**Trellising, Roots, or Herbs:
A Colonial Gardening Adventure**

**Winter Module
Garlic, Rosemary, Beans**

**4th Grade**

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**Driving Question(s)**

Which plants will be the most successful in a classroom earthbox (trellising, herb, and root)

 Given specific crops, which will grow best in the winter months?

 How did settlers garden during winter months?

**Overview**

During this module, students will be learning about winter gardening. Students will plant garlic, beans, and spinach. They will learn about low tunnels, which allow crops to be planted outside during winter months and helps them to withstand colder temperatures. Students will also participate in a physical education lesson, an art lesson, and a music lesson. Students will revisit math concepts learned during the previous module, or if you are working on this as a standalone module they will visit perimeter and area for the first time.

 **Major Products & Performances**

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| Group: | Garden BlueprintCreating EarthBoxLow TunnelBaking projectGarden (indoor and outdoor)Harvesting Produce |
| Individual: | Planting SeedsMath ActivitiesJournalingMaking predictions/observationsResearchingArt ProjectPhysical Education |

**Teacher Background
About the Plant(s):**

**Garlic:** http://www.almanac.com/plant/garlic

**Rosemary:** http://www.almanac.com/plant/rosemary

**Beans:** http://www.burpee.com/vegetables/beans/growing-beans-pole-or-bush-article10325.html

Winter Wonderland

Part One:

Your garden is growing, and they are calling you a horticulture expert…whatever that means.  However, the weather is starting to get even cooler, and Old Man Winter will be here to visit before you know it.

Unfortunately, the plants that you have growing now aren’t going to make it through the harsh winter months, so it’s time to revisit your seed inventory.  You know that you will need something that is hearty enough to grow in the winter.  This is your first year here, so you aren’t exactly sure what you are in for when it comes to winter weather, but coming from Missouri, you are ready for anything!

Part Two:

You have several bean seeds.  You think you remember your Great Aunt Bertha telling you that these little things were stronger than they looked, so you are going to give them a shot.  You also have a bulb of garlic left over from the stew that your wagon company made last week.  Your wagon company also has kale, watermelon, and tomato seeds that could be an option for planting. It’s time to get your hands dirty again and start your winter garden, because ready or not…here comes winter.

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| **Title** | Lesson One: Winter Crops: Entry Event  |
| **Overview**  | The focus of this lesson is for the students to conduct research, (through different media) collaborate their findings, and determine the most favorable edible crop to grow in this climate.  The students will write a letter to Aunt Bertha to discuss their findings. Duration: 3 days  |
| **Standards**  | 21C.O.3-4.1.LS.1 Student identifies information needed to solve a problem or complete an assignment, conducts a search and prioritizes various sources based on credibility and relevance, retrieves relevant information from a variety of media sources, and uses this information to create an effective presentation.ELA.4.SL.C13.1 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.* 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.
* follow agreed-upon rules for discussions and carry out assigned roles.
* 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.
* review the key ideas expressed and explain their own ideas and understanding in light of the discussion

ELA.4.SL.C14.1 report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.ELA.4.R.C1.4 refer to details and examples in an informational text when explaining what the text says explicitly and when drawing inferences from the text |
| **Materials/Advance Preparation Needed** | **Materials:*** Garden Books from classroom and/or school library on edible plants and trellising/vertical gardening.
* Internet
* Seed catalogs
* Master Gardener

**Advanced Preparation**:* Stations must be created that provide a variety of research opportunities (internet, encyclopedias, resource books, guest speakers (experts)
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| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)** | **Introduction:** Provide students with the new winter scenario and tell them to read Part One with a partner.  Pose the question, “What does the seasonal change mean for your planned garden?”  Take student responses and list them on the board.  **Lesson:** Read Part Two of the scenario.  Explain to the students that they will be researching plants given and should choose trellising and root crops that will grow best in the winter.  Hold a discussion about why herb crops will not be successful in the winter.  Students will take notes in their Colonial Journals.  **Closure:**Have the students take part in a Think Pair Share to discuss their research.  |
| **Assessment (What will be the evidence of student learning?)** | The students will write a letter to Aunt Bertha about which crops that they chose and why using relevant facts and specific details.  |

Letter to Aunt Bertha

Teacher Name:

Student Name:

