Market Math

Integrating mathematics to prepare for a Middle School farmers' market

GARDEN BED, GRIDS, and PLANTING

Duration: 45 x 2 Sessions || Grade Level: 5-6

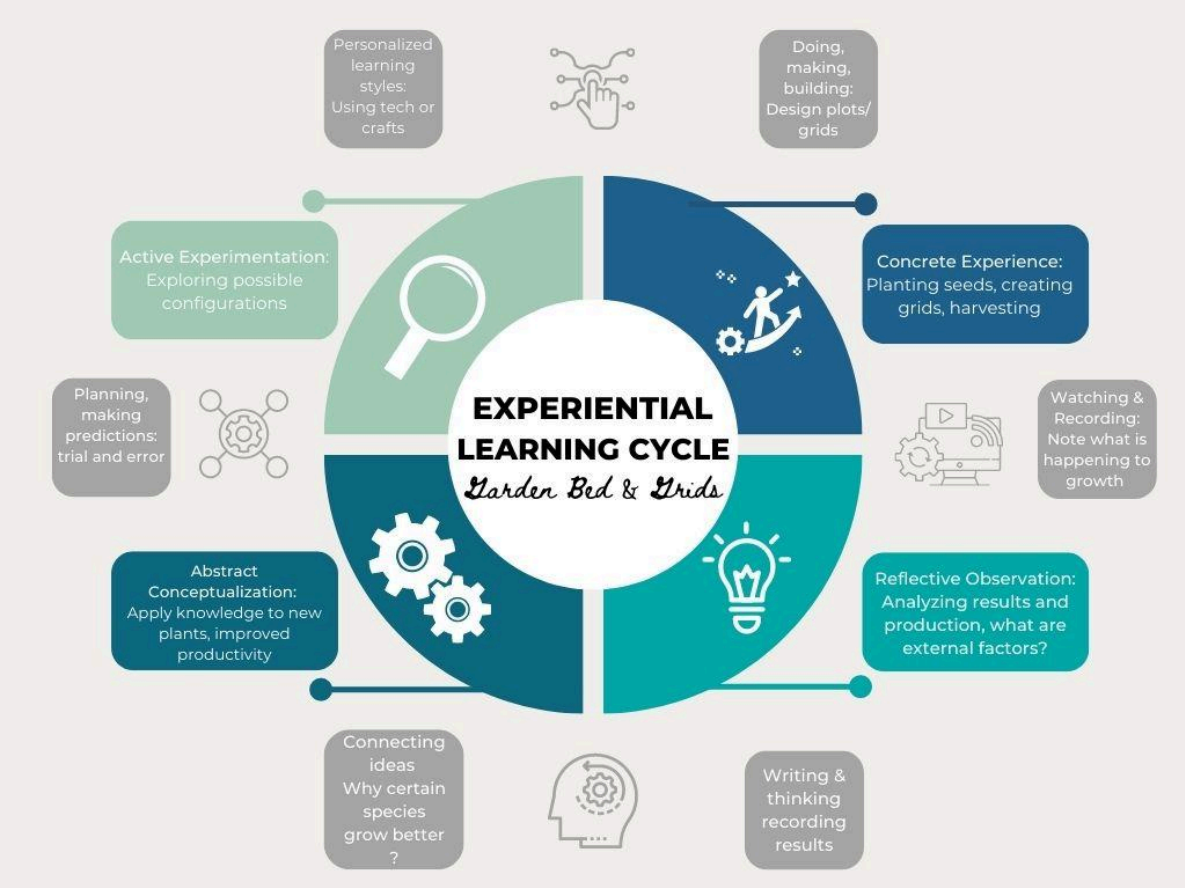
Objectives

In this series, students can explore different ways to set up garden bed grids. This series offers tactile options to payout garden bed grid options and technology-enhanced tools to visualize formations. Exploring 'friendships' between plants allow students to research compatible companion plants to maximize growth and production!

BIG IDEA: Understanding there may be more than one solution possible but some may be more favorable depending on the parameters and limitations.

Inquiry Questions:	☐ How can different dimensions of garden beds be created? ☐ What factors need to be considered when planting garden beds? ☐ Why is it important to consider spacing and favorable companion plants to maximize growth and production in garden beds?
Math Learning Outcomes **(BC Mathematics 5-6):**	➔ Computational fluency and flexibility with numbers extend to operations with whole numbers and decimals. ➔ Compare quantities and ratios ➔ Exploring multiples and factors. ➔ Use mathematical arguments to support personal choices ➔ Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving ➔ Engage in problem-solving experiences that are connected to place, story, cultural practices, and perspectives relevant to, the local community, and other cultures
Session Components	★ Part 1: Garden bed grids (area and perimeter) ★ Part 2: Companion plants

Link to Experiential Learning Cycle



Active Experimentation (AE):
Exploring through modeling with popsicle sticks/toothpicks to construct garden beds.

Concrete Experience (CE):
Planting of seeds, laying out gridlines

Writing and Thinking/Connecting Ideas:
Exploring how different plants work well with each other to support growth and production

TECHNOLOGY for EDUCATION:
Mathigon: Polypad with Grid settings. Create blueprints for garden bed dimensions.
Garden Bed Puzzle: Explore different types of perennials and how their height may impact their visibility
Research using online sources for background information and knowledge on plants and garden zones.
Suggested sites: Heeman's Beginner's Guide to Planting, Better Gardening and Home, Kids' Gardening, Garden Tabs

Part 1: Garden Bed Grids

Problem solving with area and perimeter!

TEACHER NOTES - INTRODUCTION:

Garden beds are a fun way to explore mathematical concepts and to gain concrete and active experimentation! Students are encouraged to use craft supplies, such as popsicle sticks or toothpicks to create miniature models of their garden beds. Extensions could include building their own!

