PBS KIDS

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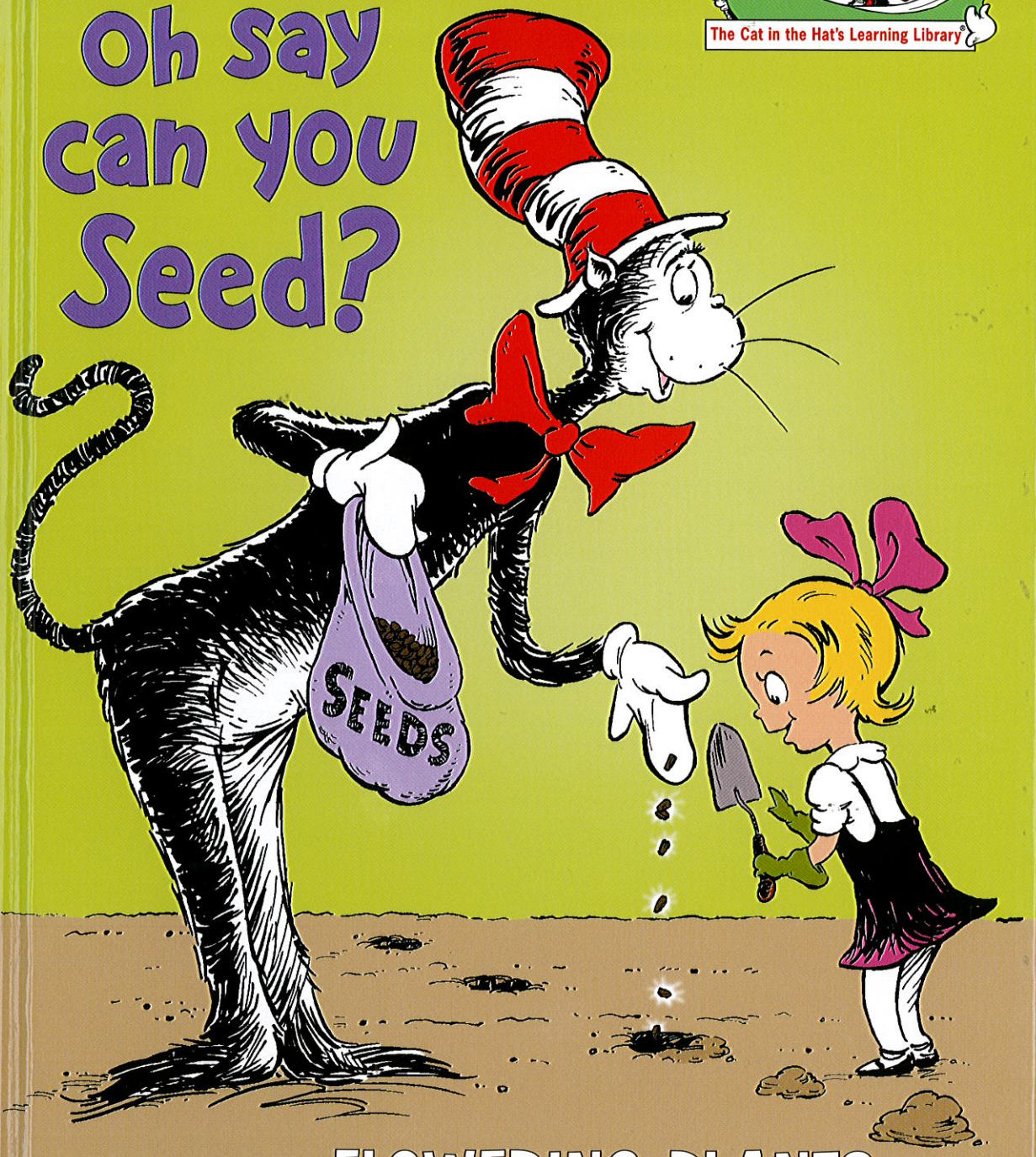
The Cat in the Hat's Learning Library®

Oh say can you Seed?



All About FLOWERING PLANTS

by Bonnie Worth • illustrated by Aristides Ruiz

Oh Say Can You Seed?

Skills: Science/Writing/Journaling

Objective: The student will observe and become familiar with seed parts, the germination process, parts of plants, parts of a flower, the process of pollination and seed dispersal.

Background: Plants help the environment and us in many different ways!

Plants make food. Plants are the only organisms that can convert light energy from the sun into food. Also plants produce ALL of the food that animals, including people, eat. That includes meat. The animals that give us meat, such as cattle or chickens eat grass, oats, corn, or other plants. Other ways plants are essential to life:
Plants make oxygen.
Plants provide habitats for animals.
Plants help make and preserve the soil.
Plants provide useful products for people.
Plants beautify our surroundings**.**
Biology of Plants: Plants and Life on Earth
http://www.mbgnet.net/bioplants/earth.html
Those involved in Texas agriculture work hard to care for the soil, water, plants, animals and other natural resources that provide what we need every day.

Materials: The material needs within this unit are unique to each lesson. When appropriate, a master copy and answer key is provided.
Meet a Farmer Videos on Vimeo
https://vimeo.com/channels/txfbaitc
www.texasfarmbureau.org
Scroll to Vimeo, bottom of page

Procedure: Use the book, *Oh Say Can You Seed ?* by Bonnie Worth as a framework. The suggested activities are aligned to page numbers and vocabulary within the text. This text has been used with various grade levels and contains a variety of activities for grades K-5.
TFB Videos: Cabbage Cravings, Arnosky Flowers, Sesame Seed, Tiny Seed, Big Crop, etc. Videos can be used to introduce plant part concepts. Found at: www.texasfarmbureau.org Vimeo or https://vimeo.com/channels/txfbaitc

The following materials have been gathered from various sources, such as National Ag in The Classroom, various state's Ag in the Classroom programs, commodity groups and government publications. Every effort has been made to cite sources. Where appropriate, a subscription has been purchased. These materials are to be distributed for educational purposes only.

TEKS

Kindergarten
1A&C, 2A-E, 3A-C, 4A-B, 5A&B, 6A, 7A-C, 8A-C, 9B, 10A-D

First Grade
1A&C, 2A-E, 4A-B, 6A, 7B-C, 9A&C, 10B

Second Grade
1A&C, 2A-F, 3B, 4A&B, 6A, 7B&C, 8C, 9A-C, 10B

Third Grade
1A&B, 2A-F, 3A, 4A, 5B-D, 6A, 7D, 9B, 10A

Fourth Grade
1B, 2A-F, 3ACD, 4A, 5ABC, 6A, 7A&C, 8B, 9AB, 10

Fifth Grade
1A&B, 2AF, 3A, 4A, 5AD, 6A, 8B, 9BD

TEXAS FARM BUREAU®

Oh Say Can You Seed?
By Bonnie Worth
Pages 6-15
Section A

The following activities can be used with Bonnie Worth's book, *Oh Say Can You Seed?* The page numbers are suggestions and align activities within the text.

Begin pre-reading and purpose setting activities by using questions such as:

- What do you think this book is about?
- What do you know about plants, seeds, flowering plants?
- What might the author's purpose be in writing this book?
- Is this text fiction or nonfiction?
  - Is it reference, biography, autobiography, or informational?
  - Is it science fiction, fantasy, or poetry?
- What do we know about books written in the *Cat in the Hat* style?

Read pages 6 through 15. Display <u>vocabulary</u> at this time.

- <u>Embryo</u>—tiny young plant within the seed
- <u>Cotyledon</u>—the tiny young plant's food source before germination
- <u>Seed Coat</u>—protection for the seed

Suggested Activities within this section:

A1 Bean Seed Dissection
A2 Bean Book (4 pages)
A3 Seed Parts Color Sheet (unlabeled)
A4 Seed Parts Color Sheet (labeled)
A5 Seed Parts (Mailbox 2 pages)
A6 Parts of a Seed (TFB)
A7 Parts of a Seed (Primary-2 pages)
A8 Testing a Hypothesis: ***If the cotyledon is the seed's food source, and it's removed, the seed will not be able to grow.*** (3 pages)
A9 Seed Sort Activity (3 pages)
A10 Seed Packet Design, American Farm Bureau Federation (3 pages)
A11 Do Something Cool (Swell Seed Lifting Power) (4 pages)
A12 Pre and Post Test (2 pages)

Bean Dissection

Traditional Lesson Design

Preparation:

Purchase a bag of large lima beans at the supermarket.

Count out approximately 2 to 4 beans for each student who will participate in the Bean Dissection activity.

Place counted beans in a bowl and cover with water.

Wet paper towels may also be used.

Soak beans overnight or at least several hours.

Teacher Information:

Introduce the book *Oh Say Can You Seed?* by Bonnie Worth to the class. Read orally pages 6-15 and discuss. Use the next activities to help your students explore the parts of a seed.

Distribute 2 to 4 beans to each student. Place beans on a dry paper towels.

Discuss seed parts with students as they investigate the beans.

Ask students to take beans apart and identify the seed coat, cotyledons and embryo.
Explain to students that seeds have three basic parts: the seed coat, the outer covering that protects the seed, the embryo, the part of the seed from which the plant grows, and the cotyledon or stored food for the seed. Seeds may also have more than one cotyledon depending on the type of seed. Have each student carefully remove the seed coat, separate the two cotyledons, and then carefully remove the embryo.

Students can observe and record findings as they locate seed parts.
You may ask students to sketch the seed parts as they locate and identify them.
Younger students may complete the *Parts of a Seed, color, cut and glue activity.*
Provide "Ag in the Classroom Bean Book" kits for students to construct as a reference.

The Bean Book

By: _____

1

Let's Learn about Lima Beans

- Lima beans grow in the form of a bush or vine.
- The vines can reach up to 12 feet high!
- The flowers of the lima bean plant have an abundance of nectar which attracts honey bees.
- The bean gets its name from Lima, Peru, the first place to export them.