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| Category | 4 - Above Standards | 3 - Meets Standards | 2- Approaching Standards | 1 - Below Standards |  Score |
| Attention Grabber | The introductory paragraph has a strong hook or attention grabber that is appropriate for the audience. This could be a strong statement, a relevant quotation, statistic, or question addressed to the reader. | The introductory paragraph has a hook or attention grabber, but it is weak, rambling or inappropriate for the audience. | The author has an interesting introductory paragraph but the connection to the topic is not clear. | The introductory paragraph is not interesting AND is not relevant to the topic. |   |
| Support for Position | Includes 3 or more pieces of evidence (facts, statistics, examples, real-life experiences) that support the position statement. The writer anticipates the reader\'s concerns, biases or arguments and has provided at least 1 counter-argument. | Includes 3 or more pieces of evidence (facts, statistics, examples, real-life experiences) that support the position statement. | Includes 2 pieces of evidence (facts, statistics, examples, real-life experiences) that support the position statement. | Includes 1 or fewer pieces of evidence (facts, statistics, examples, real-life experiences). |   |
| Evidence and Examples | All of the evidence and examples are specific, relevant and explanations are given that show how each piece of evidence supports the author\'s position. | Most of the evidence and examples are specific, relevant and explanations are given that show how each piece of evidence supports the author’s position. | At least one of the pieces of evidence and examples is relevant and has an explanation that shows how that piece of evidence supports the author\'s position. | Evidence and examples are NOT relevant AND/OR are not explained. |   |
| Accuracy | All supportive facts and statistics are reported accurately. | Almost all supportive facts and statistics are reported accurately. | Most supportive facts and statistics are reported accurately. | Most supportive facts and statistics were inaccurately reported. |   |
| Closing Paragraph | The conclusion is strong and leaves the reader solidly understanding the writer\'s position. Effective restatement of the position statement begins the closing paragraph. | The conclusion is recognizable. The author\'s position is restated within the first two sentences of the closing paragraph. | The author\'s position is restated within the closing paragraph, but not near the beginning. | There is no conclusion - the paper just ends. |   |
| Capitalization and Punctuation | Author makes no errors in capitalization or punctuation, so the essay is exceptionally easy to read. | Author makes 1-2 errors in capitalization or punctuation, but the essay is still easy to read | Author makes a few errors in capitalization and/or punctuation that catch the reader\'s attention and interrupt the flow. | Author makes several errors in capitalization and/or punctuation that catch the reader\'s attention and interrupt the flow. |   |

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| **Title** | Lesson Two: Jack and the Beanstalk  |
| **Overview** | The students will use pre-reading strategies to comprehend Jack and the Beanstalk and explain the characteristics that make this story a fairy tale. |
| **Standards** | ELA.4.R.C1.2  determine a theme of a story, drama or poem from details in the literary text; summarize the text.ELA.4.R.C2.2 Explain major differences between poems, drama,and prose, and refer to the structural elements of poems (e.g., verse, rhythm, meter) and drama (e.g., casts of characters, settings, descriptions, dialogue, stage directions) when writing or speaking about a literary text. |
| **Materials/Advance Preparation Needed** | **Materials:*** Jack and the Beanstalk

**Advanced Preparation:*** Establish read aloud rules and climate for classroom
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| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)** | **Introduction:** The teacher should introduce the story “Jack and the Beanstalk” to the students and have them make predictions.  Explain that this story is a fairy tale and ask students to explain the elements of fairy tales. **Lesson:** Have an interactive read aloud of the story asking comprehension questions as you read.  **Closure:** Have students make predictions of how we could grow our own bean stalks.  What materials would we need?  Do you think that beans are trellising, herb, or root plant and why? |
| **Assessment (What will be the evidence of student learning?)** | The students will answer comprehension questions about the story “Jack and the Beanstalk” as well as fairy tales and the elements that make “Jack and the Beanstalk” a fairytale.  |

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| **Title** | Lesson 3 - Using a Low Tunnel. |
| **Overview** | Students will \*\*Teacher Note: A low tunnel is also referred to as a “hoop house.”  It works like a “cold frame” in that it provides frost protection in order to extend the outdoor growing season.  Thus, you can plant seeds (or transplant seedlings) earlier in the spring and you can continue to harvest later into the fall.  The low tunnel needs to be built by someone else in advance.  However, an important part of this lesson is to discuss with the class how to build the low tunnel, including the measurements that would need to be taken.   |
| **Standards** | Science

