Jump Start YOUR School Garden

AGRICULTURE IN THE CLASSROOM
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Introduction

School gardens are an excellent way to take learning outside of the classroom and have students interact with the natural world. In addition to increasing student engagement, school gardens have been shown to positively impact academic achievement. Jump Start Your School Garden is intended to help educators integrate the use of the garden - whether it is an outdoor garden or an indoor container garden - into their science and mathematics curriculum. Additionally, tips and suggestions have been included for schools who hope to begin a garden or to enhance an existing one.

Acknowledgements

This resource has been made possible through a grant from the National Agriculture in the Classroom Program and USDA Agriculture in the Classroom Excellence Grants Program.

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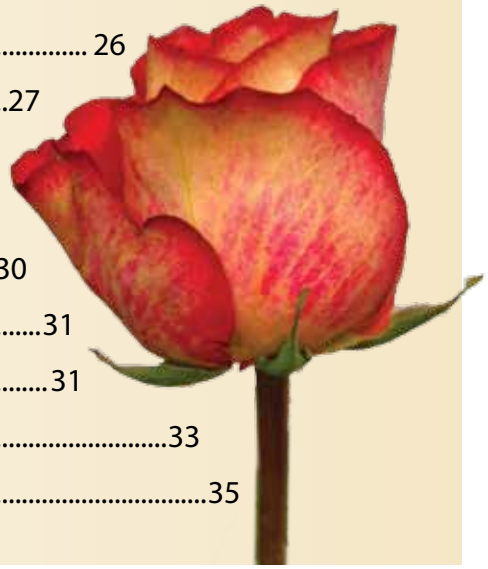


Getting Started

Location, location, location

The ideal location for your garden is an area that receives at least 6 hours of sunlight each day; unless you are planting a shade garden. Additionally, the site should have good drainage, access to water, and easy access from the school/classrooms.

Size matters

Start small, even if that is just a few containers. Starting too large can be a set-up for failure.

It takes a village

Maintenance is the most critical part of a school garden. Enlist as many people as possible to help with the endeavor.

Potential Partners:

- Students and teachers as part of lessons.
- Parent volunteers to help with the start-up of the garden and then to assist teachers with their students while working in the garden.
- Master Gardeners from the community to assist classes and teach gardening lessons. Contact your local Cooperative Extension office to find Master Gardeners in your area.
- Establish a club for after school or during the summer. Members may be students, teachers, or parents.
- Garden clubs from the community to assist with classes and to teach gardening lessons.
- High school students who can earn community service hours by helping with garden upkeep and maintenance.

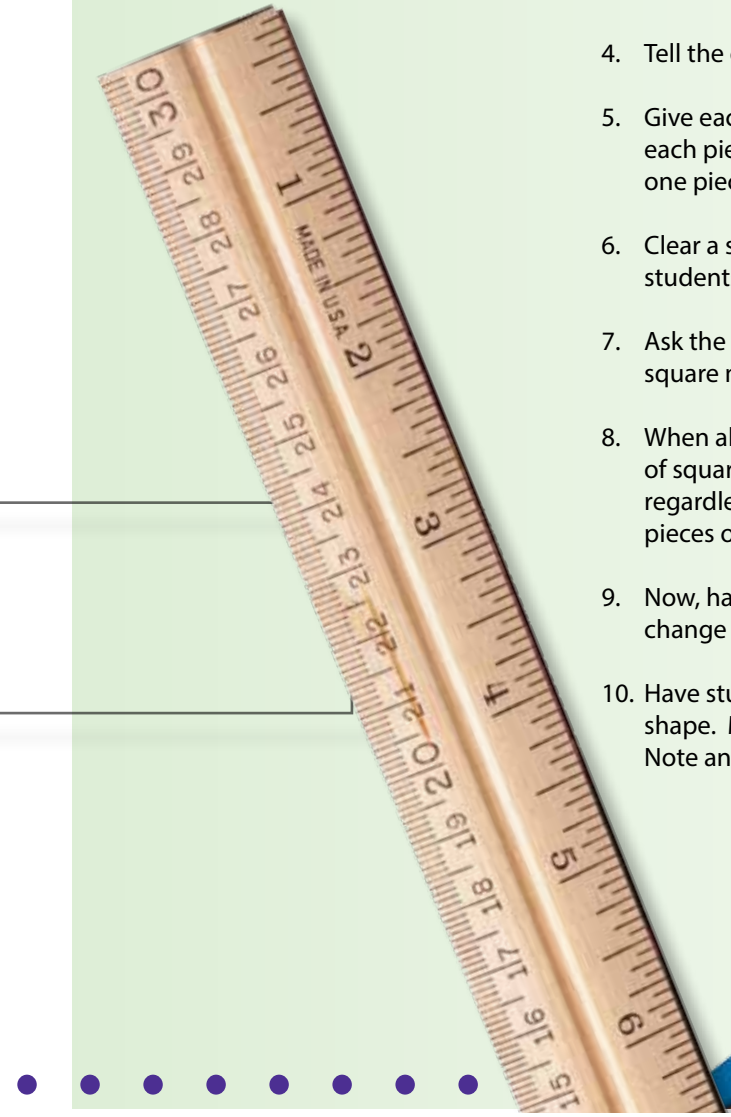
Discover an Acre

Students practice their math skills while helping design a garden.

Standards of Learning
Math: 3.10, 5.8

Objectives
Students will:
- Investigate perimeter and area using 12 inch squares to model a garden
- Measure the perimeter and area of a given space

Materials
- 12" ruler
- 12 x 12 inch construction paper



Background Knowledge
The purpose of this activity is to provide students with a concrete example of area and perimeter. Measurement is also reinforced with this activity. The area is the space that the garden your students create takes up. They can find out the area of their garden if they count the number of squares that they used to create the garden. The perimeter of an object measures the outside lining, so for the students' garden they will count the outside edges of the squares.

Procedure
1. As a class, brainstorm the units we use to measure various things. Examples: an eraser- centimeter; length of a pencil- inch; height of a door- yard, etc.
2. Discuss measuring area and inform the students that we use square feet to measure area.
3. Show students what a square foot looks like by drawing a square on the board that measures 1 square foot.
4. Tell the children that today they are going to be planning a garden.
5. Give each student several 12" x 12" pieces of construction paper. Explain each piece of paper is a square foot. It measures 1 foot x 1 foot. The area of one piece of paper is one square foot.
6. Clear a space in the classroom or go to a room such as the cafeteria where students will be able to lay all of the squares on the floor and view them.
7. Ask the students to place each square on the floor one at a time. Each square must touch at least one side of another square.
8. When all the squares are laid down, have the students count the number of square feet (area) in the shape. (This number does not change, because regardless of how the squares are arranged there is the same number of pieces of construction paper.)
9. Now, have students measure the perimeter of the shape. (This number may change depending on how the shape is formed.)
10. Have students pick up the squares and rearrange them into a different shape. Measure the area and perimeter again. Note any changes.

Discover an Acre (cont.)

Take it Further

Copy seed packet pictures and place on the square foot pages. Write under the seed packet how many of the given seeds can be planted per square foot.

- Have children sort their garden according to the parts of the plant you eat or by how many seeds can be planted per square foot.
- Incorporate multiplication word problems- example: I have 4 square feet and want to plant parsnips. If I can plant 4 parsnip seeds per square foot, how many parsnip seeds can I plant?

Take students outside with the 12" x 12" pieces of construction paper to find square footage and/or perimeter of common objects such as a sidewalk, door, window, a picnic tabletop, a seesaw, or a parking space.

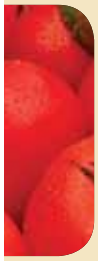
Square Foot
den

Garden Spotlight

Make the lesson come alive by planting your own **Square Foot Garden.** Divide your garden into square foot increments and plant within the squares.