7

The bean has a cover called the **seed coat**. It protects the seed

2

Inside the seed coat are two **seed leaves (cotyledon)**. They hold the food the new plant needs to grow

3

A baby plant is hiding between the seed leaves. It is called an **embryo**.

4

Leaves ← Stem ↖ Roots ↑

5

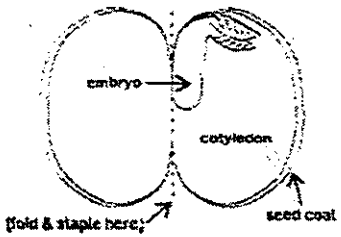
Every kind of seed has three parts. They are the **embryo, stored food (cotyledon)** and a **seed coat**.

6

Bean Book Instructions:

- Cut out the seeds coat, seed leaves and embryo.
- Cut apart blocks of text, following the dotted lines.
- Fold the seed leaves (yellow) into the seed coat (tan) and tuck the embryo (green) into the upper center of seed leaves.
- Attach seed parts by stapling along the fold.
- Using the numbers as reference (see below), glue text onto the pages of your Bean Book.
- Write your name on the cover of your book.

Placing of seed parts

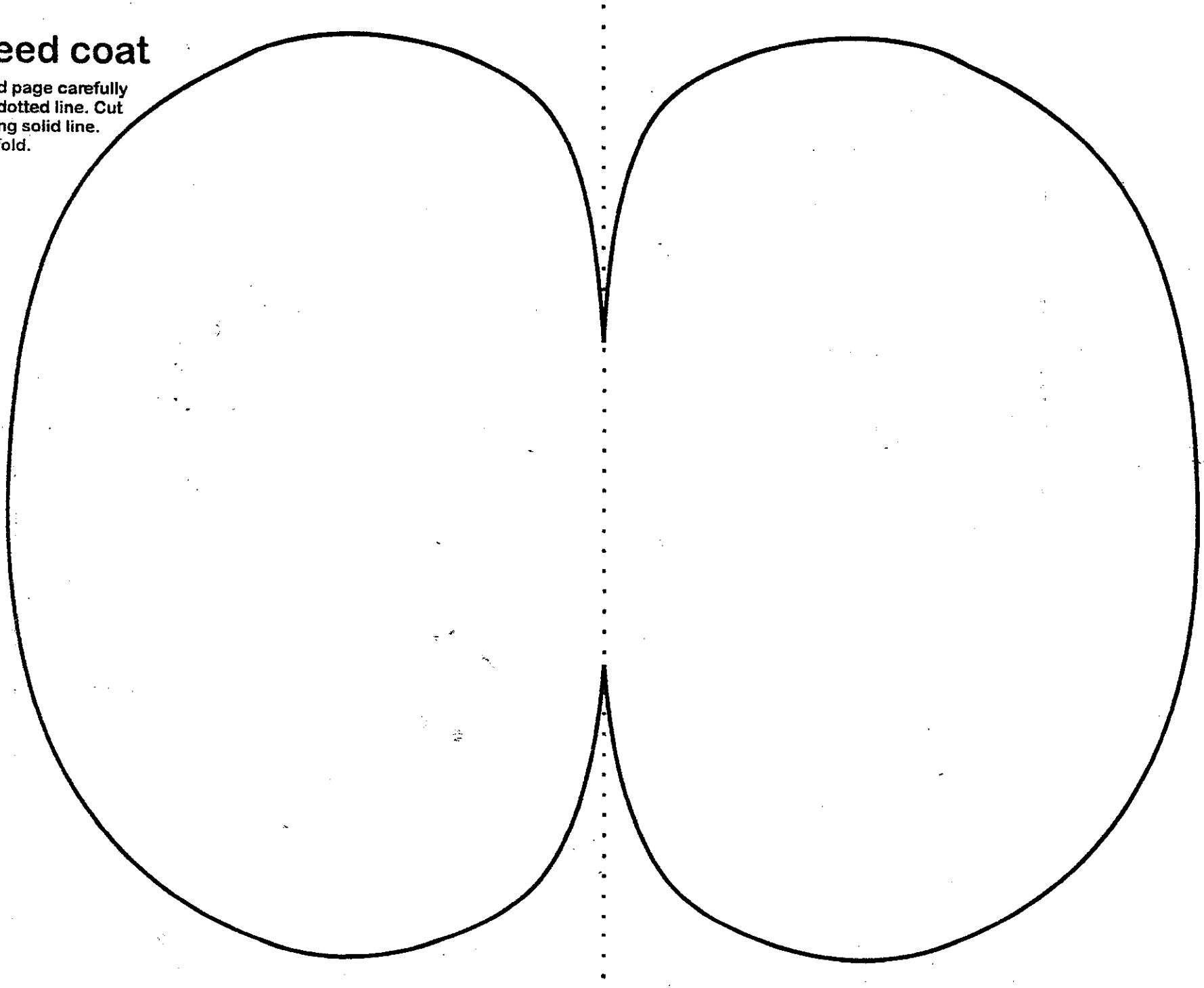


Place Bean Book text in the following order:

1. Front cover
2. Inside front cover
3. Page after inside front cover (first cotyledon)
4. Inside of first cotyledon, next to embryo
5. Inside of second cotyledon, with arrows pointing to parts of embryo
6. Inside back cover
7. Outside back cover

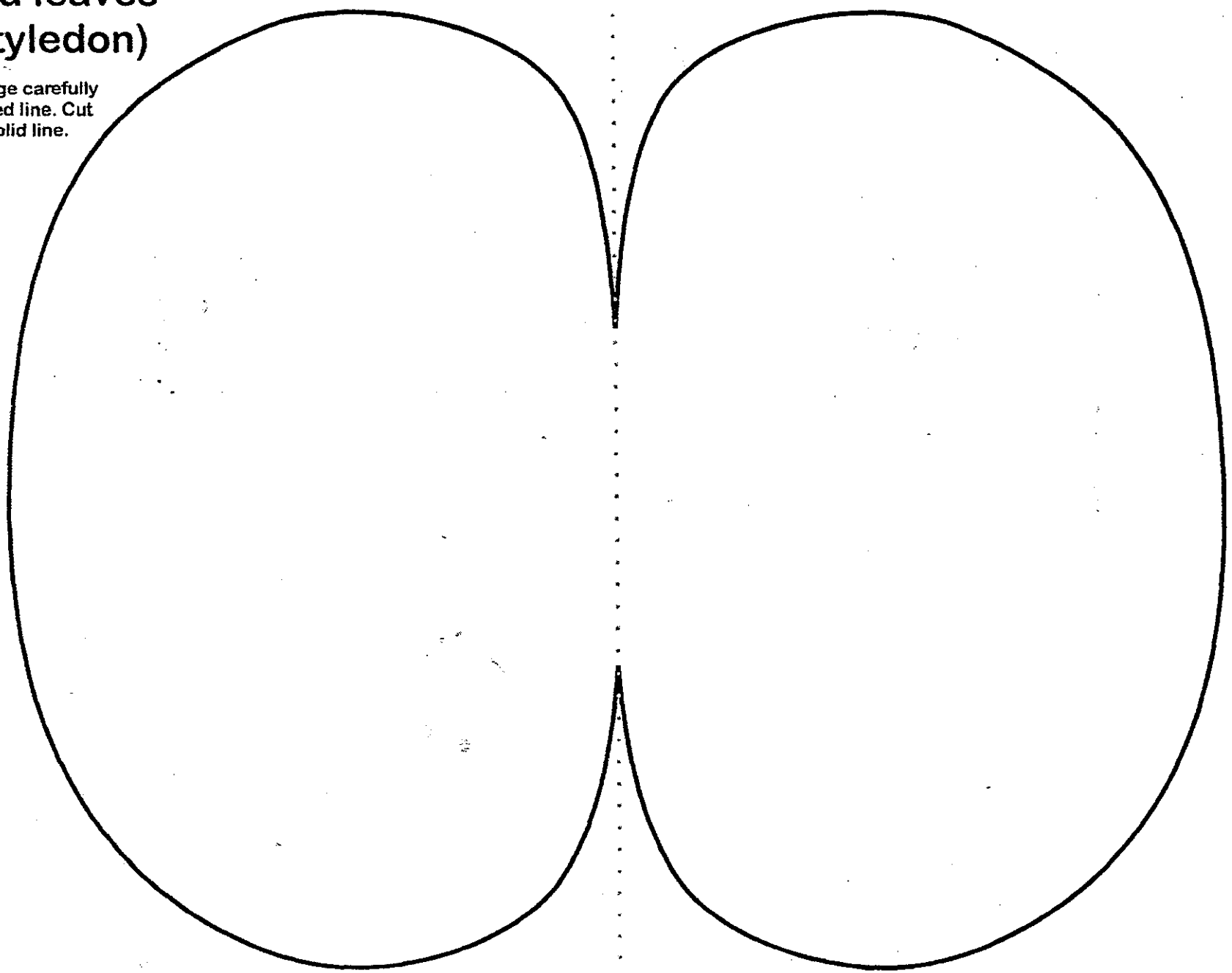
seed coat

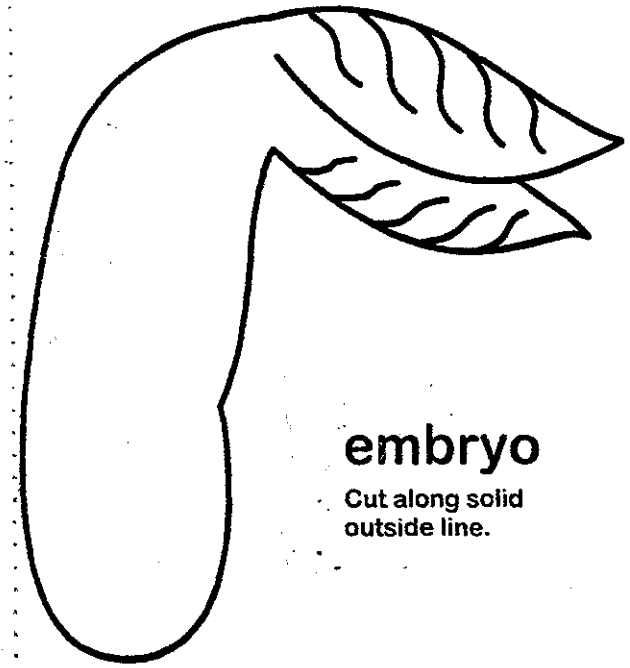
Fold page carefully on dotted line. Cut along solid line. Unfold.