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| 4-PS3-2. | Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. |
| 4-PS3-4. | Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. |

**3-5-ETS1-1.** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. |
| **Materials/Advance Preparation Needed** | * Thermometers that can be placed inside and outside of the low tunnel. If affordable, obtain thermometers that also contain a gauge for measuring relative humidity
* [Images of low tunnels](http://swroc.cfans.umn.edu/prod/groups/cfans/%40pub/%40cfans/%40swroc/documents/asset/cfans_asset_330305.pdf) and  [images of cloches](http://americangardenhistory.blogspot.com/2012/03/beautiful-glass-cloche.html)
* Low tunnel (see advance preparation)

Advance Preparation:A volunteer will need to construct the low tunnel in advance. A couple of different designs can be constructed (see item 4, a-c, under procedures below).  [Sample design instructions](http://groworganic.com/organic-gardening/articles/how-to-build-a-low-tunnel-hoop-house). [Venting a sample hoop house/more design](http://www.oklahomagardening.okstate.edu/category/seg/2014-features/040514-seg-lowtunnels) |
| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)** | 1.  Pose: “What did the early American settlers do to protect their crops from freezing, so they could plant vegetables early in the spring and harvest them late into the fall (they did not have supermarkets where they could purchase lettuce in January!!)? Show [images of cloches](http://americangardenhistory.blogspot.com/2012/03/beautiful-glass-cloche.html).2. Pose “Now that we have plastic (greenhouse film) available to us, what is something simple that we could build to allow us to do the same?  3. Once students introduce the idea of a greenhouse-like structure, show and discuss [images of low tunnels](http://swroc.cfans.umn.edu/prod/groups/cfans/%40pub/%40cfans/%40swroc/documents/asset/cfans_asset_330305.pdf). Talk about ways in which the climate *inside* the low tunnel would be a little different than the climate *outside* the low tunnel.  Pose: “How could we measure and monitor these differences?” (By recording the temperature and humidity inside and outside of the low tunnel.)4. Pose:  What does the low tunnel have to do with energy? Discuss with the students that radiant energy from the sun is absorbed by the ground and some of it is *transferred* by the ground back to the air in the form of heat energy.  This is an example of energy transformation. The plastic covering along with the more humid air inside the low tunnel holds in some of that heat energy.  5. Show and discuss [Oklahoma Extension Services video](http://www.oklahomagardening.okstate.edu/category/seg/2014-features/040514-seg-lowtunnels) (4 minutes) about microclimate in low tunnel—it  illustrates simple low tunnels and how to prevent the temperature from becoming too warm.6. Have a conversation about the different designs of low tunnels for a sample garden plot, such as a 4 ft x 8 ft raised bed:a. Anchor PVC pipe into the soil (ideally inserting it over a piece of rebar that is anchored in the soil), then drape over the top the greenhouse film; weight down with sandbags or rocks the greenhouse film at the ends and on the sides to prevent wind from blowing it off. Clamps can be used instead of weights at the ends.b. Build a 4ft by 8 ft wooden frame; drill holes into the frame on both sides of the bed and insert the PVC pipe on both sides to make a hoop (make at least 3 hoops—one at each end and one in the middle; then screw the PVC pipe to the wood to prevent it from coming lose and hurting someone. Drape the plastic over the top and weight it down on the sides and the end.c. This design is a repeat of b., but the in this case actually affix the plastic to each side of the frame using furring strips; then use clamps to secure at ends. *NOTE:  For each design, thin flexible wire, fiberglass rods, or electrical conduit piping can be used instead of PVC pipe for the “row cover hoops,” but they must be anchored or secured in some way so that they do not fly loose and hurt someone. Also, instead of greenhouse film, horticultural fleece/frost blanket material may be used, but there are limitations to using it by itself in cold weather.* 7. Decide upon a type of vegetable for which you want to extend the growing season.  Good choices are lettuce, spinach, or summer (bush) squash in the spring, or most any type of greens in the fall-winter. An example follows for early planting of summer squash:a. Determine the recommended date to plant: [The Vegetable Garden Planting Schedules by Zone](http://www.thevegetablegarden.info/resources/planting-schedules/zones-5-6-planting-schedule) (for zones 5-6, May 15-30—this would be for direct seeding or for transplants) Plant seeds.b. Set a goal of trying to transplant seedlings 3 weeks earlier (e.g., late April) than the recommended date, and determine the date by which you would need to start the seedlings in the classroom (they need at least 3 weeks to grow from a seed to a seedling that has its first true leaves and is ready to transplant).c. Use a calendar to mark down and keep track of key dates, such as seed planting, transplanting, first fruit harvested, last fruit harvested. Also, on each date after transplanting to the low tunnel, record the temperature inside and outside of the low tunnel in the early morning and late afternoon.   d. Repeat as desired for other vegetables, such as a type of greens. FUTURE LESSONS/EXTENSIONS Launch the investigation(s) on the appropriate date as determined in b. A more robust investigation that pulls in more of the NGSS engineering design standards (ETS) would be for them to try at least two different designs, e.g., they could lay some horticultural fleece underneath the low tunnel directly on one-half of the seedlings, and leave the other half with no fleece.  Precaution:  If you are using greenhouse plastic (as opposed to horticultural fleece/frost blanket material)as the cover for the low tunnel, remember that once the outdoor temperatures reach about 60 degrees or so, you will need to vent it during the day time or the temperature inside will stress the plants.   |
| **Assessment (What will be the evidence of student learning?)** | Students should complete a journal entry to the query:  What is the value of a “low tunnel” and how does it work? Draw a picture to show how it works.  |

