

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

Sponsored by



LESSON 1.12

How Do Plants Drink?

Unit:
PLANTS AND GARDENING

PRECEPTS

- A. Action
 - A2. Focus on results
- N. Decision Making
 - N2. Demonstrate problem-solving skills



Lesson Type:
Small Group

NATIONAL STANDARDS

CS.01.01.01.a. Work productively with a group or independently.
NS.K-4.2 Physical Science

STUDENT LEARNING OBJECTIVES

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

- Draw conclusions based on data gathered in an experiment.
- Define *capillary action*.





TIME

Instruction time for this lesson: **30 minutes.**



RESOURCES

National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ **One flower for interest approach.** Select a long stemmed flower, such as a carnation or rose.
- ✓ **One Straw Flower stem per student** (*Prepare in advance of lesson – see PALS1.12.SG.AS.A*)
- ✓ **One paper flower for Straw Flower** - See PALS1.12.SG.AS.B
- ✓ **Colored pencils for each student**
- ✓ **One glass beaker or jar for each student**
- ✓ **Blue or green food coloring**
- ✓ **Writing surface**
- ✓ **Markers**

KEY TERMS



The following term is presented in this lesson and appears in ***bold italics***:
Capillary action



CONTENT OUTLINE

Objective 1. | Create a Straw Flower

- A. Provide a paper flower to students
- B. Color paper flower
- C. Attach flower to straw

Objective 2. | How Do Plants Drink Experiment

- A. Provide each student a cup of colored water
- B. Place flower stem in colored water
- C. Draw conclusions based on results of experiment

INTEREST APPROACH



When we get thirsty, what do we do? Right, we get a drink of water. What about this flower?

Hold up real flower for all students to see.



How does this flower get a drink since it has no hands to pick up a glass or mouth to drink it?

Take 15 seconds to discuss this with your neighbors. Begin now.



Time's up. Raise your right hand if you have an answer about how plants drink?

Pause for response. Call on students who raise a hand.



So, you think plants drink through their stems? Let's conduct an experiment to see if our guess is correct.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Draw conclusions based on data gathered in an experiment.



I. Create a Straw Flower

- A. Provide a paper flower to students
- B. Color paper flower
- C. Attach flower to straw

To simulate how plants drink, students will create a "Straw Flower." Prepare stems and cut out flowers in advance of the lesson. Follow PALS1.12.SG.AS.A and PALS1.12.SG.AS.B to prepare the flower parts. Provide one paper flower to each student and allow time for them to color. Assist students in stapling flowers to straws. Follow PALS1.12.SG.AS.C to conduct experiment.



In order to test the theory that plants drink through their stems, we must first create a model flower. We will need three items which are on the supply table in front of the room.

Hold up each item as you name it so students can see what they are to obtain for this exercise. One stem, one flower, colors to color flowers.



What three things will you need? (*Wait for student response*). When I say FLOWERS proceed quietly to the supply table, pick up your three items and return to your desk. What questions do you have?

FLOWERS

Once students have returned to their work stations, instruct them to color the flower any color of their choice. Provide them approximately three minutes to accomplish this.



Now, let's take three minutes to color the flower. Once finished coloring the flower, we will work together to staple it to the stem.

When there is one minute of time left, survey the group to see if more time is needed. If not, announce they have one minute to finish.



We have one more minute to finish coloring. When finished coloring, raise and keep a hand in the air. I will then staple your flower to its stem. (*Make sure, when stapling the flower to the straw, the end of the straw with the paper strip hanging out is at the bottom as this simulates the roots of the plant.*)

II. How do Plants Drink Experiment

- A. Provide each student a cup of colored water
- B. Place flower stem in colored water
- C. Draw conclusions based on results of experiment

Once all students have completed their Straw Flowers, distribute cups or beakers to each student. Fill cups with about one inch of colored water; green or blue food coloring is best. Instruct students to place stem of flower into the water. The water should begin immediately to move up the stem. The rate of water movement will slow about halfway up the stem. Discuss with student how this is like a real flower.



What happened when you placed the stem of your flower into the colored water? Yes! The water began to move up the stem. Place your right hand on your right cheek if you think this is like a real flower.



Correct! Real flowers, and most other plants, bring water up through their stems just like your Straw Flower did.

OBJECTIVE 2: Define *capillary action*



III. Compare Straw a Flower with a real Flower

- A. Discuss the effect of **capillary action** in the straw flower
- B. Compare the stem of a real flower to the straw flower

Ask students to describe how the Straw Flower is similar to a real flower.



