



Growing healthy keiki, schools, and communities
A program of the Kōkua Hawai'i Foundation

THE SCIENTIFIC GARDEN

Student Workbook

Grade 5

Student's Name: _____ Group # _____

Classroom: _____

Date: _____

www.kokuahawaiifoundation.org/aina



A program of the Kōkua Hawai'i Foundation

A farm to school program connecting children to their land, waters, and food to grow a healthier Hawai'i

'ĀINA In Schools is a farm to school initiative launched in 2006 that connects children to their local land, waters, and food to grow a healthier Hawai'i. In addition to encouraging the use of locally grown fruits and vegetables in school meals and snacks, the program includes a standards-based nutrition, garden, and compost curriculum that empowers children to grow their own food, make informed food decisions, and reduce waste. 'ĀINA In Schools also promotes field trips to local farms, chef cooking demonstrations in classrooms, as well as waste reduction, garden, and cooking educational opportunities for families and community members.

Six Integrated Program Components

Core components:

- **Nutrition Education** empowers students to try new foods and make healthy choices that will last a lifetime.
- **Garden-Based Learning** transforms the school garden into a learning laboratory where all subjects are explored.
- **Healthy Food on Campus** increases local, fresh products in school lunches and snacks to provide healthy choices and support local farms.

Additional components:

- **Agricultural Literacy** introduces students to where their food comes from and who grows and prepares their food.
- **Waste Reduction** reduces, reuses, and recycles waste in gardens, schoolyards, cafeterias, and classrooms.
- **Family & Community Outreach** raises awareness to support student, family, and community health and wellness.



"As an educator, I appreciate your program on so many levels. Your program does more than simply address state standards, but gives our students meaning and relevance as they study and engage in a living classroom where they literally see the fruits (and vegetables!) of their labor."

School Principal

'ĀINA In Schools Curriculum

- The 'ĀINA In Schools curriculum includes 8 lessons per year for grades K-6 that are standards-based, multi-subject, and hands-on. The curriculum supports a variety of learning styles and covers topics from the Nutrition, Garden, and Waste Reduction components. Successive units enable students to build on previous knowledge while developing a solid foundation in 'āina-based systems thinking. Nutrition and garden lessons also include close to the source, healthy snacks that reinforce key concepts.
- 'ĀINA In Schools Curriculum Trainings for Educators and online access to all materials via the Kōkua Hawai'i Foundation website enable educators to bring the 'ĀINA In Schools experience to students throughout Hawai'i and beyond. Lessons meet Common Core and HCPSIII standards for grades K-6 and are easily adaptable for other grades.

Key KHF Farm to School Partnerships

- Co-leader and founding partner of the **O'ahu Farm to School Network**: www.oahufarmtoschool.org.
- Founding member of the **Hawai'i Farm to School & School Garden Hui**: www.hawaiischoolgardenhui.org.
- Hawai'i Core Partner for the **National Farm to School Network**: www.farmtoschool.org.
- Kōkua Hawai'i Foundation is also an Advisory Committee member of the **Hawai'i Environmental Education Alliance**: www.heea.org.

'ĀINA In Schools is a program of the Kōkua Hawai'i Foundation



www.kokuahawaiifoundation.org/aina



Student Worksheet
THE SCIENTIFIC GARDEN
Grade 5 * Pre-Unit Survey

Name

School

Teacher

I have been at this school since grade: K 1 2 3 4 5 (circle one)

This Pre-Unit Survey is to see what you already know about these topics. It is ok if you don't know any of the answers. You will be learning about these topics this semester. Try your best and have fun!

1. Circle all the variables that can affect plant growth. Circle all that apply:

Soil Composition Wind Air Water Light Weeds Seasons Temperature
Pollination Diversity Fertilizers Mulch Vermicast Singing Pests

2. How can you tell if soil is healthy? Circle ONE answer:

- a. The soil is full of life
- b. The soil drains well
- c. Plants are healthy with few or no problems with pests and diseases
- d. All the above

3. What are the four main components of soil? Circle ONE answer:

- a. Food scraps, water, dirt, air
- b. Water, sand, bacteria, earth
- c. Air, water, minerals, organic matter

4. What can you add to soil to improve soil health? Circle ONE answer:

- a. Compost
- b. Vermicast
- c. Bokashi
- d. All the above

5. Draw a line to match each word to its correct definition:

- a. Decomposition
- b. Mulch
- c. Hypothesis
- d. Data
- e. Vermicast
- 1. Castings (poop) from composting worms; rich in soluble nutrients
- 2. A statement or educated guess that explains a predicted answer to the question being asked
- 3. The process by which a material is broken down into simple forms of matter
- 4. A material that is used to cover the soil for beneficial purposes
- 5. Facts, statistics, or items of information collected for reference

6. Do you like gardening? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

7. Do you like eating fruits and vegetables? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

8. Do you like cooking? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

9. Do you like making compost? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

10. Do you like 'ĀINA Lessons? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

11. Do you and your family grow any food at home? Circle: Yes or No

If yes, please list the foods you grow at home: _____

12. Do you compost at home? (compost pile, worm bins, or bokashi bucket) Circle: Yes or No

13. How often do you eat fruits and vegetables? Circle ONE answer:

- a. I don't eat fruits and vegetables
- b. 1-2 times a week
- c. 3-5 times a week
- d. Every day

14. Circle the fruits and vegetables that you like to eat:

- Apple Cantaloupe Banana/Mai'a Blueberries Avocado Coconut/Niu Guava Dragonfruit
 Mango Passionfruit/Liliko'i Honeydew Rambutan Tangerine Strawberry Blackberries
 Lemon Starfruit Breadfruit/'Ulu Lychee Orange Papaya Pineapple Watermelon
 Radish Spinach Basil Beans Broccoli Squash Zucchini Sweet Potato/'Uala Corn Tomato
 Lettuce Watercress Taro/Kalo Cucumber Green Beans Asparagus Carrots Celery Kale

Other: _____

15. Describe what 'āina means to you: _____

16. List two ways that you take care of the 'āina:

- 1. _____
- 2. _____

17. Complete the following sentence:

My favorite thing about 'ĀINA In Schools Lessons is _____

Dear Parent or Caregiver:

This semester, 5th graders will be participating in four 'ĀINA In Schools Garden Lessons. 'ĀINA In Schools, a program of Kōkua Hawai'i Foundation, is a farm to school initiative that connects children to their local land, waters, and food to grow a healthier Hawai'i. Program components vary from school to school and include nutrition education, garden-based learning, healthy snacks, farm field trips, chef visits, waste reduction, and family and community outreach.