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| **Title** | Lesson 4: Area and Perimeter |
| **Overview** | Students will be using the concepts of area and perimeter in order to design a blueprint for their garden. Duration: 1 hour |
| **Standards** | M.4.MD.2  use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects and money, including problems involving simple fractions or decimals and problems that require expressing measurements given in a larger unit in terms of a smaller unit and represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (CCSS Math.4.MD.2)M.4.MD.3 apply the area and perimeter formulas for rectangles in real world and mathematical problems. (For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.) (CCSS Math.4.MD.3) |
| **Materials/Advance Preparation Needed** | Materials:* Perimeter and Area Worksheets

Advanced Preparations:* Copy enough Graph Paper Worksheets for each student
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| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)** | Introduction:Before beginning the lesson, the teacher will ask students, “What is a blueprint?”  The teacher will give students think time to formulate a response, and then as the students give their responses, the teacher will list these on the chalkboard/whiteboard.  The students will most likely connect a blueprint to a building. The teacher will then ask students why a blueprint is important in the building process.  Again, the teacher will allow the students think time before taking responses.  The teacher will then explain that a blueprint is an important part of the design process when building something.  The teacher will then ask the students, "Would it be important to plan out the design of a garden?" Give students an opportunity to answer. Explain that today, they will be doing just that.Lesson:  Ask the students what they can remember about the word perimeter?  When we are talking about perimeter, what are we measuring?  How would we find the perimeter of their desk?Distribute the Perimeter and Area sheet to students.  Ask students "What unit will you be using on this paper (meters)?  "Are these squares actually a meter long (no)?  Explain that sometimes on blueprints and maps, people use a scale to show something small representing something bigger.  In this case, each side of a square will represent 1 meter.Work on finding the perimeter of the first shape together.  After completing this as a group, students will work at their tables to complete the other shapes.  Ask students what they remember about area?  What are we measuring when we are looking for area?  What do we do in order to find the area of a shape?  How would we find the area of their desk?  How is this different from the perimeter?On the graph paper, work together to find the area of the first shape.  Be sure to clue the students in to squaring their units.  Explain that they must square their units when dealing with area because they multiply the units together.  Have students count the number of squares inside the shape to check their math.  Did their calculations match up to the number of squares? Have students work in teams to find the area of the other shapes.The teacher will now explain to students that their colonial garden will only have a certain area in which they will plant their crops.  They must create a garden blueprint that has a garden with the area of 72 square meters.  Students will work independently in order to create their own shapes.  They will double check the area by counting the number of squares inside of their shape.Once students are finished, have them work to find the perimeter of their own garden.  After they have found their perimeter, have them look at a neighbors perimeter.  Ask the following:"Does your neighbor have the same perimeter as you?"  "Do they have the same area as you?""Why do you think that the perimeters of these shapes are different, but their area is the same?"Closure:Hold a discussion about how students use perimeter and area in their own lives, in and out of the classroom.   |
| **Assessment (What will be the evidence of student learning?)** | The teacher will observe students as they complete the graphic sheet independently, and support those who need help. Students will determine the area and perimeter of shapes on a teacher generated worksheet.  |