seed leaves (cotyledon)

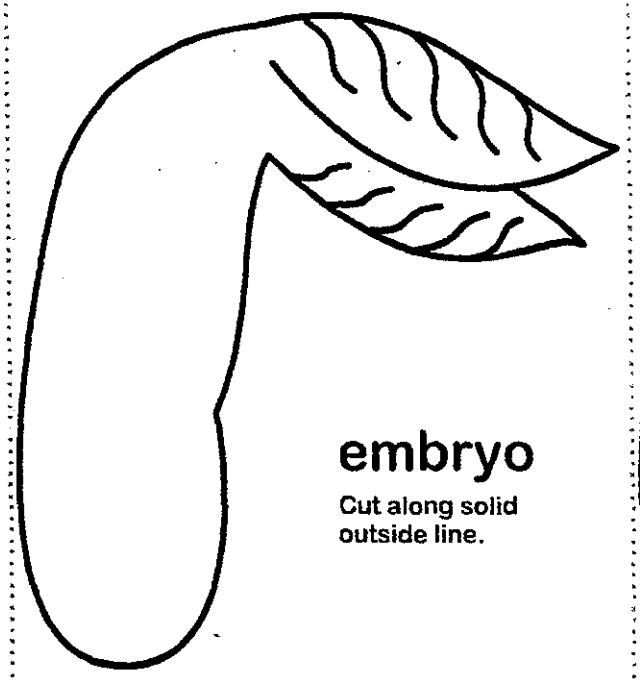
Fold page carefully on dotted line. Cut along solid line. Unfold.





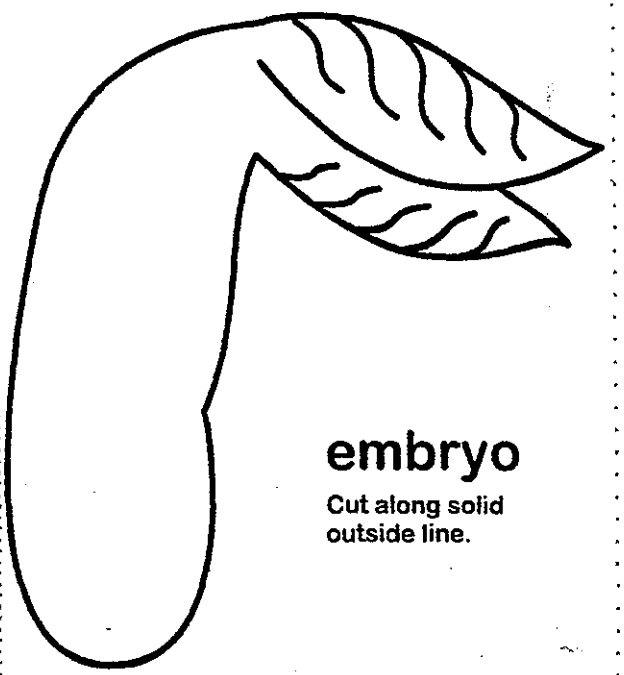
embryo

Cut along solid outside line.



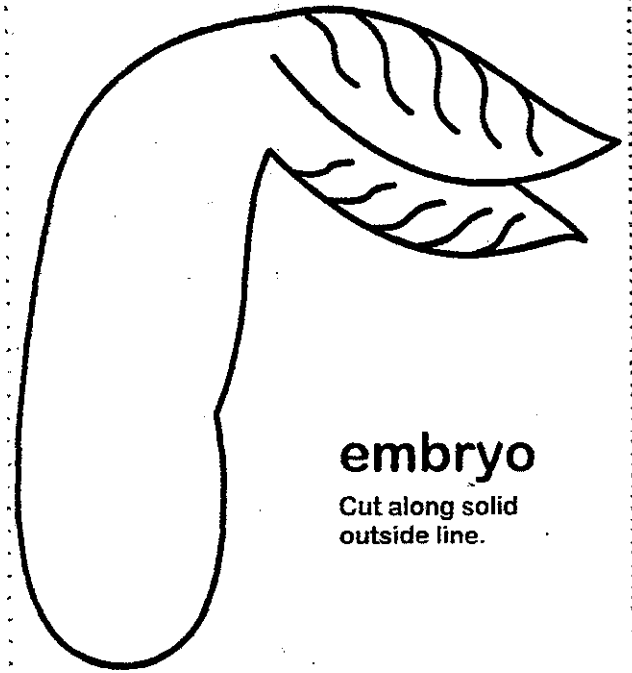
embryo

Cut along solid outside line.



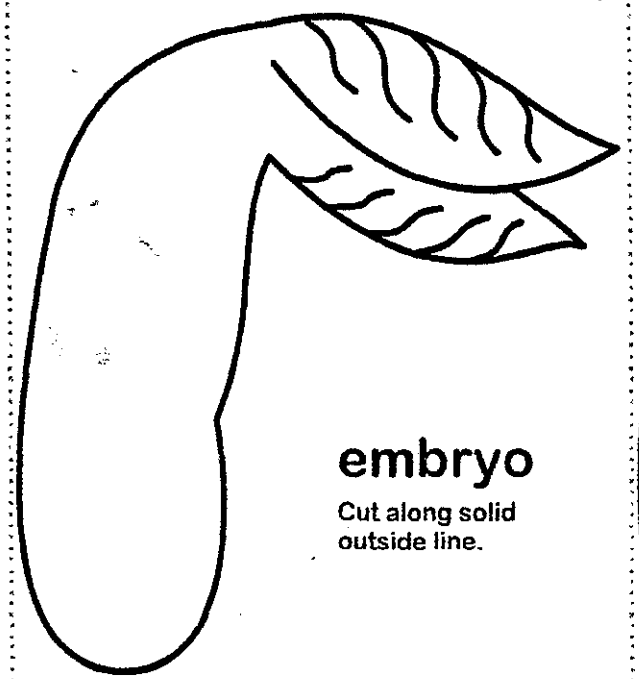
embryo

Cut along solid outside line.



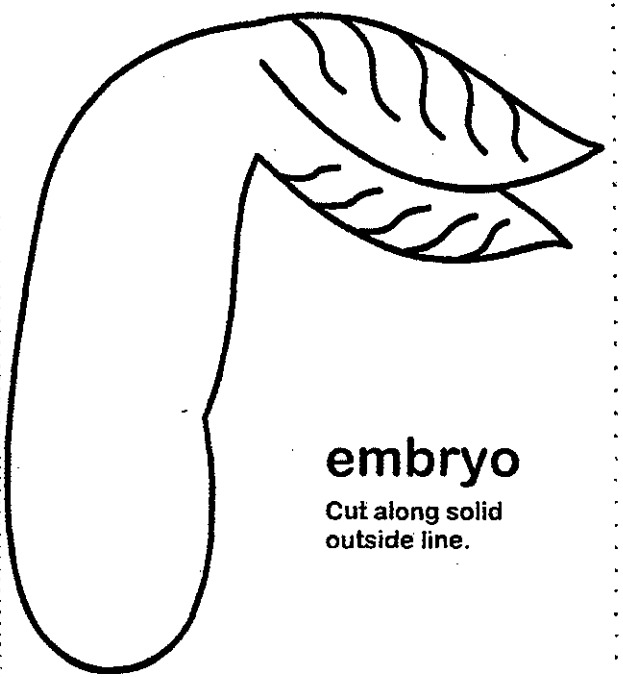
embryo

Cut along solid outside line.



embryo

Cut along solid outside line.