Although the lessons are delivered once a month, the students will be continually engaged in between lessons with regular garden activities that include watering, weeding, making observations, data collection, harvesting, and spending time in the garden.

Photos and Media Releases: By now each of you should have received a Kōkua Hawai'i Foundation Media Release Form. We hope that you have this form and have submitted it to your child's classroom teacher. From time to time, KHF takes photos/videos of our lessons to highlight activities that are noteworthy.

To keep yourself up to date on what your child is doing in 'ĀINA, we suggest putting this up on your refrigerator or bulletin board and follow up as the lessons are delivered. You can help reinforce, engage, and learn along with your child by going over the lessons and activities after each lesson. A unit summary and suggested questions/activity for each lesson are listed below.

Mahalo!

In **The Scientific Garden** unit, students will use science to answer important questions about how to grow healthy soil and plants, abundant food, and how to become successful gardeners and better stewards of the environment. They will utilize the scientific method to test the effects of certain variables (mulch and vermicast) on the growth of bush beans in their garden, and they will observe quantitative and qualitative data in their garden regularly and record data in their journals. Students will conduct a soil sample experiment, explore soil life, and monitor plant health. Key concepts include 'āina, the importance of observation, data collection, and experimentation for gardeners and farmers, the scientific method, the importance of soil and organic matter, microorganisms (fungi and bacteria), invertebrates, producers, consumers, decomposers, decomposition, photosynthesis, and the soil food web.



Lesson 1 - Gardeners Are Scientists

In this lesson, students discuss the role of gardeners and farmers as scientists, and the variables that affect plant growth. They share soil observations collected before the lesson and discuss the design of their garden experiment. In the garden, students create plots and signs, plant bush bean seeds, and add mulch and vermicast to certain plots in order to begin their scientific experiment.

Questions to discuss with your child:

- What do gardeners, farmers, and scientists have in common?
- How do gardens represent larger-scale systems such as farms and natural ecosystems?
- What variables are being tested in this unit?

Suggested home activity:

- Create a rain gauge using a clear cup. Place the cup next to the plants. Observe or record amount of water collected after rainfall.
- Observe the movement of the sun across your home or garden throughout the day. Relate this to the growth patterns of plants.



Lesson 2 - Soil and Organic Matter

In this lesson, students discuss their garden observations as well as their scientific questions and hypotheses. They discuss the importance of healthy soil and organic matter. In the garden, they will conduct soil sample experiments in order to study the amount of organic matter in different samples of soil. Students care for their garden by adding mulch and vermicast in the appropriate plots watering plots equally, and removing weeds..

Questions to discuss with your child:

- What is organic matter and why is it important?
- Explain the steps of the soil sample experiment.

Suggested home activity:

- Do some soil experiments at home. For more info, visit: www.soils4kids.org/experiments

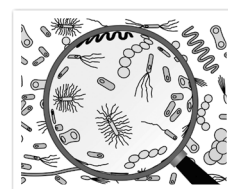


Lesson 3 - Soil Food Web

In this lesson, students review the goal of their garden experiment, share observations made, and discuss the importance of healthy soil and the soil food web. They will be introduced to the soil "F.B.I." (fungi, bacteria, invertebrates) and discuss the important role of decomposers. In the garden, students will observe and collect data on soil life, care for their garden, harvest available green beans, and continue their scientific experiment.

Questions to discuss with your child:

- Who are the soil "F.B.I.?"
- Describe the soil food web.



Suggested home activity:

- An excellent resource for in-depth learning about the soil food web and its critical role in nutrient cycling (sustainability) is the book entitled, *Teaming With Microbes: The Organic Gardener's Guide to the Soil Food Web* by Jeff Lowenfels and Wayne Lewis.

Lesson 4 - Conclusions

In this lesson, students review their scientific experiment and discuss the process of analyzing data and creating conclusions. Students will work in groups and use the Class Data Sheets to analyze data on soil health, plant health, and the amount of food produced in their Scientific Garden. The class will then discuss their results and conclusions together. They will enjoy a snack of fresh fruits and vegetables and discuss lessons learned from their Scientific Garden.



Questions to discuss with your child:

- What is the outcome of the experiment?
- Was your hypothesis correct? Why or why not?

Suggested home activity:

- Watch *Dirt! The Movie*. Visit the website: www.dirtthemovie.org/

If you have any questions or are interested in becoming an 'ĀINA In Schools docent, please do not hesitate to ask.

To learn more about 'ĀINA In Schools at your child's school, please contact your school's 'ĀINA Team Coordinator, or contact:



'ĀINA In Schools
aina@kokuahawaiiifoundation.org



Guided Notes
THE SCIENTIFIC GARDEN
Lesson 1 * Gardeners Are Scientists

Name

Class Date

KEY TERMS AND CONCEPTS

‘Āina - Land; that which feeds, nourishes, and sustains us (e.g., food, water, air)

Data - Facts, statistics, or items of information collected for reference or analysis

Experiment - To try or test, especially in order to discover or prove something

Mulch - Any material that is used to cover the soil for beneficial purposes including preserving moisture and discouraging weeds

Observe - To see, perceive, or notice; to regard with attention

Science - Systematic knowledge gained through observation and experimentation

Variable - A factor or condition that is subject to change, especially one that is allowed to change in a scientific experiment in order to test a hypothesis

Vermicast - Castings (poop) from composting worms; rich in soluble nutrients and microbial life (microorganisms); enhances plant growth and health

Part 1 Directions: Use this space to record your notes, drawings, and observations.

