GRADE 4 | *Garden*

SCOPE & SEQUENCE

GRADE 4 STANDARDS

At the end of Grade 4, students will be able to:

- Demonstrate knowledge of the structure and function of plant parts, specifically of seeds and seed parts.
- Demonstrate knowledge of photosynthesis.
- Demonstrate knowledge of soil management strategies in the garden.
- Demonstrate knowledge of how geographic place and climate influence the foods growing in a bioregion.
- Demonstrate knowledge of how latitude and altitude influence plant growth.
- Demonstrate knowledge of how to identify, assess, and resolve stress and/or poor health of plants.
- Demonstrate knowledge of a regional food system.
- Demonstrate knowledge of urban garden design.

GRADE 4 | FALL

Each activity described below should be designed to last approximately 45 minutes.

Lesson # & Title	Topic	Content Learning Objective(s)	Suggested Lesson Activity	Life Skills Learning Objective(s)	Connections to Kitchen Lessons	Possible Extensions	Academic Standard Connections	Health Standard Connections
START THE YEAR *Schoolwide Garden Work Party with Families/Local Community*								
1. Welcome to the Garden!	Personal and Community Life Skills **(PLS and CLS)**		Engage students by having them share their names and something in the garden they think might have changed over the summer. Have them explore teamwork through an age-appropriate a teambuilding exercise. Explain behavior expectations by reviewing garden agreements established in **Grade 3 Lesson #1: Welcome to the Garden!** Review Personal and Community Life Skills. Then have students elaborate upon these agreements as they walk around the space and explore the garden in search of things that changed over the summer. Gather, share out, and record observations together.	**PLS.1-6** **CLS.5** Students participate in the development of agreed upon protocols and behaviors for the garden and kitchen environments.	Draw connections between garden agreements and kitchen agreements.	Draw connections between garden agreements and classroom agreements.	**CCSS.ELA 4.SL.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse patterns building on others' ideas and expressing their own clearly.	

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2. Dissecting Seeds	Plants **(P)**	**P.4.1** Describe structures and functions of seeds.	Give students pre-soaked bean seeds to dissect. Have them explore, looking closely with magnifying glasses and drawing each structure they can find. Challenge students to look at the structures for evidence of the function they serve, and write their best guesses. Then tell students the scientific name of each structure and explain the function each serves: Use an analogy of a baby plant (embryo) needing a coat (seed coat) for protection and a lunchbox (endosperm) to provide food while it's underground. 	**PLS.2** Students are able to express empathy and caring for themselves, others, and the environment.	As students dissect seeds and learn the names of each part in the garden, ask them to remind you of the difference between whole wheat and white wheat in terms of seed structures and functions (learned in **Grade 3 Kitchen Lesson #9: Threshing, Winnowing, and Grinding Wheat**). Both wheat flours contain the seed's endosperm, but in white wheat the germ (embryo) and bran (seed coat) have been removed. Review the nutritional benefits of whole wheat.	**Classroom:** Write a fictional descriptive paragraph about a baby seed that includes facts about its structure and features that prepare it for growth.	**NGSS Science and Engineering Practice:** Engaging in Argument from Evidence. **CCSS.ELA-LITERACY.SL.4.1.D** Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.	

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3. Planting Seeds	Plants **(P)**	**P.4.1** Describe structures and functions of seeds. **GTE.4.1-4** Garden Tools and Equipment	Review safe tool use, and then have students explore seed planting by planting some cool weather crops from seed, such as radishes or greens. After they plant, review the structures inside those seeds (from **Lesson #2: Dissecting Seeds**) and explain how the baby plants will get food while they're underground. Then explain how they will get food once their sprouts come up above the ground by making their own food through a process called photosynthesis.	**PLS.1** Students are self-aware and show respect for their own needs, the needs of others, and the environment. They practice safe and conscientious behaviors in the garden and kitchen environments. **PLS.2** Students are able to express empathy and caring for themselves, others, and the environment.	If possible, incorporate the radishes and greens planted in this lesson into **Kitchen Lesson #7: Green Salad with French Dressing**.	**Classroom:** Create a timeline of a seed's life showing how the structures develop and where the energy comes from to stimulate their growth. **Community:** Plant similar plants in a community garden to compare their growth, and therefore how they are able to make their own food in each location.	**NGSS Science and Engineering Practice:** Planning and Carrying Out Investigations. **CCSS.ELA-LITERACY.SL.4.1.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.	