Plant Recommendations:

- One plant per square foot (12 inches apart): "patio" (dwarf bush) tomatoes, potatoes, broccoli, cabbage, cauliflower, kale, head lettuce, New Zealand spinach, peppers, peanuts, large sunflowers, tampala (amaranth)
- Four plants per square foot (6 inches apart): leaf lettuce, parsley, Swiss chard, sweet corn (small varieties), mustard greens, basil, coriander, dill, parsnips, shallots, small sunflowers, turnips
- Nine plants per square foot (4 inches apart): bush beans, spinach, leeks, anise, chervil, corn salad (mache), mustard greens, nasturtiums
- Sixteen plants per square foot (3 inches apart): carrots, beets, radishes, onions, cumin, garden cress



What Should I Plant?

Keep it simple and plant crops that will mature in the spring before the end of the school year or plant in the early fall before the danger of frost. The crops listed below are cool season crops and do well in the spring or early fall.

Size listed is for mature size. Most of the crops can be harvested before they are at their mature size and served as "baby vegetables." Lettuce and spinach work well like this.

Vegetable crops need at least six hours of sunlight each day.

These vegetables can be grown in the ground, in raised beds, or in large containers.

Crop	Days to Harvest	Size	Comments
Beets	50 – 70	2 – 3" diameter	Harvest small outer leaves to use in salads.
Broccoli	50 – 65*	6 – 7" across	Side shoots may be harvested after main head is removed.
Cauliflower	55 – 80*	6 – 8" across	Tie leaves over head when head is 2 – 3" across.
Lettuce	45 – 60	4 – 6" tall	Harvest outer leaves first. Hot weather causes bitterness.
Peas	55 – 85	3" pods	Harvest when seeds are plump in the pod.
Radish	25 – 45	½ - 1½" diameter	Harvest before they become too large.
Spinach	45 – 60	6 – 8" tall	Can be harvested smaller. Eat cooked or raw.
Turnip	45 – 70	2 – 3" diameter	Greens can also be cooked and eaten.

*from transplants

Garden Explorations

Help students discover the natural world around them.

Standards of Learning
Science: K.1, K.4, 1.1, 2.1, 3.1, 4.1

Objectives
Students will:
- Investigate an ecosystem
- Classify their findings
- Record their discoveries

Materials
- Zip top sandwich bags (one/student)
- Magnifying glasses
- Paper

Background Knowledge
School gardens and the schoolyard beyond are a great place for exploration and investigation. As students explore this unique ecosystem, they will be able to bring a small part of it back to the classroom for further investigation. Increasing students' awareness of the plant and animal life around them is very important in today's world. Many of our students do not play outside at home and do not have the opportunity to explore the natural world. This lesson provides an opportunity to show students the many living things in their environment.

Procedure
1. Give each student a zip top sandwich bag.
2. Share your class collection rules before taking a nature walk. For example, in public gardens students may not pick items from trees and plants. Items which fall to the ground are plentiful for collecting as specimens. Is picking up a dead bug appropriate? Define the collection area. Each setting has its own unique set of rules.
3. Provide the class a time limit to find at least five items that will fit in their zip top bags.
4. Bring the class back together and divide them into groups of three or four students per group.
5. Ask the groups to empty their bags and share with their team members.
6. After all members have shared their findings, ask the students to think of ways to sort or classify their objects.
7. This process may be repeated multiple times.
8. After classifying, give each student a magnifying glass. Ask them to look closely at their objects. Do they see anything they didn't see without the magnifying glasses? Can they think of additional ways to sort or classify?
9. Give each student a piece of paper. Through illustration and writing, ask the students to show one way their group classified the garden objects. Ask them to write on the paper the way they are classifying their garden objects, for example, "Plants and Animals" or "Color, "etc.
10. Divide a bulletin board into sections (one/group). Display the students' zip top bags filled with objects at the top of each section. Display the students' classification sheets below them.
11. Have a class discussion about the different ways the garden objects were classified. What discoveries were revealed with the magnifying glasses?

Take it Further
Write a story about their garden exploration, including as many of the objects from their group as possible.

Rainbow Garden

Match colors to fruit, vegetables, and flowers.

Background Knowledge
The natural world is full of color. In this lesson students will investigate the many different types of plants and sort them by color.

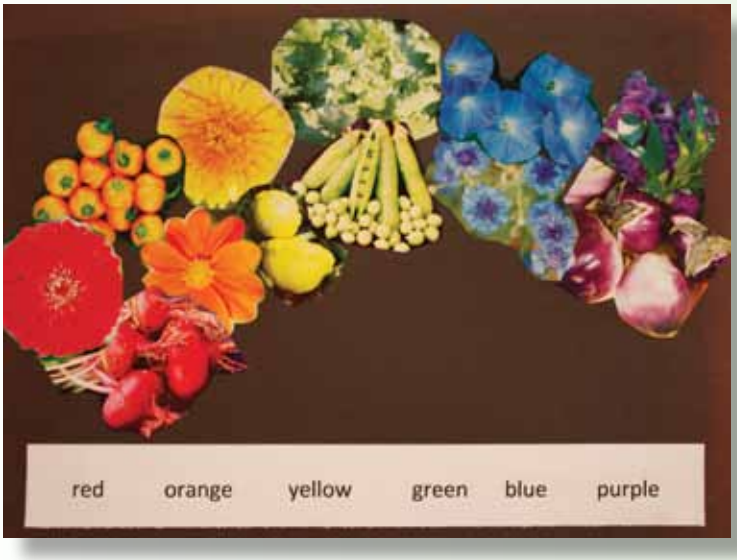
Procedure
1. Give students seed catalogs and garden magazines or access to the Internet to search for colorful plant images.
2. Ask students to find images of plants (fruits, flowers, etc.) in each of the colors of the rainbow.
3. Have students cut out the images.
4. Arrange them on a black or white piece of construction paper in a rainbow or other desired shape.
5. Label the colors.

Take it Further
Plant a rainbow garden either in a planter bed at school or in containers.
Some sample plants are:
- **Red** – petunias, zinnias, celosia, tulips, radishes, beets
- **Orange** – marigolds, zinnias, tulips, tomatoes, carrots
- **Yellow** – marigolds, petunias, daffodils, squash, tomatoes
- **Green** – zinnias, parsley, rosemary, basil, lettuce, spinach, peas
- **Blue** – morning glory, grape hyacinth, cornflower, love-in-a-mist, blueberries
- **Purple** – ageratum, statice, salvia, petunias, hyacinth, tulips, eggplant, turnips, string beans, potatoes, bell peppers

Standards of Learning
Science: K.4

Objectives
Students will:
- Investigate and understand physical properties (color) of objects (garden plants).

