

# **Alaska Educators Guide to Hydroponically Growing, Harvesting, and Learning about Food and Plants in the Classroom**



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# Table of Contents

<b>Introduction</b>	3
❖ What is this guide? Who is it for?	4
❖ Why would you choose to do hydroponics?	4
<b>Section 1: Getting Started</b>	5
❖ How to choose a system	6
❖ Find a grant	7
❖ Ordering supplies	7-8
❖ Maintenance	8
<b>Section 2: Lesson Plans</b>	9
❖ Introduction	10
❖ Tundra Day	11-15
❖ Where does our food come from?	16-18
❖ Seeds	19-21
❖ Plant Journaling	22-25
❖ Caring for plants	26-27
<b>Section 3 : Harvesting</b>	28
❖ Harvest Food	29
❖ Clean System	29
❖ Share food with others	30
❖ Post writing project	30
<b>Section 4: Other Resources</b>	31
❖ Websites	32
❖ Articles	33
❖ Exemplars	33
<b>Conclusion</b>	34
❖ Contact information	35
❖ References	35



# Introduction

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- What is this guide?
- Who is it for?
- Why would you choose to do hydroponics?



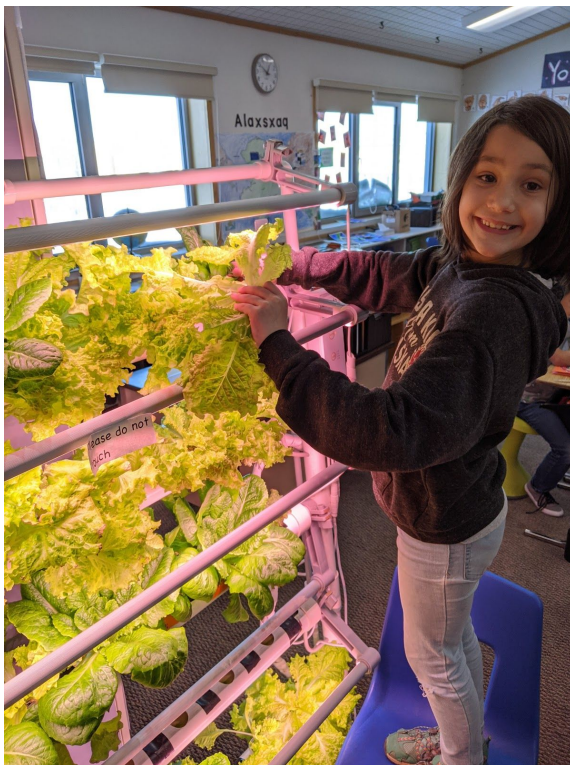
## WHAT is this guide?

This guide is set up to help educators like you incorporate hydroponics into your classroom. There are five sections included in this guide, and they are presented in order, with the beginning sections giving you what you need to know/do first to get started, following with a section on lesson plans to help you teach important aspects of growing plants. There are many resources out there to help with this process, and this guide concludes with some of those resources.

Using hydroponics in the classroom is a wonderful way to connect students to living plants during the school year. Depending on where your community is, it may be the only option for gardening. This guide provides some helpful tips and will give you the confidence as a teacher to start your very own indoor garden through hydroponics.

## WHO is this guide for?

This is a guide for any educator; teacher, para or principal who is interested in starting an indoor garden in your school.



## Why would you choose hydroponics?

Using hydroponics as an indoor school garden can engage students in many new and exciting learning experiences. Hydroponics allows you to grow plants with low weekly maintenance and have a larger and faster harvest. Hydroponics will enable your students to explore the plant life cycle and be able to eat what they have grown.



# Section 1: Getting Started

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- ❖ How to choose a system
- ❖ Find a grant
- ❖ Ordering supplies
- ❖ Maintenance

## How to choose a system?

There are six basic systems but many variations sold by different vendors.

- ❖ Wick
- ❖ Water Culture
- ❖ Ebb and Flow (Flood and Drain)
- ❖ Drip (Recovery or non-recovery)
- ❖ N.F.T (Nutrient Film Technique)
- ❖ Aeroponic

This website goes in depth on how each system works.

<http://www.simplyhydro.com/system/>

When thinking about what will work for your classroom and school think of the space available.

Ask yourself

- ❖ Do I have wall space? Or floor space?
- ❖ Do I have a room? Or hallway? Or nook?
- ❖ Do I want fish? Or to buy nutrients?
- ❖ Do I want to build it? Or do I want the system made for me?

At my school, we chose the N.F.T system with a grow wall. N.F.T. systems have a constant flow of nutrient solution with a submersible pump. The nutrient solution is pumped into the growing tray (usually a tube) and flows over the roots of the plants, and then drains back into the reservoir. Normally the plant is supported in a small plastic basket with the roots dangling into the nutrient solution.



## Find a Grant

These systems and supplies can be very expensive so it is best to try and find a grant. Reach out to partners in your community and state. Think of a proposal and purpose for your indoor garden. At our school we decided that we wanted to start a school-wide salad bar, so we sought grants supporting food security and community food systems. We applied for and received a grant for almost \$7000.

