

Next Generation Science Standards (NGSS) Guide for Growing Healthy Habits

Eight practices of science and engineering essential for NGSS

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Before NGSS	With NGSS
Educator will ask questions with only one correct answer	Educator will ask open-ended questions that require students to use critical thinking to engage classroom discussions
Educators will explain an idea to the class	Educator will pose a problem and students will plan and carry out investigations identify patterns, relationships, changes, and cause and effect in order to support arguments
Pre-planned outcomes or “cookbook” for hands-on activities or experiments	Educator will engage students in a class discussion to raise questions and generate possible outcomes. Students will explore these ideas to collectively lead to a deeper understanding of established core scientific data
Memorization of terms and facts	Students learn terms and facts as they conduct deeper investigation to develop explanations and solutions supported by evidence-based information
Students read text and answer questions	Students read multiple texts (scientific magazines, web pages, reference books, etc.) about a topic and develop their own summaries and theories based on the information
Activities are oversimplified for students	Students are engaged in sophisticated investigations to analyze and interpret data
Concepts are taught through lecture-style teaching, with minimal visual or physical context	Students are taught through systems thinking and modeling to explain concepts and to give context
Students are asked to complete worksheets	Students will write in journals, reports, create posters, and develop media presentations that explain and argue concepts
Educators will prepare demonstrations prior to lessons	Students will work in groups to conduct investigations and hands-on learning activities

Next Generation Science Standards Notes

- Next Generations Science Standards are broken into 3 parts: Content Standards, Practice Standards, and Big Concepts
- There is a progression across grades.
- Students learn to use both knowledge and practice to achieve answers.
- There are 7 crosscutting core concepts that are used to help students to better understand core ideas in science and engineering: 1) patterns, 2) cause and effect, 3) scale, proportion, and quantity, 4) systems and system models, 5) energy and matter, 6) structure and function, and 7) stability and change.

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Applying NGSS with Growing Healthy Habits

GHH	Adapting GHH to NGSS	GHH Lessons to use As Is
General Recommendations	<ul style="list-style-type: none"> • Instead of explaining an idea or concept, ask an open-ended question to engage students in a discussion, in which they will explore what they already know. • When learning about a new fruit or vegetable, have students explore it with their senses prior to tasting and record their responses in their journal. • Engage students in hands-on gardening experiments and gardens as much as possible! • Encourage using the Journal assignments with each unit and challenge students to record notes about what they have learned in each unit. 	<ul style="list-style-type: none"> • Activities that involve creating a model or real-life demonstration • Activities that involve a deeper exploration of an idea, concept, or system to better understand and share findings • Growing experiments that are student-led
Unit 1- What's So Great About Gardening		
	Adapting GHH to NGSS	GHH Lessons to use As Is
1: Understanding My Plate	<ul style="list-style-type: none"> • Instead of reading the written prompts, have students come up with examples of their own for barriers to eating fruits and vegetables. • Have students write down the foods that they have consumed in the past 24 hours and circle any foods that are “sometimes” foods. 	<ul style="list-style-type: none"> • Students will work in teams to sort through magazines, newspapers, and grocery ads to find “all the time” and “sometimes” foods. They will cut these out and use what they know about healthy eating to sort them into 2 groups and explain their choices.
2: Not All Vegetables are Created Equal		<ul style="list-style-type: none"> • The Multi-Sensory Taste Test aligns well with NGSS.
3: Food Systems Sequencing	<ul style="list-style-type: none"> • Have students engage in further investigation to determine the nutrition facts of both corn on the cob and Corn Pops, the distance to a local farm, farmers’ market, a grocery store, and a Kellogg factory. Ask them to map out each step. 	<ul style="list-style-type: none"> • This lesson aligns well with NGSS.

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Unit 2 – Parts of the Plant that We Eat		
1: Plant Diagrams	<ul style="list-style-type: none"> • Instead of passing out the handout, present students with a carrot, celery stalk, spinach leaves, broccoli, tomato, and peas. Ask them to write down in their journal which part of the plant each vegetable comes from. • Assign groups to research each plant part and share what they learn about their function and demonstrate the benefits of eating each plant part. 	
2: Parts of the Plant Salad		<ul style="list-style-type: none"> • Make sure each student has the opportunity to participate in preparing the recipe. Be sure to have a small group of students prepare the salad dressing recipe!
3: Parts of the Plant Relay Race		<ul style="list-style-type: none"> • The relay race provides models and context for learning.
Unit 3 – Feed the Soil...and the Soil Will Feed You		
1: What is Soil Made of?	<ul style="list-style-type: none"> • Instead of taking samples of soil prior to the lesson, take students outside and have them dig up the samples of soil. • Prior to adding the soil to the jar, have them pour out the samples onto a tarp or newspaper and write down everything they find in each sample. • Have students draw a picture of the soil jars and label each layer and the items they identify in each sample/jar. 	
2: How Do Different Soils Affect Our Planets?	<ul style="list-style-type: none"> • Have students set up their experiment planting seeds in different samples of soil. 	<ul style="list-style-type: none"> • This lesson is a nice example of planning and using investigation, as well as analyzing interpreting results.
3: Soil Salad	<ul style="list-style-type: none"> • Add the layers of this salad to a clear bowl with a lid to demonstrate each layer, then place the lid on top and shake it up, to model how soil is mixed up. • 	<ul style="list-style-type: none"> • This lesson is also a nice example of modeling.