Look at the straw flower as it sits in the glass. Think about how this straw flower is similar to a real flower?

Pause for 10-15 seconds.



When I say, GO, take 30 seconds to share with a neighbor how the straw flower and a real flower are alike.

GO!

Answers may include, it has a flower, a stem, water goes up the stem, etc.



There sure was a lot of great conversation going on just now. I heard things like the straw flower has a flower and a stem. Some said the water goes up the stem like plants. These ideas are all correct.

So what made the water go up the stem of the straw flower? Who will share an answer?

*Pause to see if students can guess what caused the water to move. If none of them talk about the paper towel, explain how it works with **capillary action**.*



In the straw flower we created, the stem has a piece of paper towel inside of it. A small piece was hanging outside the bottom of the straw. What on a real flower is the paper towel like?

Listening for answers “like the roots of the flower’s plant and it began to absorb the water.”



The paper towel has very small channels that act like tiny straws and allow the water to move up. This is called **capillary action**.

Write this on a writing surface so students can see the word.



On the count of three, we will slowly sound out this term together.

Sound it out slowly with students



One, two, three –

C A P I L L A R Y A C T I O N !

One more time, together now:

C A P I L L A R Y A C T I O N !



Good job!



A real plant stem works just like the straw flower. Inside of the stem are structures that act like little straws. When it rains or a plant is watered, **capillary action** moves the water up into the stem so the plant can drink. This is how plants get a drink.



REVIEW / SUMMARY

Demonstrate the following cheer to help students remember **capillary action** and what that term means:

Modified Karaoke e-Moment®



Let's celebrate with a cheer about **capillary action**. It goes like this:

CAP (clap) ILL (clap) ARY (clap)
CAP (clap) ILL (clap) ARY (clap)
Capillary actions rule,
Helps plants drink
and keeps them cool.
Go **Capillary action!** (clap)

APPLICATION



One-on-One Idea

Instruct students to ask their parents for a stalk of celery. Cut the end off the celery and place it in a glass of colored water just like the straw flower. The celery will transport the colored water up its stem just like the straw flower did. However, it will take a longer time, usually 24 hours.



Large Group Idea

As a large group discuss what happens to capillary action when we forget to water plants or it doesn't rain? Answer: The capillary action slows down. If there is no water for a long period of time, capillary action stops and the plants dry up and may die.



PALS1.12.SG.ASSESS.A

True or False

- _____ 1. Water moves up a plant's stem through capillary action.
- _____ 2. Plants drink through their stems.