Some Grants available:

- ❖ STEM Grant Program Opportunity

<http://www.alaskaacsa.org/bp-classrooms-of-excellence-stem-grant-program-registration/>

- ❖ Western Alaska Community Grant Program (American Seafoods)
- ❖ Carrs Safeway Alaska Education Grant Program

<http://www.alaskaacsa.org/safeway/>

Now it doesn't have to be that expensive if you just want to start out small but whether you build it yourself or buy a pre-made complete system, expect to start out by spending between \$500-\$1000.

## Ordering Supplies

Once you have decided on the system and secured some funds you are ready to buy supplies. This list will not include items you need to actually build the system like piping, buckets, lights and pumps. This list is intended for once your system is set up, and includes what you will need to get plants growing:

- ❖ Nutrients (powder or liquid; make sure it is specific to the plant you are growing)
- ❖ pH reader
- ❖ Rockwool or Rapid Rooter (for seeds to start in)
- ❖ Seed starter tray
- ❖ Variety of seeds (mostly greens depending on system)



- ❖ Fish tank Algae cleaner
- ❖ Electrical Tape (to cover holes you are not planting in)

**Tip:** We mostly grow greens like lettuce, spinach and kale. In the grow tower I use in my classroom, the holes are drilled every 3 inches and it is best to plant every one if doing herbs. For larger greens, plant 6-10 inches apart, be sure to cover any openings so the light can not touch the nutrient filled water. If you do not cover them you will get an algae bloom and it will be very difficult to clean the system.

**Nutrients:** I have used a variety of nutrients from these two companies, Greenway Biotech and General Hydroponics and have been satisfied with the results. Be sure if you are growing a flowering fruit to get a “bloom” mix for that part of the life cycle.

## Maintenance

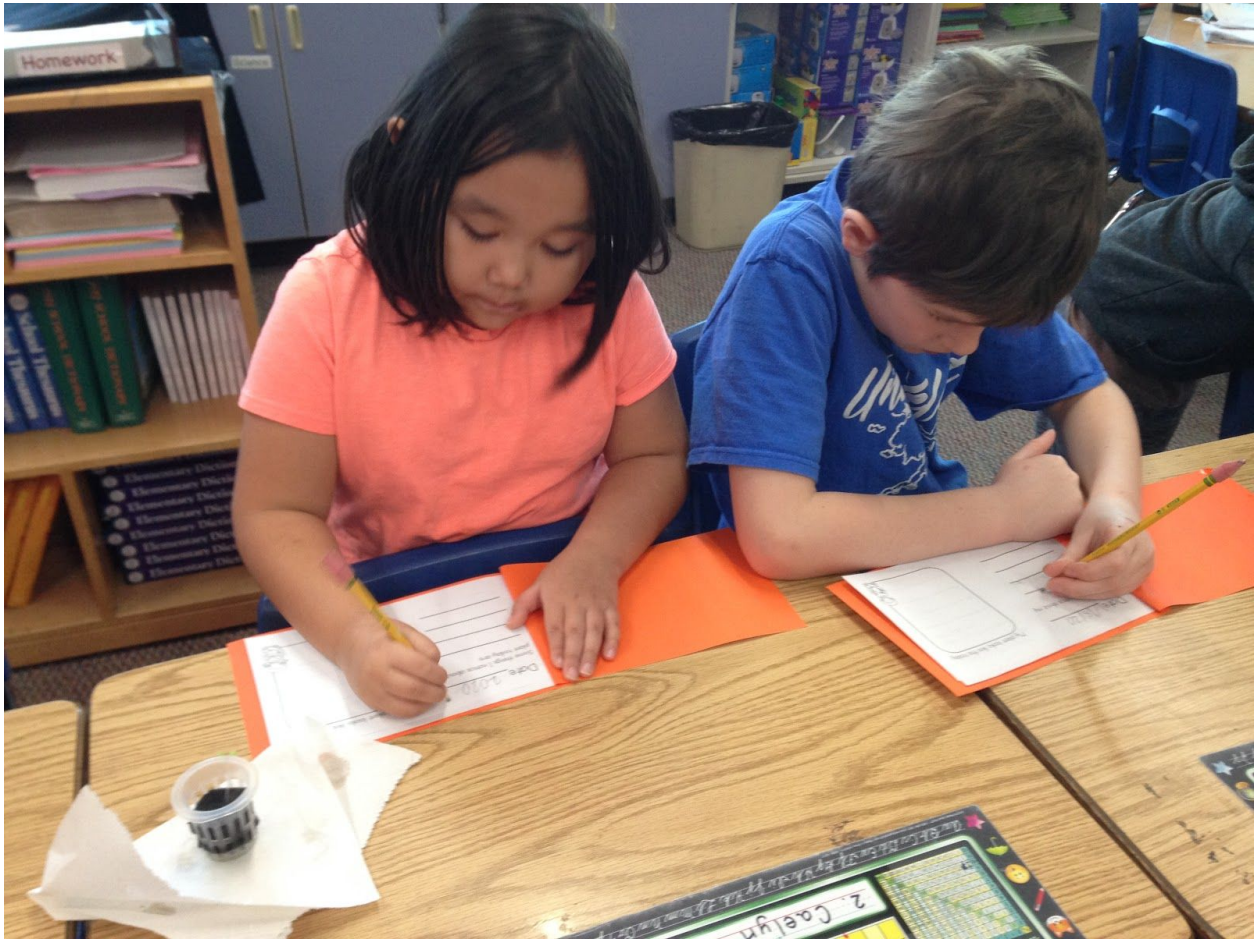
Plant seeds about 7-10 days prior to putting into your system. Some systems come with growing trays and sponges but if they do not, be sure to purchase them. Soak the sponges in regular water and then add seeds. Be sure to use water without added nutrients, the nutrients will get added once the seeds sprout.



