

Math In The Garden

Ideas from the New Jersey Agricultural Society Learning Through Gardening program

There are so many ways to teach math in the garden! Just look at all the opportunities on the back on any seed packet. Teachers at every grade level can find a way to discuss math while planning, planting, observing, and harvesting a garden. At the same time, you'll be showing your students how math is used in everyday life. Here are some ways to dress up your math lessons with a little green.



Algebra

- Use algebraic formulas to compute a variable, such as the amount of fertilizer to add per quart or liter of water. (Most fertilizer packages indicate how much to add per gallon of water.)
 - Collect various dry bean seeds or plant leaves, and ask students to sort them by size, shape, color, and number.
 - Plant lima bean seeds in small pots. Place half the pots in a bright window and half in a dark closet. Measure growth daily. After two weeks, compile information into a chart and determine the average growth rate of plants grown in the light versus the dark. Discuss and calculate the effect of the variable of light on the variable of plant growth.
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- *Communication*
 - Find out how much money your school spends on cafeteria waste removal. Spend a number of days weighing the food waste and chart the data. Write a report and publish the results within the school and/or do a presentation for students and staff about saving money by reducing food waste and composting the waste you can't avoid. You could take it to the next step and figure out the expenses versus savings of different composting options and share these with the school board!
 - Participate in the Journey North Project at:
<http://www.learner.org/jnorth/tm/tulips/Planting.html>
 - Track the appearance of tulip bulbs in your schoolyard and share the data with other students and teachers participating throughout the country.

Connections

- Measure the perimeters of the entire garden, various beds, paths, and other features. Compute the overall area of garden and garden beds. Draw a map to scale using graph paper. Use the map to plan new garden designs.

Data Analysis and Probability

- Count the total number of flower buds on cucumber plant. Gently attach a piece of tape around the stem near the flower to mark those you counted (be careful not to damage the stems). A few weeks later, examine your marked flower buds and look for signs of baby fruit. Figure out what percentage or fraction of the total flowers produced fruit (number of fruit divided by the number of flowers). Discuss the probability of a cucumber flower producing a fruit.
- Host a bean race. Plant a number of beans at the base of a trellis and track their growth on a chart. Determine the rate of growth. Award the fastest growing plant a blue ribbon.
- Measure the height of a group of plants and determine the mean, median, and mode.

Geometry

- Estimate the number of pots that will fit on your windowsill or under your grow lights. Calculate using different sizes of pots.
- Plant a classroom window box. Determine the volume of soil you will need to fill your box. As you prepare the potting soil, first determine the weight and volume of potting mix when it is dry, then recalculate the weight and volume of moistened mix
- Complete a scavenger hunt in your garden. Look for objects representing different geometric shapes such as circles, squares, and triangles.



Measurement

- Calculate serving sizes of common fruits and vegetables using measuring cups.
- Make a recipe using harvest from the garden requiring different measuring techniques. Search the Internet for recipe ideas.
- Measure the height of garden plants using standard (inches and centimeters) and nonstandard (such as pencil lengths or hand widths) measuring techniques. Chart, compare, and discuss your results.

- Plant bean seeds and let them grow for a few weeks. Remove them from the soil and carefully wash soil away from the roots. Measure part of the root system. Estimate the percentage of total roots you measured and then estimate the length of the entire root system on that plant. After estimating, measure the rest of the roots and compare to your length estimate.

Number and Operations

- Plant lettuce seeds in a flat or pot carefully keeping track of the number planted. As the seeds emerge, count the number of seedlings. Use these two numbers to calculate the germination rate (number of seedlings divided by number of seeds planted, multiplied by 100).
- Ask students to estimate the number of seeds in a tomato, then slice it open and count the number of seeds actually present. Compute the difference between the estimate and actual number of seeds using subtraction.
- Collect five to ten flowers from the same plant in your garden. Count the number of petals on each flower and create a chart to display your results. Repeat with other types of flowers in the garden. What do the results say about the characteristics of plants?



Problem Solving

- Create a planting schedule for your garden. First, determine the desired harvest date for each crop. Next, find the days-to-maturity for each, and count backwards from the harvest date to decide when each crop should be planted.
- Track the cost of garden supplies against the amount of produce you harvest. Figure out the cost per unit (weight, volume, piece) of fruit or vegetable. Compare your cost to the cost of similar produce at the supermarket.

Reasoning and Proof

- Plant a variety of seeds. Find out the number of days it should take for them to germinate (often this is listed on the seed packet). Chart the researched data, then track the actual time for germination and compare the results. Discuss the accuracy of the researched information and how seed producers may have arrived at those numbers. Discuss variables that may have affected your results.

Representation

- Track weather conditions, such as temperature, rain, wind, and humidity, over time. Graph and chart data to summarize your findings.
- Complete a market survey of students and parents regarding garden products you might want to sell. Summarize and interpret data to help you set the foundations for a school garden business.