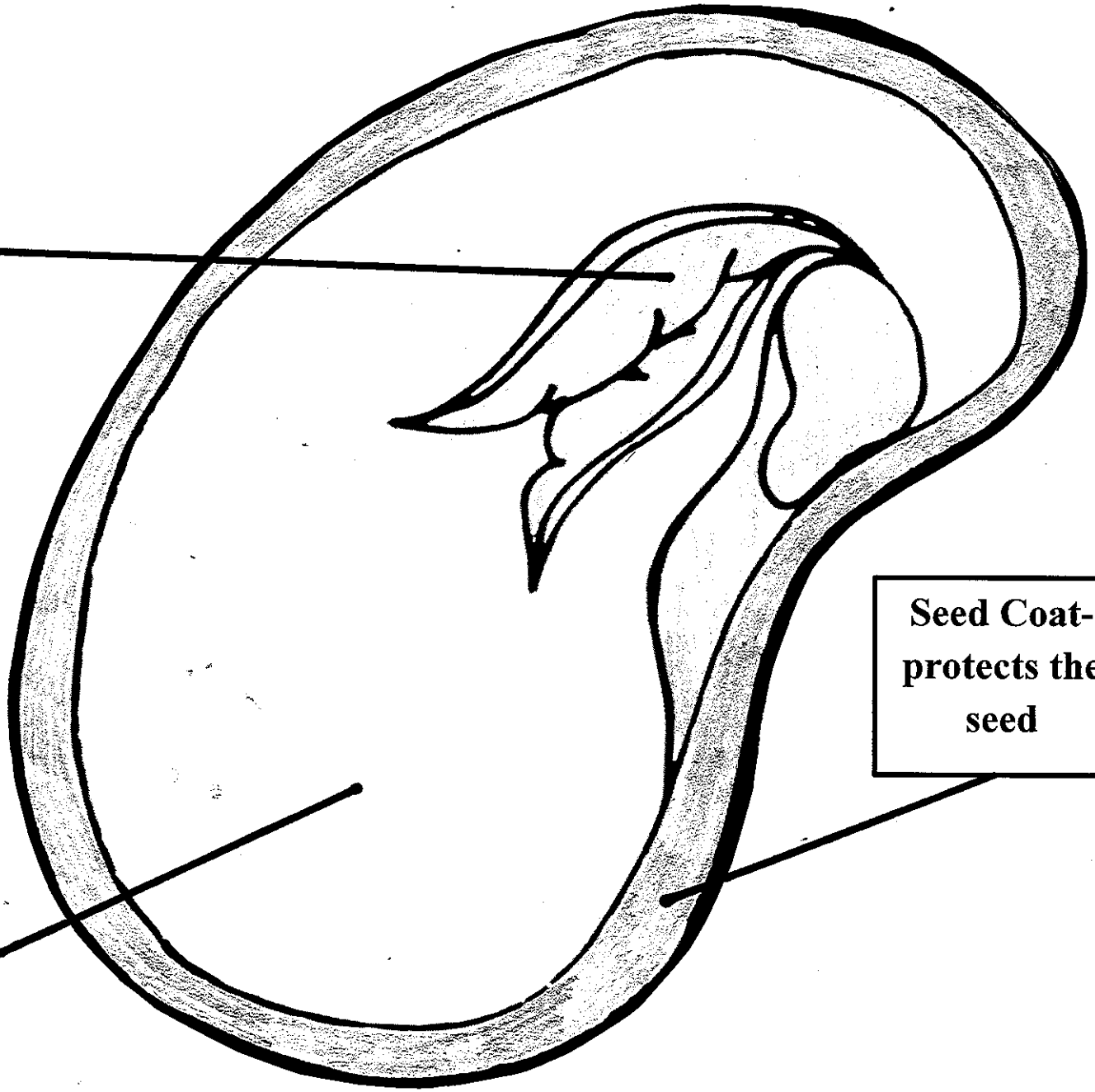


embryo

Cut along solid outside line.

Name_____ Date_____

Parts of a Seed



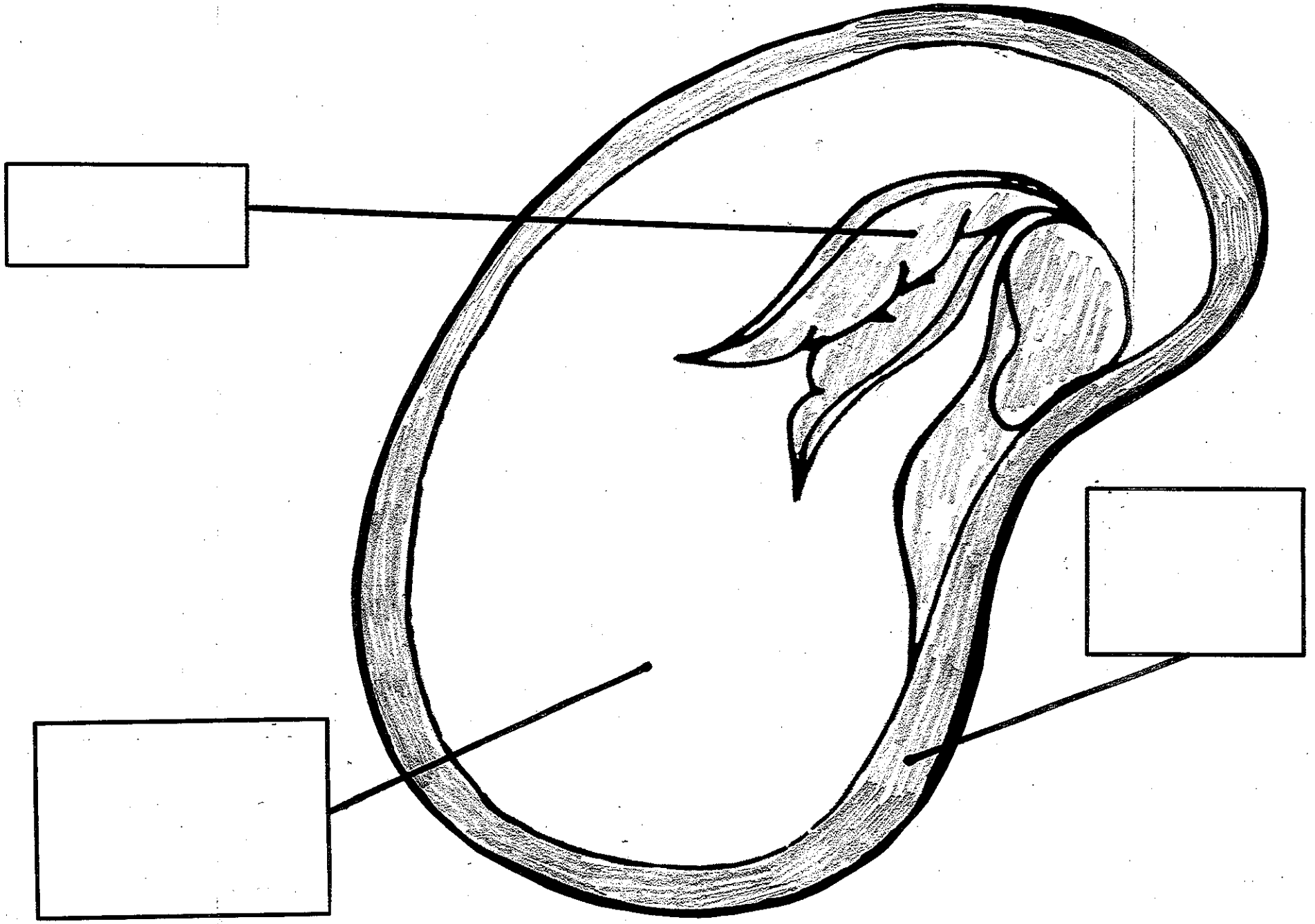
Embryo-the tiny new plant

Seed Coat- protects the seed

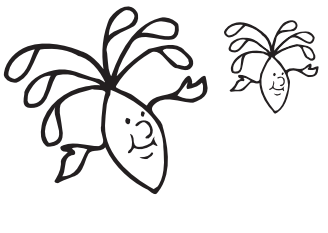
Cotyledons- the seed's food before germination