Part 2 Directions: Use this space to draw a diagram of the four plots in your garden bed. Label the number of each plot and label if the plot contains mulch and/or vermicast.



Notes, Drawings, and Observations
THE SCIENTIFIC GARDEN

Name

Class Date

Directions: Use this space to record your notes, drawings, and observations.



Garden Experiment Report: Part I

Directions: Fill in your answers to the questions below. Use additional paper if you need more space to complete your answers.

1. Question: The testable research question that is being asked in our garden experiment is:

“Will mulch and/or vermicast improve the health of the garden soil and plants and increase the amount of food produced?”

2. Hypothesis: What is your hypothesis (your educated guess in answering the question above)? Include an explanation of why you believe your hypothesis to be true.

3. Experiment: How was the experiment set up? Draw a diagram and include a description of the plots that have been created in your Scientific Garden.

4. Data Collection: Collect data each week in your Scientific Garden in order to help answer the testable research question. Record data in your journal.

Examples of data to collect include:

- **Soil Health:** How does the soil look and feel? What kinds (number and diversity) of soil life are observed?
- **Plant Health:** Assess the health of plants by the color of their leaves and by looking for signs of insect damage and/or disease.
- **Amount and Quality of Food Produced:** Starting after Lesson 2, use the Green Bean Harvest Sign and Harvest Data Class Data Sheet to record the quantity, weight, and quality of green beans harvested from each plot.



Garden Experiment Report: Part II

Directions: Fill in your answers to the questions below. Use additional paper if you need more space to complete your answers.

5. Results: As a class, you discussed the results shown by the data collected from the Scientific Garden. Briefly describe the results presented by each group (i.e., which plot(s) produced the most desirable results):

Organic Matter Results:

Soil Life Diversity and Abundance Results:

Plant Health Results:

Harvest Results: Quantity of Green Beans:

Harvest Results: Weight of Green Beans:

Harvest Results: Quality of Green Beans:

6. Conclusion: Describe your conclusion to the garden experiment by answering our scientific question, “**Did mulch and/or vermicast improve the health of the garden soil and plants and increase the amount of food produced?**”. Was your hypothesis true or false?

7. Lessons Learned: Describe what you learned from the garden experiment.

8. Further Study: List two scientific questions that you would be interested in finding out the answer to:



Name

Class Date

Plant Health Observations

Directions:

1. Visit your garden plot weekly to observe and record your observations, compare the health of the plants in each plot. Assess the health of plants by the color of their leaves and by looking for signs of insect damage and/or disease. When assessing the leaf color, consider these guidelines:
 - The plant is healthy if most of the leaves are a vibrant/dark green color and new growth (small, healthy leaves) appears at the top of the stems.
 - The plant may be stressed (unhealthy) if most of the leaves are light green to yellow.
 - The presence of a few brown (dead) leaves is normal for the lower leaves on the bean plants. However, the plant may be dying if most of the leaves are brown.
2. In the columns below include detailed descriptions of what you observe in each plot.
3. If you run out of space in the data tables continue on the following sheet.

Date	Plot 1	Plot 2	Plot 3	Plot 4



Class Data Sheet
THE SCIENTIFIC GARDEN
Lesson 1 * Gardeners as Scientists

Name

Class Date

Plant Health Observations

Date	Plot 1	Plot 2	Plot 3	Plot 4

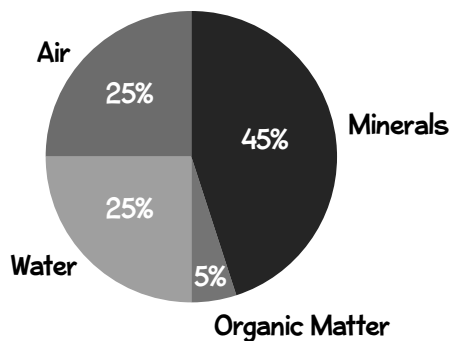
KEY TERMS AND CONCEPTS

Microorganisms - Any organism too small to be seen by the unaided eye such as bacteria, protozoa, and some fungi and algae

Organic - Of or relating to an organism, a living entity

Organic Farming - A form of agriculture which uses nature-based techniques (such as crop rotation and composting) to maintain soil fertility, and which excludes or strictly limits the use of manufactured inputs (such as pesticides, fertilizers, and genetically modified organisms)

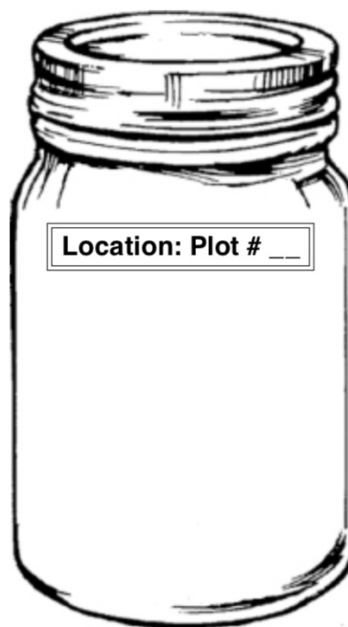
Organic Matter - Material that is either living (e.g., worms, roots, and bacteria) or that originated from life (e.g., fallen leaves, dead roots, and dead insects)



The four main components of soil in their average ratios.

Part 1 Directions: Use this space to record your notes, drawings, and observations.

Part 2 Directions: Draw the results of your soil experiment here. (Label: sand, silt, clay, water, and organic matter)





Soil Sample Experiment Report

Directions: Fill in your answers to the questions below. Use the back of the page if you need more space to complete your answers.

