying through doing experiments and searches (research). Experiments are tests conducted in controlled conditions that will help you discover something new about the topic. Conducting an experiment includes six steps: 1) develop a research question--the question your experiment is trying to answer; 2) decide on an hypothesis--an educated guess about what might be the results of the experiment; 3) write down the steps you will take to conduct the experiment--this is called your "methods" and includes a list of the supplies you will need for your experiment; 4) do the experiment following your methods; 5) record your results on a table, chart or in a log; and 6) examine your results to determine what you have learned and if your hypothesis is correct--this is called your "conclusions." Searching is doing research to find out more about the topic you are studying. You can use many creative methods to gather information in your searches, including: books, videos, computers, and interviews with people.
- **Theorizing** -- In this phase you will reflect on what you have learned and develop new pieces of knowledge about the topic. When you theorize you will use the questioning, experimenting and searching you did in the first two phases to: 1) discuss new ideas you have about the topic--these new ideas are your theories; 2) give evidence to support theories, that is, clearly explain what made you come up with your theory; and 3) participate in scientific discussions, debates and arguments with your classmates--you will explain your theories to your classmates, listen to what they have to say about your theory then respond to their ideas and critiques about your theories, you will also listen to your classmates theories and give them critiques that can help them revise and improve their theory.
- **Applying to life** -- Use what you have learned each day as you think and do things. Also, as you use what you learn you will develop new questions for future explorations!

## BACKGROUND INFORMATION FOR THE TEACHER

The Learning Cycle is described in detail in the teacher introduction section, please read this before teaching this lesson.

## PROCEDURE

### Part 1

### The QuEST Learning Cycle...

#### 1. Review the QuEST Learning Cycle handouts.

- Review each of the phases of the learning cycle and read the descriptions on the handout.
- Highlight that “experimenting/searching” is the standard scientific method to carefully review the steps to do an experiment.
- Review the questions we might ask in each phase of QuEST.

#### 2. Explain that this 2-part lesson will demonstrate how the QuEST learning cycle works through learning about grapes.



### Questioning

#### 3. Pass out 3-4 grapes to each student. Have the student share what they already know about grapes and observe the grapes in front of them.

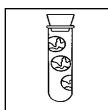
- Tell the students that in the questioning phase they will explore what they already know about the topic they are going to study, that is why you are asking them to share what they already know about grapes.
- In addition, this phase involves discovering new things about the topic, that is why you are asking them to observe the grapes and discuss what they observe.
- This is also a good opportunity for the students to practice observation skills. Encourage them to use all their senses (including taste) to observe the grapes and find things they did not know about grapes.

#### A note about reviewing the handouts

Point out that in Questioning and Experimenting/Searching the questions are written in the third person (we) since in those phases the students will usually work as a whole class or in small groups.

However, in the Theorizing and Applying the life phases the questions are written in the first person (I). In these phases each student will be internalizing what she or he learned and deciding how to use the information in the future.

### PROCEDURE (CONTINUED)

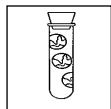


#### Experimenting/Searching

4. In groups of 2-5 have the students develop an experiment to answer the question, "How is grape juice made from grapes?" Record the methods and materials on their worksheet.
  - Encourage the groups to write the methods of their experiment using as much detail as they can.
  - Explain that scientists write up their methods so that someone else could repeat the experiment exactly by reading the description of the methods.
5. Invite each group to share their experiment. Encourage questions among the groups.
  - Explain that in LiFE, the students will often present their work to each other. An important part of these presentations will be for the students to question each other. This will help them be able to ask scientific questions of each other and when answering the questions they will learn to justify their work.
6. Decide on ONE experiment (it can be one of the groups' experiments or a combination) you will do as an entire class in the next session. Determine where you will get the materials.
  - Try to choose an experiment based on what the groups decided. This will help the students realize that they are scientists since they can come up with the methods for an experiment.
  - However, you may have to modify the experiment based on the materials available.
  - Once you decide on the experiment, write up the methods in a detailed fashion, so you will be able to follow the methods precisely in the next session. Also make a list of all the materials needed for the experiment and determine where you are going to get the materials.
7. LiFE Logs: complete this paragraph: "Before today, some things I did not know about grapes are..."

