

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

Sponsored by



LESSON 1.16

Garden in a Bottle

Unit:
FOOD AND NUTRITION

PRECEPTS

J - Mental Growth

J1. Think critically

J3. Practice sound decision-making



Lesson Type:
One-on-One

NATIONAL STANDARDS

CS.02.04.01.c. Demonstrate critical and creative thinking skills while completing a task.

NM-MEA.PK-2.1 Understand Measurable Attributes of Objects and the Units, Systems and Processes of Measurement.

NM-MEA.PK-2.2 Apply Appropriate Techniques, Tools and Formulas to Determine Measurements

NS.K-4.3 Life Science

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will ...

- Construct a bottle greenhouse.
- Define *condensation*.
- Define *transpiration*.





TIME

Instruction time for this lesson: **20 minutes.**



RESOURCES

None Available



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ One two-liter empty pop bottle – clear plastic
- ✓ Knife for cutting bottle in half
- ✓ Potting soil – enough for 3 inches of soil in pop bottle
- ✓ Small gravel – enough for 1-inch layer in pop bottle
- ✓ Crushed charcoal – enough for ½-inch layer of charcoal in bottle
- ✓ Seeds – Suggested seeds: marigold or tomato
- ✓ Spray bottle to mist newly planted seeds
- ✓ Small felt tip marker
- ✓ PALS1.16.ONE.AS.A

KEY TERMS



The following terms are presented in this lesson and appear in *bold italics*:

Condensation

Transpiration



CONTENT OUTLINE

Objective 1. | Construct a bottle garden

- A. Select a clear, two-liter pop bottle
- B. Wash the bottle out
- C. Cut across bottle, one-third of the way down from top
- D. Cut slits in bottom portion of bottle so it will squeeze together for top to fit over
- E. Place a layer of gravel, about 1-inch deep in bottom of bottle
- F. Place a half inch of crushed charcoal
- G. Place 3 inches of potting soil on top of charcoal
- H. Make three holes and plant one seed in each hole
- I. Mist soil with water until moist
- J. Place top on bottle garden and sit in area that receives sunlight

Objective 2. | Caring for the Garden in a Bottle

- A. Keep soil moist.
- B. *Transpiration* and *condensation*

INTEREST APPROACH



In the spring and summer, we see many plants growing. However, in the winter, the plants die or no longer grow. What if we could build a mini-greenhouse where we could grow plants in our homes? Let's give it a try.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Construct a bottle garden.



Prepare the bottle for the bottle garden. Use PALS1.16.ONE.AS.A and follow instructions.

- I. Construct a bottle garden
 - A. Select a clear, two-liter pop bottle
 - B. Wash the bottle out
 - C. Cut across bottle, approximately one-third down from top
 - D. Cut slits in bottom portion of bottle so it will squeeze together for top to fit over



First, build the mini greenhouse. Use a 2.0 liter, clear plastic bottle. Measure down from the top about one-third of the way and draw a line around the bottle.

You will need to help your PALS locate a spot one-third of the way down the bottle from the top. Watch to see if he/she needs help cutting the bottle.



Next cut two slits in each side of the bottom half. They should be about one and a half inches long. First, make two marks with the marker to show how long to make these cuts. Good. Now carefully cut the slits.

You will need to assist your PALS with this.

E. Place a layer of gravel about 1-inch thick in bottom of bottle

F. Place a half inch of crushed charcoal

G. Place 3 inches of potting soil on top of charcoal



Thank you for being careful with the knife and for being so tidy with our materials! Now mark the bottle to show how much gravel, charcoal and soil to place.

Help your PALS to mark one inch from bottom for gravel, a half inch above that mark for charcoal and three inches above that mark for potting soil.



Great. Now we are ready to place gravel in the bottom. This will help form a place for extra water from the soil to drain so the plants won't get too much water. Pour the gravel in until it reaches the first mark.

Next let's put the charcoal in. Why do you think it needs charcoal?

Pause, allow your PALS to think for awhile. Once he/she has had a chance to respond, explain that charcoal helps to absorb musty odors that occur from standing water.