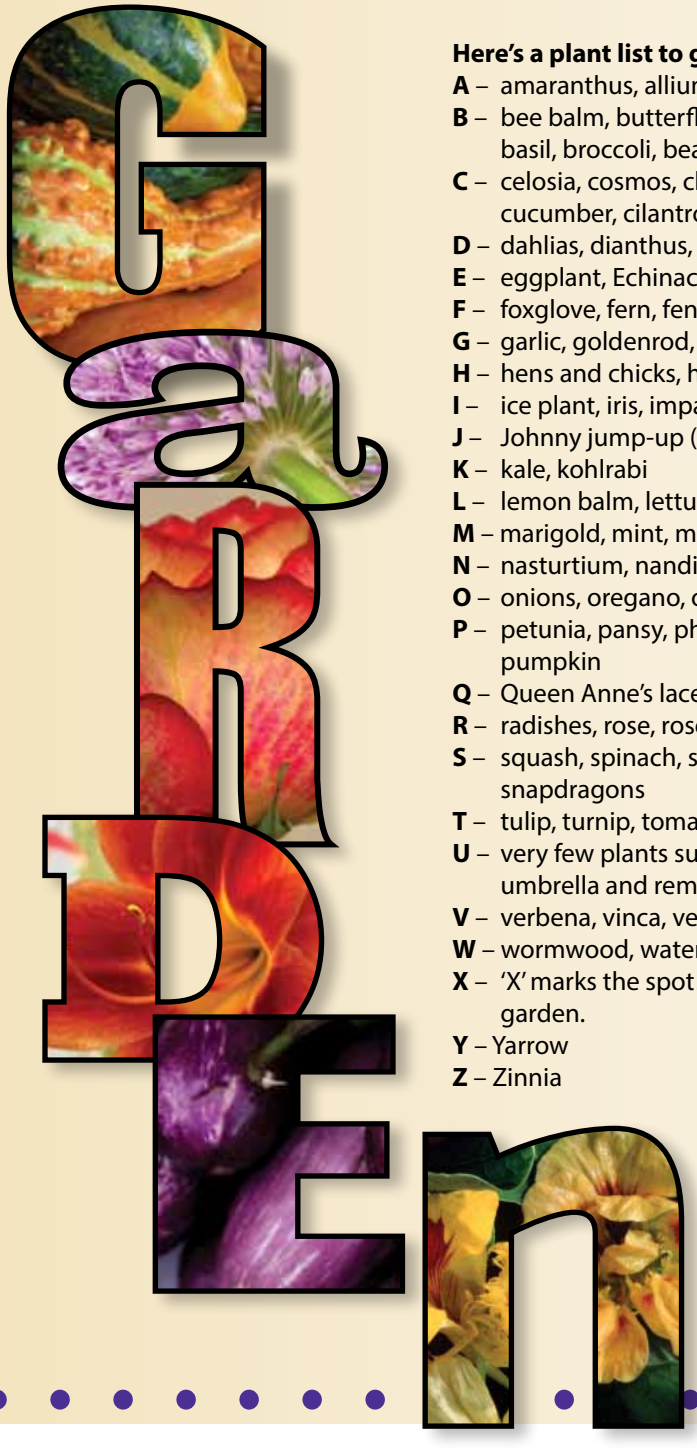
Materials
- Seed catalogs
- Garden magazines
- Crayons or markers
- Construction paper or card stock
- Glue sticks
- Scissors



Garden Spotlight

Plant an **Alphabet Garden.**

Plant a plant or group of plants that begin with each letter of the alphabet. Place a large letter in each section of the garden for the plants that begin with that letter. For example, in the 'A' section of the garden plant Amaranthus, Allium, Ageratum and Asparagus. Be sure to label all of the plants! If you don't want to plant the entire alphabet, spell something such as the school name or mascot and plant a plant to coordinate with each letter. LIONS could be lemon balm, iris, oregano, nasturtiums and salvia.
Be creative!



Here's a plant list to get you started.

A – amaranthus, allium, ageratum, asparagus, alyssum
B – bee balm, butterfly bush, butterfly weed, begonias, black-eyed Susan, beets, basil, broccoli, beans
C – celosia, cosmos, chives, carrots, cabbage, collards, corn, cabbage, cauliflower, cucumber, cilantro, crocus, cotton
D – dahlias, dianthus, daylily, daffodil, dill, dusty miller
E – eggplant, Echinacea
F – foxglove, fern, fennel, feverfew, four o'clocks
G – garlic, goldenrod, gourds, gomphrena
H – hens and chicks, heliotrope, hollyhocks, hibiscus (hardy varieties), hyacinth
I – ice plant, iris, impatiens
J – Johnny jump-up (violas)
K – kale, kohlrabi
L – lemon balm, lettuce, lavender, lamb's ear, lily, larkspur
M – marigold, mint, mustard, marjoram, mums
N – nasturtium, nandina, nigella
O – onions, oregano, okra
P – petunia, pansy, phlox, potato, peppers, parsley, peas, parsnips, peanuts, pumpkin
Q – Queen Anne's lace
R – radishes, rose, rosemary
S – squash, spinach, sedum, sage, salvia, Swiss chard, sweet peas, sunflowers, snapdragons
T – tulip, turnip, tomato, thyme, tomatillo
U – very few plants suitable for a school garden…Have a wooden cut-out of an umbrella and remind students to carry them on rainy days!
V – verbena, vinca, veronica
W – wormwood, watermelon
X – 'X' marks the spot…This is a great place for a bench or a photo-op in the garden.
Y – Yarrow
Z – Zinnia

Edible Plant Parts Garden

Teach plant parts with a student-created container garden.

Background Knowledge

We eat all plant parts, but not all parts of every plant. Here's a list of some favorite edible plant parts that can be grown in a Virginia garden:

- **roots** – carrots, beets, radishes, turnips, sweet potatoes
- **stems** – asparagus, kohlrabi, potatoes (tubers)
- **leaves** – lettuce, spinach, cabbage, Swiss chard, collards, kale, mustard, onions (bulb)
- **flowers** – broccoli, cauliflower, nasturtiums, violas
- **fruits** – tomatoes, peppers, cucumbers, squash, beans and peas (in the pod), eggplant, melons, pumpkins
- **seeds** – beans and peas (shelled), corn, sunflower

The garden should be located in an area that receives at least six hours of sunlight/day.

Procedure

1. Divide the class into six groups – one for each plant part.
2. Give each group a container or assign their raised bed.
3. Have students put a shallow layer of drainage material in the bottom of their container.
4. Have students add potting medium to their containers. If using a combination, add a little of each and let the students mix it with their hands or trowels. Fill to within 2 inches of the top of the container.
5. Mix about ½ cup slow-release fertilizer into the soil. Some potting soils already have slow-release fertilizer in them. Read your labels!
6. Give each group seeds/seedlings for their container. One type of plant per container is recommended. Show the students how to plant their seeds. The recommended depth is typically 1 ½ - 2 times the seed's diameter. Seedlings should be planted at the same depth they were growing in their small container.
7. Water the seeds/seedlings.
8. Students should write the crop name, date and their name on the plant labels and place them in the container.
9. Check the containers daily for water as needed.
10. Students should keep a garden journal, recording the type of seeds/seedlings planted; date planted; when first seeds germinate; daily observations, etc. Measurements can also be recorded.
11. When plants are at the desired size, harvest, wash and eat either raw or cooked.

Note: Some plants take longer to mature to a harvest-size (especially the fruit group). If you want all groups to harvest at about the same time, choose some of the crops that mature quickly (lettuce, spinach, radishes) and divide the groups accordingly, even if you don't plant something from each plant part group. For example, plant several root and leaf crops and purchase items from the other plant part groups at harvest time for discussion and sampling.