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4. Identifying Pests	Garden and Food Systems **(GFS)**	**GFS.4.1** Identify pests in the garden.	Provide students with a field guide to common garden pests and the evidence they leave. (Make sure your guide includes examples of specific pest damage that are common in your garden.) Have teams explore the garden for as many examples of pest damage as they can find. For each example, have them use their field guide to try to identify the culprit. Then have them elaborate by sharing their findings with one another.	**PLS.2** Students are able to express empathy and caring for themselves, others, and the environment.	In the garden, research insects eaten in various cultures and identify which food group insects fall into (protein).	**Classroom:** Use rhyming words to write limericks to connect visible pest damage in the garden to the name of the pest. **Community:** Create informational flyers to distribute throughout neighborhoods to home gardeners to present images and descriptions of pests and pest damage.	**NGSS Science and Engineering Practice:** Engaging in Argument from Evidence. **CCSS.ELA-LITERACY.SL.4.4** 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.	

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5. Garden Trouble-shooting	Plants **(P)**	**P.4.4** Understand signs of distress or poor health in plants and create solutions.	Have students go on a scavenger hunt in the garden, exploring for specific signs of distress or deficiency in plants such as wilting from lack of water, holes in leaves from snails, yellowing leaves from nutrient deficiency, etc. Once students have found evidence of distress in plants, assign each team a type of distress and challenge teams to research and come up with a solution (i.e. a barrier against snails or adding compost for a nutrient deficiency). Have students record their plans in their journals for **Lesson #6: Preventing Pest Activity**.	**PLS.6** Students actively seek creative and resourceful solutions.	Discuss the role of nutrients and phytonutrients in keeping plants healthy, and also in keeping us healthy. In the garden, enjoy a fresh fruit or vegetable and then thank the plant for the nutrients it gives you.	**Classroom:** Create charts to show findings, modeled either as cause/effect or problem/ solution. **Community:** Take photos to share with community of common signs of distress and tested solutions to them.	**NGSS Science and Engineering Practice:** Engaging in Argument from Evidence. **NGSS Science and Engineering Practice:** Asking Questions and Defining Problems. **NGSS Science and Engineering Practice:** Constructing Explanations and Designing Solutions. **CCSS.ELA-LITERACY.SL.4.1.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.	

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6. Preventing Pest Activity	Garden and Food Systems **(GFS)**	**GFS.4.2** Create a plan to mitigate pests in the garden. **GTE.4.1-4** Garden Tools and Equipment	Have each team from **Lesson #5: Garden Troubleshooting** elaborate on their research, presenting a plan for mitigating damage. Once you've approved their plan, have teams implement their plans (for example, by placing floating row cover over a crop or planting a plant that attracts a predatory insect near a plant that has a lot of pest damage).	**CLS.1** Students demonstrate problem solving and resolve conflict as a team.	In the garden, have students write letters to the pests explaining what crops are growing, what dishes they plan to cook in the kitchen using those crops, and why they want to protect them.	**Community:** Create a podcast describing ways that have been researched or tested to prevent pest damage in the garden.	**NGSS Science and Engineering Practice:** Constructing Explanations and Designing Solutions. **CCSS.ELA-LITERACY.SL.4.4** 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.	

GRADE 4 | WINTER

Each activity described below should be designed to last approximately 45 minutes.

Lesson # & Title	Topic	Content Learning Objective(s)	Suggested Lesson Activity	Life Skills Learning Objective(s)	Connections to Kitchen Lessons	Possible Extensions	Academic Standard Connections	Health Standard Connections
7. Photo-synthesis	Plants **(P)**	**P.4.2** Explain photosynthesis.	Remind students that once a seed germinates, the sprout above the ground begins to make its own food. Use a role play to explain photosynthesis. Assign roles of a plant gathering sunlight, carbon dioxide (from a human or other animal exhaling), and water from the soil to create more plant material, including new food for us. Then harvest something you planted in the fall, such as lettuce and radishes, to make a salad. As you enjoy the salad, have students elaborate by sharing how the plant used the sun's energy to make food that now gives us energy. Collect food scraps for your worm bin to be created in **Lesson #8: Building a Worm Bin**.	**PLS.4** Students are active and engaged learners who show up on time prepared to learn and manage their time wisely.	Prepare a salad, such as prepared in **Lesson #7: Green Salad with French Dressing**. As you prepare and enjoy, discuss the function of the leaves in gathering sunlight for photosynthesis.	**Community:** Create a game for younger students that models photosynthesis and the process of collecting all plant needs.	**NGSS Science and Engineering Practice:** Constructing Explanations.	**National Health Education Standard 7:** Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.