Before planting in the system prune back the sprouts so there is one per sponge. Pick the strongest looking sprout. If you are unsure which is strongest you can leave more than one and check back in a week.

Check pH at least twice a week (5.5-6.5). The bigger your water reserve is the less you need to check it. As the plants get bigger, you want to check the pH more frequently. Every 2 to 3 weeks, empty all the water and replace it with new clean water and nutrients. Follow the directions on the nutrient packet to see how much you should be adding.





## Section 2: Lesson Plans

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- ❖ Introduction
- ❖ Tundra Day
- ❖ Where does our food come from?
- ❖ Seeds
- ❖ Plant Journaling
- ❖ Caring for plants

## Introduction

These lesson plans are meant to be used as a thematic unit that will center students in their local place and lead into hydroponics, which can be used anywhere. Grounding your students in the place they live is important to any project. This unit on hydroponics will be kicked off by Tundra Day lesson plan, which is one of the predominant ecosystems where my school is based, but it can be modified for any ecosystem, depending on where you and your students live. For example, Tundra Day could easily become Forest Day, Mountain Day, River Day, etc. This day is meant to teach students about their local ecosystem and plants (including the many edible species!). Tundra Day activities will lead into the following lesson on Where Our Foods Come From.

The next lesson on Where Our Foods Come From will continue to explore local foods that can be harvested while also learning about foods often purchased at the local store. This will give students an idea on how far food is traveling before it reaches their bellies (and the repercussions of such long travels!). This will then lead students into the following four lessons on growing our own food through hydroponics. Through growing their own food, the students will learn about the plant life cycle while providing fresh food for themselves and their community.



1. Seeds
2. Plant Journaling
3. Caring for plants
4. Harvesting

# LESSON PLAN: Tundra Day

*Lesson Plan for Grade 3, Science, Culture, Art, Physical Activity, Health*  
*Prepared by Bethany Fernstrom*

## OVERVIEW & PURPOSE

Students will explore the tundra and participate in eight different activities that help them develop a deeper understanding of one of the primary ecosystems that comprises the place where they live, the tundra.

## EDUCATION STANDARDS

1. Cultural standard E: Culturally knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them.
2. Physical Education Standard E: Exhibit personal and social behavior that respects self and others in physical activity settings.
3. Science LS1: From molecules to organisms: Structures and processes
4. Science LS2: Ecosystems: Interactions, energy, and dynamics
5. Visual Art: Anchor Standard #1 - Generate and conceptualize artistic ideas and work
6. Health and Safety: Identify a wide variety of Alaska Native foods and be able to classify into the four food groups.



## OBJECTIVES

1. Students will learn more about the ecosystems that surround their home.
2. Students will spend time exploring the natural environment and plants.



3. Students will create art projects using their natural environment.
4. Students will learn about native plants and how they can be used in everyday life.

## MATERIALS NEEDED

1. Six to eight adults to lead activities
2. Different items depending on activities (e.g. paint chips, magnifying glasses, name tags with group names, plant cards, soil trays)



## ACTIVITY

*Eight activities rotated every 20 minutes (this example includes eight, but there are so many more - be creative and pick topics you are interested in)*

Activity 1: Lichen soil builder investigation (found in this document, which includes many other activities: <https://www.adfg.alaska.gov/static/education/educators/curricula/>

[alaskawildlifecurriculum/pdfs/alaskas\\_tundra\\_wildlife\\_curriculum.pdf](https://www.adfg.alaska.gov/static/education/educators/curricula/alaskawildlifecurriculum/pdfs/alaskas_tundra_wildlife_curriculum.pdf))

Activity 2: Life in tundra soil. Given a sample of tundra soil, students will estimate and measure the invertebrate organisms in it. Use trays and magnifying glasses to take a closer look at tundra invertebrates.

Activity 3: Share *Leave No Trace* principles with students. Use hand gestures for all seven principles (hand gestures demonstrated here:

<https://www.youtube.com/watch?v=4pp4aqwE0pQ>) 1. Know before you go 2. Choose the right path 3. Trash your trash 4. Leave what you find 5. Be careful with fire 6. Respect wildlife 7. Be kind to other visitors. Label a small beach ball with all seven principles, stand group in a large circle and pass the ball around and think of examples for each principle their thumbs land on.

Activity 4: Color Search. Need a variety of colored paint chips. Students search the tundra to find matching colors and create a color museum.

Activity 5: Predator/Prey tag. Choose three tundra animals to have students play. Example of similar game in Alaska Tundra Wildlife Curriculum.

Activity 6: Plant identification. Bilingual teacher shares several photos of native plants and tells what they can be used for. Pairs of students take a plant card and search the tundra to try and find the plants.