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Unit 4: Variety: The Spice of Life		
1: Eat Your Colors	<ul style="list-style-type: none"> Students that are not participating in the preparation of the recipe could investigate the recipe further and research the nutritional benefits of each ingredient in the recipe and share what they learn. 	<ul style="list-style-type: none"> The “Take Your Pick” game and tasting are both good examples of providing context for learning.
2: Garden Survivor	<ul style="list-style-type: none"> Plant a Garden in a Glove with students, with a different kind of seed in each finger and have them track their garden’s progress and findings in their journal. 	<ul style="list-style-type: none"> This lesson engages students to share their knowledge about a healthy diet. In the “Garden Survivor” game, students will use what they know to predict how their garden will turn out and interpret the results at the end of each “season”.
3: Who’s Who in the Garden?	<ul style="list-style-type: none"> Ask students to research different jobs related to food production... from farming to manufacturing... to grocers and share their findings. 	<ul style="list-style-type: none"> This can be an optional lesson.
Unit 5: Plan Your Planting		
1: Gimme Some Space!		<ul style="list-style-type: none"> The spacing experiment is a great experiment to help students learn the importance of space to grow. When the seedlings are 2-4 inches tall, have them harvest the seedlings by cutting off the leaves to taste (and explore with their senses prior to tasting).
2: What’s on the Menu?	<ul style="list-style-type: none"> To take this a step further, let students plan and plant an actual garden. (Any kind of garden will do!) 	<ul style="list-style-type: none"> This is a good exploratory lesson.
3: Garden on a Plate		<ul style="list-style-type: none"> This is a great modeling lesson.
Unit 6: Seed Magic		
1: Seed Dissection		<ul style="list-style-type: none"> This lesson engages students in a discussion to allow them to explore what they already know. This is a great investigative lesson.

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2: Energy Stored in Seeds		<ul style="list-style-type: none"> This lessons demonstrates cause and effect.
3: After Germination: Photosynthesis	<ul style="list-style-type: none"> Challenge students to brainstorm other ways that they could investigate the system of photosynthesis. 	<ul style="list-style-type: none"> Students will review the results of the light vs. dark experiment and interpret the results.
Unit 7: Keep it Growing		
1: Water, Water, Everywhere!	<ul style="list-style-type: none"> Plant Lettuce Cup Terrariums with students and have them observe the gardens and record their findings 	
2: To Weed or Not to Weed	<ul style="list-style-type: none"> Have students go outside to their school garden or visit any other gardens on the campus to pull a few weeds to observe. Have them look at the size and depth of the roots, how the weeds grow, and ask them to explain why they think it is important to keep weeds out of the garden. 	
3: Put a Lid on it!		<ul style="list-style-type: none"> Lesson is acceptable as is, but an experiment with a real plant or garden would be more beneficial.
Unit 8: Healthy Harvest		
1: Garden Inputs and Outputs		<ul style="list-style-type: none"> This lesson uses math and computational thinking.
2: What's it Worth?		<ul style="list-style-type: none"> This lesson uses math and computational thinking.
3: Does Money Grow on Plants?	<ul style="list-style-type: none"> If there is not enough to harvest from the garden, compute the cost of starting the garden (seeds, soil, container, etc.) and if ingredients were purchased, compute the cost and compare. 	
Unit 9: Garden Fitness		
1: Almond Energy Burn		<ul style="list-style-type: none"> This lesson is well-suited for NGSS, using concepts relating to cause and effect, energy and matter, as well as stability and change.
2: Energy in Food: Quality vs. Quantity		<ul style="list-style-type: none"> This lesson is well-suited for NGSS, using concepts related to patterns, cause and effect, energy and matter.

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3: Frozen Energy (optional)	<ul style="list-style-type: none">• This lesson is optional. If growing dill and any other vegetables, such as radishes or spinach, this is a great recipe to prepare in class to provide students the experience of harvesting and using what they grow.	
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