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8. Building a Worm Bin	Soil **(S)**	**S.4.1** Identify and describe structure and function of organisms living in soil. **GTE.4.1-4** Garden Tools and Equipment	Explain to students why and how to build a worm bin. Have them elaborate by building one together. Have students work together to shred and moisten newspaper for bedding, collect food scraps to feed the worms, and then add some red wriggler worms. For more information on building a worm bin, visit the Vermicomposting section on Life Lab's Composting page. 	**PLS.2** Students are able to express empathy and caring for themselves, others, and the environment. **CLS.2** Students cooperate and communicate well with each other.	Add food scraps from the kitchen into the worm bin.	**Classroom:** Read *Wiggling Worms at Work* by Wendy Pfeffer. **Community:** Create a "How to" Guide about building a worm bin to share with your community.	**NGSS Science and Engineering Practice:** Planning and Carrying Out Investigations. **CCSS.ELA-LITERACY.W.4.2.D** Use precise language and domain-specific vocabulary to inform about or explain the topic.	**National Health Education Standard 7:** Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.

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9. Geography and Food, Part 1	Weather and Seasons, Climate and Geography **(WSCG)**	**WSCG.4.1** Understand and describe how geographic place and cultural significance might influences what and when foods grow in your location.	Assign each team of about 4 students a country and have them explore and research the most common fruits grown there and one of the most common dishes eaten there. Include in your list of countries 2 countries located at similar latitudes, such as, France and Japan; Iraq and Mexico; Senegal and Nicaragua; Kenya and Ecuador; Northern Australia and Mozambique; Southern Australia and Argentina; and New Zealand and Chile. Also include your location in the US and a country at a similar latitude, which you can find online, such as available at Wikipedia's List of Countries by Latitude. Have teams elaborate, sharing out their key crops and dishes. As they do, mark on a collective world map. 	**CLS.4** Students appreciate and are respectful of differences and diversity in their communities.	In the garden, prepare and enjoy a few of the common crops researched by the students. Discuss the cultural and nutritional significance of each crop.	**Classroom:** Read sections of *What the World Eats* by Faith D'Aluisio and Peter Menzel. **Community:** Interview members of the community who have roots in other countries on the common fruits and common dishes from the area.	**Social Studies:** Geography. **Social Studies:** Diversity and Community.	**National Health Education Standard 2:** Students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors.

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10. Geography and Food, Part 2	Weather and Seasons, Climate and Geography **(WSCG)**	**WSCG.4.2** Understand the effect of latitude on foods from various places around the world.	Look at the map from **Lesson #9: Geography and Food, Part 1** together. Introduce and define the term "latitude." Have students explore and identify countries with similar latitudes. Notice if their fruits or dishes are similar or different. Explain that having a similar latitude means they have a similar climate, meaning they can often grow similar crops. Then brainstorm with students reasons why they might still have different key crops and dishes. If they don't mention the following factors, add geographical conditions such as elevation, oceans, etc. and also cultural traditions to the list. Read aloud *Bread Bread Bread* by Ann Morris and discuss how culture impacts food preparation and traditions. 	**CLS.4** Students appreciate and are respectful of differences and diversity in their communities.	Hang a world map in the kitchen and stick on pictures of common foods grown in various regions.	**Classroom:** Research one crop and how it's prepared differently in a variety of different world cultures. **Community:** Visit local restaurants that represent different world cultures, and compare and contrast the menu items for the crops that they feature.	**NGSS Science and Engineering Practice:** Analyzing and Interpreting Data. **CCSS.ELA-LITERACY.W.4.7** Conduct short research projects that build knowledge through investigation of different aspects of a topic.	**National Health Education Standard 2:** Students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors.

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11. The World Travels of a Fruit	Garden and Food Systems **(GFS)**	**GFS.4.3** Define a regional food system. **WSCG.4.1** Understand and describe how geographic place and cultural significance might influences what and when foods grow in your location.	Bring in a fruit grown somewhere out of your state but within your region of the US (i.e. Pacific Northwest, the South, the Northeast, etc) for students to explore. Tell students where it was grown, and ask them to brainstorm all the steps to get it to where you are now (a farmer, a packer, a transporter). Then have students elaborate on this concept by using the produce to create a simple snack in 2 ways, following 2 different cultural traditions, such as orange slices with and without dried chile de arbol sprinkled on top (a Mexican tradition). Remind students that cultural traditions are influenced by what can grow in a region. 	**PLS.6** Students actively seek creative and resourceful solutions. **CLS.4** Students appreciate and are respectful of differences and diversity in their communities.	Have students write thank you letters to farmers in their region for a particular food the farmer grew and that the students prepared in the kitchen recently.	**Classroom:** Read the book *Before We Eat* by Pat Brisson. **Community:** Interview community members that work along the food system (farmer, packer, transporter, etc).	**CCSS.ELA-LITERACY.W.4.3.C** Use a variety of transitional words and phrases to manage the sequence of events. **NGSS Science and Engineering Practice:** Obtaining, Evaluating and Communicating Information.	**National Health Education Standard 5:** Students will demonstrate the ability to use decision-making skills to enhance health. **National Health Education Standard 7:** Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.

