

Garden Grid

Grades 3-5

English Language Arts, Math, Science, Visual Arts, Physical Education



Objectives

Students will read about growing a garden and learn how much space each plant requires to grow. Using area and perimeter, students will create a grid and plan a garden, allowing sufficient space for each plant to grow. Students will construct newspaper pots and plant seeds or plants. They will devise experiments to see the effect they will have on plants and their growth. Students will create artwork depicting their favorite vegetables. Students will play a simple garden game as they scramble to get a chair.

Vocabulary

blueprint—a detailed plan of how to do something

grid—a pattern of lines that cross each other to form squares on a piece of paper, a map, etc.

interplant—to plant a crop between (plants of another kind)

native—used to refer to the place or type of place where a plant or animal normally or naturally lives

pollinate—to give (a plant) pollen from another plant of the same kind so that seeds will be produced

Background

Plants that are crowded do not grow well. They rob one another of the space, fertilizer, water and sun necessary for healthy growth. Some plants need more space to grow than others. Pumpkins, cucumbers and melons, need room to sprawl along the ground. Some gardeners build trellises and train vining plants to climb in order to save space. Radishes require very little space and can be **interplanted** among plants that need more room. Good gardeners plan their gardens to make sure every plant has all the space it needs.

Additional Reading

Cherry, Lynne, *How Groundhog's Garden Grew*, Blue Sky, 2003.

Darbyshire, Tom, *Who Grew My Soup?*, Publications International Ltd, 2009.

Eclare, Melanie, *A Harvest of Color: Growing a Vegetable Garden*, Ragged Bears, 2002.

Garden Grid

Activity 1: Garden Grid Reading Page, (ELA) 1 50 minute class period

Students will read about growing a garden and learn how much space each plant requires to grow.

Oklahoma Academic Standards

Activity 1: Garden Grid Reading Page, (English Language Arts)

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|--------------------|--|
| 3.2.4.1 | Students will locate the main idea and key supporting details of a text or section of text. |
| 4.2.R.4
5.2.R.3 | Students will begin to paraphrase main ideas with supporting details in a text. |
| 3.2.W.1
4.2.W.1 | Students will develop drafts by categorizing ideas and organizing them into paragraphs. |
| 5.2.W.3 | Students will develop drafts by choosing an organizational structure (<i>e.g., description, compare/contrast, sequential, problem/solution, cause/effect, etc.</i>) and building on ideas in multi-paragraph essays. |

Materials:

- Activity 1 Reading Page 1: “**Garden Grid Reading**”
- Activity 1 Worksheet 1: “**Garden Grid Reading Comprehension**”

Procedures

1. Read and discuss background and vocabulary.
2. Hand out copies of the “**Garden Grid Reading Page**” and “**Garden Grid Reading Comprehension.**”
 - Students will read independently or listen as the teacher reads the page aloud
 - Students will complete the worksheet included with this lesson to test understanding of the reading pages.
3. Students will write paragraphs comparing and contrasting at least two of the vegetables described in the reading pages.

Extension

1. Each student will write an essay beginning with the phrase “In my garden there must be”
 - Students will share their writing with classmates.
 - Students will illustrate their essays.
2. Bring cookbooks to class.
 - Students will use online sources or find recipes in the books you have provided for preparing each of the vegetables listed in the reading pages.
 - Students will write their own recipes for their favorite vegetables to be included in a class veggie cookbook.
3. Students will write acrostic poems using the names of their favorite vegetables and adjectives that describe them

Bell Pepper (pimienta)

One bell pepper has more vitamin C than an orange or a cup of strawberries. Peppers love warm soil and die if there is a frost. The pepper is a vegetable that is native to America. Bell peppers belong to a different group of peppers than black pepper, but they belong to the same group as the pepper from which chili powder is made.

Cantaloupe (cantalupo)

Cantaloupe needs plenty of space to grow, too. Like the pumpkin, it grows on a vine that spreads out along the ground. Cantaloupe are also called muskmelon. They need plenty of sun and water and, like carrots, are a very good source of vitamins A and C. Each vine produces three or four fruits. When the fruit is ready it will break off the vine.