Standards of Learning

Science: K.7, 1.4, 2.4, 3.8, 4.4

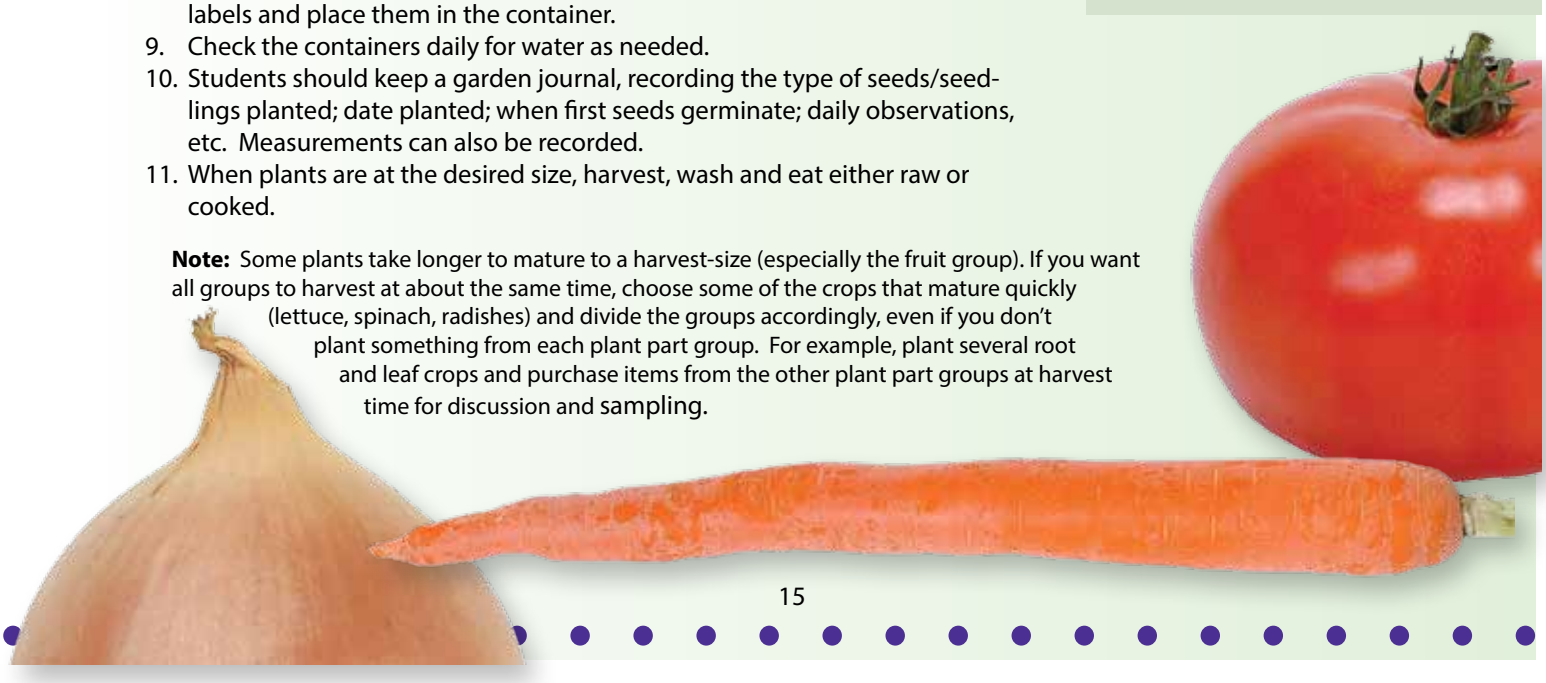
Objectives

Students will:

- Investigate plant life processes
- Identify plants with edible parts

Materials

- 6 large containers (½ barrel size) with drainage holes
- Assorted seeds or seedlings representing all plant parts
- Potting soil, garden soil, compost (A combination of these would be great!)
- Slow-release fertilizer
- Drainage material (small rocks, broken clay pots, Styrofoam packing peanuts)
- Watering cans
- Wooden or plastic plant labels (wooden craft sticks work well.)
- Pencils



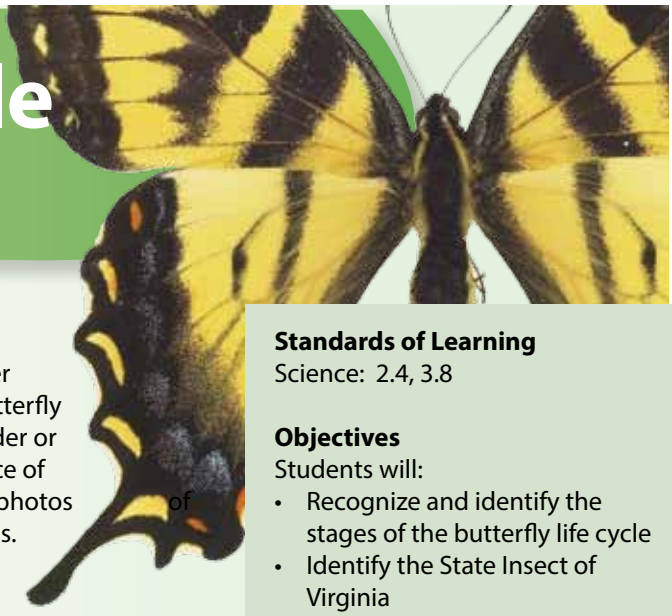
Garden Spotlight

Like the Plant Parts Container Garden? Try these tips for more container gardens.

- A container garden can be made from just about anything as long as it holds soil and has a drainage hole. Container gardens don't have to be flower pots. Be creative! Use an old bucket, wheel barrow, wagon, old shoes or boots, even old pots and pans. Yard sales and thrift stores are great places to find interesting containers.
- Small containers can be nestled into garden beds, while large ones can stand alone in the landscape.
- Plants with the same requirements should be planted together…sun plants with sun plants, shade plants with shade plants.
- A good rule of thumb: For containers large enough to hold more than one plant, you should have at least one creeping or weeping plant, one bushy plant and one tall or upright plant.
- Use a good potting soil.
- Fertilize your container gardens! A slow release fertilizer is great, because you can apply it once in early spring and it will last for the rest of the growing season.
- Containers may be used for vegetables, annuals, perennials, small shrubs and trees or a combination of these plants.

Butterfly Life Cycle

Get to know one of the inhabitants of your garden.

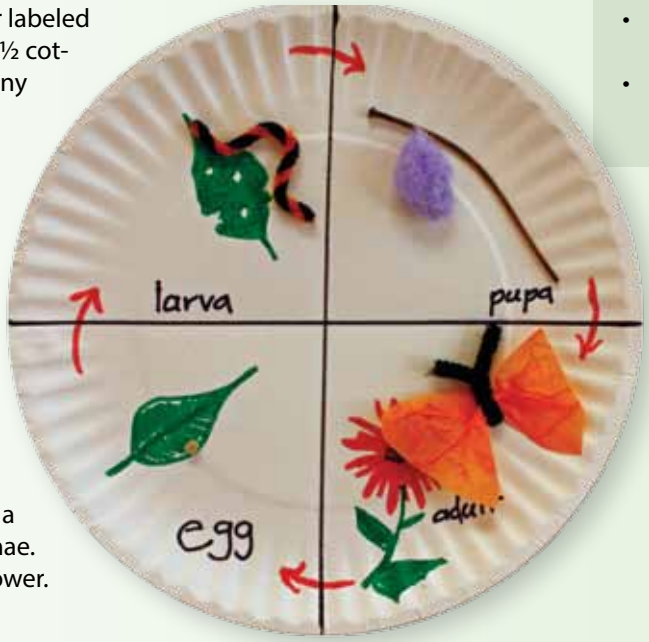


Background Knowledge

Familiarize students with butterflies, especially the Eastern Tiger Swallowtail which is the State Insect of Virginia. Review the butterfly life cycle. Read the book Where Butterflies Grow by Joanne Ryder or another book about butterfly life cycles. Discuss the importance of butterflies as pollinators for our food crops and flowers. Show photos of butterflies in different stages of their life cycle to the students.

Procedure

1. Have students observe the photos provided or search the Internet for more images of butterflies in different stages of their life cycle. Print some photos and compare the different species of butterflies during the different stages.
2. Give each student a paper plate.
3. Have students fold the plate in half. Open and fold in half in the opposite direction and open.
4. The plate is now divided into quarters.
5. Using a pencil or crayon, students should trace along the folded lines.
6. Write the four stages of the butterfly life cycle (egg, larva, pupa, adult) on the plate (one per quarter.)
7. Draw a leaf in the quarter labeled egg. Glue the tiny fringe ball on the leaf.
8. Draw a leaf with some holes to represent food in it in the quarter labeled larva. Use an Earth-colored pipe cleaner to represent the larva. If desired, it can be bent into an "inch worm" shape. Glue it on the leaf.
9. Glue the twig in the quarter labeled pupa. Using the fiber fill or ½ cotton ball, roll it into a tight, tiny pupa and glue it onto the stick.
10. Draw a flower in the quarter labeled adult. Use the tissue paper and a black pipe cleaner to make the butterfly. Pinch the tissue paper together to form a "bow tie." Fold the pipe cleaner in half. Insert the tissue paper and twist half way, leaving the end in a 'V' shape to look like antennae. Glue the butterfly on the flower.



