

Michigan State University Extension

Tollgate Farm and Education Center

SPRING INTO FARMING: THE NUTRIENT TRAIL

Big Idea:

Students will follow the nutrient trail around the farm to discover how the creatures and plants on the farm are connected. They will question, hypothesize, analyze data, conclude and question again as they close the nutrient loop from producers to consumers to decomposers.

Big Question:

- How are all the creatures and plants on the farm connected?

Michigan NGSS Performance Expectations:

K-LS1-1	Use observations to describe patterns of what plants and animals (including humans) need to survive.
K-PS3	Make observations to determine the effect of sunlight on Earth's surfaces.
1-LS3-1	Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
2-LS2-2	Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
5-LS1-1	Support an argument that plants get the materials they need for growth chiefly from air and water.
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-LS3-1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organism.
4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
5-LS2-1	Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Common Core ELA and Math Standards:

ELA-LITERACY.SL.K.1a-b	Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups. a. Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion). b. Continue a conversation through multiple exchanges.
ELA-LITERACY.SL.K.2	Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.

ELA-LITERACY.SL .K.3	Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
ELA-LITERACY.RI .1.6	Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.
ELA-LITERACY.SL .1.1a-c	Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. <ul style="list-style-type: none"> a. Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others' talk in conversations by responding to the comments of others through multiple exchanges. c. Ask questions to clear up any confusion about the topics and texts under discussion.
ELA-LITERACY.SL .1.3	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
ELA-LITERACY.SL .2.1a-c	Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups. <ul style="list-style-type: none"> a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others' talk in conversations by linking their comments to the remarks of others. c. Ask for clarification and further explanation as needed about the topics and texts under discussion.
ELA-LITERACY.SL .2.3	Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
ELA-LITERACY.SL .3.1a-d	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher- led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others. d. Explain their own ideas and understanding in light of the discussion.
ELA-LITERACY.SL .3.3	Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
ELA-LITERACY.SL .4.1a-d	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher- led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions and carry out assigned roles. c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others. d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
ELA-LITERACY.SL .5.1a-d	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher- led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions and carry out assigned roles. c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others. d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

Math.Content.K .CC.4-5	<p>Count to tell the number of objects.</p> <p>4. Understand the relationship between numbers and quantities; connect counting to cardinality.</p> <ol style="list-style-type: none"> When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. Understand that each successive number name refers to a quantity that is one larger. <p>5. Count to answer “how many?” questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.</p>
Math.Content.K .MD.1-2	<p>Describe and compare measurable attributes.</p> <ol style="list-style-type: none"> Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.
Math.Content.1 .MD.1	<p>Measure lengths indirectly and by iterating length units.</p> <ul style="list-style-type: none"> Order three objects by length; compare the lengths of two objects indirectly by using a third object.
Math.Content.1 .MD.4	<p>Represent and interpret data.</p> <ul style="list-style-type: none"> Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
Math.Content.1 .OA.5-6	<p>Add and subtract within 20. Work with addition and subtraction equations.</p> <ul style="list-style-type: none"> Relate counting to addition and subtraction (e.g., by counting on 2 to add 2). Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$).
Math.Content.2 .OA.2	<p>Add and subtract within 20.</p> <ul style="list-style-type: none"> Fluently add and subtract within 20 using mental strategies.2 By end of Grade 2, know from memory all sums of two one-digit numbers.
Math.Content.2 .MD.1-4	<p>Measure and estimate lengths in standard units.</p> <ol style="list-style-type: none"> Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen. Estimate lengths using units of inches, feet, centimeters, and meters. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
Math.Content.2 .MD.10	<p>Represent and interpret data.</p> <p>10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems⁴ using information presented in a bar graph.</p>
Math.Content.3 .MD.4	<p>Represent and interpret data.</p> <p>4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.</p>
Math.Content.4 .MD.1	<p>Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</p> <ol style="list-style-type: none"> Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express

	<p>measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two- column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...</p>
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Content Outcomes:

- Discover the nutrient trail around the farm to close the nutrient loop from producers to consumers to decomposers.

Assessment:

Revisit the big question at the end of the program and discuss, in pairs, small groups, or as a large group. What new understandings have students gained?

Program Introduction

Welcome to Spring Into Farming! We’ll be going on an adventure today to solve a mystery and we need your help. How are all our farm creatures and the plants on the farm connected? What do you think you will see today on the farm? What job do each of the living organisms serve?

Tollgate would like to acknowledge that the land we are meeting on today is the original homelands of the Anishinaabe tribal nations. We owe a debt of gratitude to the people who first lived on this land. We honor and respect the many diverse indigenous peoples still connected to this land on which we gather.

Possible Rotations:

- Vermicomposting and Greenhouse *Greenhouse*
- Garden Time *Edu Garden*
- Goats and Milking *Animal Barn*
- Pond Study *Pond*
- Chickens & Embryology *Chicken Tractor and Lower Barn Yard*
- Wagon Ride with Vermicomposting

Teacher Resources:

Background Information:

- [First Peas to the Table Project](#)
- [Vermicomposting](#)
- [University of Illinois Extension “The Adventures of Herman”](#)
- [University of Illinois Extension “The Great Plant Escape”](#)

Children’s Literature:

- [First Peas to the Table](#) by Susan Grigsby
- [From Seed to Plant](#) by Gail Gibbons
- [A Seed is Sleepy](#) by Diana Ashton
- [Lettuce Grows on the Ground](#) by Mari C. Schuh
- [Yucky Worms](#) by Vivien French
- [Winnie Finn Worm Farmer](#) by Carol Brender
- [An Earthworm's Life](#) by John Himmelman
- [Compost Stew: An A to Z Recipe for the Earth](#) by Mary McKenna Siddals
- [Chickens Aren't the Only Ones](#) by Ruth Heller
- [Chicks & Chickens](#) by Gail Gibbons

References:

- Garden Time is adapted from [First Peas to the Table](#) by Susan Grigsby

CURIOSITY PHOTOS

Following are photographs and questions intended to inspire curiosity and wonder throughout the days leading up to your Tollgate visit.









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