Activity 6: Scientific Plant drawings. Each student has a clipboard, paper and pencil; students sit in a circle and find a plant to draw. 5-7 minutes to draw and then switches places with someone in the circle and other students tries to find what they were drawing and continues to work on drawing. Rotate a few more times until the station is over.

Activity 7: Migration Game. Discuss why and where caribou migrate. Play a game similar to the Alaska Tundra Wildlife Curriculum.



Activity 8: Mystery Collection. Use egg cartons and label with two words that are opposites (e.g. soft/hard, curly/straight, smooth/rough). Have pairs of students (one older, one younger) search the tundra for small examples into their egg carton. Students can search for 7-10 minutes and they gather in a circle. Have each pair share their collection and see if other students can guess what features they were collecting.

## REFLECTION

*When back in the classroom each teacher brainstorms on board the concepts students learned. Each student gets a sheet of paper (top half blank/bottom half lined) Students draw a photo of their favorite activity and write 3 sentences to describe what they learned.*

## Example schedule for Tundra Day

**Date:** August 29th (make-up weather September 6th)

**Time:** 10:00am - 2:00pm

**Place:** First Hill

### Teacher Centers

Treca-Mystery Collection

Jamie- Lichen

Mori- Color Search

Bethany- Leave No Trace

Karen- Migration Game

Heather- Predator/Prey Tag

### Schedule

**9:30** Begin transporting students

**9:50** Group assignments (14-15 students per group, one paraprofessional, one chaperone)

Group 1: Snowshoe Hare

Group 2: Caribou

Group 3: Ptarmigan

Group 4: Arctic Fox

Group 5: Musk Ox

Group 6: Grizzly Bear

**10:05** Center Rotations (3-4 centers ~20 minutes each)

- |            |   |
|------------|---|
| 1. Treca   | (1st: Snowshoe Hare, 2nd: Grizzly Bear, 3rd: Musk Ox) |
| 2. Jamie   | (1st: Caribou, 2nd: Snowshoe Hare, 3rd: Grizzly Bear) |
| 3. Mori    | (1st: Ptarmigan, 2nd: Caribou, 3rd: Snowshoe Hare)    |
| 4. Bethany | (1st: Arctic Fox, 2nd: Ptarmigan, 3rd: Caribou)       |
| 5. Karen   | (1st: Musk Ox, 2nd: Arctic Fox, 3rd: Ptarmigan)       |
| 6. Heather | (1st: Grizzly Bear, 2nd: Musk Ox, 3rd: Arctic Fox)    |

**~ 11:30** Lunch and Berry Picking

**12:30** Organize groups together again and assign teacher (~10 minutes)

Center Rotations (3-4 centers ~20 minutes each)

- |             |   |
|-------------|---|
| 7. Treca    | (1st: Arctic Fox, 2nd: Ptarmigan, 3rd: Caribou)       |
| 8. Jamie    | (1st: Musk Ox, 2nd: Arctic Fox, 3rd: Ptarmigan)       |
| 9. Mori     | (1st: Grizzly Bear, 2nd: Musk Ox, 3rd: Arctic Fox)    |
| 10. Bethany | (1st: Snowshoe Hare, 2nd: Grizzly Bear, 3rd: Musk Ox) |
| 11. Karen   | (1st: Caribou, 2nd: Snowshoe Hare, 3rd: Grizzly Bear) |
| 12. Heather | (1st: Ptarmigan, 2nd: Caribou, 3rd: Snowshoe Hare)    |

**2:00** Closing activity

Transport back to School

**2:30** Class Reflection



## Example permission slip

Dear Parents and Guardians,

Your child's class is going on a field trip. Please read the information on the top, **sign** below and **return** the permission slip by **August 26th**.

Field trip information:

Grades K-5 will be using the tundra as an outdoor classroom to learn about our local ecosystem. The teachers on this field trip will be Treca Ivanoff, Jamie Katchatag, Mori Jack-Busk, Bethany Fernstrom, Karen Coffey, and Heather Dickens.

Date: Thursday, **August 29th** 10 am-2 pm (Weather make-up September 6th)

Location: First Hill

Purpose: Explore the tundra and berry picking

Bring: boots, outdoor clothing, berry buckets

Schedule: 9:30 Begin transporting students

9:50 Group split up

10:00 Center Rotations (4 centers 20 minutes each)

11:30 Lunch and Berry Picking

12:30 Center Rotations (4 centers 20 minutes each)

2:00 Transport back to School

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I give permission for \_\_\_\_\_ to attend "Tundra Day" on **August 29th** 10 am.

In case of emergency \_\_\_\_\_  
Phone number above

Please check if you...

\_\_\_\_ I would like to chaperone      \_\_\_\_ I can drive my vehicle

Parent/Guardian Name

Print \_\_\_\_\_

Sign \_\_\_\_\_

# LESSON PLAN: Where does our food come from?

*Lesson Plan for Grade 3, Writing, Reading, Culture, Geography*  
*Prepared by Bethany Fernstrom*

## OVERVIEW & PURPOSE

Students will explore local foods and food that come from other places to discover where the food they are eating comes from.