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| **Title** | Lesson 5: Setting Up the Earthbox  |
| **Overview** | The students will set up their classroom EarthBox today.  They will make predictions about how much soil it will take to fill the EarthBox and work collaboratively to complete this task. Students will follow directions on the soil package to add the appropriate amount of soil in the EarthBox. (Read the soil package. Some soil must have water added prior to being put in the EarthBox.) Students will use the area and perimeter formula to help make predictions. Duration: 1-2 hours\*\*Teacher note: Modifications include allowing students to build the EarthBox as a class. This allows the students to see all parts of the EarthBox and make discoveries as to why each part is important. Write discoveries and questions in Colonial Garden Journal.  |
| **Standards** | M.4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit(1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.M.4.MD.1 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 ofmeasurement, express measurements in a larger unit in terms of a smaller unit. Recordmeasurement 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 conversiontable for feet and inches listing the number pairs (1, 12), (2, 24), (3,36).M.4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room giventhe area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor. Represent and interpret data. |
| **Materials/Advance Preparation Needed** | **Materials:*** Measuring tape and rulers
* String and tape
* EarthBox kit and trellis structures
* Soil
* Small cups
* Popsicle stick markers and permanent markers

**Advanced Preparation:*** Have EarthBox instruction manual with copies.
* Have all materials set up in the areas for the students to work.
* Check seed packets for any seed preparation (this may change depending on the variety of seeds bought)
* Check out computer lab or laptops
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| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)** | **Introduction:** The teacher will show an empty EarthBox to the students and ask how they think that it works. Write predictions and questions in Colonial Journal. Have a discussion about why it is beneficial to use EarthBoxes for indoor gardening.  Also, make a connection to Colonial times (remind students that in Colonial times they would not actually have an EarthBox and they would be gardening outside).**Lesson:** In small groups, students willread copies of the EarthBox instructional manual and discuss the steps to plant in the EarthBox.  Students work in groups to estimate how much soil is needed to fill the box.  “When we ask ‘How much soil?”, what are the different ways that we can measure it? Can we take any measurements to help our estimate?” The students will then calculate the area and perimeter of the EarthBox. Using these measurements, do our predictions change?  Fill the box with hydrated potting soil (layer dolomite and make a trench for/layering in the fertilizer).**Closure:** Allow students time to set up the EarthBox.\*Teacher Note: Assign groups of students tasks in assembling the EarthBox.  While the other students are not completing their assigned task, they will research how deep to plant the seeds (pumpkin, radish, marigold) and how far apart they need to be from each other.  |
| **Assessment (What will be the evidence of student learning?)** | The teacher will check the completed EarthBoxes for correct assembly. The teacher will check students area and perimeter formula and answers ensuring they understand the mathematics.  |

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| **Title** | Lesson Six: Writing Throughout the GPBL |
| **Overview** | The students will be writing throughout our GPBL. This will consist of observations, comparing and contrasting, drawing/labeling, note taking, and summarizing. They will be taught strategies to appropriately write/take notes and will be expected to write a summary at the end of the GPBL of which crops were most successful within the classroom EarthBox.Duration: Entire school year |
| **Standards** | ELA.4.W.C9.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, andmultimedia when useful to aiding comprehension. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related tothe topic. Link ideas within categories of information using words and phrases (e.g.,*another*, *for example*, *also*, *because*). Use precise language and domain specificvocabulary to inform about or explain the topic. Provide a concluding statement or section related to the information or explanation presented.ELA.4.L.C15.1 Demonstrate command of the conventions of Objective English grammar and usage when writing or speaking. Use relative pronouns (*who, whose,**whom, which, that*) and relative adverbs (*where, when, why*). Form and use the progressive (e.g., *I was walking; I am walking; I will be walking*) verb tenses. Use modal auxiliaries (e.g., *can, may, must*) to convey various conditions. Order adjectives within sentences according to conventional patterns (e.g., *a small red bag* rather than *a**red small bag*). Form and use prepositional phrases. Produce complete sentences, recognizing and correcting inappropriateELA.4.W.C10.2 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing (See Language Objectives for conventions of English).ELA.4.W.C10.1 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade specific expectations for writing types are defined in Objectives 1-3 in Text and Types and Purposes) |
| **Materials/Advance Preparation Needed** | **Materials:*** Colonial Garden Journals
* Pencils and crayons
* EarthBoxes
* Plants (trellising, root, and herb)