Standards of Learning

Science: 2.4, 3.8

Objectives

Students will:

- Recognize and identify the stages of the butterfly life cycle
- Identify the State Insect of Virginia

Materials

- Paper plates (one per student)
- Tiny fringe balls (one/student)
- Twigs (no longer than 3")
- Fiber fill or ½ cotton ball
- Assorted pipe cleaners cut into 3" sections
- Black pipe cleaners cut into 3" sections (2/student)
- Assorted colors of tissu cut into 2" x 3" pieces
- Glue
- Crayons, colored penci markers

Butterfly Symmetry

Find symmetry with this beautiful pollinator.

Standards of Learning
Math: 2.15

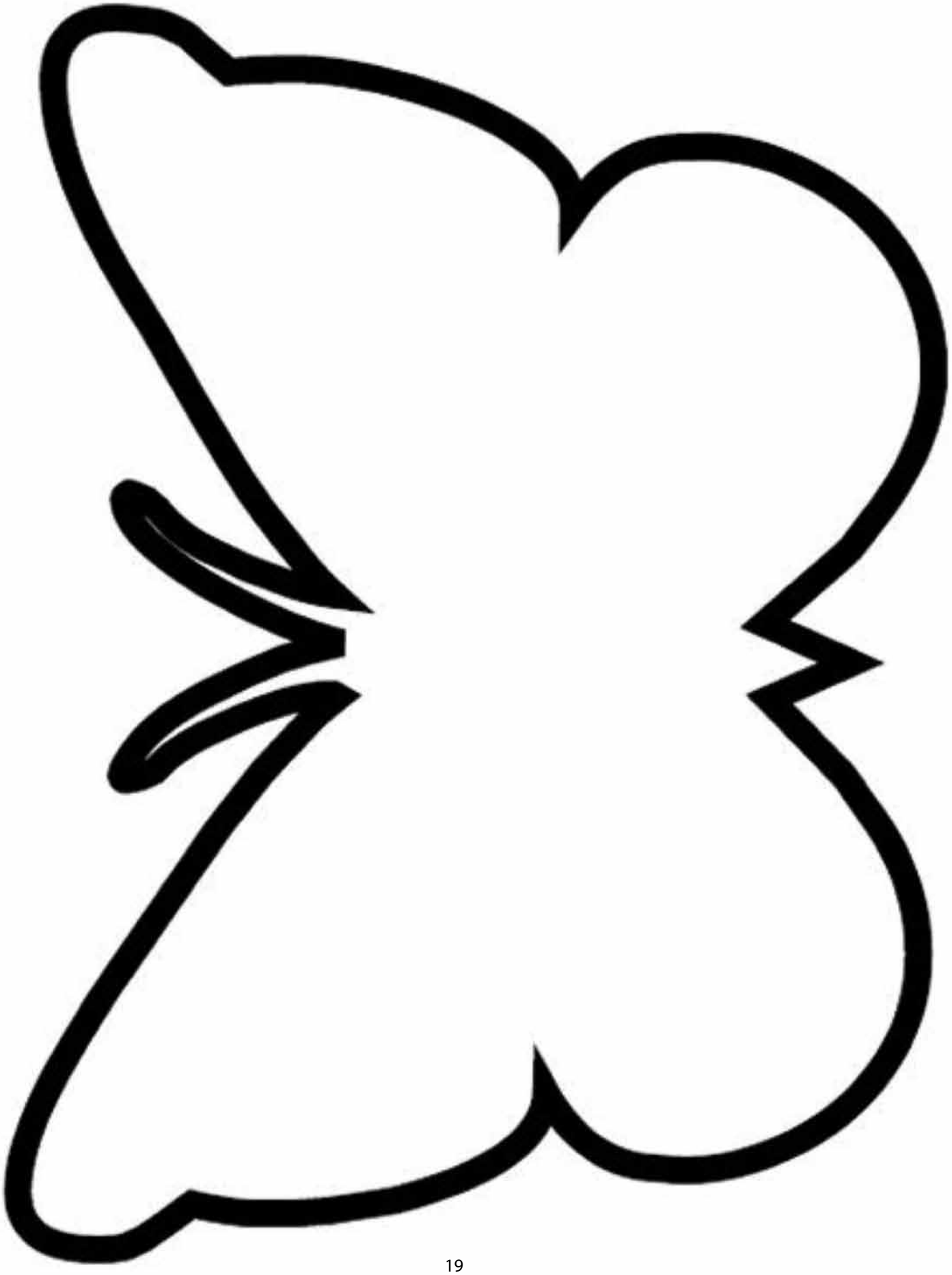
Objectives
Students will:
- Create and identify a line of symmetry in a figure.

Materials
- 8 ½" x 11" paper (white or pastel)
- Scissors
- Butterfly template (attached)
- Assorted tempura paints
- Sponge paint brushes
- Black pipe cleaners (optional)
- Glue (optional)

Background Knowledge
Familiarize students with butterflies, especially the Eastern Tiger Swallowtail which is the State Insect of Virginia. Review the butterfly life cycle. Discuss the importance of butterflies as pollinators for our food crops and flowers. Show photos of butterflies to the students.

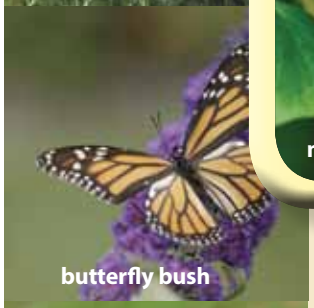
Procedure
1. Have students observe the photos provided or search for butterfly photos on the Internet. Ask them to look at patterns and symmetry in the butterflies' wings.
2. Give each student an 8 ½" x 11" piece of paper.
3. Have students fold the paper in half (hamburger fold).
4. Students may draw half of a butterfly with the fold along the body or use a stencil lined up along the folded edge.
5. Cut along the wing lines.
6. Open the folded paper to reveal the butterfly shape and identify the crease as the line of symmetry that bisects the butterfly.
7. Using sponge brushes, dab paint onto one side of the butterfly's wings.
8. Fold the wings together and press firmly with hands.
9. Open the wings to reveal the symmetrical pattern on the wings.
10. Allow the paint to dry.
11. Display butterflies on a bulletin board.

Take it Further
For older students, allow them to create the butterfly's body using black pipe cleaners. Remember to show the body parts (head, thorax, and abdomen) as well as antennae on the head and six legs on the thorax.



Garden Spotlight

If you're studying butterflies or the butterfly life cycle, why not plant some things to attract them to your schoolyard. Here are some good ones to get you started: butterfly bush, butterfly weed, milkweed, parsley, dill, fennel, zinnias, marigolds and vinca.



Pizza Garden Fractions

Practice fractions with a favorite food.

Background Knowledge

Review the basic ingredients used to make a pizza: dough (made from flour, which is made from wheat seeds), tomato sauce (tomatoes), assorted herbs (basil, oregano and parsley leaves) and cheese (milk from cows). Other ingredients may include peppers (sweet or hot), onions, mushrooms, spinach, pepperoni, or sausage. Discuss which of these can be grown in a garden. Make a list of the garden ingredients versus other ingredients.

Procedure

1. Tell students they are going to be Pizza Garden Designers.
2. Give each student a paper plate to create a pizza garden plan.
3. Ask them to fold the plate in half and then open it up.
4. Have them lay a ruler along the line and mark the line with a pencil.
5. Ask them to fold the plate in half in the opposite direction and open it up.
6. Have them lay a ruler along this line and mark the line with a pencil.
7. Now label the pieces of the plate as fourths.
8. Have the students draw or paste a picture of wheat in $^1/_4$ of the plate.
9. Have the students draw or paste a picture of tomatoes in $^1/_4$ of the plate.
10. Have students draw or paste a picture of herbs in $^1/_4$ of the plate.
11. Have the students draw or paste a picture of another pizza plant ingredient (such as peppers, onions, or mushrooms) in the other quarter.
12. Label each ingredient with the plant name.
13. With older students, they can fold their plates into $^1/_8$'s or measure and draw lines for $^1/_3$'s and $^1/_6$'s. Additional ingredients may be added for each fraction of the plate.