## EDUCATION STANDARDS

1. Geography A: A student should be able to make and use maps, globes, and graphs to gather, analyze, and report spatial (geographic) information
2. Geography B: A student should understand and be able to interpret spatial (geographic) characteristics of human systems, including migration, movement, interactions of cultures, economic activities, settlement patterns, and political units in the state, nation, and world.
3. Culture E: Culturally-knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them.
4. English Informational Text 3. Describe the relationship or connection among a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
5. Writing 2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly



## OBJECTIVES

1. Students will identify where the food we eat

comes from.

2. Students will create a map and label where the food we eat comes from.
3. Students will identify food that we eat that is sourced locally and think about possible food that we can grow in our own community.

## MATERIALS NEEDED

1. Where foods are found in Alaska... Map
2. Food Labels
3. Blank world Map

## ACTIVITY

*Three activities over a one week period*

Activity 1: Brainstorm local foods and look at attached map (about 20-30 minutes)



Activity 2: Learning Journey to local store. Each student finds 3 items in the store and writes down where it is from. (20-30 minutes)

Activity 3: Share and make a class list of items found and places they are from. Look at a map and discuss. Where is most of our food from? Write one paragraph about where your food comes from.

## VERIFICATION

*Steps to check for student understanding*

1. Each student actively participating during brainstorm session
2. During Activity 3 collect the writing and follow the one point rubric to assess.





Map found: [www.anthc.org](http://www.anthc.org) (Traditional Food Guide Activity Book)



# LESSON PLAN: Seeds

*Lesson Plan for Grade 3 Reading and Science*

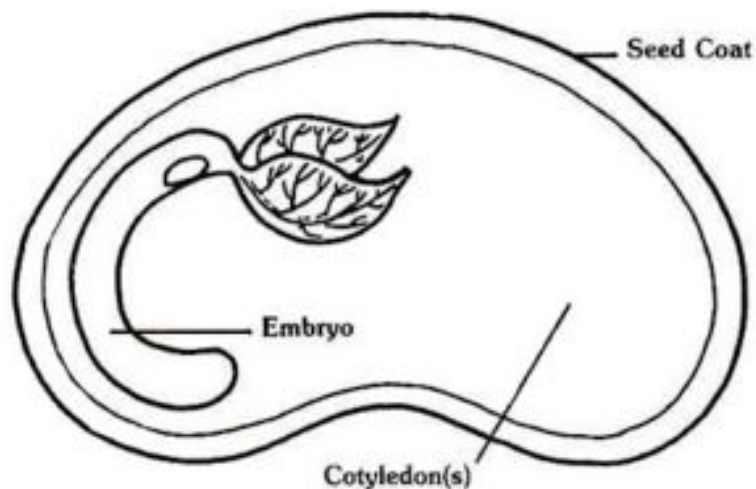
*Lesson Adapted from Alaska Indoor Gardening Curriculum*

## OVERVIEW & PURPOSE

Students will explore seeds and learn more about basic parts of seeds. They will also plant seeds for later observation in plant journaling.

## EDUCATION STANDARDS

**Alaska State Science Standards:** 3-LS4-4, 4-LS1-1, 5-LS1-1, 5-LS2-1

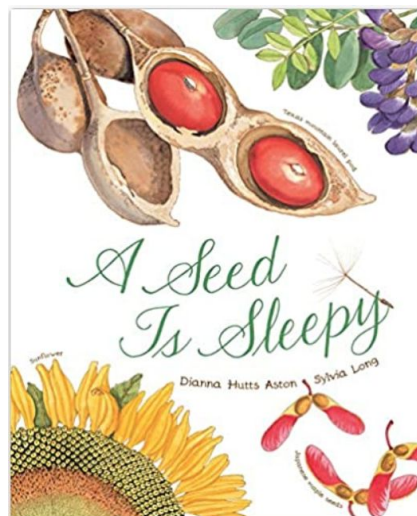


## OBJECTIVES

1. Students will learn the basic parts of seeds and what they need to grow into a plant.
2. Students will be able to identify the process of growth and development from a seed to a plant.
3. Students will discover what's inside a seed, to predict how seeds will change after sprouting, and to observe the sprouting (germination) process.

## MATERIALS NEEDED

1. Book (A Seed is Sleepy by Dianna Aston)
2. Variety of Seeds (100)
3. 20 Sponges/Rockwool
4. Diagram of seed
5. 20 Plastic Zipper bags
6. Hand magnifying glasses



## ACTIVITY

1. Read **A Seed is Sleepy** by Dianna Aston

2. Introduction

- Tell students that today they will be learning how seeds grow and develop into plants with the help of soil, water, sunshine, and carbon dioxide.
- Inform students that all plants start off as a seed and that all seeds have life in them, and they need energy and food to form a plant.
- Inform the students that a seed will not grow if they hold it on their hands or place it on the table.

3. Discuss how germination works. Write the word germination on the board.

Germination

Germinate is a big word. Does anyone know what that means? Germination refers to the process of a seed growing into a plant. A seed is like a suitcase for the plant. It has everything it needs in order to begin to grow into the plant.

For germination to begin, the environment must be right.

