Purpose

Plant a bed of crops to be used in making sauerkraut and kimchi. Compare and contrast plant traits within the same family. Use the garden bed to teach the following standards:

5.P.2.1 Explain how the sun's energy impacts the process of the water cycle (including evaporation, transpiration, condensation, precipitation and runoff).

5.P.2.2 Compare the weight of an object to the sum of the weight of its parts before and after an interaction.

5.P.2.3 Summarize properties of original materials, and the new material(s) formed, to demonstrate a change has occurred.

5.P.3 Explain how heating and cooling affect some materials and how this relates to their purpose and practical applications.

5.L.1.1 Explain why some organisms are capable of surviving as a single cell while others require many cells that are specialized to survive.

5.L.2.2 Classify the organisms within an ecosystem according the function they serve: producers, consumers, or decomposers (biotic factors).

5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

5.L.3.1 Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.

5.L.3.2 Give examples of likenesses that are inherited and some that are not.

NC.5.MD.5 Relate volume to the operations of multiplication and addition.

- Build understanding of the volume formula for rectangular prisms with whole-number edge lengths in the context of solving problems.

NC.5.G.1 Graph points in the first quadrant of a coordinate plane, identify and interpret the x and y coordinates to solve problems.

5.G.1 Exemplify how technical advances (communication, transportation, and agriculture) have allowed people to overcome geographic limitations.

Prior to Planting

- Students determine the area and perimeter of the bed.
- Determine the total volume of soil the bed will hold. If the bed needs to be topped off, determine the volume of soil needed.
- Determine the appropriate amount of fertilizer needed based on square footage.
- Divide the bed into square feet and grid. Use the grid to review the coordinate grid system.
- Use fractions to determine how many square feet of each crop will be planted.
- Use multiplication to determine how many seeds or transplants are needed.
- Read informational text to determine how to grow each crop and when to plant each.
- Start seeds indoors. During the germination process, observe the water cycle as condensation forms on the humidity dome. Where did the water come from and how did it get on the humidity dome? What happens when the drops get too heavy?

Growing

- Take the temperature of the soil, water, and the air in the morning and afternoon. Compare the temperature of the soil, water, and the air. How does the material affect temperature change through the day?
- When watering the garden, discuss how that water is being used by the plant and how it gets back into the atmosphere through transpiration. To demonstrate this, place a plastic bag over a leaf or plant and loosely tie. Observe the condensation on the inside of the bag after 1 day.
- Make observations of the garden ecosystem, identify the producers, consumers, and decomposers. Observe the school compost bin to see the effect of decomposers. Take

the temperature of the compost bin regularly to observe how the materials change throughout the compost process.

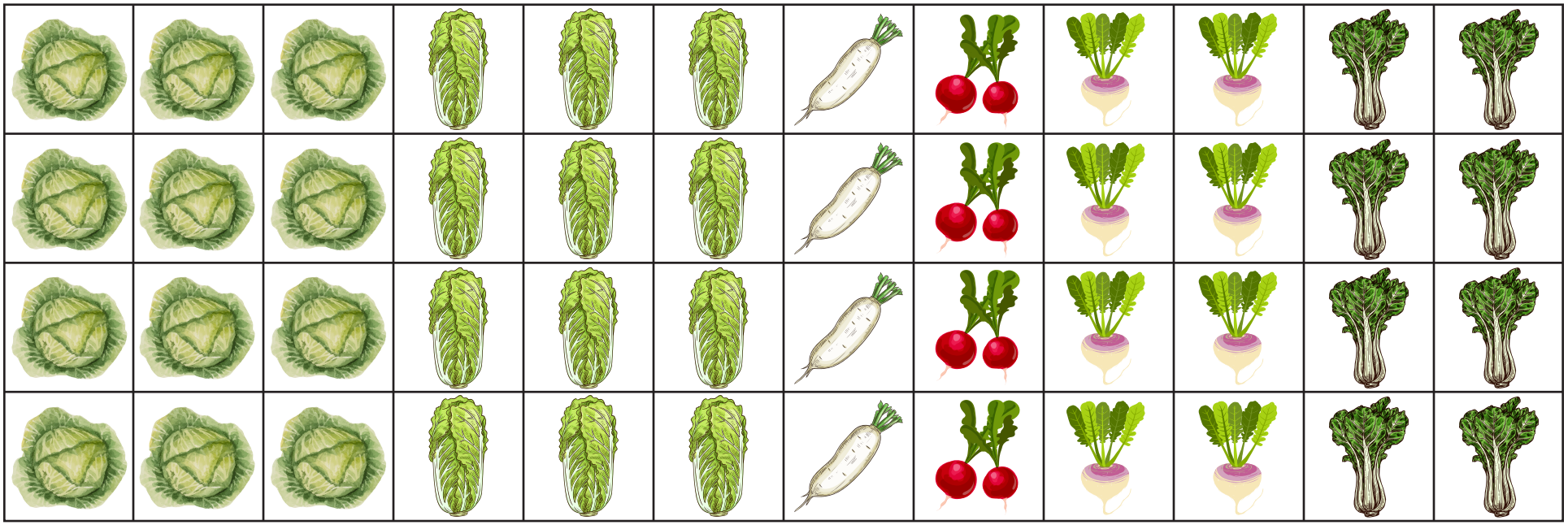
- Create QR codes for each crop highlighting the country of origin and plant family. How have advances in agriculture and transportation aided our ability to grow and eat a variety of crops?
- Measure, document, and graph the growth of each crop.
- As the crops grow, note the way the plant tissue differentiates into the various plant parts. How does this differ from a single-cell organism?
- Set up a vermicomposting bin and observe how matter changes. How long does it take one pound of food to be processed into castings? Compare composting rates with vermicomposting rates, observe how long it takes one pound of food to be converted to compost and castings.

Harvest

- Measure and weigh each crop.
- Create sauerkraut or kimchi and observe how the material changes from the original. Weigh all ingredients prior to making the sauerkraut and kimchi and after the product is finished. (Don't forget to subtract the weight of the container).

Your Notes & Ideas

Sauerkraut & Kimchi Garden Bed



4′ x 12′ garden bed

Cabbage
1 per ft²

Napa Cabbage
1 per ft²

Daikon Radish
16 per ft²

Easter Egg Radish
16 per ft²

Turnip
9 per ft²

Bok Choy
9 per ft²

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