My Soil Sample Collection Site (e.g., Plot 1, Campus):

1. Question: The testable research question that is being asked in our soil sample experiment is:

“Which soil sample will have the greatest amount of organic matter?”

2. Hypothesis: What is your hypothesis (your educated guess to the answer to the question above)? Include an explanation of why you believe your hypothesis to be true.

3. Experiment: Describe the steps you took in order to carry out this experiment:

4. Data Collection: After your soil sample has been allowed to sit undisturbed in the classroom for 24 hours, use a ruler to measure the height in millimeters (mm) of the organic matter layer floating at the very top inside the jar. Record this information below for your group’s collection site, then gather the data from each of the other groups in order to complete the table. Circle the sample with the greatest amount of organic matter. On the back of this sheet, draw a life-sized picture of your settled soil sample, including each of the layers inside the jar (including from bottom to top: sand, silt, clay, organic matter). Label your drawing with a measurement of each layer (including measurement unit in millimeters).

Table: Amount of Organic Matter for Each Collection Site

Share your data and gather the data from each of the other groups in order to complete the table below.

Plot 1	Plot 2	Plot 3	Plot 4	Compost	Campus

5. Conclusion: Write your conclusion to this experiment in the space below. Was your hypothesis true or false?



Harvest Data

Directions:

1. Look at the Green Bean Harvest Sign to find out how to tell which green beans are “just right for eating” and which ones should be left on the plant (“too small” or “bulging”).
2. Visit your garden daily or weekly to harvest available green beans. Use a ruler to measure each green bean before harvesting it, to make sure it is the correct size for harvesting (at least 3.5 inches long). If the bean is yellow, leave it on the plant so it will form seeds.
3. In the correct table below or on page 2 (according to the plot you have harvested from), describe the quality of the beans according to the color, texture, firmness, and size.
4. Write the total the number (quantity) of green beans harvested from each plot.
5. Place the beans in a bag and use the hanging scale to measure their weight in grams (g) for each plot. In the correct table, record the total weight of the green beans harvested from each plot.
6. After you have gathered and recorded your data for each plot, wash the green beans and share them with your class as a snack.
7. If you run out of space in the data tables ask your teacher to give you a blank sheet.

Plot 1

Date	What Are Your Observations of the QUALITY of the Green Beans Harvested? (Color: Evenly colored green OR blotchy white/ yellow spots? Texture: Smooth OR rough “rust”? Firmness: Firm OR limp? Crisp or tough? Size: Skinny OR bulging?)	Total QUANTITY	Total WEIGHT of Green Beans Harvested

Plot 2

Date	What Are Your Observations of the QUALITY of the Green Beans Harvested? (Color: Evenly colored green OR blotchy white/ yellow spots? Texture: Smooth OR rough “rust”? Firmness: Firm OR limp? Crisp or tough? Size: Skinny OR bulging?)	Total QUANTITY	Total WEIGHT of Green Beans Harvested



Harvest Data

Plot 3

Date	What Are Your Observations of the QUALITY of the Green Beans Harvested? (Color: Evenly colored green OR blotchy white/yellow spots? Texture: Smooth OR rough "rust"? Firmness: Firm OR limp? Crisp or tough? Size: Skinny OR bulging?)	Total QUANTITY	Total WEIGHT of Green Beans Harvested

Plot 4

Date	What Are Your Observations of the QUALITY of the Green Beans Harvested? (Color: Evenly colored green OR blotchy white/yellow spots? Texture: Smooth OR rough "rust"? Firmness: Firm OR limp? Crisp or tough? Size: Skinny OR bulging?)	Total QUANTITY	Total WEIGHT of Green Beans Harvested



Guided Notes
THE SCIENTIFIC GARDEN
Lesson 3 * The Soil Food Web

Name

Class Date

KEY TERMS AND CONCEPTS

Bacteria - Unicellular organisms; widely distributed in soil, water, air, and on or in the tissues of plants and animals

Consumers - Organisms that eat other living things (e.g., animals, insects, some plants)

Decomposers - Organisms that break down organic matter and carry out decomposition (e.g., fungi, bacteria, invertebrates)

Decomposition - The process by which a material is broken down into simpler forms of matter

Food Web - A system of interlocking and interdependent food chains where matter and energy are transferred from one organisms to another

Fungi - Plural of fungus; spore-producing organisms that feed on organic matter; includes molds, yeast, mushrooms, and toadstools

Invertebrate - An animal lacking a backbone, such as an insect (arthropod) or a worm (annelid)

Photosynthesis - The process by which green plants (“producers”) and some other organisms use sunlight, carbon dioxide, and water to produce sugars (carbohydrates) and oxygen

Producers - Organisms that produce their own food (e.g., plants)

Directions: Use this space to record your notes, drawings, and observations.