The seed needs an adequate amount of:

- Water
- Oxygen
- Suitable temperature/heat

The first step in germination is for water to enter the seed coat, causing the seed to swell. The embryo inside the seed swells to the point of breaking the seed coat. Next the embryo uses the oxygen in the soil and the food store in the seed to



begin the growth process. The first part of the plant to grow is the roots. The next part to grow is the stem. It pushes its way up towards the light. The shoot sprouts with the first leaves called the cotyledons, which can begin the process of photosynthesis (making its own food). Once the stem sprouts into the light, the plant becomes a seedling. The plant is a seedling until it is independent of the food stored in the seed.

4. Plants a variety of seeds in sponges and in a plastic ziplock bag with a wet paper towel.

5. About a week later, take the seeds from the bag and look at how the coating is coming off and a sprout is forming. Look at several different kinds of seeds with hand magnifying glasses. (seed examples: Lettuce, beans, sunflower, spinach)

6. Students discuss what they see and then do a full class list of all the parts they noticed in the seeds and how they are similar or alike.

# LESSON PLAN: Plant Journaling

*Lesson Plan for Grade 3, Writing, Math and Science*

*Prepared by Bethany Fernstrom*

## OVERVIEW & PURPOSE

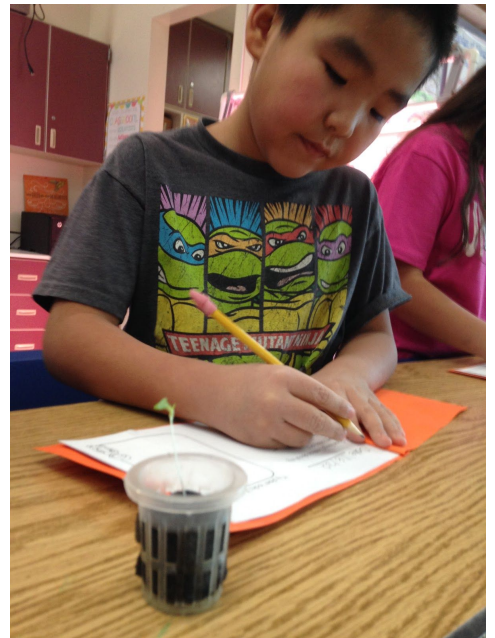
Students will keep a detailed journal of their plants as they grow from seeds to sprouts to full edible plants. The purpose is to allow students to closely observe the life cycle of a plant and to compare how the plant changes over time.

## EDUCATION STANDARDS

1. 3.MD.3. Select an appropriate unit of English, metric, or non-standard measurement to estimate the length, time, weight, or temperature (L).
2. 3-LS1-1: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
3. Range of Writing: 10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

## OBJECTIVES

1. Record observations and data about growing plants through drawings, words, and measurements.
2. Make predictions about how a seed or plant may change over time.
3. Identify and describe characteristics of seeds and plants, noting features such as color, size and shape based on observation.



4. Begin to learn about the functions of different parts of a plant.
5. Identify some of the things a plant needs in order to grow: water, light, and time.
6. Compare measurements, past and present, and note how the height of a plant changes over time.

## MATERIALS NEEDED

1. Somewhere to grow plants (pots or hydroponic grow system)
2. Plant Journals (see attached, I made eight pages, cover and back)
3. Seeds (we used two different types of lettuce)
4. Plant nutrients or soil

## ACTIVITY

*About 1-2 times a week have students observe and write in journal*

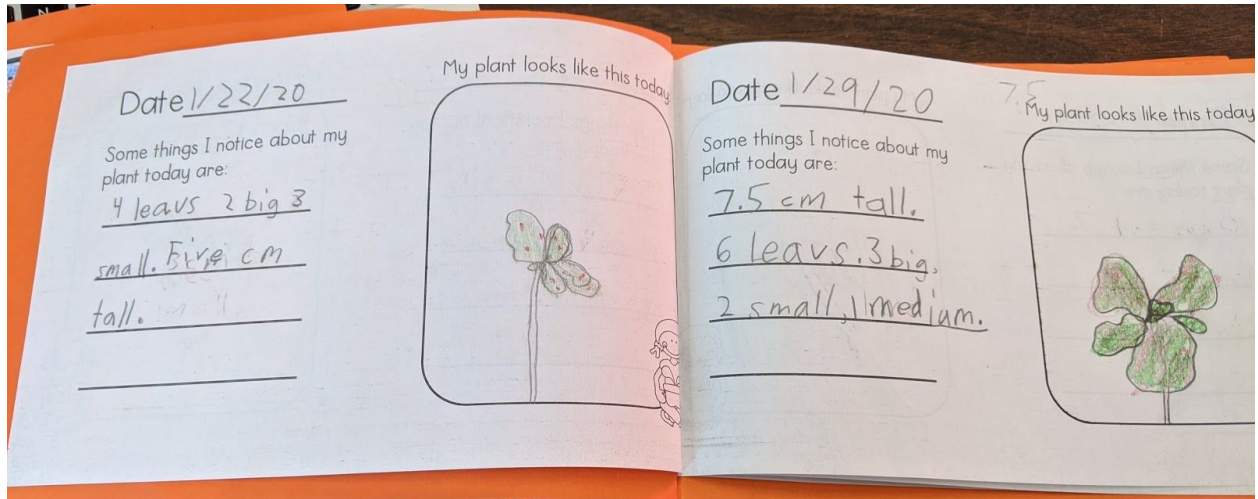
Entry 1: Plant the seeds, have students draw the seeds on the first page of their plant journal. Also have students decorate cover and color. There is enough space for students to write 1-2 sentences about planting the seed and describing the process.