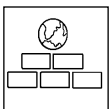
## PROCEDURE (CONTINUED)

### Part 2



#### Experimenting/Searching

1. Conduct the experiment on making grape juice from grapes from session A.
  - Do this experiment as a whole class. As the experiment is being done, help the students see how you are following the methods just as they were written up in the last session.
  - If you have the supplies and the time, conduct the experiment a second time to compare with the results from the first time. Explain to the students that scientists often do experiments more than once to determine if their results come out the same each time. If the results are different scientists carefully look over what they did to determine why this occurred.
2. Observe your results and record them on the worksheet.
  - Have the student describe the results of the experiment (does what they made look like juice? is it thick or thin? does it have skin or seeds in it? how does it smell? how does it taste?)
  - Additionally, ask the students to describe what worked and what did not work about the experiment.
  - EXAMPLE "We had grape skins in our juice. We should have added another step to strain out the skins."



#### Theorizing

3. Pose the question, "From what you learned in your experiment, how do you think the grape juice you buy in the store is made?" Have students write their answer on the worksheet.
  - Encourage the students to think about the factories that make grape juice making very large quantities. From their experiment, what do they think has to happen to the grapes in order to make grape juice in the factory?
4. Invite the students to share their answers.

### PROCEDURE (CONTINUED)



#### Applying to life

5. Ask the students to describe how their **THOUGHTS** and **ACTIONS** related to grapes and grape juice have changed as a result of this lesson.
  - Explain that in this final phase of the learning cycle the students will think about how they will use or apply what they learned in their day to day decisions.
6. LiFE Logs: have students define in their own words the 4 phases of the Learning is A QuEST cycle (questioning; experimenting/searching; theorizing and applying to life) and describe what they think it will be like to learn new things using the learning cycle.



## SAMPLE STUDENT LIFE LOG ENTRIES

**LIFE LOG**

What I have learned about grapes and grape juice.

What I learned about grapes is that when they are dry they turn into raisins. That they have acid, and that they have seeds inside and that they are good.

What I learned about grape juice is that it is liquid and that you make it out of grapes, water, and sugar.



? What did you learn about grapes?

I learned about grapes that they are healthy and that you could make juice out of grapes. Also another thing I know is that juice made of grape you need the skin because the skin have the minerals. If you want to do the grape juice you will have to wash the grapes when you put it in the bowl then it make the juice and you eat it. The grape had a lot of colors and you could see if the grapes are spoiled the juice come out. Also I learned that grapes has the seed and skin is the minerals.