Notes, Drawings, and Observations
THE SCIENTIFIC GARDEN

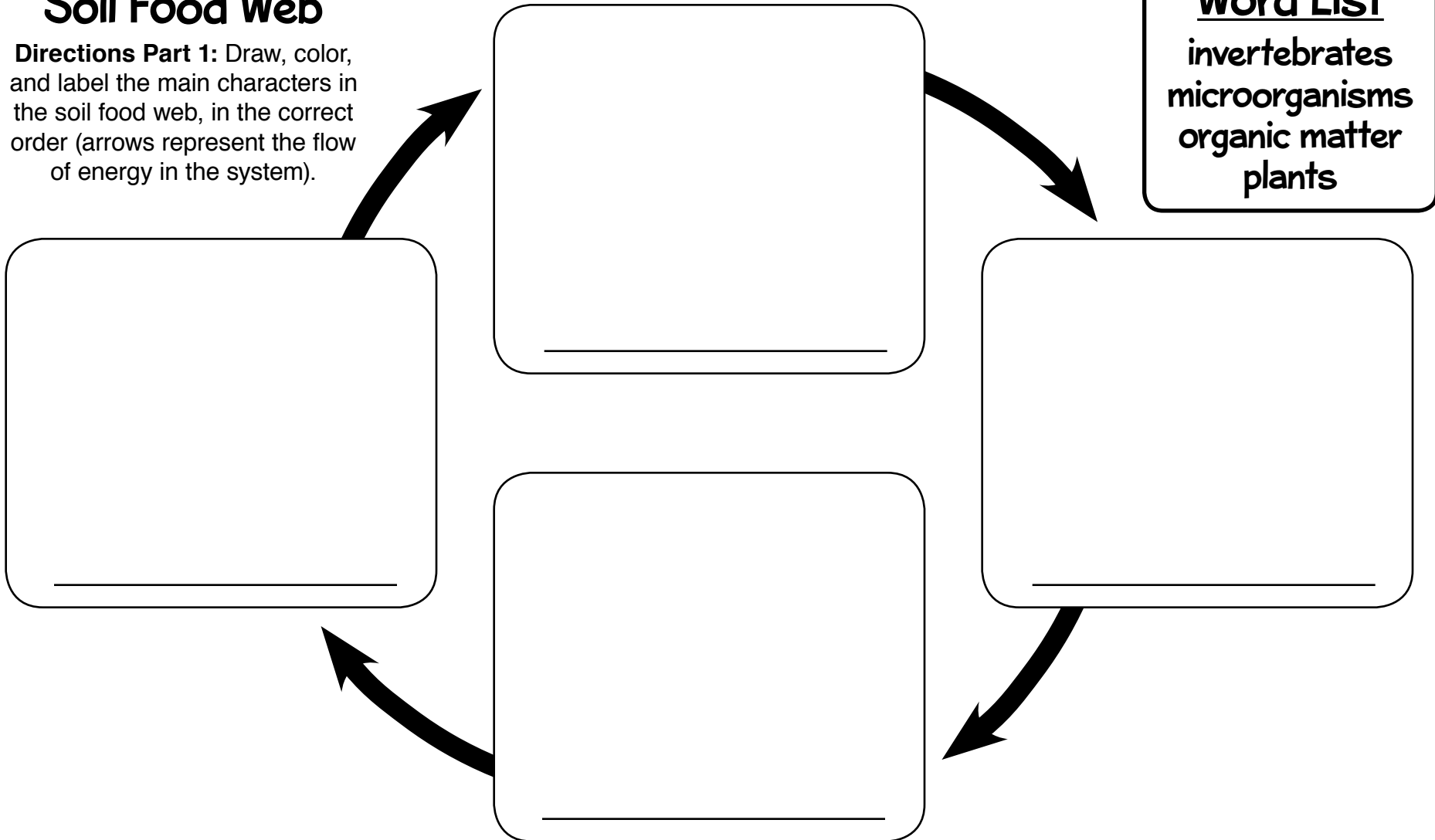
Name

Class Date

Directions: Use this space to record your notes, drawings, and observations.

Soil Food Web

Directions Part 1: Draw, color, and label the main characters in the soil food web, in the correct order (arrows represent the flow of energy in the system).



Word List

invertebrates
microorganisms
organic matter
plants



Growing healthy keiki, schools, and communities
A program of the Kōkua Hawai'i Foundation

Student Worksheet
THE SCIENTIFIC GARDEN
Lesson 3 * Soil Food Web

Name

Class Date

Directions Part 2: Fill in your answers to the questions below.

1. Who are the soil 'F.B.I.'? What do F, B, and I stand for? _____

2. Give examples of invertebrates that you have seen in your garden. _____

3. Which invertebrate is your favorite and why? _____

4. What do decomposers do and why are they important? _____

5. Write a paragraph that explains the soil food web. _____



Soil Life Data

With your group, use the magnifying glasses to closely observe the decomposers found in your soil sample. Be very gentle with the garden creatures! Fill in your answers to the questions below and record any additional observations in your Student Workbook or journal.

Plot Number: _____ **Circle Yes or No: Mulch?** Yes No **Vermicast?** Yes No

Part 1 Directions: Using the Decomposers Sign as a guide, circle the different types of decomposers found in your sample in the **Diversity Table** below.

Part 2 Directions: Tally and total the number of decomposers found in your sample. Draw pictures of the decomposers you find and record the total amount of decomposers in the **Abundance Table** below.

1. Diversity: Circle the decomposer type found and draw a picture	2. Abundance: Tally the Number of Each Decomposer Found In Your Sample	Total Number
Ant		
Composting Worm		
Earthworm		
Grub		
Millipede		
Slug		
Snail		
Sow Bug		
Other:		
Other:		
GRAND TOTAL OF DECOMPOSERS FOUND:		



Name

Class Date

Soil Life Data

Part 3 Directions: List the number of different types of decomposers found in the Diversity Table below. Share your data and gather the data from the other groups to complete the table.

Diversity Table

Plot 1	Plot 2	Plot 3	Plot 4	Compost	Campus

Part 4 Directions: Put the grand total number of all decomposers found in the Abundance Table below. Share your data and gather the data from the other groups to complete the table.

Abundance Table

Plot 1	Plot 2	Plot 3	Plot 4	Compost	Campus



Guided Notes
THE SCIENTIFIC GARDEN
Lesson 4 * Conclusions

Name

Class Date

KEY TERMS AND CONCEPTS

Conclusions - Statements that researchers make about the outcomes of an experiment/ study based on the evaluation of their results; determining whether a hypothesis was true or false in order to answer scientific questions

Data - Facts, statistics, or items of information collected for reference or analysis

Qualitative - Measuring the quality of something rather than its quantity; e.g., using descriptions

Quantitative - Measuring the quantity of something rather than its quality; e.g.; using numbers

Results - An outcome; the analysis or visualization of data by using graphs, etc.

Directions: Use this space to record your notes, drawings, and observations.