**Advanced Preparation:*** Make Colonial Garden Journals (composition notebooks that say “Colonial Garden Journal” on the front or simply staple paper together)
* Students must be able to write appropriate journal entries including date, details, descriptions, illustrations and illustration labels.
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| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)**  | **Introduction:** The students will be planting a variety of plants in both biodegradable containers as well as an EarthBox. They will be asked to observe and reflect in their Colonial Garden Journals during stations once a week.**Lesson:** Students will be taught strategies to appropriately take notes, summarize, use descriptive writing, and draw and label. Throughout the course of our GPBL the students will use these strategies to record their findings in their journals.Example of lesson: Teacher will draw a picture of the growing pole beans in a biodegradable container on the board and then label each part. The students then that day in stations can each draw and label their specific plastic bag using the example on the board.**Closure:** Students will be given a certain amount of time to work in their journals (this will be decided by teacher), when this allotted time is nearing its end the teacher will need to remind students to finish up their work |
| **Assessment (What will be the evidence of student learning?)** | The students will keep all of their recordings in their Colonial Garden Journal. Towards the end of the GPBL the students will be asked to use their notes and entries to write a culminating summary of which grew better.\*\*Teacher Note: Teacher will periodically check the students’ journals during this part of the module. |

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| **Title** | Lesson 7: Measuring Plant Growth  |
| **Overview** | This lesson will continue throughout the duration of the unit. Students will measure plants and graph results on a weekly basis.   |
| **Standards** | M.4..MD.4 Make a line plot to display a data set of measurements in fractions of a unit and solve problems involving addition and subtraction of fractions by using information presented in line plots. (for example; from a line plot find and interpret the difference in length between the longest and shortest specimen in a plant collection)M.4.MD.1 know relative size of measurement units within one system of units including km, m, cm, kg, g, lb…within a single system of measurement, express measurement in a larger unit in term of a smaller unit, record measurement equivalents in two column table |
| **Materials/Advance Preparation Needed** | **Materials:*** Ruler
* Plants
* Graph paper
* Pencils
* Journals

**Advanced Preparations:** * Must have graph paper and measuing tools prepared for students.
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| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)** | **Introduction:** As the plants begin to grow, students will decide on a measuring day. Students will measure on the same day every week. After students measure and record their information in their journal and then they will add a plot to their line plot. **Lesson:** Students will also discover the change in growth from week to week, make predictions as to how much they think the plant will grow in the upcoming week, and find the difference between the predicted measurement and the actual measurement.  Students will also discover why it is necessary to use a single unit of measurement while collecting data. For example, we cannot do cm. one week and in. another week.**Closure:** To wrap up this continuing lesson, students will reflect on what they have learned during the lesson. |
| **Assessment (What will be the evidence of student learning?)** | Teacher observation will be done throughout the measurement process. Students will also be assessed on the completion of the line plot at the end of the unit. They will be expected to have all parts of the graph correctly labeled and information included.  |

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| **Title** | Lesson 8 - Garlic Bread |
| **Overview** | Students will be using garlic that they have harvested from their colonial garden to create homemade whole clove garlic bread as a math lesson.  They will strengthening their knowledge of fractions during  the lesson. |
| **Standards** |

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| M.4.OA.4  |  | find all factor pairs for a whole number in the range 1–100, recognize that a whole number is a multiple of each of its factors, determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number and determine whether a given whole number in the range 1–100 is prime or composite . (CCSS Math.4.OA.4) |

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| M.4.NF.2  |  | compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½, recognize that comparisons are valid only when the two fractions refer to the same whole and record the results of comparisons with symbols >, = or <, and justify the conclusions, e.g., by using a visual fraction model. (CCSS Math.4.NF.2) |