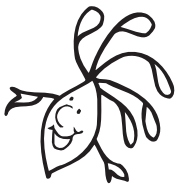
Name_____ Date_____

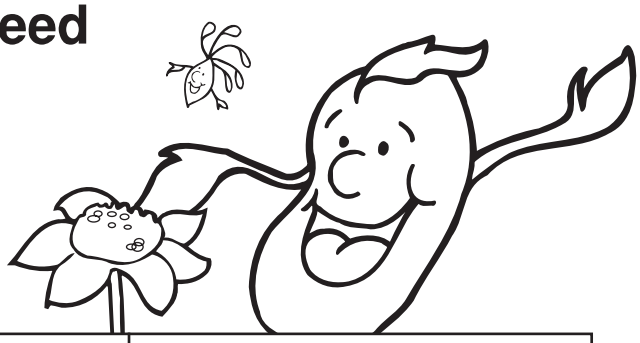
Parts of a Seed



Parts of a Seed



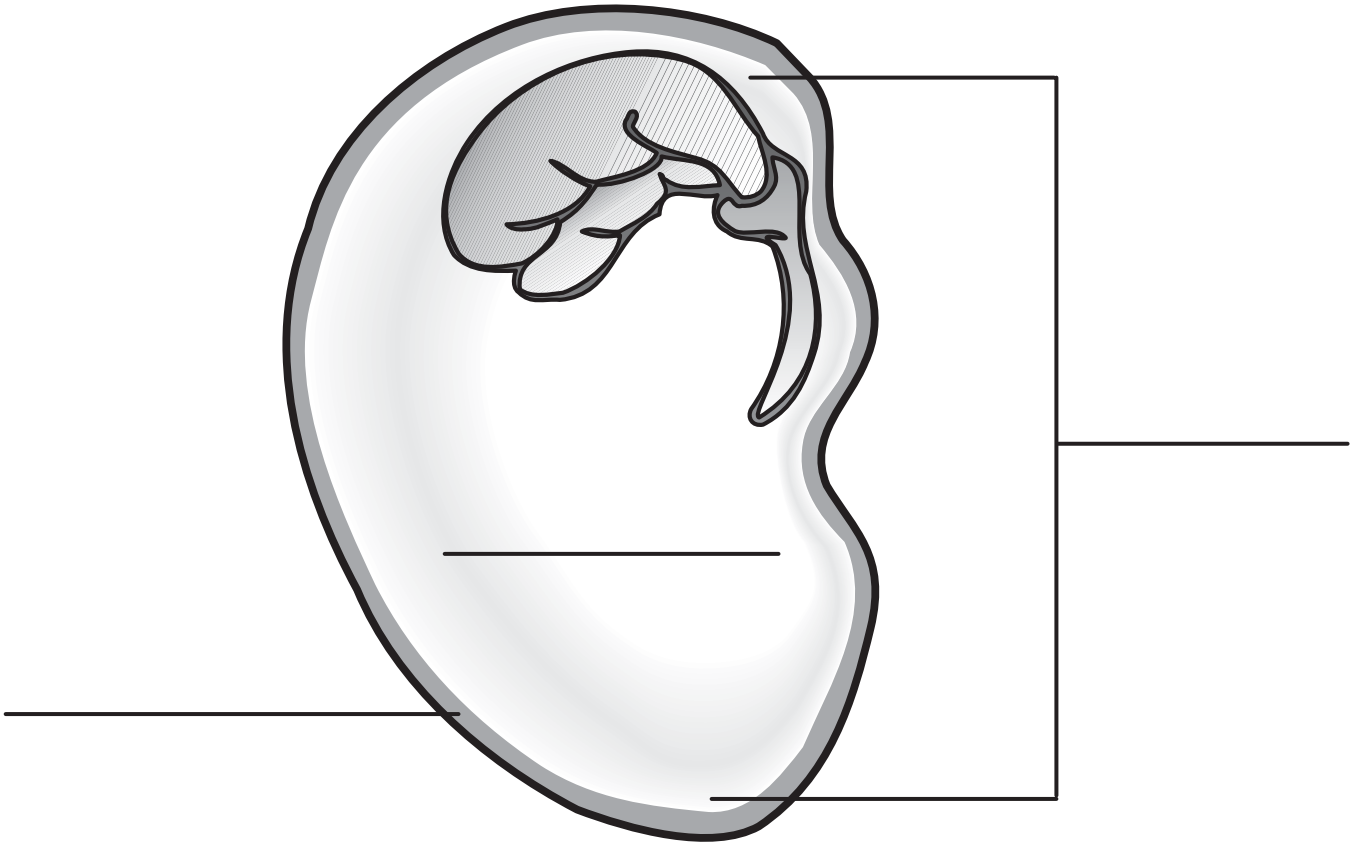




Glue each seed part in the correct box.

Seed Coat	Embryo	Cotyledon

Label the seed.

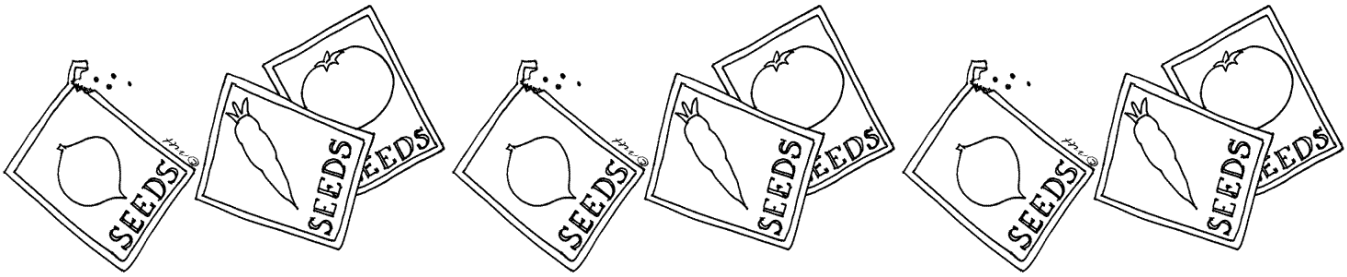


How to Use the Reproducible

Use this activity to help your students explore the parts of a seed. The night before, soak enough large dried lima beans for each child to have one bean (seed). Explain to students that seeds have three basic parts: the *seed coat* (outer covering that protects the seed), the *embryo* (the part of the seed from which the plant grows), and the *cotyledon* (food storage tissue of the seed). Also inform the students that seeds can have more than one cotyledon, depending on the type of seed. Next, distribute a lima bean, a toothpick, and a copy of the reproducible to each student. Have each child use her toothpick to carefully remove the seed coat from the lima bean and glue it in the box on the reproducible labeled "Seed Coat." Instruct her to gently separate the two cotyledons and then examine the two seed halves. Explain that the cotyledon with the little leafy structure is the embryo with food tissue and that the cotyledon without the leafy structure is simply food tissue. Have each child glue the embryo half of the cotyledon in the box labeled "Embryo." Then have the child glue the second cotyledon half in the box labeled "Cotyledon." Next, instruct her to label the parts of the seed on the diagram. Now, that's super seed-part separation!

Name_____**Date**_____

Parts of a Seed



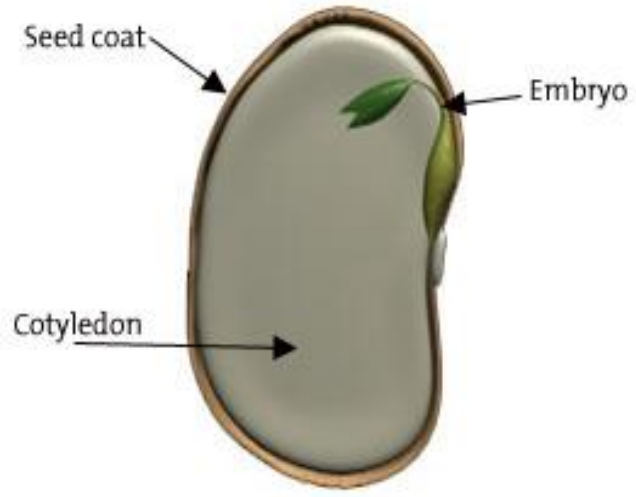
Glue each seed part in the correct box.

Seed Coat	**Embryo**	**Cotyledon**

Seed Coat-protection for the seed

Embryo-the tiny plant inside the seed

Cotyledon-food for the seed



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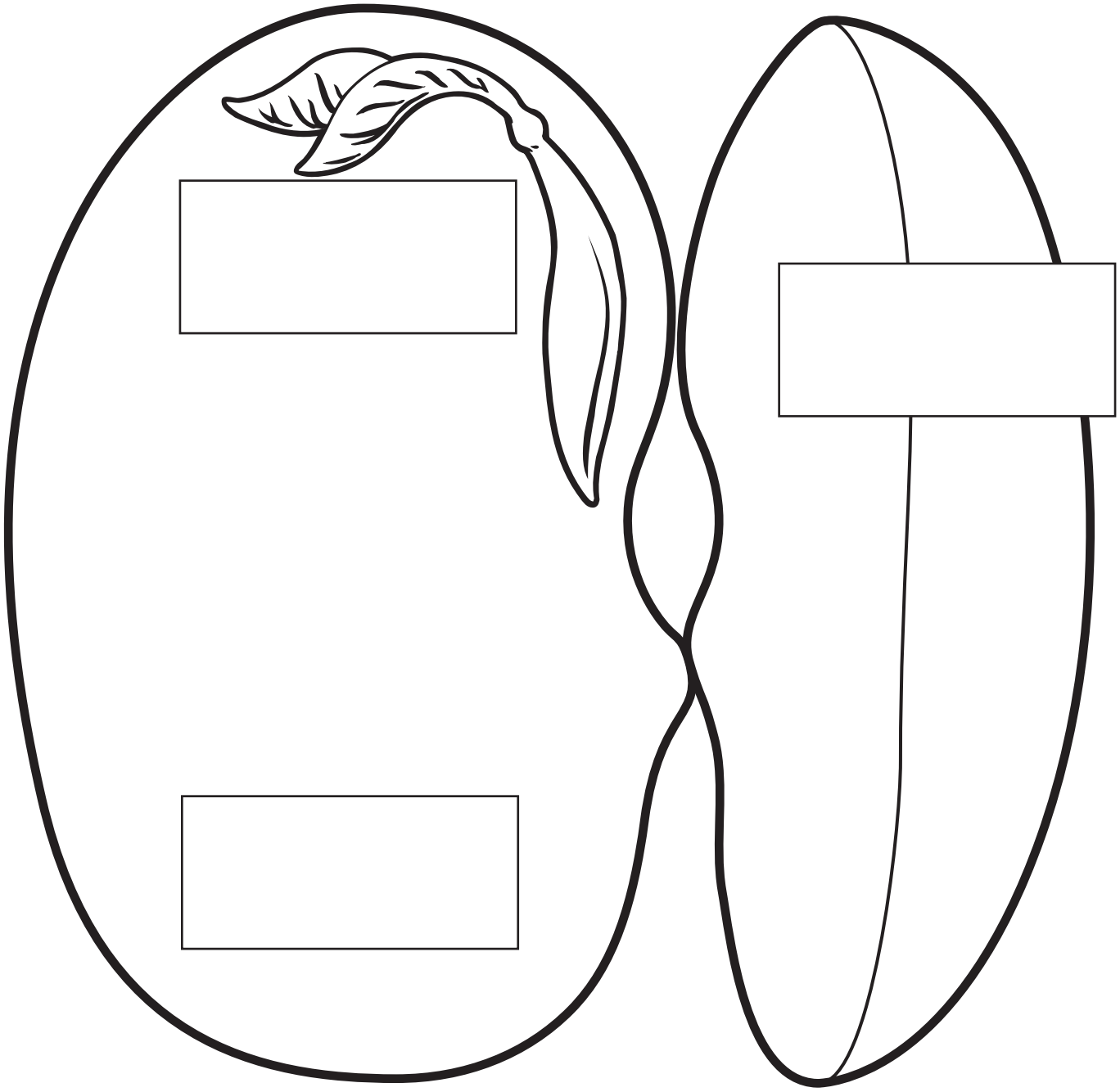
Name _____ *Seeds*

Parts of a Seed

Color. Cut. Glue.



seed coat	food	new plant parts

How To Use The Reproducible

Give your youngsters a closer look at the parts of a seed with this hands-on activity. To prepare, copy the reproducible for each student and gather a class supply of large dried lima beans. Soak the beans overnight in red-tinted water. (The red food coloring will make it easier for the children to distinguish the seed parts.) On the day of the activity, provide each child in a small group with a presoaked bean on a paper towel and a magnifying glass. Explain to your youngsters that all seeds have three parts: the embryo, or new plant parts that are beginning to grow inside the seed; the seed coat that protects the new plant; and the food that helps the new plant grow. Help each child carefully remove the seed coat from his bean. Guide him to investigate with a magnifying glass the seed's interior and then describe it. Help youngsters locate and identify the seed parts. Then read the text on the reproducible to youngsters and help them label the parts of the seed. Take a closer look!