PALS1.12.SG.ASSESS.A | EVALUATION ANSWER KEY

1. True
2. True

PALS1.12.SG.AS.A

How Do Flowers Drink Experiment – Part I

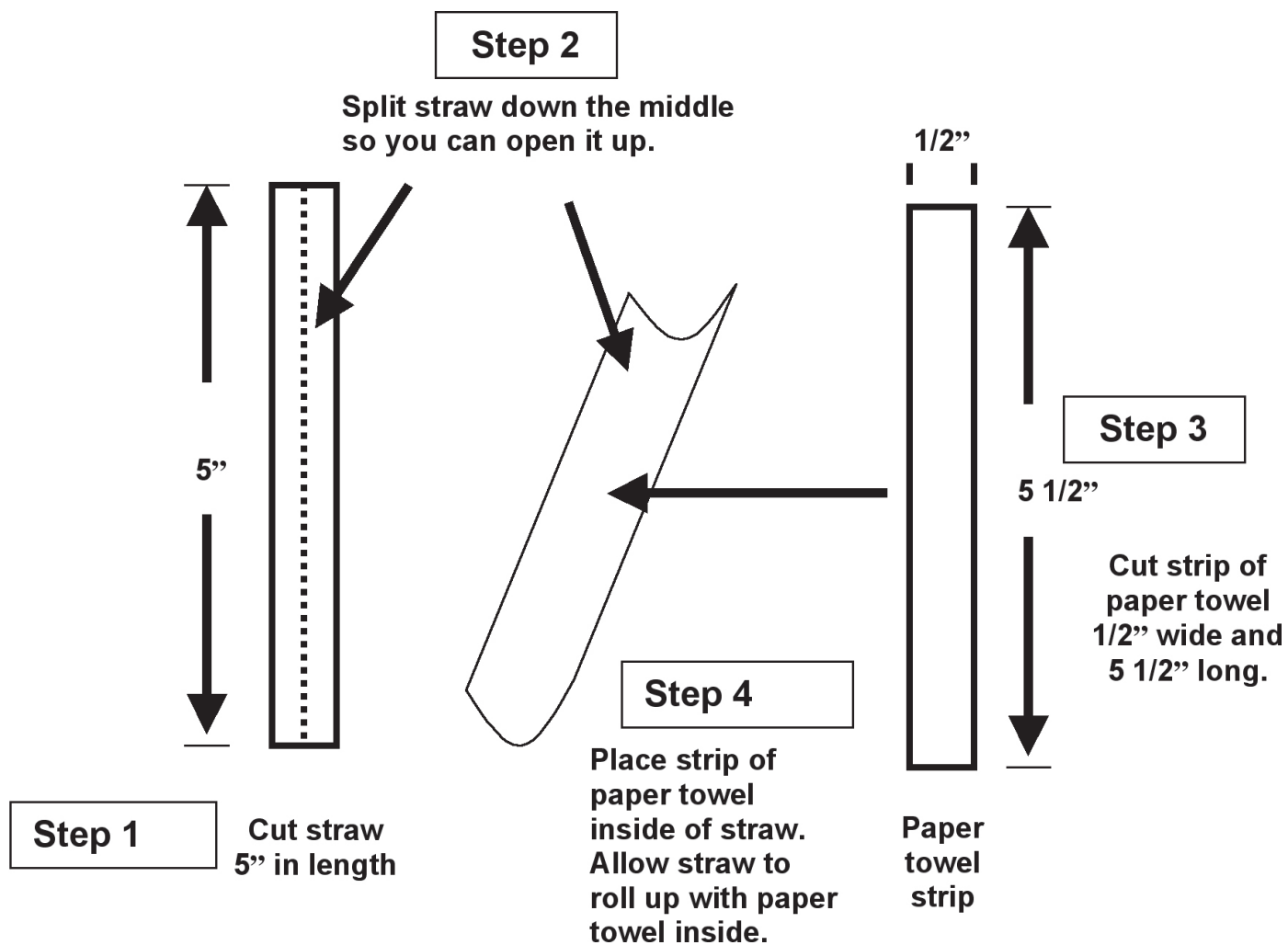
I. Create a “Straw Flower.” To simulate how a flower drinks, create the following straw flower. You will need to create this in advance of the class.

- A. Obtain a regular drinking straw that is light colored, preferably white.
- B. Cut the straw to a length of 5 inches. If the straws have a flexible joint, do not use this end, measure the 5 inches from the bottom.
- C. Using a pair of scissors, split the straw lengthways so you can open straw up. (See diagram)
- D. Cut a strip of paper towel approximately $\frac{1}{2}$ ” x 5 $\frac{1}{2}$ ” long. Leave $\frac{1}{2}$ ” of paper hang out one end of straw. The paper towel will simulate the roots and vascular bundles that water moves through to hydrate the plant.
- E. Place strip of towel inside the split straw. Once paper is in place, allow straw to roll back to original shape. This will simulate the stem.

NOTE: Use a high quality paper towel with good absorbency (***Do not use institution paper towels found in most school paper towel dispensers as they do not have fast absorption rates.***)

- F. Cut out flowers on PALS1.12.SG.AS.B. Give one flower to each student and instruct them to color the flower. Once flowers are colored, assist students in stapling the flower to the stem.
- G. The flower is now ready for the experiment.