Carrots (zanahoria)

Carrots only need a small amount of space and are very easy to grow. They need well-worked, sandy soil so they will grow long, straight roots. The root of the carrot is what we eat. Lumps and stones in the soil will cause the carrots to grow crooked. Carrots are a good source of Vitamins A and C. Carrots grow well in cool weather.

Corn (maiz)

Corn is native to America and Native Americans taught the early settlers to plant it. Corn is pollinated by wind, so it must be planted in small blocks of three or four rows, instead of in single rows. There are many different kinds of corn. Popcorn is made from one kind of corn that is allowed to dry on the stalk. The corn on the cob we like to eat is called “sweet corn.”

Okra (quingombo)

Okra is more common in Oklahoma and other southern gardens than it is in other parts of the country. That's because it needs plenty of sunshine and won't even start to grow unless the weather is very warm. In Louisiana okra is called “gumbo” because it is an important ingredient in a kind of soup by that name.



Peas (guicante)

Peas are often the first vegetable to be planted in the garden in the early spring. They like cool weather and must be harvested before it starts getting hot. Peas are a great source of vitamins A, B, and C. Peas grow on vines. They grow best when they have something to climb, like a fence, a wall, or even dried tree branches stuck in the ground.

Pumpkin (calabaza)

Have you ever heard anyone talk about frost on the pumpkin? Since pumpkin is one of the last vegetables in the garden, it may get frost on it. The frost will not kill the pumpkin. However, pumpkins store better if they are cut from their vines during the warm days of mid-Autumn, before the first frost. Pumpkins need plenty of space to grow into long crawling vines. Pumpkins are native to America.

Radishes (rabano)

Radishes grow well when the weather is cool. They are started from seed after the last spring frost. Seeds should be planted three to four inches apart. This plant produces bright red swollen roots that are white inside. This is the part of the plant that we eat. Their bright color and spicy taste make them taste great in a tossed salad. Radishes are a good source of Vitamin C.

Sunflower (girasol)

The sunflower is native to America. To the Incas of Peru the sunflower was a symbol of the sun in their religious events. Sunflower seeds are a great source of many vitamins. When sunflower plants are young, their heads will turn to the sun each morning. Every part of the sunflower plant has a use. The flowers can be used to make yellow dye. The inside of the stalks floats better than cork, so it is sometimes used in life rafts.

Tomato (tomate)

In August, 1820, Robert Gibbon Johnson stood on the steps of the Salem, New Jersey, courthouse and ate a tomato. His doctor had told him not to. Americans thought tomatoes would kill you because they are related to other poisonous plants. Tomato leaves can kill many insects and some livestock, and the native forms of this plant, found in America, did have poisonous fruits. Robert Gibbon Johnson was lucky, the tomato he ate on the courthouse steps did not kill him. The tomatoes that we eat today are not poisonous. In fact, tomatoes are a great source of vitamins A and C.

Garden Grid

Activity 1 Worksheet 1: Garden Grid Reading Comprehension



Name: _____ Date: _____

Read about vegetables on the Reading Page or listen as your teacher reads. Using the information you read, answer these questions.

1. In your own words, explain why carrots are sometimes crooked:

2. Vegetables are a good source of Vitamins A and C. Which vegetables in the reading passage are you most likely to eat? What vitamins do they provide?

3. Explain in your own words why sunflowers are used in life rafts:

4. Which plant is pollinated by the wind? How does it need to be planted to pollinate?

5. Explain why people thought tomatoes were poisonous:

6. Choose two vegetables that are native to America. Write a short paragraph comparing/contrasting them:

Garden Grid

Activity 1 Worksheet 1: Garden Grid Reading Comprehension (ANSWERS)



Name: _____ Date: _____

Read about vegetables on the Reading Page or listen as your teacher reads. Using the information you read, answer these questions.

1. In your own words, explain why carrots are sometimes crooked:

Answers will vary, but should include: Lumps and stones in the soil will cause the carrots to grow crooked.

2. Vegetables are a good source of Vitamins A and C. Which vegetables in the reading passage are you most likely to eat? What vitamins do they provide?

Answers will vary

3. Explain in your own words why sunflowers are used in life rafts:

Answers will vary, but should include: The inside of the stalks floats better than cork, so it is sometimes used in life rafts.