Name

Class Date

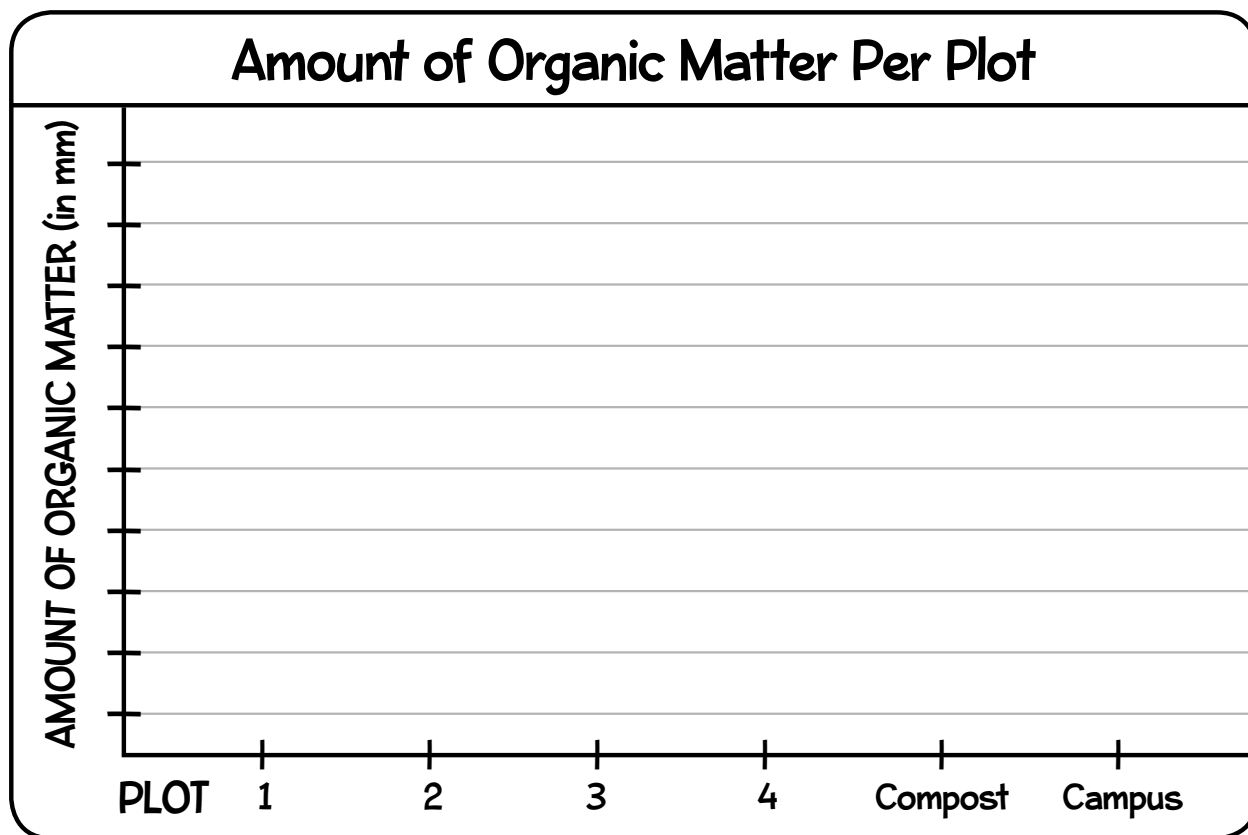
Organic Matter Results

Directions:

1. Using your Soil Experiment Report Student Worksheet from Lesson 2, fill in the data in the table below.
2. In the graph below, label the y-axis with the appropriate increments, then create a bar graph using the data from the table.
3. Write your group's conclusion below the bar graph.
4. Draw your bar graph on the board in the classroom in order to share your results with the class.

Table: Amount of Organic Matter for Each Collection Site

Plot 1	Plot 2	Plot 3	Plot 4	Compost	Campus



Conclusion: Which plot had the greatest amount of organic matter? _____



Name

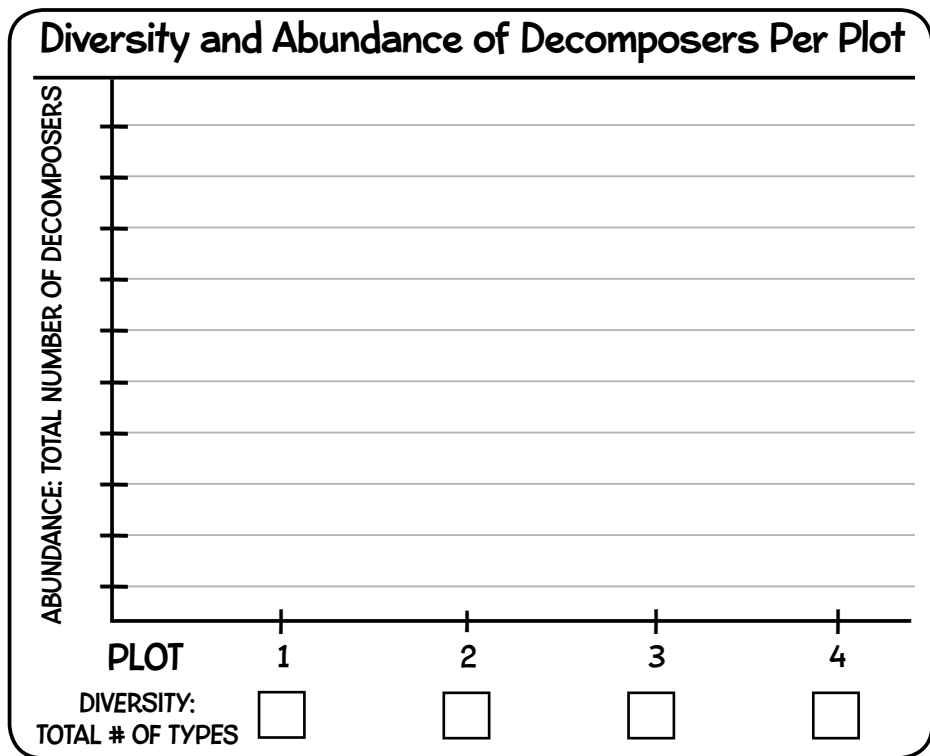
Class Date

Soil Life Results: Diversity & Abundance

Directions:

1. Gather all six Soil Life Data Class Data Sheets from Lesson 3 (one per plot).
2. **Diversity:** In the table at right, put a check mark in the boxes to indicate which plots contained each decomposer type.
3. Add the total number of decomposer types per plot and record the numbers in the DIVERSITY row at the bottom of the table.
4. **Abundance:** Enter the total number of each decomposer type found per plot in the same box.
5. Add the total number of decomposers per plot and record the numbers in the ABUNDANCE row at the bottom of the table.
6. In the graph below, label the y-axis with appropriate unit increments, then create a bar graph using the data from the table.
7. Write your group's conclusion to the right of the bar graph.
8. Draw your bar graph on the board in the classroom in order to share your results with the class.

Decomposer Type	Plot 1	Plot 2	Plot 3	Plot 4
Ant				
Composting Worm				
Earthworm				
Grub				
Millipede				
Slug				
Snail				
Sow Bug				
Other:				
Other:				
DIVERSITY: Total Number of Different Types of Decomposers				
ABUNDANCE: Total Number of Decomposers found				



Conclusion: Which plot had the greatest diversity of decomposer types? Which plot had the greatest abundance of decomposers?



Plant Health Results

Directions:

1. As a group, review the observations and comparisons you made each week on the Plant Health Observations Class Data Sheet regarding the health of the plants in each plot (such as the color of their leaves and any signs of insect damage and/or disease).
2. As a group, summarize your plant health assessments for each plot and enter the data in the table below.
3. Compare and discuss the summaries and write your group's conclusion below the table.
4. Share your results and conclusion with the class.

Plot Number	Summary of Plant Health Assessments Per Plot
Plot 1	
Plot 2	
Plot 3	
Plot 4	

Conclusion: Which plot had the healthiest plants, according to your group's assessment?

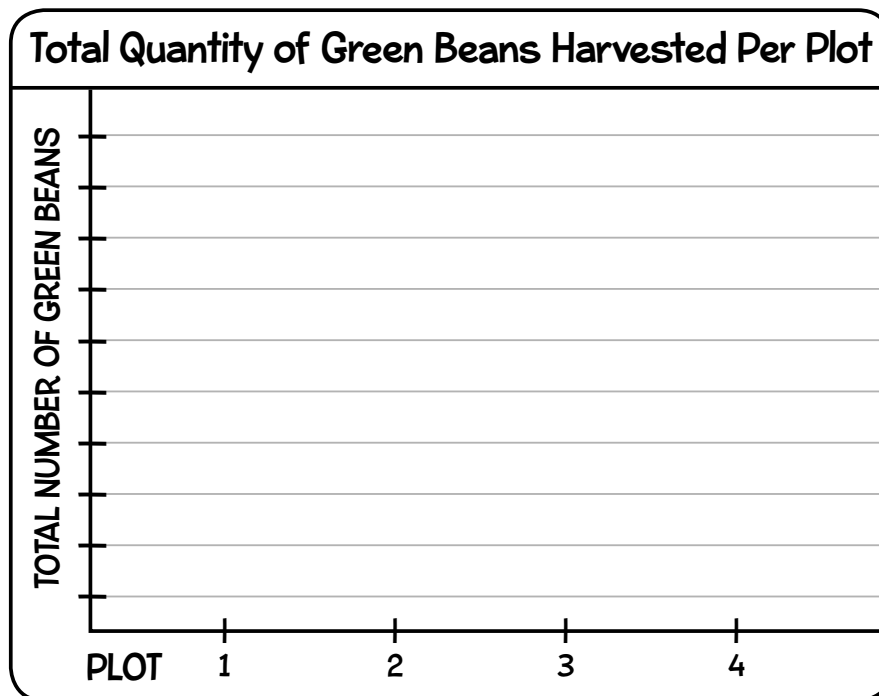


Harvest Results: Quantity

Directions:

1. Gather all of the Harvest Data Class Data Sheets created by your class.
2. Using the data on those sheets, fill in the data in the table below.
3. In the graph below, label the y-axis with appropriate unit increments, then create a bar graph using the data from the table.
4. Write your group's conclusion below the bar graph.
5. Draw your bar graph on the board in the classroom in order to share your results with the class.

Plot Number	Total Quantity of Green Beans Harvested
Plot 1	
Plot 2	
Plot 3	
Plot 4	



Conclusion: Which plot had the greatest total quantity of green beans harvested? _____