Testing a Hypothesis

This activity will allow students to conduct an experiment, test a hypothesis, and record findings.

Hypothesis: ***If the cotyledon is the seed's food source, and I remove it, the seed will not be able to grow.***

You will need: Beans soaked overnight or several hours. Each student will need 2 to 4. (You may want to soak extra seeds)
Ziploc Sandwich bags
Paper towels
Water and a tablespoon for measurement
Stapler
Tape
Sheet to record findings and predictions.

Procedure:

1. Soak beans in water overnight or several hours.
2. Prepare Ziploc bags by placing a paper towel inside the Ziploc. Punch a row of staples 2 inches from the bottom of the Ziploc. The staples will hold the paper towel in place and will help with drainage, decreasing the chance the seeds will rot.
3. Give each student 2 to 4 beans.
4. Instruct the students to put one or two beans in their Ziploc bag, on top of the row of staples.
5. With the remaining seeds, have students carefully peel the seed coats off the two seeds.
6. Next gently take the seeds without seed coats and gently pull them apart to reveal the two halves. Have students locate the embryos. Have extra beans available for this step. Have students work to remove the embryos intact.

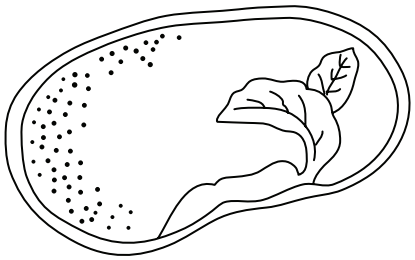
Once the embryos have been separated, carefully place them inside the Ziploc bag, above the row of staples. Students should now have bean seed embryos and whole bean seeds in their bag.

7. Remind students that the cotyledons are the seeds' food supply. They feed the seed until it can grow leaves and make its own food. This experiment is to see how well seeds grow without their food supply.
8. Add one tablespoon of water to each bag to wet the paper towel and moisten the seeds. Using tape, hang the bags on a window or in a well-lit area. They should get light and warmth, but not too much heat. Don't seal the bags.

Require students to journal findings of all experiments stating whether hypotheses were proven or disproven.

Name: _____

Seed Science Experiment



1. Draw a star on the cotyledon of this seed.
2. Draw a circle around the embryo of this seed.
3. What does the cotyledon do for the seed?

_____

_____

Questions

4. What do you think would happen if we removed the cotyledons?

_____

5. Draw a picture of the plants in your bag. Make sure it shows one whole seed AND one seed without the cotyledons.

Hypothesis

6. Write what you think the two plants will look like in one week.

_____

_____

7. Draw a picture of what you think they will look like.

Experiment

8. Draw a picture of the plants now.

Results

9. What happened to the seeds without the cotyledons?

_____

Seed Sort Activity

Materials:

Gather several different types of seeds. Stores greatly discount seed packets at the end of the season. Or some will donate when they find out they are to be used in the classroom. Cantaloupe, soybeans, watermelon, garden peas, peanut (not roasted or salted), cucumber, string bean, squash, black-eyed peas, butterbean, corn, pumpkin, and sunflower are examples. Seeds that are large enough for students to hold are the best choices. Before class, put one of each seed variety in a baggie or small cup. Make as many groups as you need per table, per science group, or per student. You may also use a Bean Soup mix.

One page of listed seeds. (Page included for reference, but use the seeds you are examining)

One page diagram (page included)

Procedure:

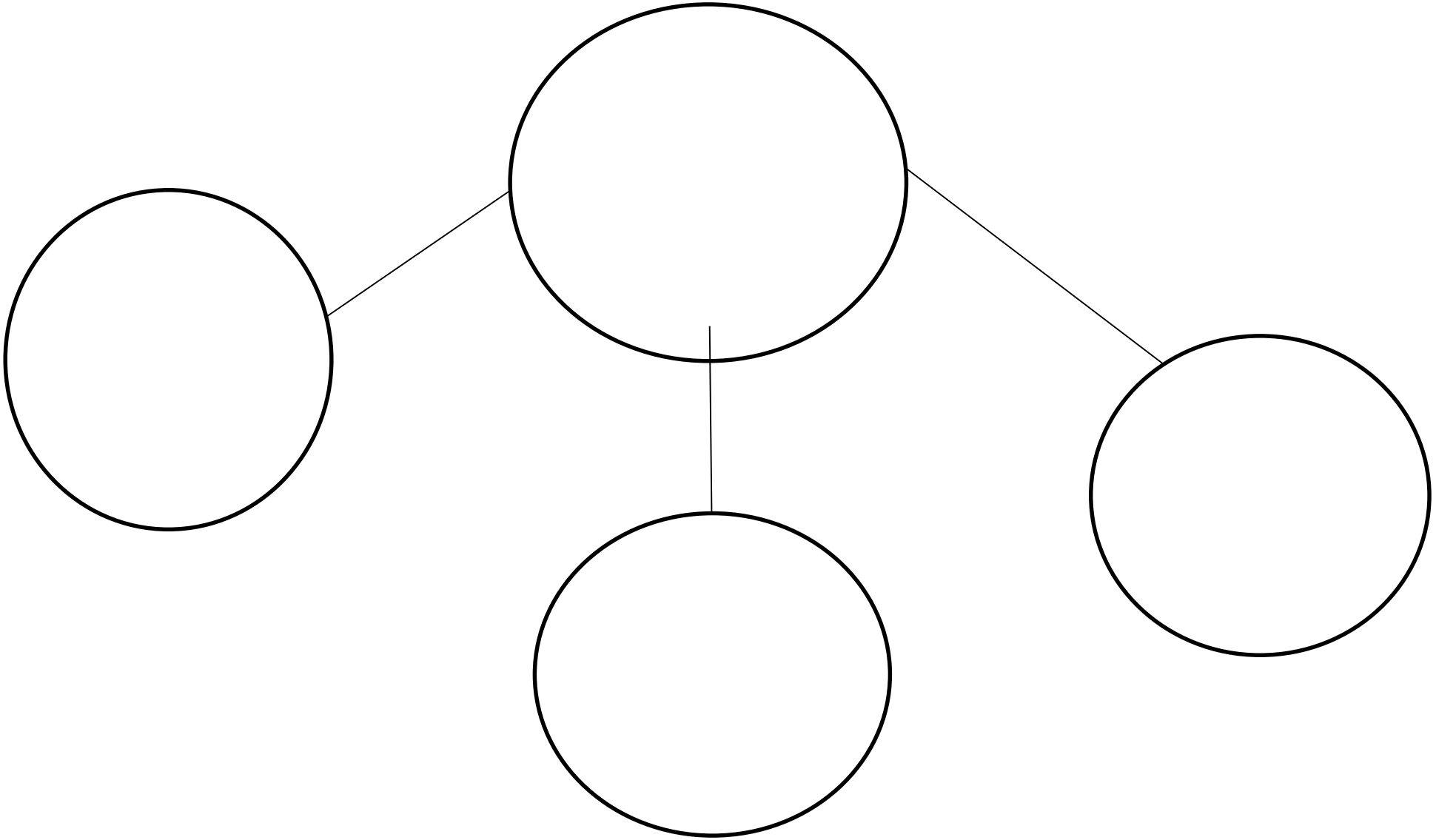
Activity 1:

- Take the two column list of seed names and tell students they will be given these seeds. Have them predict what they know about seeds they have seen.
    - What does a watermelon seed look like?
    - What does a pumpkin seed look like?
    - Which one has the toughest seed coat?
    - Which one is the squash seed? Why do you think that?
- Take the diagram page and sort the seeds. Label and add categories as needed.
    - By color?
    - By size?
    - By favorite food?
- After the activity, seeds may be planted in the school garden or classroom.

Name_____**Date**_____

Sorting Seeds

Directions: Place all your seeds in the top center circle. Sort seeds into at least three main groups by moving them to the other circles. Add more circles if you want more categories. Label each circle.



Name_____ Date_____

Seed Sort Activity

Watermelon

Garden Pea

Peanut

Cucumber

String Bean

Squash

Black-eyed pea

Butter bean

Corn

Sunflower

Cantaloupe

Soybean

Pumpkin

Pinto beans

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DAYS TO GERM *4 - 7*		**DIÁS A GERMINAR** *4 - 7*
DEPTH *1/2 in.*		**PROFUNDIDAD** *13 mm*
SPACING *12 in./ 1 in.*		**ESPACIO** *30 cm/ 3 cm*
DAYS TO HARVEST *28*		**DIÁS DE COSECHA** *28*

April - July | Abril - Julio

March - May & August | Marzo - Mayo y Agosto

September - May | Septiembre - Mayo

After danger of frost, sow outdoors. Thin when plants are a few inches tall.

Después del peligro de helada, siembre en exteriores. Reduzca cuando las plantas tienen unas cuantas pulgadas de alto.