4. Which plant is pollinated by the wind? How does it need to be planted to pollinate?

Corn is pollinated by wind, so it must be planted in small blocks of three or four rows, instead of in single rows.

5. Explain why people thought tomatoes were poisonous:

Americans thought tomatoes would kill you because they are related to other poisonous plants. Tomato leaves can kill many insects and some livestock, and the native forms of this plant, found in America, did have poisonous fruits.

6. Choose two vegetables that are native to America. Write a short paragraph comparing/contrasting them:

Answers will vary

Garden Grid

Activity 2: Square Foot Garden, (Math) 1-3 50 minute class periods

Using area and perimeter, students will create a grid and plan a garden.

Oklahoma Academic Standards

Activity 2: Square Foot Garden, (Math)

- | | |
|----------|---|
| 3.GM.2.1 | Find perimeter of polygon, given whole number lengths of the sides, in real-world and mathematical situations. |
| 3.GM.2.2 | Develop and use formulas to determine the area of rectangles. Justify why length and width are multiplied to find the area of a rectangle by breaking the rectangle into one unit by one unit squares and viewing these as grouped into rows and columns. |
| 4.GM.2.2 | Find the area of polygons that can be decomposed into rectangles. |
| 5.GM.2.3 | Find the perimeter of polygons and create arguments for reasonable values for the perimeter of shapes that include curves. |

Materials:

- Square foot pieces of paper in various colors (can purchase 12" x 12" pieces in the craft section) or can cut construction paper into 12" x 12" pieces
- Rulers
- Paper and pencils, crayons, or markers

Garden Grid

Procedures

1. Working together as a class, students will create various shapes of gardens and find the area and perimeter of each garden.
 - Discuss ways to measure the amount of space that a large garden would cover.
 - Discuss measuring area and inform students that we use square feet to measure area.
2. Each student will need at least three 12- by 12-inch squares of construction paper. (Laminate the squares for durability). Explain that each piece of paper is a square foot because it measures 1 foot by 1 foot. The area of one piece of paper is one square foot.
3. Each student will measure the perimeter of one sheet of paper by using a ruler to measure all four sides. The perimeter is four feet.
4. Clear a space in the classroom, or go to a room with an open area where students can lay all of the squares on the floor to view them.
5. Explain that as a class you are going to create a garden with the squares. Explain the rules for creating the garden:
 - a. All squares must touch another square completely on at least one side.
 - b. Students can't tell others where to put their squares.
 - c. Students cannot move the squares once they are laid down.
 - d. After all squares are laid down, each student will find the perimeter (the edge) and the area of the garden.
 - e. Students will sketch a diagram of the garden and record both.
6. Students will rearrange the garden. Challenge them to find the smallest perimeter of garden that is possible using all squares. Students will sketch a diagram and record the area and perimeter.
 - Discuss why the perimeter changes but the area remains the same.
7. Using the 12 x 12 squares, allow students to work in groups to find the square footage and perimeter of common objects at school such as sidewalks, table tops, or parking spaces.
8. Have the students look online to price fencing supplies and determine the cost to fence their garden using various fencing supplies.

Extension

1. Tell students that an acre is approximately 43,000 square feet (about the size of a football field without the end zones).
2. Work together as a class to calculate the square footage of the classroom. Calculate the number of classrooms it would take to fill one acre of land.
3. Students will calculate the square footage of their bedrooms. Calculate how many bedrooms it would take to fill one acre of land.

Garden Grid

Activity 3: Garden Grid Blueprint, (Math) 1-2 50 minute class periods

Using area and perimeter, students will create a grid and plan a garden, allowing sufficient space for each plant to grow.

Oklahoma Academic Standards

Activity 3: Garden Grid Blueprint, (Math)

- 3.GM.2.1 Find perimeter of polygon, given whole number lengths of the sides, in real-world and mathematical situations.
- 3.GM.2.2 Develop and use formulas to determine the area of rectangles. Justify why length and width are multiplied to find the area of a rectangle by breaking the rectangle into one unit by one unit squares and viewing these as grouped into rows and columns.
- 4.GM.2.2 Find the area of polygons that can be decomposed into rectangles.
- 5.GM.2.3 Find the perimeter of polygons and create arguments for reasonable values for the perimeter of shapes that include curves.

