

Gardening: A Math Adventure

Grade Level: 4-6

Approximate Length of Activity: Two class periods plus gardening time

Objectives:

Teacher:

1. Help students understand how math computations can be applied to a “real life” situation (planting a garden).
2. Help students learn about cooperation and teamwork by making decisions about their garden.

Students:

1. Apply math computation skills (addition and multiplication) to a real life situation.
2. Follow step-by-step directions to complete a class garden.
3. Use group decision-making skills to determine the kinds of items a garden will have.
4. Create graphs from groups of information.

Michigan Content Standards: (Math) II.2.1; II.2.5; III.1.1; IV.2.3; V.1.2; VI.2.1

Introduction:

Gardening is the cultivation of plants, usually in or near the home, as a hobby. Gardening is closely related to horticulture. Horticulture is the growth of fruits, vegetables, flowers, shrubs, grass, and trees. Plants are made up of roots, stems, and leaves. The roots help to anchor the plant in the soil. They also absorb water and minerals to promote plant growth. Stems of plants are various shapes and sizes. Twigs, branches, and trunks are all stems of plants. Some stems grow partially underground, but most stems grow above ground. Stems support the leaves and flowers of plants so they can receive an adequate amount of sunlight. Leaves have the job of providing food for the plant. The leaves need sunlight, which provides energy to combine carbon dioxide, water, and minerals to make food for the plant. This process is called photosynthesis.

Plants are important to all living things. They provide us with oxygen to breathe, food to eat and clothes to wear. Some plants also provide us with wood to build homes and many other things.

We get food from many different parts of the plant. Some foods, such as carrots and sweet potatoes, are actually the roots of the plant. Corn, soybeans, and wheat are seeds of the plant. These three types of seeds provide us with food that is used to make many foods and products. We eat the leaves of plants when we eat lettuce and celery. Broccoli and cauliflower are actually the flower buds of plants. Oranges, bananas, and apples are the fruits of plants.

Plants also provide us with clothing, wood, and medicine. Cotton plants provide us with cotton for many different types of cloth products such as clothing, sheets, and curtains. Trees provide us with lumber so we can make paper, furniture, and most importantly, houses. Wood is also used in various parts of the world for people to burn for heat to cook food and to keep their homes warm. Plants also provide us with medicines like quinine, digitalis, and cortisone, to help treat human diseases and conditions.

Your students can plan and plant a garden right on the school grounds. This project is an exciting way to teach math using addition, multiplication, bar graphs and line graphs. From the beginning layout to the bountiful harvest, fun math situations can be worked repeatedly. Your students will understand that math is needed in the “real” world, and it can be a lot of fun.

Types of Gardens to Plant:

1. Rainbow gardens: Identify flowers and other plants that will add color and interest to your garden.
2. Soup and salad gardens: Think about favorite soups and salads – then grow them! Vegetables may include lettuce, tomatoes, spinach, carrots, celery, radishes, onions, cucumbers, potatoes, peas, and corn.
3. Butterfly gardens: Choose varieties of plants that attract butterflies. A helpful book may be *Landscaping for Wildlife* by Carrol Henderson.

Materials Needed:

- Graph paper
- Colored pencils
- Pencil
- Paper
- Various seed packages (examples include pumpkin, corn, cantaloupe, carrots, onions, tomatoes, and green beans)

Activity Outline:

1. Have your students design a layout of a garden. First, they must decide what they would like to plant in their garden. For example, your students may choose pumpkin, corn, cantaloupe, carrots, onions, tomatoes, and green beans.
2. To design the layout of a garden, each student will construct a small model of a garden using colored pencils on graph paper. Each color will represent a different plant. (For example, a plant that spreads four feet will be four squares wide and four squares high.) Information included on seed packages will be helpful in planning the layout of the garden. **Do not let students begin this project until you have relayed all information in steps 1-5 of this activity outline. If they begin now, they will not have room for tilling.*
3. Here is a sample of the space used for various plants:

Pumpkin	4 feet
Corn	2 feet
Cantaloupe	5 feet
Carrots	1 foot
Onions	1 foot
Tomatoes	2 feet
<u>Green Beans</u>	<u>2 feet</u>
Total	17 feet

4. When coloring the area used for plants, three feet should be allotted between each row of plants for tilling. Since the sample garden (including the plants listed in #1) has seven different plants, there will need to be six tiller spaces between the rows. A three-foot border on each side of the garden is also needed for tilling space.
5. Here is a diagram showing the sample garden discussed above with 30-foot rows:



6. Ask your students to find the length and width of their gardens.
 - a. To find the length, either count the squares or add together the length of the rows and the tilling space on the borders. The length of the rows in the sample garden is 30 feet and the tilling space needed on the borders is six feet (three feet on each end), so the total length is 36 feet.
 - b. To find the width, either count the squares or add together the total feet of the rows, the tilling space between the rows, and the tilling space on the borders of the garden. In the sample garden, the total feet of the rows is 17 feet, the total tilling space between the rows is 18 feet, and the total tilling space needed on the sides of the garden is six feet, so the total width is 41 feet.
7. If possible, allow your students to plant a garden at your school using one of the graph paper models. The expenses for this project will include the cost of the seeds, fertilizer, and organic pesticides. The soil will need to be tilled or plowed prior to planting. The seed packages vary in price. One packet of seeds is sufficient for at least 60 feet of space. An average sack of fertilizer will cover 1,500 square feet. The sample garden discussed above is 1,476 square feet (36'x41'), so an average sack of fertilizer will be sufficient.
8. As the garden produces vegetables, the class can keep a record of the harvest. Plotting the daily result on a line or bar graph is an excellent way for students to learn how to display data and compare at a glance the production of the plant. Since the garden will be growing over the summer, your students may end up charting the harvest at the beginning of their school year and planting a garden at the end.

Discussion Questions:

1. Which vegetables will need the most space in our garden?
2. Which vegetables will need the least space?
3. If we doubled the size of our garden, what would its new area be?
4. How many bag of fertilizer will our new garden need?
5. Figure the average price of a package of seeds using the seeds we have purchased.
6. Create a bar graph displaying the cost of each package of seeds. Which seed cost the most? Which seeds cost the least?

Related Activities:

1. Set aside an afternoon in the fall to enjoy the bountiful harvest.
2. Donate some of your garden's harvest to a local food bank or a homeless shelter.
3. Ask a produce manager from a local grocery store to come in and talk about his or her job and how the store receives its produce.