Take it Further

Celebrate fractions with a pizza party! Show the students the whole pizza. Count the number of slices.
Ask the students to tell you the fractions as you show portions of the pizza ($^1/_2$, $^1/_4$, $^1/_8$, etc.)
Now, eat and enjoy!

Standards of Learning

Math: K.5, 1.3, 2.3

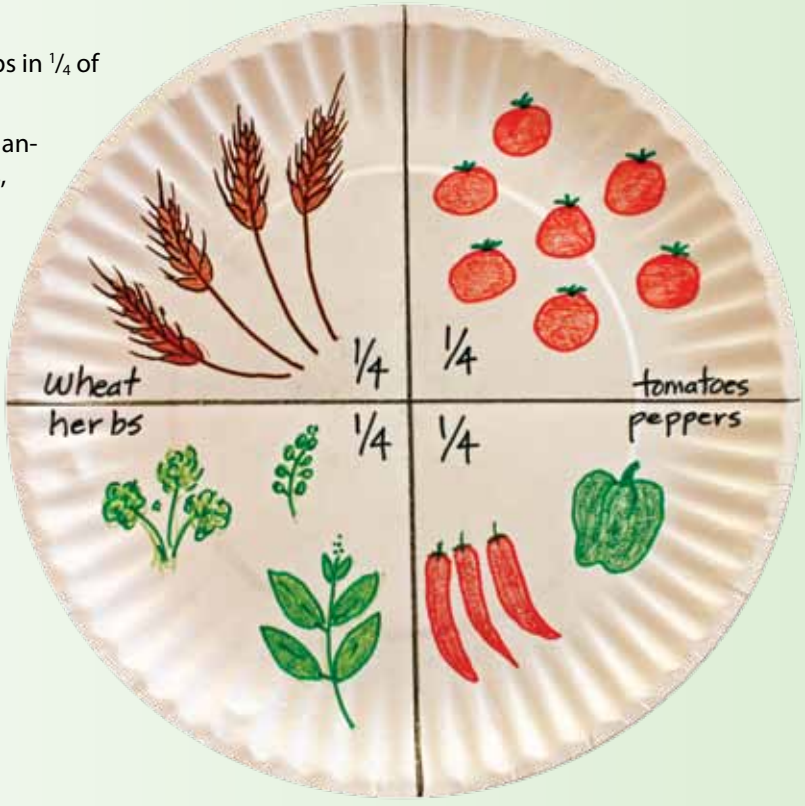
Objectives

Students will:

- Identify the parts of a set that represent fractions.
- Name and write fractions represented by a model.

Materials

- Paper plates
- Rulers
- Pencils, crayons and/or markers
- Images of wheat, tomatoes, herbs and other garden plants that can be found on a pizza



Garden Spotlight

Plant a pizza garden at school. Keep in mind that the majority of the crops in a pizza garden will mature during the summer when most students are not in school. It is not recommended to plant this type of garden unless someone will be maintaining it during the summer.

Have summer garden helpers and want another fun summer garden? Try a salsa garden. Plant all of the items that you'd find in salsa. You need to include tomatoes, tomatillos, peppers (sweet and hot), onions, garlic, parsley and cilantro.

Irrigation Challenge

Students practice team-building and problem solving while learning the importance of water.

Before You Begin
Cut the pool noodles into various lengths ranging from 6" – 12". Cut each section in half (lengthwise) to expose the center of the noodle, resulting in a half circle. An electric knife makes this step much easier than cutting with scissors or a box cutter.

Background Knowledge
Irrigation is the watering of land by artificial means to foster plant growth. Many farmers in Virginia use irrigation systems to water their crops, especially during periods of little or no rain. There are many types of irrigation systems which vary depending on the crop and the size of the field/garden that needs to be watered. Crops may be watered by:

a) **surface irrigation** – water moving over the land in trenches

b) **drip irrigation** – using hoses with tiny holes along the ground to distribute water

c) **sprinkler irrigation** – using sprinklers to distribute water overhead

d) **manual** – watering by hand with a hose or a watering can, which is not practical for large areas

Procedure
1. Set up an obstacle course for the irrigation system. It can be as simple or complicated as you would like, depending on the abilities of your students. Try going over and under large objects (tables or benches) or around corners and curves. Make the course longer than the students' sections of noodles.
2. Divide the class into two teams.
3. Give each student a section of noodle.
4. Give each team a set number of marbles (5 – 10)
5. Teams will have a designated time to plan their strategy.
6. All marbles must travel along each student's section of noodle.
7. All marbles must begin at the starting point and end in the team's bucket at the end of the obstacle course.
8. Only one marble per section of noodle at a time.
9. If a marble is dropped, it must return to the starting point.
10. The first team with all of their marbles in their bucket wins.

Take it Further
Have the students time their procedure. Repeat the procedure several times and record the time. Make observations and conclusions.

Do the activity outside and using a given amount of water instead of marbles. This can be quite messy, so be prepared for students to get wet and possibly dirty!

References
www.kidsgardening.org

Standards of Learning
English: 3.1, 4.1, 5.1

Objectives
Students will:
- Investigate and understand that water flows and has properties that can be observed and tested.

Materials
- 2 – 3 pool noodles (long, skinny, foam pool toys)
- Several small marbles
- Scissors, box cutter or electric knife
- 2 small buckets

Garden Spotlight

Add a water feature to your garden. This can be a simple water-tight container with a bubbler or a small pool with a waterfall. Grow plants that thrive in or near water. Water gardens can be high maintenance, especially if you have pumps or filters that need to be checked on a regular basis. Depending on the age of the students, safety may also be a concern around the water. Water gardens, like other gardens, attract wildlife, so be prepared to greet garden friends!

Virginia Regions Garden

Help students explore the bounty of the state's regions.

Background Knowledge

Familiarize students with plants/crops that are grown in Virginia for food, fibers and fuel as well as for beautification.

- **Coastal Plain:** peanuts, potatoes, green beans, soybeans, corn, wheat, cotton, nursery products, hay, watermelon, Azalea, ornamental grasses
- **Piedmont:** tomatoes, soybeans, corn, squash, peaches, pumpkins, apples, tobacco, grapes, hay, Dogwood
- **Blue Ridge:** pumpkins, corn, Christmas trees, tomatoes
- **Valley and Ridge:** apples, hay, Sugar Maple trees
- **Appalachian Plateau:** hay (alfalfa, clover, fescue), tobacco
- All regions may include plants native to their region.

Procedure

1. Divide the class into five groups, one for each region of Virginia.
2. Give each group a list of plants for a region. Using the AITC Commodities Map, students will decide the region in which their crops are grown.
3. Have students research the list of plants for their group's region.
4. Have each group give a report about the plants in their region by doing a PowerPoint presentation, a bulletin board, a poster, etc.
5. With parent volunteers, Master Gardeners or other adult assistance, students may plant a garden with some of the plants/crops from their region.
6. The garden may take on a variety of looks depending on the school grounds. You may want to create a large outline of Virginia and plant within the regions. You may build five raised beds (one for each region) to plant one or more of the crops and label the beds with the region and show the region on a map. You may use five large containers to represent the regions and plant one crop from each region in the container. The possibilities are endless! Be creative!

Standards of Learning

Science 4.9
History and Social Studies VS.2, VS.10

Objectives

Students will:

- Name plants and crops that grow in the five regions of Virginia.

Materials

- AITC commodities map (appendix)
- Internet access

Garden Spotlight

Virginia Garden

Continue your study of the state with a Virginia Garden. Grow plants in your garden that can be found growing across Virginia from the Eastern Shore to the mountains. These plants can be natives, flowers, shrubs, trees, vegetables or field crops.