When there is water in a closed area, like this bottle, it can begin to smell bad. Charcoal helps to filter the smell.



What do we put in next? That's right, the potting soil. Pour soil in until it reaches the next line.

H. Make three holes and plant one seed in each hole

I. Mist soil with water until moist

J. Place top on bottle garden and sit in area that receives sunlight



Now that the soil is ready, what do you think we do next? Correct. We plant the seeds. First make three small holes about a half inch deep.

Show your PALS how deep a half inch is.



Make the small holes by pushing your finger into the soil in three spots.

Next put two seeds in each hole and lightly cover the seeds with more potting soil.

Now that the seeds are planted, what do they need to help them grow?

If your PALS is not familiar with growing plants, you may have to provide some hints.



Exactly – Water and sunlight. Take the misting bottle and lightly mist the soil until it is moist. *Monitor to make sure the soil is moist but not saturated.*

You're ready to put the lid on.

You may need to assist your PALS in placing the lid over the bottom piece.



We are ready to put our garden in a bottle in the sunlight. It will take about a week before we see plants growing.

OBJECTIVE 2 AND 3. | Define *condensation*. Define *transpiration*.



- II. Caring for the Garden in a Bottle
 - A. Keep soil moist
 - B. ***Transpiration*** and ***condensation***



Now that we have our Garden in a Bottle made, we must check the soil from time to time. Make sure the soil stays moist. If the top of the soil becomes dry, mist it with the spray bottle.

When the plants begin to grow, they will give off water vapor. They are somewhat like us. For example, when we are outside on a hot day and are running or playing, what do we start doing?

Allow your PALS to say sweat.



Plants do something similar, only we call it ***transpiration***. Say that word with me: ***Trans pir ation***. Very nice!



When plants begin ***transpiration***, the water vapor collects on the sides of the bottle to form water droplets. This is called ***condensation***. Say that with me: ***Con den sa tion***.



The great thing about ***transpiration*** and ***condensation*** happening inside your garden in a bottle is you don't have to add much water. As the plants create water vapor, the droplets form on the wall and become heavy enough to fall to the soil, like it is raining. So the plants actually water themselves. Pretty cool, don't you think?

REVIEW / SUMMARY



1. Name something we need to check until the plants begin to grow.

Answer: Keep soil moist



2. What do we call it when plants give off water vapor when they are growing?

Answer: Transpiration



3. What is it called when water droplets form from the water vapor?

Answer: Condensation

APPLICATION



Large Group Idea

To help students understand the water cycle, each student could make a Garden in a Bottle and record how long it takes plants to germinate and grow and how old the plants are before they see transpiration and condensation appearing. They could also chart how much water needs to be added once a plant reaches a certain level of growth.

Continued Discussion

Continue to check back with your PALS to answer questions and share in his/her excitement when the plants start to grow. Discuss the importance of sunlight for the garden to grow and the effect of proper temperature on germination. After four to six weeks; the plants may need to be transplanted to a larger container.



PALS1.16.ONE.ASSESA.A

Name _____

1. Name something we need to check until the plants begin to grow.
2. What do we call it when plants give off water vapor when they are growing?
3. What is it called when water droplets form from the water vapor?

PALS 1.16.ONE.AS.A

Creating a Garden in a Bottle

A. Prepare a 2.0 liter, clear plastic bottle

1. Thoroughly wash out bottle.
2. Cut through bottle, approximately one-third way down the bottle.
3. Make two slits, about one and a half inches down, on topside of bottom portion of bottle. This will enable the bottle to be gently squeezed and the top to fit over it.
4. Fill bottom with one inch of small gravel
5. Place a half inch of crushed charcoal over gravel.
6. Place 3 inches of potting soil over charcoal.
7. Make three holes to put seeds in.
8. Place seeds in holes and cover with one-fourth inch of soil
9. Mist soil until moist
10. Place top of bottle over bottom
11. Place bottle in area where it will receive sunlight
12. After several months, plants may need to be transplanted to a larger area, especially if using tomatoes