Materials:

- Activity 3 Reading Page 1: “**Garden Planting Directions**”
- Activity 3 Worksheet 1: “**Garden Grid Veggies**”
- 6 copies for each group of Activity 3 Worksheet 2: “**Garden Grid Blueprint**”
- Tape, scissors, markers or crayons

Procedures

1. Students will work in groups to plan gardens, using the information and pictures provided.
—Provide each group with six sheets of “**Garden Grid Blueprint**” worksheet, copies of the “**Garden Grid Veggies**” worksheet and the “**Garden Planting Directions**” worksheet showing space requirements for each vegetable. Tell students the grid paper will be the blueprints for their gardens.
2. Students will read the information about space needed for different vegetables and discuss what plants they want to grow and what shape they would like their gardens to take.
3. Students will tape the grid sheets together in the desired shape.
4. Students will color the plants they want to grow, cut them out and place them on the grid, allowing the required amount of space for each plant.
5. Students will find the perimeter and area of their gardens.
—Explain that each square on the grid sheet garden equals one square foot.
—Students will determine that the perimeter for each square is four feet.
6. When their garden grids are complete, students will count the number of square feet (area) in their gardens by counting how many squares they used to create their gardens.
—Students will measure the perimeters of their gardens. This number will depend on the shape each group chose for its garden.
7. Discuss how the area and perimeter of the gardens vary depending on the shape of garden each groups chose and the crops they decided to plant.

Vegetables need space between them so they can get all the water and food they need. Some plants need more space than others. Plants like pumpkin and melons need plenty of space to spread out. Other plants, like radishes and onions, don't need as much space. Gardeners usually plant their vegetables in rows. That way they can walk between the plants and take care of them. Use this chart to decide how much space to leave between your vegetables. In addition, three feet should be allotted between each plant for tilling and a three foot border on each side of the garden for tilling.

1 square = 1 foot

Plant



cantaloupe
(cantalupa)

and



pumpkin
(calabaza)

2 feet apart, with 10 feet between rows.

Plant



carrots
(zanahoria)

and



peas
(guicante)

less than 1 foot apart, with 2 feet between rows.

Plant



tomatoes
(tomate)

3 feet apart,
with 5 feet
between rows.

Plant



okra
(quingombo)

1 foot apart,
with 2 feet
between rows.

Plant



pepper
(pimienta)

2 foot apart,
with 2 feet
between rows.

Plant



radishes
(rabano)

less than 1
foot apart,
with 1 foot
between rows.

Plant



corn
(maiz)

1 foot
apart, with
3 feet
between rows.