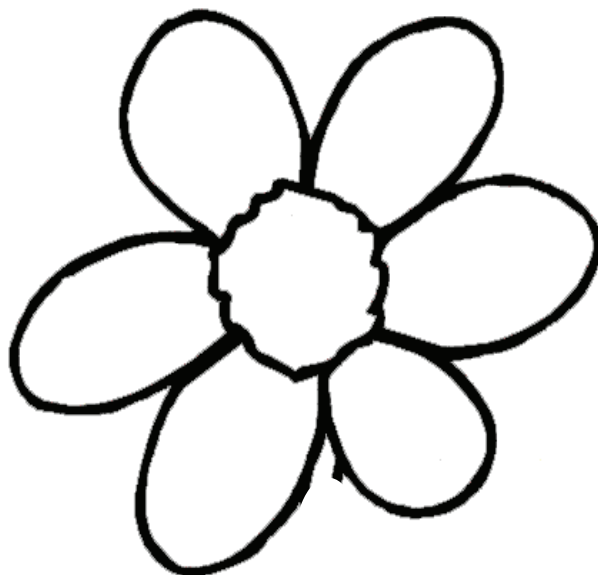
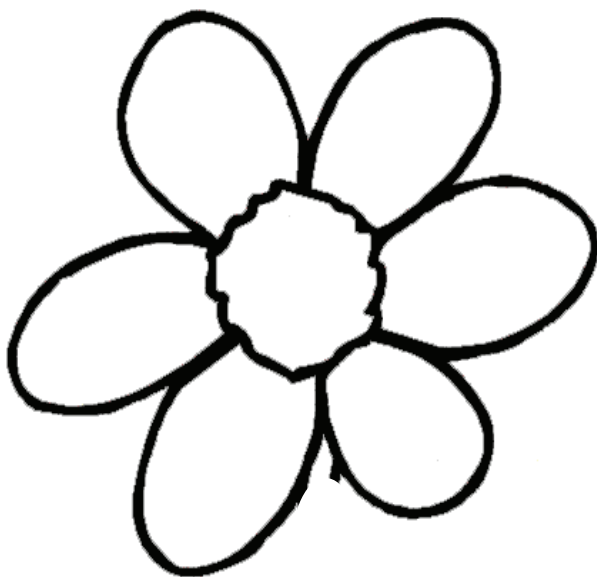
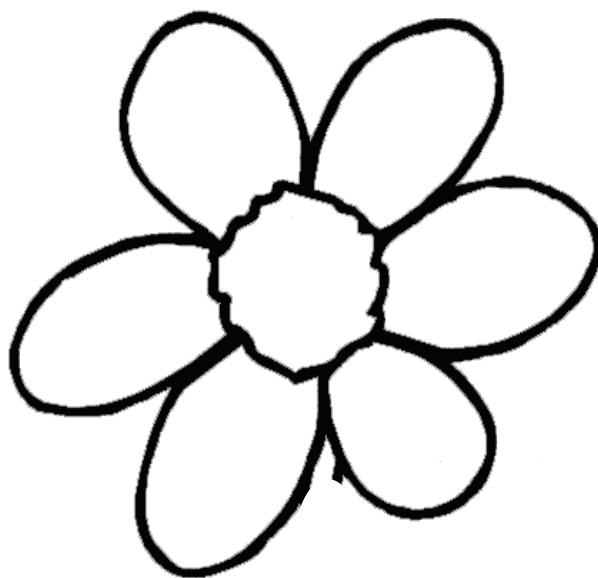
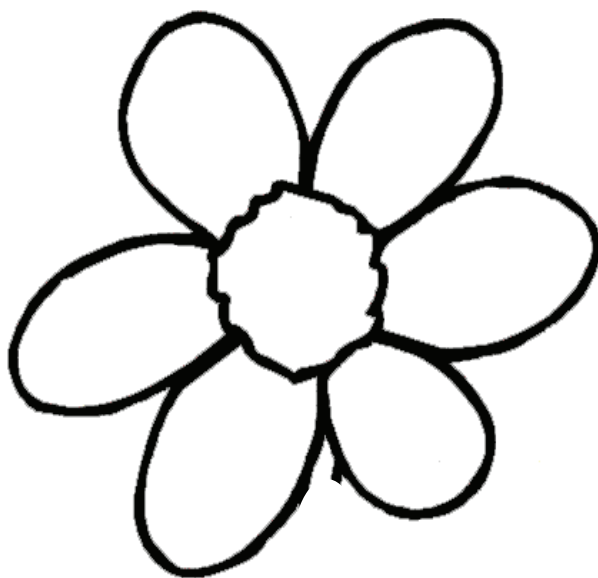
PALS1.12.SG.AS.A (Diagram)



PALS1.12.SG.AS.B

How Do Flowers Drink Experiment – Part I (Cont)

Copy this sheet to produce enough flowers for one flower per student. Cut flowers out in advance of lesson.



PALS1.12.SG.AS.C

How Do Flowers Drink Experiment – Part II

I. Fill cups with colored water

- A. Give each student a small cup or beaker. Place colored water about one inch deep in each cup. Use food coloring to color water. Blue and green work best.
- B. Once each student has a cup of colored water, place flower into cup as shown below. Water will immediately begin to move up the straw. It may take several minutes for the water to get to top.
- C. Discuss how straw is like the stem of a flower.