Colonial Herb Garden
Three Sisters Garden

Or, step back in time with a **Colonial Herb Garden** or **Three Sisters Garden**

Colonial Herb Garden
This is a perfect place to discuss Jamestown, Williamsburg and early colonists in Virginia. Herbs were used to make medicines and perfumes as well as flavor foods. Include herbs such as parsley, sage, thyme, rosemary, lavender, mint, bee balm, chamomile, wormwood, feverfew and yarrow.

Three Sisters (Native American) Garden
This is a great summer garden, because it includes beans, corn and squash. Plant several varieties of each vegetable for more interest. As your students study Native Americans, this is a perfect connection with plants.

Leaf Area and Perimeter

Practice measurement with objects found in nature.

Background Knowledge

Perimeter is the outside measurement of a given space. In gardening, it's important to know the perimeter of your garden, so you will know how much fence to purchase. Area is the space within a given perimeter. You should know the area of your garden, so you will know how much seed, fertilizer and mulch to purchase for the given space.

Procedure

A.

1. Have students pick a leaf from a tree or garden plant (nothing too small or too large)...about the size of their hand.
2. Students should trace an outline of their leaf on a piece of paper. A couple of small pieces of tape may be needed to hold the leaf in place for tracing.
3. Remove the leaf to reveal the outline.
4. Give each student a piece of yarn about one yard in length.
5. Ask them to use the yarn to outline the perimeter of the leaf.
6. Cut the yarn at the point where it overlaps the starting point.
7. Remove yarn from the paper and lay it on a ruler, yardstick or tape measure to determine the perimeter of the leaf in inches.
8. Write the answer on the paper with the leaf outline. Example: perimeter = 14"

B.

1. Give students a one inch square of paper (different color) and have them glue it to the paper with the leaf outline.
2. Give students a small cup with dried beans.
3. Ask them to fill the square inch with the dried beans, laying them side by side.
4. Count the number of beans in the square inch and write that number on the paper beside the square inch. Example: 18 beans/square inch
5. Estimate the number of beans needed to fill their leaf outline and write their estimate on their paper.
6. Fill the leaf outline with dried beans, laying them side by side.
7. Count the number of beans in the leaf outline. Write the total beside the leaf.
8. Divide the number of beans in the leaf outline by the number of beans in the square inch to give the total number of square inches in the leaf.

Take it Further

Have students measure perimeter and area for other items and spaces within the garden. Items that can be measured are table tops, stepping stones, defined spaces of a sidewalk, a raised bed, etc. Small spaces can be measured in inches and square inches, while larger spaces can be measured in feet and square feet.

Standards of Learning

Math: 3.9, 5.8

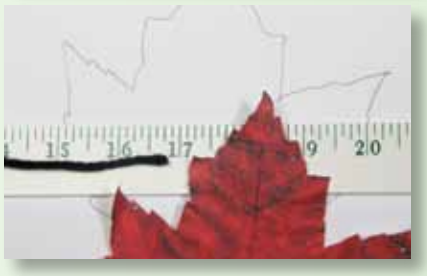
Objectives

Students will:

- Calculate area and perimeter for a given space, using a leaf as a guideline.

Materials

- 8 ½" x 11" paper (white or pastel)
- Pencils
- Tape
- Yarn
- Dried beans, peas or corn
- Small cups



Garden Circles

Find geometry in nature.

Standards of Learning
Math: 5.9

Objectives
Students will:
- Explore the schoolyard and garden to identify circles.
- Measure the diameter, radius, chord and circumference of circles.
- Record their measurements.

Materials
- Rulers, yardsticks, tape measures
- Yarn or twine
- Pencils
- Paper

Background Knowledge
- **Circumference** – the perimeter or the external boundary of a figure (circle) or object
- **Diameter** – the length of a straight line through the center of an object
- **Radius** – a line segment extending from the center of a circle or sphere to the circumference or bounding surface
- **Chord** – a straight line segment joining and included between two points on a circle; broadly : a straight line joining two points on a curve

Procedure
1. After reviewing the terms above, take students to the schoolyard or school garden and ask them to look for circles. You may want to embellish the garden by adding flower pots in a variety of sizes. Other things to look for are round stepping stones, bird baths, tree trunks, etc.

2. Students may work in pairs or small groups to measure and record the circumference, diameter, radius and chord of the circles they find. Encourage students to find at least five circles to measure.

Tip: If enough tape measures are not available for each group, use a length of yarn or twine to wrap around the circles and then measure the yarn with a ruler or yardstick.

Garden Spotlight

Want to add more interest to your garden? Try these ideas!

Contents – In addition to plants, these are possibilities but not absolute necessities for the garden.

- Storage for tools and other items needed in the garden
- Tables with benches or chairs
- Additional seating, such as benches or stumps
- Containers
- Compost bins/compost pile
- Bird feeders
- Bird bath
- Bird houses
- Statuary
- Garden art created by students
- Signs – formal or informal
- Thermometer – weather-proof and large enough for a class to see
- Rain gauge
- Sundial

Paths/Walkways – make garden paths wide enough for two people to walk comfortably beside each other

- Mulch
- Gravel
- Combination of pavers and crusher run (small gravel) or sand
- Bricks
- Concrete – if you do this, imbed some native plant leaf prints for interest.

Garden Scrapbook Calendar

Track your garden with this fun keepsake.

Standards of Learning
Science K.1, K.9, K.10, 1.1, 1.7, 2.1, 2.4, 2.7, 3.1, 3.8, 4.1

Objectives
Students will:
- Create and contribute to a calendar that charts the growth of their school garden
- Collect data about the garden along with photos and student illustrations.

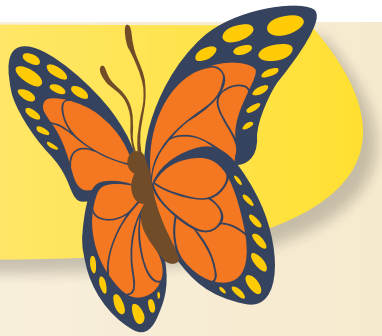
Materials
- Pictures of your garden and/or other applicable keepsakes (seed packets, for example)
- Student writing and/or science journals (if used)
- Scissors
- Adhesive
- Stickers, journaling markers, decorative papers and other scrapbook supplies, as needed

Background Knowledge
An excellent way to record the growth and progress of your garden is to create a scrapbook calendar with your students. Use this as a creative and artistic form of science journaling that not only charts the daily and seasonal changes in your garden, but also produces a lasting and memorable keepsake to share with future classes. A scrapbook calendar is used as opposed to a scrapbook album in order to help the students make the connection between the calendar and the seasonal changes taking place in their garden. Do not deter from this activity if you don't have a school garden! Charting and cataloguing the growth of an indoor classroom "garden" works well also.

Procedure
1. Before planting the first seed in your school garden, take pictures and have students record their observations of and make predictions about their bare garden. Discuss the plans that you have for your school garden, elaborate or simple. Sketch out these plans, either as a group or an individual assignment. Keep these "scraps" for your calendar.
2. As you and your students work in the garden, record the progress in various ways – journal entries and illustrations, charts and graphs, and of course, pictures. Keep all images and records (you may choose to scan them) and be sure to label with dates.
3. A school garden can be a wonderful sensory experience for young children! As they explore their garden, encourage them to use all of their senses as they observe and record data. While tasting is not usually encouraged in science class, one exception can be eating fresh vegetable picked from your garden in the fall.
4. Once your school garden is well underway, don't forget to focus on the critters that call your school garden home. At least one garden observation and journal entry should be devoted to life forms other than plants that inhabit your garden. Pictures of garden critters make for great scrapbook pages!
5. At the end of the year divide students into 12 groups or pairs. Assign each a month and provide them with the pictures and records that were taken that month. Have them create a scrapbook page to represent that month.
6. Collect all pages and assemble as a calendar.