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12. Exploring our Worm Habitat	Soil **(S)**	**S.4.2** Describe the role of fungi, bacteria, and invertebrates in soil.	Give pairs of students a scoop of worm castings from the worm bin. Have them use magnifiers and tweezers to explore, looking for every type of item they can find in there. Then have them sort into living and nonliving objects. If they don't mention fungus, have them look for thin little hairs going through the castings and explain that these are parts of fungus. Explain that the fungus, the worms, and other insects (also known as invertebrates), and something so small we can't see it (called bacteria) are all doing the work of decomposing the food scraps in the bin. We call these "The Garden FBI." 	**PLS.2** Students are able to express empathy and caring for themselves, others, and the environment.	Prior to exploring the worm bin, ask students to recall some of the foods they put in there from the kitchen and when they put them in. Then have them predict what they'll see before they open the bin.	**Classroom:** Further research fungus, bacteria, and invertebrates to build understanding of all of the decomposers at work that may be too small to see. **Community:** Visit other active worm bins in the community to compare and contrast what decomposers can be found.	**NGSS Science and Engineering Practice:** Engaging in Argument from Evidence **CCSS.ELA-LITERACY.W.4.2.C** Link ideas within categories of information using words and phrases (e.g., another, for example, also, because).	

GRADE 4 | SPRING

Each activity described below should be designed to last approximately 45 minutes.

Lesson # & Title	Topic	Content Learning Objective(s)	Suggested Lesson Activity	Life Skills Learning Objective(s)	Connections to Kitchen Lessons	Possible Extensions	Academic Standard Connections	Health Standard Connections
13. Mapping a Bed	Garden Planning and Maintenance **(GPM)**	**GPM.4.3** Calculate square footage of garden beds and paths. **GTE.4.1-4** Garden Tools and Equipment	Assign a garden bed or section of garden path to each team of 3-4 students. Have them use rulers or measuring tape to measure the edges of the bed. Explain how to calculate the surface area in square feet. Then have students elaborate, calculating how many of a particular crop, such as tomatoes (approx 1 per 2 square feet) or corn (approx. 1 per 1 square foot), will fit in each bed. Have them record in their journals for **Lesson #14: Garden and Kitchen Math**.	**CLS.1** Students demonstrate problem solving and resolve conflict as a team. **CLS.2** Students cooperate and communicate well with each other.	When the students are using baking sheets in the kitchen (such as prepared in **Kitchen Lesson #14: Ooey Gooey Blueberry French Toast**), have students use rulers to measure and calculate the volume of rectangular kitchen objects such as baking sheets, bread baking tins, and the like. Discuss how this information is used by chefs.	**Community:** Engage students in leading a workshop for lower grades around the effectiveness of square foot gardening and how to implement it in home gardens.	**CCSS.MATH. CONTENT.4.MD.A.3** Apply the area and perimeter formulas for rectangles in real world and mathematical problems. **NGSS Science and Engineering Practice:** Developing and Using Models	

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14. Garden and Kitchen Math 	Garden Planning and Maintenance **(GPM)**	**GPM.4.2** Calculate amounts of produce to grow in school garden.	Engage students by reading aloud *Minnie's Diner: A Multiplying Menu* by Dayle Ann Dodds. Then allow students to explore how to determine a multiplier for their salsa recipe to serve all of the students in their class. Explain to students how to use that multiplier to determine the amount of ingredients they will need for their multiplied menu. Then elaborate by determining exactly how much produce would need to be planted to make this recipe for the whole class. Student work can be evaluated with the worksheet students use to make their calculations. 	**CLS.1** Students demonstrate problem solving and resolve conflict as a team.	In **Lesson #16: Planting for a Feast**, students will plant the produce planned for in this lesson. Then in **Grade 5 Kitchen Lesson #5: Fiesta Quesadillas with Simple Salsa and Holy Moly Guacamole** students will use the produce they planted together. At this time, they can reflect on how accurately they estimated the yields when they planted.	**Classroom:** Have students write word problems about farmers and chefs calculating produce amounts. **Cafeteria:** Use an item in the lunch line or salad bar to estimate how many plants were required to supply that amount of produce.	**CCSS.MATH. CONTENT.4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **CCSS.ELA-LITERACY.W.4.2.D** Use precise language and domain-specific vocabulary to inform about or explain the topic.	