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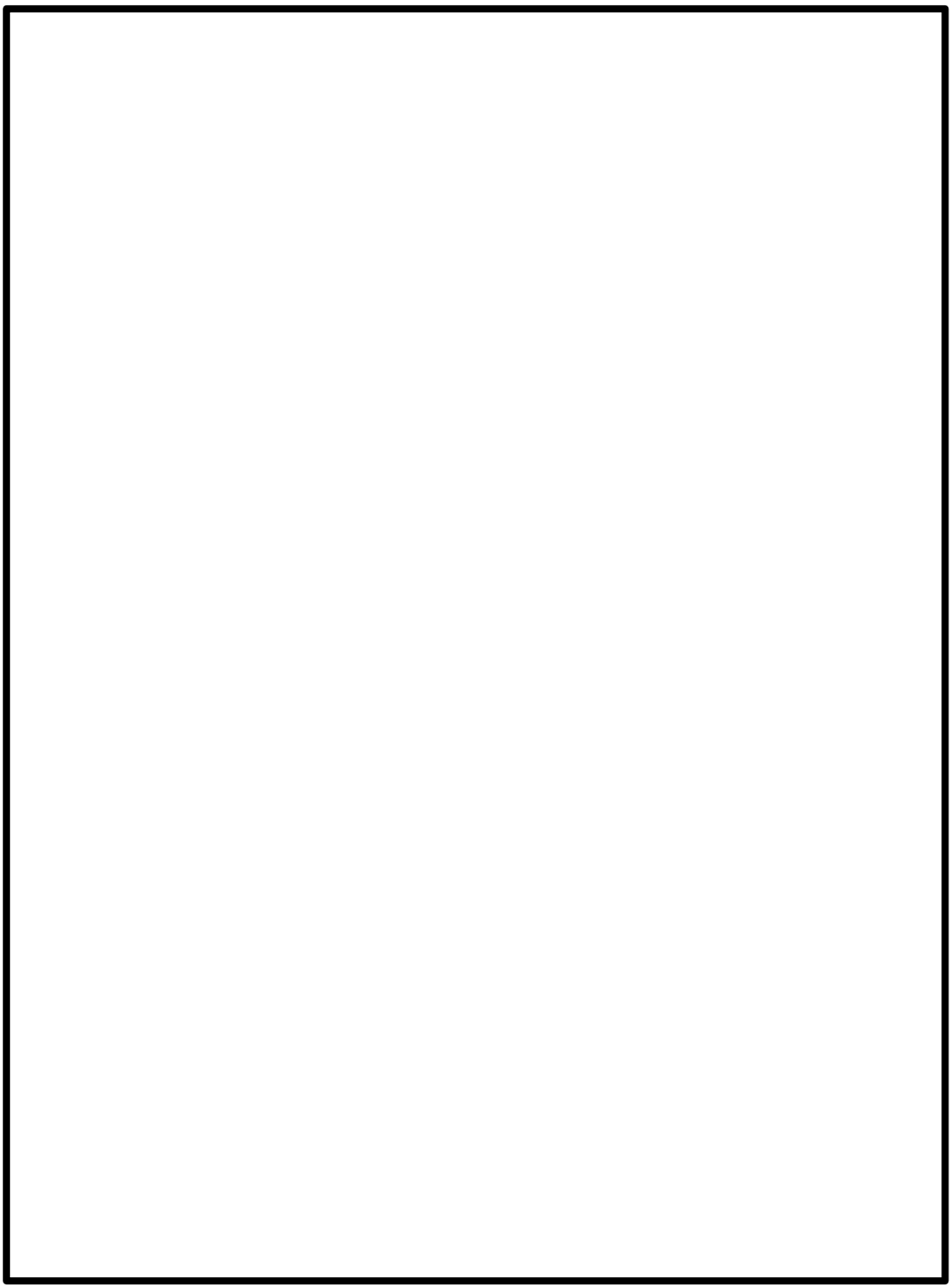
Name_____Date_____

Design Your Own Seed Packet!

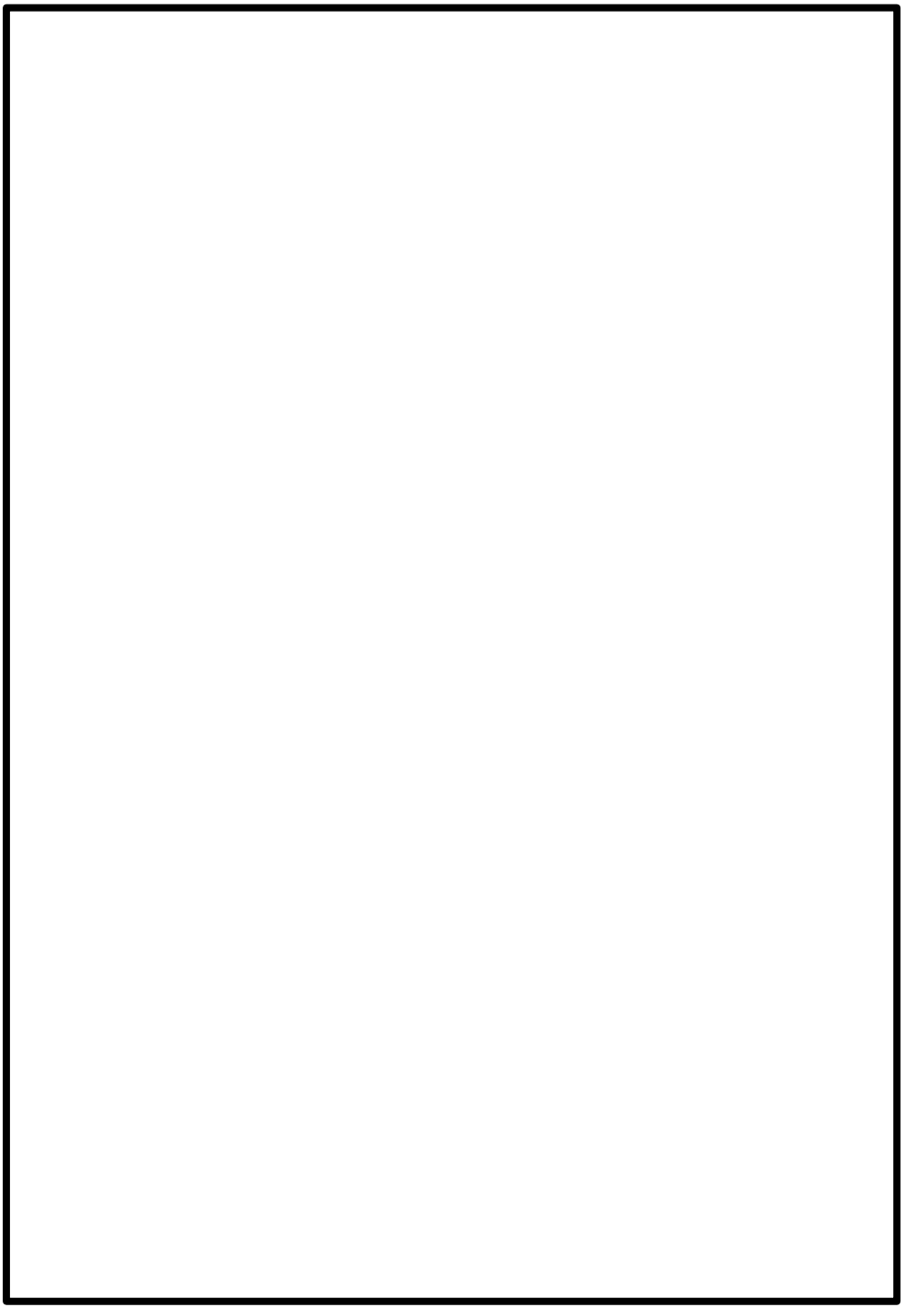
Directions: Draw your own seed packet. Don't forget to include the back. Include a creative name for your seeds and decorate your packet so people will want to buy and plant your seeds.

Front of your Seed Packet



Don't forget to include the important information on the back of your seed packet.

Back of Seed Packet Design



Do Something COOL

SEED LIFTING POWER

A soybean sprout needs to be strong to push up through the soil. How strong is it? Can it lift up a penny, a nickel, a dime, or a quarter? What do you think will happen? Do the following experiment to find out. That's what a scientist would do. Before you start, read pages 2 and 3 in *COOLBEAN the Soybean* and use the scientific method doing this experiment.

What you need

- □ Soybean seeds or other bean seeds
- □ Potting soil
- □ Large spoon
- □ Eight 12-oz. paper or Styrofoam cups
- □ Aluminum foil baking pan large enough to hold the cups
- □ Water
- □ Coins: 2 pennies, 2 nickels, 2 dimes, and 2 quarters

What you do

Before you start:

Create a journal for this experiment in a notebook or on a computer.
Write down the question that the experiment will answer.
Write down your hypothesis: What do you think the answer to the question will be?

Set up the experiment:

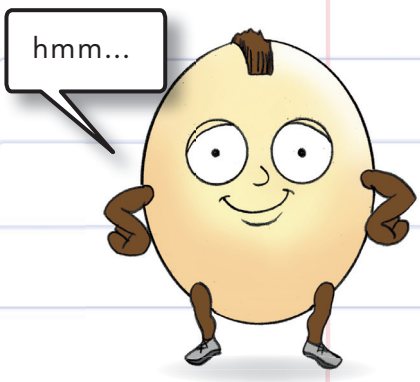
1. Assemble your supplies.
2. Poke a small hole in the bottom of each cup to allow water to drain out.
3. Fill the cups with potting soil up to one-half from the top of the cup.
4. Place one seed in each cup. Push the seed down about one inch into the soil. Fill the hole lightly with soil.
5. Lightly water the soil. It should be moist but not wet.
6. Place one coin over each seed.
7. Place the cups in the baking pan.
8. Keep the soil moist.

Observe your experiment and record your observations in your journal. As you observe answer these questions:

How many days does it take for the seeds to sprout? Did they all sprout on the same day?

Describe what happens to each coin when the seed sprouts. Does the seedling lift the coin? Does it flip the coin? Does the seedling creep out from underneath the coin? Or does nothing happen?

How much weight was each seedling able to lift? To find the weight of each coin go to http://www.usmint.gov/about_the_mint/?action=coin_specifications.



Experiment: Those Swell Seeds

by Rich Wendling on July 1, 2012

Jesus Christ spoke about the power of the mustard seed. Have you ever thought about the challenges that a seed must overcome just to see the light of day? God placed within seeds an astonishing power that even the pyramid builders sought to master.