Entry 2-7: Measure plant, describe the amount of leaves and anything

else they notice. Draw the plant and color as accurately as possible.

Entry 8: Harvest. Have students pick one leaf and draw it very detailed. Count total leaves and measure the longest leaf to write in a journal.

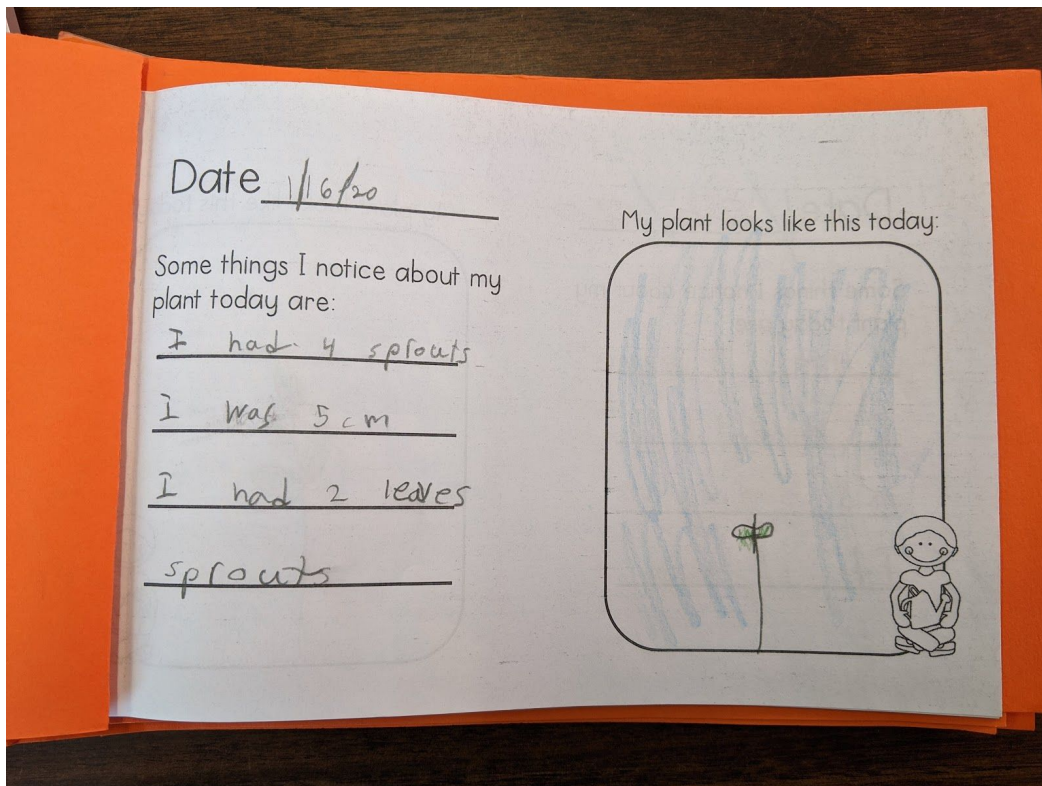




## VERIFICATION

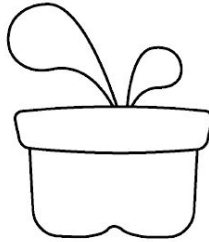
### Steps to check for student understanding

1. Each day rotate around and be sure all students are including all the information.
2. Collect journals at the end and check for full completion.
3. A few days after harvesting, ask students to write a paragraph about what they observed happening to their plant over time.





# My Plant Journal



By

Some things I notice about my plant today are:

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A large blank rectangular area with rounded corners, intended for drawing. A small cartoon character is sitting in the bottom right corner.



<https://www.teacherspayteachers.com/Store/Michaela-Peterson-We-Heart-Edu>

# LESSON PLAN: Caring for Plants

*Lesson Plan for Grade 3 Reading, Math, Science*

*Lesson written by Bethany Fernstrom*

## OVERVIEW & PURPOSE

Students will be able to care for the hydroponic systems independently. They will test PH, add nutrients and maintain plant health and grow beautiful, healthy food.

## EDUCATION STANDARDS

**Science**

**Math**

**Reading**

## OBJECTIVES

1. Students will learn how to read a PH reader.
2. Students will be able to know how to add nutrients to water to balance PH between 5.5-6.5.
3. Students will know how to monitor plants and problem solve solutions.

## MATERIALS NEEDED

1. PH reader
2. Plant nutrients
3. Plants growing
4. Hydroponic system



## ACTIVITY

1. Teacher will teach students how to read a PH reader and what it means. 7 in neutral and water coming out of the faucet should be here. The nutrients are acidic and when added will bring the PH down. Most plants like the PH to be between 5.5-6.5 for growing healthy.
2. Once to twice a week students will monitor plant PE and add nutrients as they see fit.
3. Every month students will drain all water from systems and refill with PH balanced water.