Plant

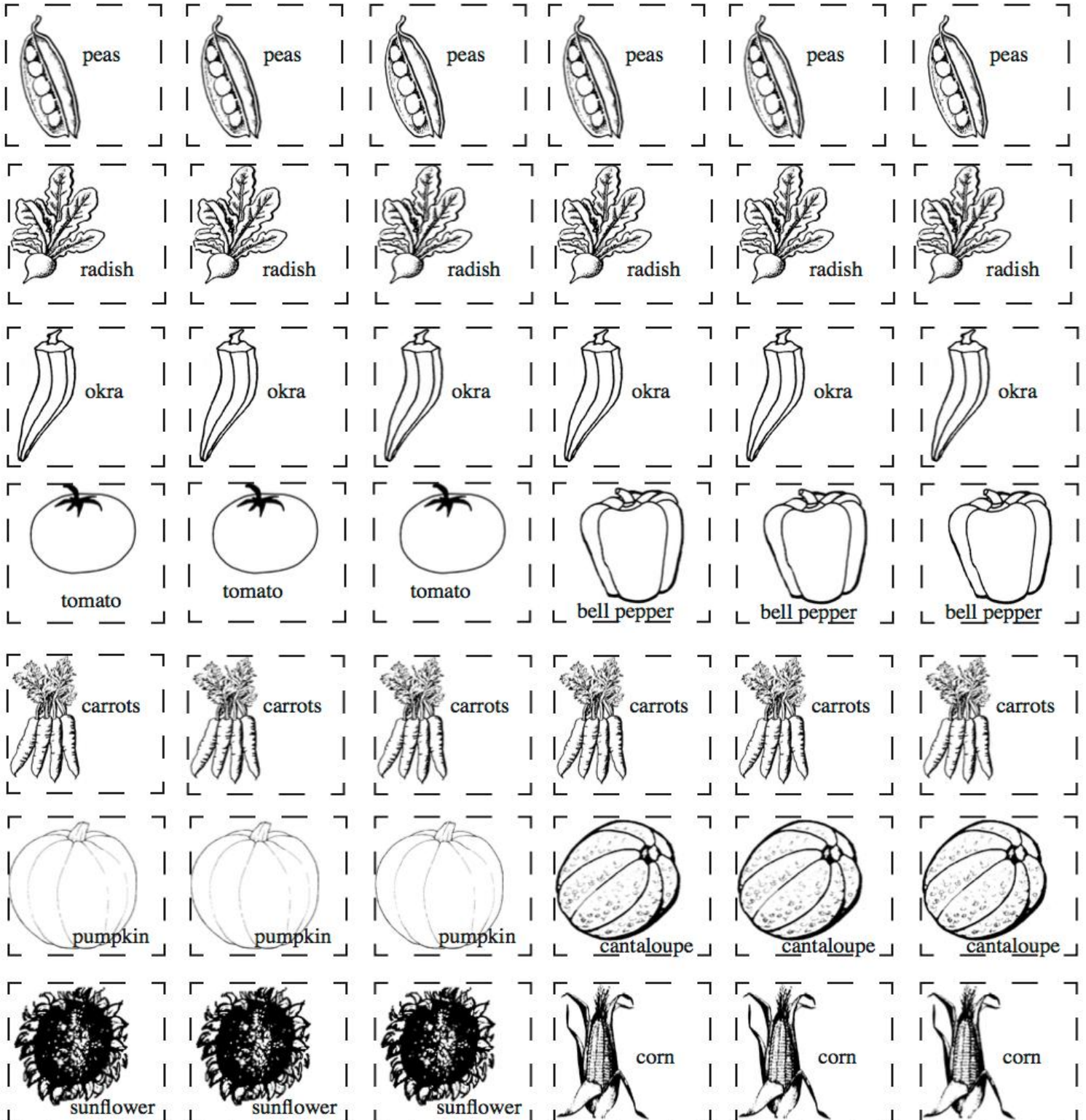


sunflowers
(girasol)

1/2 foot
apart, with
2 feet
between rows.

Color the vegetables, and cut the ones you want to plant in your garden. Place the vegetables in the grid your teacher provides. Use the chart on reading page 1 to decide how much space each vegetable needs.

1 square = 1 foot



Garden Grid

Activity 3 Worksheet 2: Garden Grid Blueprint



Name: _____ Date: _____

Garden Grid

Activity 4: Newspaper Pot Experiment, (Science) 2-3 50 minute class periods

Students will construct newspaper pots and plant seeds or plants. They will devise experiments to see the effect they will have on plants and their growth.

Oklahoma Academic Standards

Activity 4: Newspaper Pot Experiment, (Science)

- 3.LS3.2 Use evidence to support the explanation that traits can be influenced by the environment.
- 4.LS1.1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- 5.LS1.1 Support an argument that plants get the materials they need for growth chiefly from air and water.

Materials:

- Activity 4 Reading Page 1: “**Newspaper Pot Directions**”
- Newspaper or paper grocery bag
- Masking tape, water bottles or cans for wrapping around
- Seed catalogs and gardening books
- Soil, seeds or plants
- Fruits or vegetables for taste test