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| M.4.NF.3  |  | understand a fraction *a/b* with *a* > 1 as a sum of fractions 1/*b** 1. understand addition and subtraction of fractions as joining and separating parts referring to the same whole,
	2. decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation and justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8*,
	3. add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction and/or by using properties of operations and the relationship between addition and subtraction,
	4. solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
 |

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| **Materials/Advance Preparation Needed** | **Materials:*** Garlic must be ready to harvest before this lesson can be completed.
* The teacher will need the following ingredients: Garlic (1 bulb per loaf), Extra Virgin Olive Oil, dried yeast (1/4 tsp per loaf), warm water (1 Cup per loaf), Bread flour (3 to 3 1/2 Cups per loaf), salt (1 1/2 tsp. per loaf)
	+ Note:  The students will need to remove the garlic cloves to be tossed in oil and then baked for 25-30 minutes before putting it in the bread.  This can be done after step 3, but must be done before step 7.
* Pans and an oven
* Garlic Bread fractions math sheets
* Recipe link: http://www.ciaoitalia.com/seasons/18/1801/homemade-garlic-bread
* Garlic Bread scenario page
* Measuring utensils (cups, teaspoons)
* Mixing bowls

**Advanced Preparations:*** Make arrangements with kitchen staff to bake garlic bread.
 |
| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)** | 1. The teacher will begin by reading the garlic bread scenario to the students.
2. After reading the page, the students will brainstorm different recipes that can be made using the garlic that they have harvested.  List these for the students to see.  If garlic bread is not one of the items listed, guide students towards this.
3. Explain to students that they will be making garlic bread using the garlic from their colonial gardens. However, the recipe that the settlers have is only for a single loaf of bread.  Ask students how we can use this recipe to make more than one loaf.
4. Students should come to the conclusion that they will need to double or even triple the recipe in order to make the bread.
5. Distribute the Garlic Bread fractions sheet to the students.  Have students read the directions to themselves as you read them aloud.  The original ingredient and their amounts are listed in the first two columns.  Ask students how they will complete the next few columns (to double, triple, and quadruple the recipe).  Guide students, if needed, to the idea of using equivalent fractions.  Complete the first column together as a class if needed.
6. Have students complete the sheet individually or as a group.  When you are ready to check the sheet, have students come to the board to walk the other students through solving the problems.
7. When the sheet is completed, the students will receive the items they need to make the bread.  The teacher may decide how many loaves they will need for the class and split the students accordingly.  Students may also create their own mini loaves if the teacher prefers.
8. Have students follow the recipe from the link to make their bread.
9. After students have made their loves, the teacher will bake the bread and once it is finished the students can enjoy!

EXTENSION:  As an extension, students can make their own butter using baby food jars and heavy whipping cream.  if they shake the cream in the jars, it will separate into buttermilk and butter! |
| **Assessment (What will be the evidence of student learning?)** | For the assessment of this lesson, the teacher will take the loaves that the students have created and bake them as the recipe states.  If students followed the directions of the recipe carefully, then they will have garlic bread to enjoy as a class.   |



You're colonial settlement is gathering together for dinner and you are in charge of bringing the bread. There are several families that are attending, including some from bordering settlements. You have your grandmother's recipe for garlic bread, but it is only for one loaf! You are going to need to adjust your recipe to make sure that all of your ingredient amounts stay the same.

Fill out the chart below to figure out your new recipe:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Ingredient | Original Amount | Improper Fraction | Doubled | Tripled | Quadrupled |
| Garlic | 1 bulb |  |  |  |  |
| Olive Oil | 2 tsp. |  |  |  |  |
| Dried Yeast | 1/4 tsp. |  |  |  |  |
| Warm Water | 1 Cup |  |  |  |  |
| Bread Flour | 3 1/2 Cups |  |  |  |  |
| Salt | 1 1/2 tsp. |  |  |  |  |

**Think**
Use the information above to answer the following question

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| **Title** | Specialist Extension Lesson (PE)- Freeze Tag |
| **Overview** | The learning focus today will be for students to play freeze tag and review facts about colonial America. When students are tagged, they must freeze. In order to unfreeze, they must recall one fact from their that they learned about colonial America. |
| **Standards** | WE.4.5.07- demonstrate strategies for chasing, fleeing, and evading.ELA.4.R.C8.1- Read with sufficient accuracy and fluency to support comprehension. Read on-level text with purpose and understanding. Read on-level prose and poetry orally with accuracy, appropriate rate, and expression. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.  |
| **Materials/Advance Preparation Needed** | **Materials:*** Article about colonial recreation- <http://www.pencaderheritage.org/main/teachtool/games.pdf>
* Gymnasium