## Section 3: Harvesting

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- ❖ Harvest food
- ❖ Clean system
- ❖ Share food with others
- ❖ Post writing project

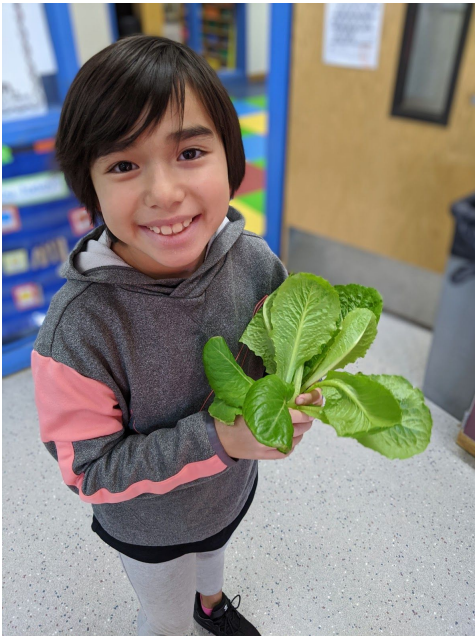


## Harvest food

**Tomatoes:** After you have hand pollinated all the flowers you should expect to see fruit forming within a week. Depending on the variety of your tomato expect full maturity of fruit between 60-80 days after seed sprouted. Check for the color of the tomato to know when it is ready to harvest. Snap off or clip tomato right above fruit.

**Cucumbers:** After you have hand pollinated all the flowers you should expect to see fruit forming within a week. Depending on the variety of your cucumber expect full maturity of fruit between 50-70 days after seed sprouted. Check for the color of the tomato to know when it is ready to harvest. Snap off or clip tomato right above fruit.

**Lettuce:** The outer leaves of lettuce can be harvested for up to a month once they reach maturity. After a month, cut the whole head of lettuce.



## Clean System

1. Empty all water from the system.
2. Use a sponge to scrub any visible algae from the system.
3. Run new clean water with fish tank cleaner through the system for 1-2 days.
4. Empty all water.

## Sharing food with others

Once food is harvested find people who want to share it with you. My class will be sharing school wide during lunch as a school wide salad bar. If you grow more than the school can eat, reach out to the local community and see if anyone will take some produce. Also think about sending extra amounts to help maintain systems; seeds, nutrients, and sponges.



## Post Writing Activity

Ask each student to write 1-3 paragraphs on their perspective of having a school hydroponic garden.



### Some suggested prompts:

1. What are the advantages of having a school wide hydroponic garden?
2. What are the disadvantages of having a school wide hydroponic garden?
3. What is your favorite part of having a school wide hydroponic garden?
4. Do you think this garden helps other people? If yes, how?





## Section 3:

# Other Resources

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- ❖ Websites
- ❖ Articles
- ❖ Exemplars

## Websites

<https://www.fairbankssoilwater.org/akaitcindoorgardening.htm>

- Indoor Gardening Curriculum
- Educator Workshop
- Standards Correlation
- Introduction to Curriculum
- Soil Growing Systems
- Soil and Nutrients
- Plant Growth and Plant Processes
- Hydroponic Growing Systems
- Aquaponic Grow Systems
- Composting and Food Waste

<http://www.simplyhydro.com/system/>

### Hydroponic Systems

- Wick
- Water Culture
- Ebb and Flow (Flood and Drain)
- Drip (Recovery or non-recovery)
- N.F.T (Nutrient Film Technique)
- Aeroponic



## Articles

Lettuce Tower in Every Classroom

<https://www.adn.com/alaska-news/education/2017/07/10/alaskan-wants-to-put-this-lettuce-tower-in-every-elementary-school-in-america/>

Hydroponic School Gardens can Cultivate Food Justice

<https://www.npr.org/sections/thesalt/2019/07/07/737789983/how-hydroponic-school-gardens-can-cultivate-food-justice-year-round>

## Exemplars

<https://www.smartcitiesdive.com/ex/sustainablecitiescollective/10-high-school-hydroponics-and-aquaponics-programs-bring-sustainable-ag-classroom/1063296/>

This website discusses 10 high schools that have used hydroponic and aquaponic programs to bring sustainable agriculture to the classroom. Most are urban schools that produce a variety of vegetables to help feed people within their school and community.

<https://www.ktoo.org/2017/12/12/prince-wales-island-schools-started-growing-food-now-first-graders-binging-broccoli/>

Wales Island Schools have a program which includes hydroponic and aquaponics to grow food for their school. The students are involved with every aspect of their school garden from seeding the plants to taking care of them and finally harvesting them to eat. They have found that more students are eating vegetables because they are taking part in creating this food.



# Conclusion

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- ❖ Reflection
  - ❖ Contact information

## Reflection

Hydroponics is a great way to engage students and I recommend giving it a try. My students have found it fascinating to have food growing in our classroom and they love to watch it grow and eat what we have grown. If you live in a cold windy place like I do this is the best option to get fresh food to your school. I can not encourage you more to give it a try. Hopefully this guide will help make it a bit easier but it is hard at first but you will quickly learn. I spent over a year of practicing and researching before I felt confident in growing hydroponically. Stick with it and you will see amazing results!

## Contact Information

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