MATHEMATICAL LEARNING OUTCOMES:

- ☐ Multiples and factors pairs
- ☐ Area of rectangular prisms
- ☐ Perimeter of rectangular prisms
- ☐ Problem-solving
- ☐ Extension: Volume, area, and perimeter of polygons

SKILL BASED OUTCOMES (Core Competencies/Approaches to Learning Skills)

- ☐ Thinking (Critical and Creative)
  - ☐ Designing and developing
  - ☐ Reflecting and assessing
- ☐ Collaboration

ACTIVITY INSTRUCTIONS:

Active Experimentation: Explore the different scenarios using limitations to a set:

a) Area

b) Perimeter.

Concrete Experimentation: In-class options: Use popsicle sticks or toothpicks to represent 1m increments.

Outdoor options: Use 1m sticks to layout outline

Abstract Conceptualization: Envisioning height visibility through the Garden Bed Puzzle Game, Polypad grid designs, Explore Learning (Gizmo's) flower bed investigation.

Supplementary Material:

Garden Bed Activity Powerpoint

Garden Bed Puzzle

Fido's Flower Bed (Explore Learning) Handout

Part 2: Companion Plants

TEACHER NOTES - INTRODUCTION:

Plants have likes and dislikes too! In fact, there are certain ones they prefer over others. By planting them with their "friends", there is a better chance of creating a more compatible growing environment for the plants to flourish!

There are four benefits to companion planting!

- ★ **Crop Protection –** some plants can take harsher weather conditions, whereas some plants are more sensitive. Tough plants can act as a natural barrier against more unfavorable conditions (Heeman).
- ★ **Limiting Risk** – Uncontrollable factors, such as weather and temperature can impact production. Minimizing external risks and challenges can help yield a higher production.
- ★ **Positive Hosting –** Certain insects and pests love certain plants! Some plants produce more nectar and pollen, which attracted the wanted insects. These are the ones that can keep the harmful pests away!
- ★ **Trap Cropping** – Good defense is a must for planting! Added protection by planting plants that insects hate besides the ones they love.

Vegetable/ Fruit	Likes to grow with	Doesn't like to grow with
Beans	Carrots, Cabbage, Cauliflower, Cucumber, Marigolds, Corn	Chives, Leeks, Garlic
Carrots	Beans, Lettuce, Peas, Tomatoes, Onions	Chives, Dill, Parsnip
Garlic	Cucumbers, Lettuce	
Lettuce	Carrots, Radish, Strawberries, Beets	Beans, Parsley
Onions	Broccoli, Cabbage, Lettuce, Tomatoes	Beans, Peas
Strawberries	Beans, Borage, Garlic, Lettuce, Onions, Peas, Spinach, Thyme	Brassicas, Fennel, Kohlrabi

Table 1: Sample of produce that it likes and don't like to grow with
(Source: Beginner's Guide to Companion Planting. Heeman. https://heeman.ca/garden-guides/companion-planting/)

MATHEMATICAL LEARNING OUTCOMES:

- ☐ Problem-solving
- ☐ Patterns

SKILL BASED OUTCOMES (Core Competencies/Approaches to Learning Skills)

- ☐ Thinking (Critical and Creative)
  - ☐ Designing and developing
  - ☐ Reflecting and assessing
- ☐ Collaboration

ACTIVITY INSTRUCTIONS:

	***Active Experimentation:*** *Use blocks or beads to represent different fruits and vegetables to determine where it would be best to plant within a garden bed. See PP for scenarios.*
	***Concrete Experimentation:*** *During the spring, plant seedlings or starter plants and make observations of growth. Consider factors such as seasonal temperature, rainfall, pests, etc.*
	***Reflective Observation:*** *What factors impacted production? What would have been done differently? What are some changes that could be made for next year's growing season?*

Supplementary Material:

Garden Bed Activity Powerpoint

Student Handout: Companion Planting Handout

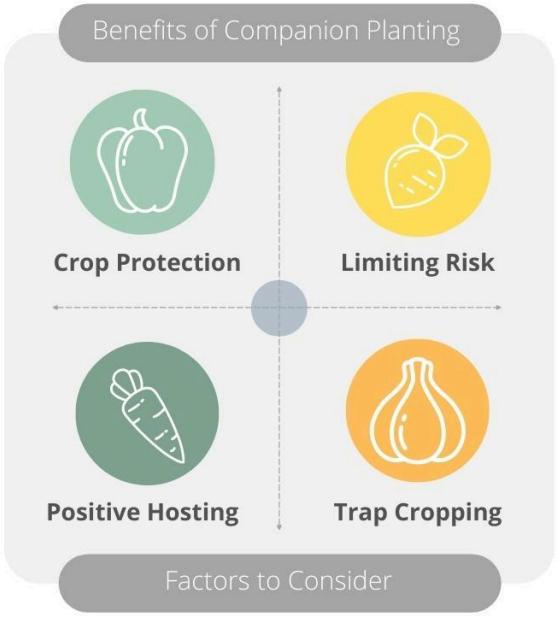
4 Reasons for Companion Planting

Crop Protection

Tougher plants can act as a natural barrier against more unfavourable conditions (Heeman).

Positive Hosting

Certain insects and pests love certain plants! Some plants produce more nectar and pollen, choose ones that can keep the harmful pests away!



Limiting Risk

Uncontrollable factors, such as weather and temperature can impact production. Minimizing external risks can help yield a higher production.

Trap Cropping

Good defence is a must for planting! Added protect by planting plants that insects hate beside the ones they love.

Adapted from Beginner's Guide to Companion Planting. Heeman. https://heeman.ca/garden-guides/companion-planting/)