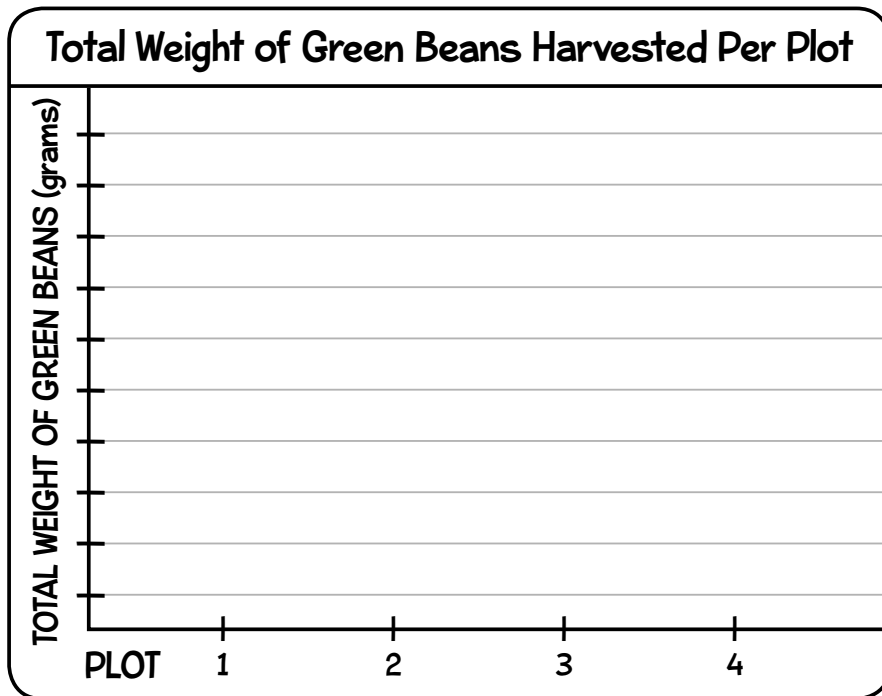


Harvest Results: Weight

Directions:

1. Gather all of the Harvest Data Class Data Sheets created by your class.
2. Using the data on those sheets, fill in the data in the table below.
3. In the graph below, label the y-axis with appropriate unit increments, then create a bar graph using the data from the table.
4. Write your group's conclusion below the bar graph.
5. Draw your bar graph on the board in the classroom in order to share your results with the class.

Plot Number	Total Weight of Green Beans Harvested
Plot 1	
Plot 2	
Plot 3	
Plot 4	



Conclusion: Which plot had the greatest total weight of green beans harvested? _____



Harvest Results: Quality

Directions:

1. As a group, review the observations and comparisons you made each week on the Harvest Data Class Data Sheet regarding the quality of the green beans harvested (such as **Color:** Evenly colored green OR blotchy white/yellow spots? **Texture:** Smooth OR rough “rust”? **Firmness:** Firm OR limp? Crisp or tough? **Size:** Skinny OR bulging?).
2. As a group, summarize your green bean harvest quality assessments for each plot and enter the data in the table below.
3. Compare and discuss the summaries and write your group’s conclusion below the table.
4. Share your results and conclusion with the class.

Plot Number	Summary of Green Bean Harvest Quality Assessments Per Plot
Plot 1	
Plot 2	
Plot 3	
Plot 4	

Conclusion: Which plot had the highest quality of harvested green beans, according to your group’s assessment?



Notes, Drawings, and Observations
THE SCIENTIFIC GARDEN

Name

Class Date

Directions: Use this space to record your notes, drawings, and observations.



Notes, Drawings, and Observations
THE SCIENTIFIC GARDEN

Name

Class Date

Directions: Use this space to record your notes, drawings, and observations.



Notes, Drawings, and Observations
THE SCIENTIFIC GARDEN

Name

Class Date

Directions: Use this space to record your notes, drawings, and observations.



Student Worksheet
THE SCIENTIFIC GARDEN
Grade 5 * Post-Unit Survey

Name

School

Teacher

I have been at this school since grade: K 1 2 3 4 5 (circle one)

1. Circle all the variables that can affect plant growth. Circle all that apply:

Soil Composition Wind Air Water Light Weeds Seasons Temperature
Pollination Diversity Fertilizers Mulch Vermicast Singing Pests

2. How can you tell if soil is healthy? Circle ONE answer:

- a. The soil is full of life
- b. The soil drains well
- c. Plants are healthy with few or no problems with pests and diseases
- d. All the above

3. What are the four main components of soil? Circle ONE answer:

- a. Food scraps, water, dirt, air
- b. Water, sand, bacteria, earth
- c. Air, water, minerals, organic matter

4. What can you add to soil to improve soil health? Circle ONE answer:

- a. Compost
- b. Vermicast
- c. Bokashi
- d. All the above

5. Draw a line to match each word to its correct definition:

- | | |
|------------------|-----------------------------------------------------------------------------------------------|
| a. Decomposition | 1. Castings (poop) from composting worms; rich in soluble nutrients |
| b. Mulch | 2. A statement or educated guess that explains a predicted answer to the question being asked |
| c. Hypothesis | 3. The process by which a material is broken down into simple forms of matter |
| d. Data | 4. A material that is used to cover the soil for beneficial purposes |
| e. Vermicast | 5. Facts, statistics, or items of information collected for reference |

6. Do you like gardening? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

7. Do you like eating fruits and vegetables? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

8. Do you like cooking? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

9. Do you like making compost? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

10. Do you like 'ĀINA Lessons? Circle ONE answer:

- a. I do not like
- b. unsure
- c. I like a little
- d. I like a lot

11. Do you and your family grow any food at home? Circle: Yes or No

If yes, please list the foods you grow at home: _____

12. Do you compost at home? (compost pile, worm bins, or bokashi bucket) Circle: Yes or No

13. How often do you eat fruits and vegetables? Circle ONE answer:

- a. I don't eat fruits and vegetables
- b. 1-2 times a week
- c. 3-5 times a week
- d. Every day

14. Circle the fruits and vegetables that you like to eat:

- Apple Cantaloupe Banana/Mai'a Blueberries Avocado Coconut/Niu Guava Dragonfruit
- Mango Passionfruit/Liliko'i Honeydew Rambutan Tangerine Strawberry Blackberries
- Lemon Starfruit Breadfruit/'Ulu Lychee Orange Papaya Pineapple Watermelon
- Radish Spinach Basil Beans Broccoli Squash Zucchini Sweet Potato/'Uala Corn Tomato
- Lettuce Watercress Taro/Kalo Cucumber Green Beans Asparagus Carrots Celery Kale
- Other: _____

15. Describe what 'āina means to you: _____

16. List two ways that you take care of the 'āina:

- 1. _____
- 2. _____

17. Complete the following sentence:

My favorite thing about 'ĀINA In Schools Lessons is _____

INSIDE
COVER
BLANK

OUTSIDE-
COVER
BLANK