Student Year 1 Worksheet Packet, page 3

Name \_\_\_\_\_

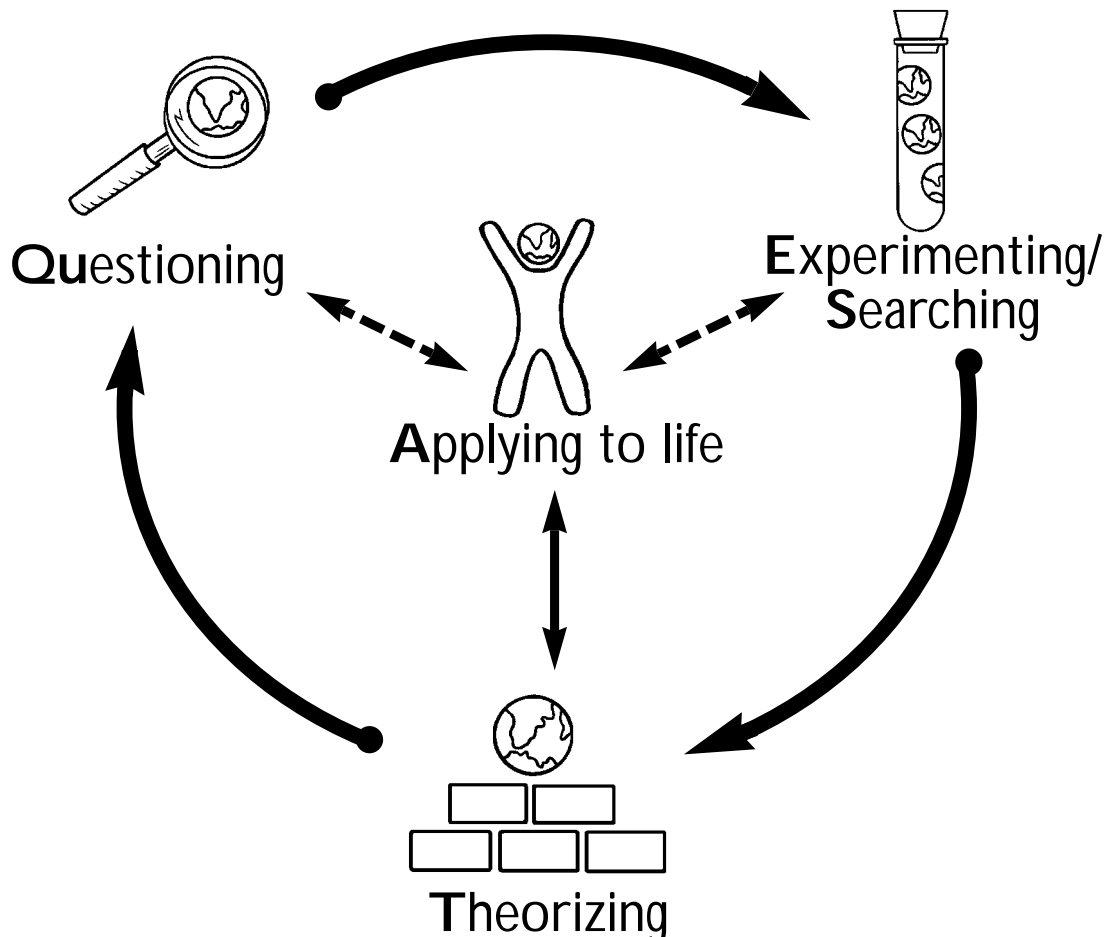
Date \_\_\_\_\_

## YEAR 2: READING FOR LIFE PACKET

The LiFE Learning Cycle: Learning is A QuEST!

You have been learning since you were born. Have you ever thought about HOW you learn? You will in the LiFE program!

As you learn in LiFE, you will go through a cycle or a QuEST. When you begin to study a topic, first you will **Question** what you already know and what you would like to learn. Second, you will learn more about the subject by doing **Experiments** and using books and other resources to **Search** for more information. Next you will put together what you learn by making new **Theories**, or explanations of how things work. And of course you will have the most fun using what you learned in your everyday life! This is called **Application** or "**Applying to life**."



## Student Year 1 Worksheet Packet, page 4

### More about how each part of Learning is A QuEST:



- **Questioning** -- in this first phase of the quest you will think about what you already know about the topic and what questions you have. The questioning phase is a time for exploration. Good learners always ask good questions! Here are some examples:

What do we already know about the topic?

What don't we know about the topic but would like to learn?

What are we curious about?

How should we investigate this topic?



- **Experimenting/Searching** -- Here is where you start to answer your questions. In this part you will explore the topic you are studying by doing experiments and research.

Experiments are tests done in controlled conditions that will help you discover something new about the topic. There are six steps in an experiment:

**Step 1: Develop an experiment question**--the question your experiment is trying to answer.

*Ask yourself:* What questions do we have about the topic that can be answered by conducting an experiment?

**Step 2: Decide on a hypothesis**--a hypothesis is a prediction, or a guess, about what might be the results of the experiment.

*Ask yourself:* What do we think the results of our experiment will be?

**Step 3: Write down the steps you will take during the experiment**--this is called your "methods". Also include a list of the supplies you will need for your experiment.

*Ask yourself:* How do we conduct our experiment? What are all the steps we must take to conduct our experiment? What materials do we need?

**Step 4: Do the experiment following your methods.**

*Ask yourself:* Are we following our methods? Are our methods written clearly enough that someone could copy our experiment exactly? Are our methods working or not working? How can we change our methods to make them better?