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15. Planning for a Feast	Garden Planning and Maintenance **(GPM)**	**GPM.4.1** Demonstrate ability to create a planting map for the garden.	Have students use their findings about how many of each type of plant they'll need from **Lesson #14: Garden and Kitchen Math** to plan what to plant in their garden and where. Have them explore the garden and create a blank map of it, featuring the cardinal directions, as well as empty beds where they can plant and any other key garden landmarks. Explain the importance of placing tall plants along the north end of the beds so that they don't shade the shorter plants. Have student teams use seed packets or a planting guide to find the spacing requirements for each plant, and then have them elaborate by mapping where each plant could go in the garden in their journals. 	**PLS.6** Students actively seek creative and resourceful solutions. **CLS.1** Students demonstrate problem solving and resolve conflict as a team.	In **Lesson #16: Planting for a Feast**, students will plant the produce planned for in this lesson. Then in **Grade 5 Kitchen Lesson #5: Fiesta Quesadillas with Simple Salsa and Holy Moly Guacamole** students will use the produce they planted together.	**Community:** Offer garden planning services, requesting bed size and plant preferences and allowing students to develop a garden plan for community members.	**Social Studies:** Geography. **NGSS Science and Engineering Practice:** Developing and Using Models.	

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16. Planting for a Feast	Plants **(P)**	**P.4.3** Know how and when to plant seeds. **GTE.4.1-4** Garden Tools and Equipment	Using the life-sized maps they created (and you've evaluated and approved) in **Lesson #15: Planning for a Feast**, have students plant available beds to grow the produce for the dishes they will be preparing in the fall, such as **Simple Salsa, *There's a Chef in My Soup!***. Review tool safety, and explain how to use a round point shovel to collect finished compost to add to a bed. Have students elaborate by preparing the beds for planting and then use hand trowels to mark in the bed where they will plant each plant. Finally, they may plant and water in their crops.	**PLS.1** Students are self-aware and show respect for their own needs, the needs of others, and the environment. They practice safe and conscientious behaviors in the garden and kitchen environments.	In **Grade 5 Kitchen Lesson #5: Fiesta Quesadillas with Simple Salsa and Holy Moly Guacamole** students will use the produce they planted together.	**Community:** Invite members of the community to join you for this planting day.	**NGSS Science and Engineering Practice:** Planning and Carrying Out Investigations. **CCSS.ELA-LITERACY.SL.4.1.B** Follow agreed-upon rules for discussions and carry out assigned roles.	
17. Planting Beans	Garden Tools and Equipment **(GTE)**	**GTE.4.1-4** Garden Tools and Equipment	Review safe tool use. Have students elaborate on their garden skills learning by working as independently as possible to prepare beds and then plant a variety of beans into them for harvest in the fall, including green, red, black and cannellini beans.	**PLS.1.** Students are self-aware and show respect for their own needs, the needs of others, and the environment. They practice safe and conscientious behaviors in the garden and kitchen environments.	Have students harvest, store, and use the beans grown in this lesson in **Grade 5 Kitchen Lesson #10: Cooking Beans**, and **Grade 5 Kitchen Lesson #11: Beans Galore Salad**.	**Community:** Invite members of the community to join you for this planting day.	**CCSS.ELA-LITERACY.SL.4.1.B** Follow agreed-upon rules for discussions and carry out assigned roles.	

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18. Garden Caretaker Station Rotation	Garden Tools and Equipment **(GTE)**	**GTE.4.1-4** Garden Tools and Equipment **P.4.4** Understand signs of distress or poor health in plants and create solutions.	Review safe tool use. Divide class into 3 groups. Have each group spend 10-15 minutes elaborating on their garden learning at each of the following stations: (1) Sign-Making: Have students paint signs for their garden beds, naming the crops and possible recipes, such as "Salad Bed: Lettuce, Carrots and Cucumbers." (2) Weeding: Select an area and clear it completely of weeds; and (3) Looking for damage: Check all around the garden for signs of damage or disease and implement solutions learned in **Lesson #5: Garden Troubleshooting** (such as removing snails, spraying a crop with a cayenne pepper spray, or covering a bed with floating row cover) to improve growing conditions.	**CLS.2** Students cooperate and communicate well with each other.	As you frame the student roles as garden caretakers, make the connection between the work they're doing in the garden, the food growing, and the dishes they're preparing in the kitchen.	**Classroom:** Have students write directions for a garden caretaking task, such as "How to Weed" or "How to Paint a Sign."	**VA:Cr2.2.4a** When making works of art, utilize and care for materials, tools, and equipment in a manner that prevents danger to oneself and others.	