**Advanced Preparation:** * Make arrangements with physical education teacher to use the gymnasium
* Print out copies of colonial recreation article
 |
| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)** | **Introduction**: To begin the lesson, the class will read an article about colonial recreation. After reading the article, the teacher will ask students how recreation in colonial times is different from recreation in current times. **Lesson:** Next, the teacher will go over rules about the game students will be playing. Students will play freeze tag, but with a twist. In order to be unfrozen, they must recall one fact that they learned about colonial America. Once the fact has been recalled, they are free to begin running again.**Closure:** The class will have a discussion about the colonial facts recalled. The class will also summarize the similarities and differences about colonial recreation and recreation today.  |
| **Assessment (What will be the evidence of student learning?)** | The students will recall facts about colonial America when they become frozen. The teacher will observe students’ answers and record results. The teacher will keep track of which students have recalled a fact. At the end of the game, if a student(s) was not frozen at all, they must recall a fact about colonial America. The class will then have a discussion about all of the facts that were recalled.  |

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| **Title** | Specialist Extension (Music) - Oats, Peas, Beans and Barley grow |
| **Overview** | The learning focus today will be for students to focus on the song and play party called “Oats, Peas, Beans and Barley Grow”Oats, Peas, Beans and Barley Grow Oats, peas, beans, and barley growOats, peas, beans, and barley growDo you, or I, or anyone knowHow oats, peas, beans, and barley grow?First the farmer sows the seed,Stands erect and takes his ease.Stomps his foot and claps his hands andTurns around to view his land.Looking for a partner, Looking for a partner.Open the ring and let one in To whirl around and dance and sing,Tra-la la, la la la …etc.  |
| **Standards** | National Standard 1: Singing, alone and with others, a varied repertoire of music.MU.O.GM3-5.1.01 expand singing songs in major and minor keysRLA.O.4.1.01 Identify and practice appropriate vocabulary:* multiple meaning words
* synonyms
 |
| **Materials/ Needed** | **Materials:** * Example what oats, peas, and barley look like
* Visual of poem
* Guitar
* Space to move around the room, making one large circle
 |
| **Procedures/Steps:****(Emphasis on students making inquiry, e.g., posing questions/problems and working towards answers and solutions)** | **Introduction:** To begin the music lesson, students will watch a short powerpoint presentation that will show them the differences between oats, peas, beans and barley. Next, student will look at the words and learn song. Students will identify and practice appropriate vocabulary while discussing multiple meaning words and synonyms. This song is steeped with history, so teacher should share background on the song.**Lesson:** The teacher will sing the song. Music only works if we work together. Students will sing the play party song with guitar accompaniment. Teacher will ask class to make a circle, holding hands. The teacher will explain the play party and what to do on each section. The class will play the game.**Closure:** Students will work together to complete this play party by the conclusion of music class. Teacher will video and/or audio record to allow students to self-assess their class. Class will line up to return back to the classroom.  |
| **Assessment (What will be the evidence of student learning?)** | The students will use self-assessment to assess the learning and understanding of the concepts taught. The students will both see and/hear their final product and clearly distinguish whether or not the students have a grasp of the information. |

**The Power of Friction**

**Group # \_\_\_\_\_\_\_\_\_**

**Group Member Names:**

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
5. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
6. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| 1. **Observe and Ask Questions**
2. What are four (4) things we know about friction?
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Think about three real world examples of where we see friction and discuss with your group how friction effects the objects movement.
8. Ask a question that you would like to answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 |
| 1. **Form a Hypothesis**
2. In a complete sentence, write an answer to our question.

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| 1. **Plan an Experiment**
2. Discuss with your group how you can create an experiment to test your question/hypothesis.
3. Describe the steps you will take to perform the experiment.

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| 1. **Observe and Ask Questions**
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**The Power of Friction**

**Group # \_\_\_\_\_\_\_\_\_**

**Group Member Names:**

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
3. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
5. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
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