**Step 5: Write your results on a table, chart or in a log.**

*Ask yourself:* What is the best way to show our results? Should we use a chart, a graph, or a table? Are we recording everything we are learning from our experiment? What are we missing?

## Student Year 1 Worksheet Packet, page 5

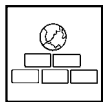
### SIX STEPS TO FOLLOW FOR AN EXPERIMENT, CONTINUED

**Step 6: Examine your results and think about what you have learned.** Use your answers to this question to make your "conclusions."

Ask yourself: What do our results say about our hypothesis? Are our results different from what we thought would happen or the same? If so, why? Do we think our results happened because of something we did in our experiment or did our results happen because of something that went wrong?

Searching is looking for information to find out about the topic you are studying. You can use many creative methods to gather information in your searches, such as: books, videos, computers, and interviews with people.

*Ask yourself:* What do we want to know that we can't answer through doing experiments? How can we find this out?



- **Theorizing** -- in this step you will think about what you have learned and use it to create new ideas about the topic. These new ideas are called "theories". When you theorize, you will use the information you learned from questioning, experimenting and searching in the first two phases to:

- 1) discuss new ideas you have about the topic--these new ideas are your theories;
- 2) give evidence to back up your theories, this means you will explain how you came up with your theory; and
- 3) participate in scientific discussions, debates and arguments with your classmates. You will explain your theories to your classmates, listen to what they have to say about your theory, then answer their questions about your theories. You will also listen to your classmates' theories and give them advice to help them improve their thinking about what they have learned.

*Ask yourself:* From what I have learned, what new theories do I have about the topic? What proof do I have to back up my theories? Can I change and improve my theories based on what my classmates said? Can I give advice to my classmates that will help them change and improve their theories?



- **Applying to life** -- use what you have learned each day as you think and do things. Also, as you use what you learn you will make up new questions for future experiments!

*Ask yourself:* How can I use what I have learned? How can I remember to think about what I have learned as I do my day-to-day activities? What can I teach my family? What new questions do I have about the topic now that I am using my new knowledge in the real world?

## Student Year 1 Worksheet Packet, page 6

Name \_\_\_\_\_

Date \_\_\_\_\_

### Introductory Lesson 2: Learning about Grapes



Quest Learning Cycle  
Phase 1:



Questioning



1. What do you already know about grapes?

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2. Look at the grapes very closely, (you can break it open if you want to) and record some new things you discover about grapes:

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3. From what you have just learned from your observations of grapes, write down some ideas about how you think grapes are turned into grape juice.

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**Student Year 1 Worksheet Packet, page 7**

**Quest Learning Cycle  
Phase 2:**



**Experimenting/  
Searching**



**Research Question: How can we make grape juice from grapes?**

**Methods:** (what steps would you take to develop an experiment to answer this research question?)  
Describe the steps in as much detail as you can! To make grape juice from grapes, first I would:

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**Materials:** (list everything you will need to PERFORM your experiment in the columns below).

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**Hypothesis:** (What do you think the results of your experiment will be? Make a prediction!)

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**Student Year 1 Worksheet Packet, page 8**



**Class experiment: How can we make grape juice from grapes?**



Methods: HOW WE WILL DO IT?

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Materials: WHAT DO WE NEED? (list in the columns below).

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Hypothesis: WHEN WE DO OUR EXPERIMENT, WHAT RESULTS DO WE PREDICT WE WILL GET?

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**Student Year 1 Worksheet Packet, page 9**



**Class experiment: How can we make grape juice from grapes?**



Results: WHAT ACTUALLY HAPPENED?


Compare your results with your hypothesis and discuss what you learned from doing this experiment?


**Student Year 1 Worksheet Packet, page 10**



**Quest Learning Cycle**

**Phase 3:**



**Theorizing**



Think about what you learned in your experiment. How do you think the grape juice you buy in the store is made?

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**Quest Learning Cycle**

**Phase 4:**



**Applying to life**

How will you apply what you learned about grapes in the future?

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