Take it Further
Have students describe the changes undergone by their garden throughout the year.

Garden Spotlight



Depending on the size of your garden, choose several stories to interpret or choose one and name the garden accordingly. Some good examples are *Peter Rabbit, Jack and the Beanstalk, Tops and Bottoms, The Tiny Caterpillar* and *Growing Vegetable Soup.*

You can also integrate literature into the garden with these great garden-themed children's books:

City Green by Dyanne DiSalvo-Ryan

The Curious Garden by Peter Brown

First Peas to the Table by Susan Grigsby

From the Garden by Michael Dahl

Garden of Happiness by Erika Tamar

Growing Vegetable Soup by Lois Ehlert

I Heard it From Alice Zucchini: Poems about the Garden by Juanita Havill

One Watermelon Seed by Celia Barker Lottridge and Karen Patkau

Pick, Pull, Snap by Lola M. Schaefer

A Seed in Need: A First Look at the Plant Life Cycle by Sam Godwin

Surprising Beans by Molly Blaisdell

The Ugly Vegetables by Grace Lin

Up, Down, and Around by Katherine Ayres

For a complete list of agriculturally and garden themed children's books, visit Agriculture in the Classroom online at **www.agintheclass.org.**

Appendix 1


Agriculture
Map of Virginia
Valley & Ridge
Blue Ridge Mountains
Chesapeake Bay
Appalachian Plateau
Piedmont Region
Coastal Plains
Apples
Aquaculture
Broilers
Cattle & Calves
Christmas trees
Corn
Cotton
Cucumbers
Dairy
Eggs
Grapes
Green Beans
Hay
Hogs
Horses
Lumber
Maple syrup
Nursery products
Peaches
Peanuts
Potatoes
Pumpkins
Sheep & Lambs
Soybeans
Sweet Potatoes
Tobacco
Tomatoes
Turkeys
Watermelon
Wheat

Standards of Learning

As of 2013 the following Virginia Standards of Learning are addressed within this book:

Mathematics

Kindergarten

K.5: The student will identify the parts of a set and/or region that represent fractions for halves and fourths.

First Grade

1.3: The student will identify the parts of a set and/or region that represent fractions for halves, thirds, and fourths and write the fractions.

Second Grade

2.3: The student will
a). identify the parts of a set and/or region that represent fractions for halves, thirds, fourths, sixths, eighths, and tenths;
b).write the fractions; and
c). compare the unit fractions for halves, thirds, fourths, sixths, eighths, and tenths.

2.15: The student will
a). draw a line a symmetry in a figure; and
b). identify and create figures with at least one line of symmetry.

Third Grade

3.9: The student will use U.S. Customary and metric units to measure
a). length to the nearest ½ inch, foot, yard, centimeter, and meter,
b). liquid volume in cups, pints, quarts, gallons, and liters;
c). weight/mass in ounces, pounds, grams, and kilograms; and
d). area and perimeter.

3.10: The student will
a). measure the distance around a polygon in order to determine perimeter; and
b). count the number of square units needed to cover a given surface in order to determine area.

Fifth Grade

5.8: The student will
a). find perimeter, area, and volume in standard units of measure;
b). differentiate among perimeter, area, and volume and identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation;
c). identify equivalent measurements within the metric system;
d). estimate and then measure to solve problems, using U.S. Customary and metric units; and
e). choose an appropriate unit of measure for a given situation involving measurement using U.S. Customary and metric units.

5.9: The student will identify and describe the diameter, radius, chord, and circumference of a circle.

Standards of Learning

Science

Kindergarten

K.1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
a). basic characteristics or properties of objects are identified by direct observation;
b). observations are made from multiple positions to achieve different perspective;
c). a set of objects is sequenced according to size;
d). a set of objects is separated into two groups based on a single physical characteristic;
e). nonstandard units are used to measure the length, mass, and volume of common objects;
f). observations and predictions are made for an unseen member in a sequence of objects;
g). a question is developed and predictions are made from one or more observations;
h). observations are recorded;
i). picture graphs are constructed;
j). unusual or unexpected results in an activity are recognized; and
k). objects are described both pictorially and verbally

K.4: The student will investigate and understand that the position, motion, and physical properties of an object can be described.

K.7: The student will investigate and understand basic needs and life processes of plants and animals.

K.9: The student will investigate and understand that there are simple repeating patterns in her/her daily life.

K.10: The student will investigate and understand that change occurs over time and rates may be fast or slow.

First Grade

1.1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
a). the senses are used to observe differences in physical properties;
b). observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy;
c). objects or events are classified and arranged according to characteristics or properties;
d). simple tools are used to enhance observations;
e). length, mass, volume, and temperature are measured using nonstandard units;
f). inferences are made and conclusions are drawn about familiar objects and events;
g). a question is developed from one or more observations;
h). predictions are made based on patterns of observations;
i). observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; and
j). simple investigations and experiments are conducted to answer questions.

1.4: The student will investigate and understand that plants have basic life needs and functional parts and can be classified according to certain characteristics.

1.7: The student will investigate and understand weather and seasonal changes.

Second Grade

2.1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
a). observations and predictions are made and questions are formed;
b). observations are differentiated from personal interpretation;
c). observations are repeated to ensure accuracy;
d). two or more characteristics or properties are used to classify objects;
e). length, volume, mass, and temperature are measured in metric unites and standard English units using the proper tools;
f). time is measured using the proper tools;
g). conditions that influence a change are identified and inferences are made;

h). data are collected and recorded, and bar graphs are constructed using numbered axes;
i). data are analyzed, and unexpected or unusual quantitative data are recognized;
j). conclusions are drawn;
k). observations and data are communicated;
l). simple physical models are designed and constructed to clarify explanations and show relationships; and
m). current applications are used to reinforce science concepts.

2.4: The student will investigate and understand that plants and animals undergo a series of orderly changes as they mature and grow.

2.7: The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings.

Third Grade

3.1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
a). observations are made and are repeated to ensure accuracy;
b). predictions are formulated using a variety of sources of information;
c). objects with similar characteristics or properties are classified into at least two sets and two subsets;
d). natural events are sequenced chronologically;
e). length, volume, mass, and temperature are estimated and measured in metric and standard English unites using proper tools and techniques;
f). time is measured to the nearest minute using proper tools and techniques;
g). questions are developed to formulate hypotheses;
h). data are gathered, charted, graphed, and analyzed;
i). unexpected or unusual quantitative data are recognized;
j). inferences are made and conclusions are drawn;
k). data are communicated;
l). models are designed and built; and
m). current applications are used to reinforce science concepts.

3.8: The student will investigate and understand basic patterns and cycles occurring in nature.

Fourth Grade

4.1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
a). distinctions are made among observations, conclusions, inferences, and predictions;
b). objects or events are classified and arranged according to characteristics or properties;
c). appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
d). appropriate instruments are selected and used to measure elapsed time;
e). predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
f). independent and dependent variables are identified;
g). constants in an experimental situation are identified;
h). hypotheses are developed as cause and effect relationships;
i). data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
j). numerical data that are contradictory or unusual in experimental results are recognized;
k). data are communicated with simple graphs, pictures, written statements, and numbers;
l). models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m). current applications are used to reinforce science concepts.

4.4: The student will investigate and understand basic plant anatomy and life processes.

4.9: The student will investigate and understand important Virginia natural resources.

Standards of Learning

English

Third Grade

3.1: The student will use effective communication skills in group activities.

Fourth Grade

4.1: The student will use effective oral communication skills in a variety of settings.

Fifth Grade

5.1: The student will listen, draw conclusions, and share responses in subject-related group learning activities.

History and Social Studies

Fourth Grade

VS.2: The student will demonstrate knowledge of the physical geography and native peoples, past and present, of Virginia.

VS.10: The student will demonstrate knowledge of government, geography, and economics.