Procedures

1. Begin by talking with students about their garden experiences.
2. Take a poll to see how many students have gardens at home, and how many of their grandparents have/had gardens.
3. Discuss with students why they think our culture as a whole has shifted away from gardening, how has that impacted their generation?
4. Have students brainstorm why someone today would grow a garden?
—Nutrition, fitness, fun, save money, beauty, connection with surroundings, pesticides, knowing how food was grown, impact on environment, etc.
5. As a class make a top ten list of things students would like to grow in a garden, have them consider if they have the right climate and space? Would it grow during the school year?
6. Brainstorm a list of what might need to be considered when planning a garden and basic needs of plants (space, time, soil type, hardiness, purpose of garden, fertility, water, light etc.).
7. Discuss the term “variable.” How would the plants grow differently if we reduced or increased one of these variables?
8. Provide seed catalogs and gardening books.
—Students will select vegetables or other plants they would like to grow.
—Students will determine if the plants they have chosen are suitable for planting in your area, based on number of days to harvest, length of season, growth requirements, etc.
9. Explain that as a class you are going to design a garden experiment to look at the impacts of some of these variables on plant growth. You may want to review or explain the concept of a control/experimental groups or experimental design.

This video demonstrates the process below:

https://www.youtube.com/watch?v=JuDCTxv_WUI

Directions

1. Fold one sheet of newspaper in half, or cut a brown grocery bag into a long strip.
2. Put water bottle or can at the end of the paper and roll the paper up until it overlaps 1"-2".
3. Cut the extra paper off.
4. Fold one end of the paper to make the bottom of the pot. Place a piece of tape across the bottom to hold it in place.
5. Put a piece of tape approximately 12" long around the newspaper to make the pot about 3" tall.
6. Remove the bottle or can.
7. Tuck the tops of the paper into the pot. The tape should be inside the pot.
8. If planting seeds, fill pot full of soil, then plant seeds and spritz to dampen the soil.
9. If planting plants, put plant in pot first, then put soil around the plant. Spritz to dampen soil.
10. When planting in the ground, dig the hole big enough for the entire pot. None of the pot should be exposed to air.

The newspaper pot will disintegrate and become part of the soil. The newspaper and the tape are biodegradable. The glue on the cheap tape that doesn't stick well is soluble and will dissolve in the soil. The tape is paper. The ink on the newspaper is usually soy ink.



Garden Grid

Activity 5: Garden Grid Art, (Visual Art) 1-3 50 minute class periods

Students will create artwork depicting their favorite vegetables.

Oklahoma Academic Standards

Activity 5: Garden Grid Art, (Visual Art)

- | | |
|------------|---|
| 3.VA.P.1.2 | Individually or collaboratively create works which represent places or objects that |
| 4.VA.P.1.2 | are part of everyday life. |
| 5.VA.P.1.2 | Design, redesign, or visually document places or everyday objects. |

Materials:

- Seed catalogs and gardening books
- Paper and drawing utensils
- Dried seeds or plants
- Glue

Procedures

1. Provide seed catalogs or garden books.
2. Students will draw pictures of their favorite vegetable plants.
3. Provide dried forms of several vegetables (dried beans and peas, dried okra, dried sunflower heads, dried pumpkin seeds, etc.)
4. Students will use the dried vegetables to create art.

Garden Grid

Activity 6: Garden is Ready Game, (Physical Education) 1 50 minute class period

Students will play a simple garden game as they scramble to get a chair.

Oklahoma Academic Standards

Activity 6: Garden is Ready Game, (Physical Education)

3.S2.E5

Applies simple offensive strategies & defensive strategies & tactics in chasing and

4.S2.E5

fleeing activities.

Materials:

- Garden vegetable names written on small pieces of paper
- Chairs

Procedures

1. Play "Garden is Ready," as follows:
 - Write the names of a variety of garden vegetables on small pieces of paper, or cut out pictures from the worksheets included with this lesson.
 - Hand out the names or pictures to students.
2. Students sit in chairs scattered around a room.
3. Without telling the others what he or she has chosen, each student chooses the name of a vegetable that grows in the garden.
4. One player serves as the gardener. He or she stands and says: "The garden is ready to harvest, and I want to harvest insert name of veggie."
5. Walking around the room, he or she calls out the names of various garden vegetables.
6. When a player hears the name of his or her vegetable, he or she gets up and walks behind the gardener.
7. When most of the vegetables have been called out of their seats, the gardener shouts: "Salad."
8. At this the students must find new seats.
9. The last student to find a seat becomes the new gardener.