On January 9, 1948, a 220-foot (67 m) steel schooner named the *Cali* left Guayaquil, Ecuador, loaded with grain, bound for Santiago, Cuba. On January 27, the *Cali* began taking on water during a storm near Grand Cayman Island. As the seawater leaked in, the grain swelled up so much that it ruptured the hull and destroyed the ship!

To the casual observer, seeds appear lifeless and simple. However, under the right conditions, they will germinate (start growing). But this process depends heavily on the presence of water. God designed seeds with the amazing ability to soak up and hold the water necessary for the complex processes of life.

Most seeds, such as grains, beans, corn, and nuts, undergo a resting phase before they begin growing into new plants. During this phase, most seeds contain very little moisture. The seed coat, or outer skin, keeps water out. The chemical processes that keep the cells functioning in the seed are slowed almost to a halt. Seeds can remain in this resting state for months, years, or even centuries. The delay allows seeds to survive harsh, unsuitable environmental conditions. It also allows time for transportation by wind, water, animals, or people.

When conditions become favorable, the seed coat goes through a marvelous transformation that allows water to soak the seed. The process of seeds absorbing water is called imbibition.

During imbibition, a seed can swell to several times its original size. This swelling can cause tremendous pressure—often over 1,000 pounds per square inch (6900 kPa). Swelling seeds can break rocks and concrete or, in the case of the *Cali*, rupture a steel cargo ship. This swelling bursts the seed coat, allowing the new plant to grow and lodging the plant in place so it can't wash away or be blown away by wind. The expanding plant can then take root in even the hardest soils.

What causes imbibition in seeds? Certain molecules in seeds, such as starches and cellulose, develop tiny electrical charges when wet. God uniquely designed water to bond

easily with these molecules. Like tiny magnets, these substances then pull more and more water into the seed, causing the seed to swell up like a water balloon. The added water activates the seed's growth hormones, causing germination. Whenever you cook oatmeal, rice, or beans, you observe imbibition.

Seeds don't hold a monopoly on imbibition. It also occurs in other plant and animal products, such as wood and sponges. In an ancient stone-cutting technique, people would drive dry wooden pegs into holes drilled into rock. When the wood pegs were soaked with water, the pegs swelled, splitting the rock. Some archaeologists believe that the Egyptians cut stone blocks in this way to build the pyramids.

So the next time you notice a blade of grass peeking through a crack in the sidewalk, or as you cook your next pot of scrumptious beans or rice, remember to praise the Creator for His wisdom. He gave even little seeds unique designs that allow them to expand to the ends of the earth, glorifying their Maker as they provide food and other necessities for living things (Genesis 1:29–30).

See For Yourself . . .

Are expanding seeds really strong enough to break apart rocks? Try this experiment to find out!

Materials

6 tablespoons (90 ml) plaster of Paris, 2 small cups, 4 dried lima beans, pen or marker, masking tape or labels, 2 paper towels, water

Procedure

1. Mix the plaster of Paris and water according to the directions on the package. Pour half the prepared plaster into each cup.
2. In the first cup, push the 4 beans into the plaster so that about three-fourths of each bean is below the surface of the plaster. Label this cup TEST. Label the cup without beans

CONTROL. Record a description of how the surface of the plaster in each cup appears. Is it smooth? Are there any cracks or bulges?

3. Fold each paper towel in half twice. Wet the folded towels with water so that they are moist but not dripping wet. Place the moist paper towels on top of the plaster in each cup so that they lie flat on the surface. In 1 hour, examine the two cups. Do you see any changes? Repeat this step every hour for 12 hours or until no further changes are observed.

Rich Wendling earned a bachelor of science degree in Education from Ohio State University. For thirteen years he taught science, social studies, and math in the public schools. He is a contributing writer for the Answers Bible Curriculum and a former employee of Answers in Genesis.

Name _____

"Oh Say Can You Seed?"
By Bonnie Worth
Pre/Post Test

Directions: See how many of these questions you can answer ***before*** hearing the story and then see how much you have learned ***after*** hearing the story! Circle the "T" if you think the answer is true and circle the "F" if you think the answer is false. Don't change your "Before Hearing Story" answers, but be sure and answer the "After Hearing Story" answers correctly!

	Before Hearing Story		After Hearing Story	
1. Every flowering plant starts out as a seed.	T	F	T	F
2. Bean seeds have 2 parts.	T	F	T	F
3. The baby plant inside of a seed is called the embryo.	T	F	T	F
4. The cotyledon is where food is stored in the bean seed.	T	F	T	F
5. The part of the plant growing above the ground is called the root system.	T	F	T	F
6. Food making is done in the roots of the plants.	T	F	T	F
7. Photosynthesis is the food-making process done by plants.	T	F	T	F
8. Plants give off carbon dioxide.	T	F	T	F
9. Bees help carry pollen from plant to plant.	T	F	T	F
10. Nuts are fruits.	T	F	T	F
11. Bur seeds are "hitchhikers".	T	F	T	F
12. Plants are the only living things on Earth that make their own food.	T	F	T	F

"Oh Say Can You Seed?" (Answer Sheet)

"Oh Say Can You Seed?"

Teacher's Answers to Pre/Post Test
(page numbers where found in text provided!)

1. T p. 7
2. F p. 13 (seeds have 3 parts)
3. T p. 14
4. T p. 15
5. F p. 19 (shoot system)
6. F p. 28 (leaves)
7. T p. 25
8. F p. 29 (oxygen)
9. T p. 31
10. T p. 35
11. T p. 36
12. T p. 26

Oh Say Can You Seed?
By Bonnie Worth
Pages 16 and 17
Section B

The following activities can be used with Bonnie Worth's book, *Oh Say Can You Seed?* The page numbers are suggestions and align activities within the text.

Prior to this lesson, plant a seed in a clear container clearly visible. This can be done in a baggie with a wet paper towel, the Garden in a Glove, or Mini Greenhouse. Ask students what they notice about the germinating seed.

- Do the roots or stem appear first?
- Why would it be necessary for the root to appear first?

Read pages 16 and 17. Display vocabulary at this time.

- Germination-the process when a seed begins to grow or sprout
- Stem-the part of the plant that is above ground. It supports the plant and helps transport water and nutrients.
- Roots-the part of the plant below ground that anchors the plant and pulls in the water and nutrients.

Suggested Activities within this section are included for your reference and may span a time frame of a few days to a few weeks.

B1 Germination Journal (5 pages)
B2 Mini Greenhouse
B3 My Little Greenhouse (2 pages)
B4 Garden in Glove (2 pages)
B5 Living Necklaces
B6 How Does Your Garden Grow (2 pages)
B7 Grass Head People (4 pages)

Germination Journal

Provide ***Germination Journal*** to students. You may choose the time frame of this activity. It can span a few days or a few weeks. Have students record their findings, make predictions, and drawings. Students may measure their plant's growth. For example, they may measure the roots and when the plant touches the top of the mini-greenhouse. They may measure the plant's height or even the diameter of the root structure.

Some suggested questions are:

- What term did you find that describes the sprouting of a seed? (germinate/germination)
- What are the names of the three parts of a seed? (seed coat, cotyledon, embryo)
- What is the function of each seed part? (the seed coat protects the seed, the cotyledon provides food for the baby plant, the embryo is the baby plant that will grow)
- What does a seed need in order to germinate? (water, soil or other growing medium, warm temperature, air)
- Once a seed has germinated, what does the young plant need in order to grow? (water, soil or other growing medium, appropriate temperature, sunlight)
- Why did you not need to water the seeds and seedlings inside the mini-greenhouse? (the greenhouse was able to sustain its own water cycle)
- What are the stages of the water cycle? (evaporation, condensation, precipitation)

Allow students to continue to care for, observe and journal the activities associated with their plants. They should remove the tops of the mini-greenhouses when the first leaf touches the top of the upper cup, or replant when the plant has leaves. When using the mini-greenhouses, students may condition the plants to be transplanted outdoors by placing the greenhouses outdoors briefly, adding a few minutes each day.

Germination Observations

Science Journal

Name:_____

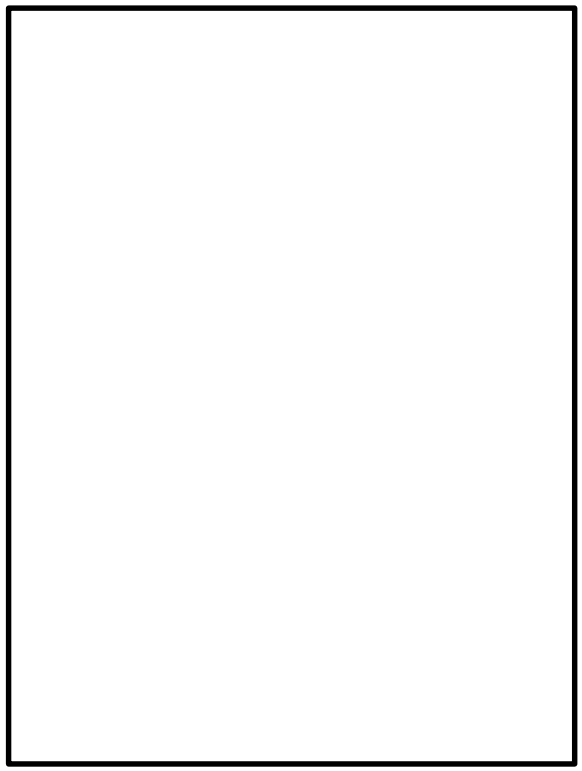
Texas Farm Bureau Education Outreach
www.texasfarmbureau.org

TEXAS FARM BUREAU®

Weekly Observation Sheet

Week Number_____ Seed Type_____

I see…	I wonder…



Date:_____ Age_____ Height (in cm.)_____ Diameter (in cm.)_____

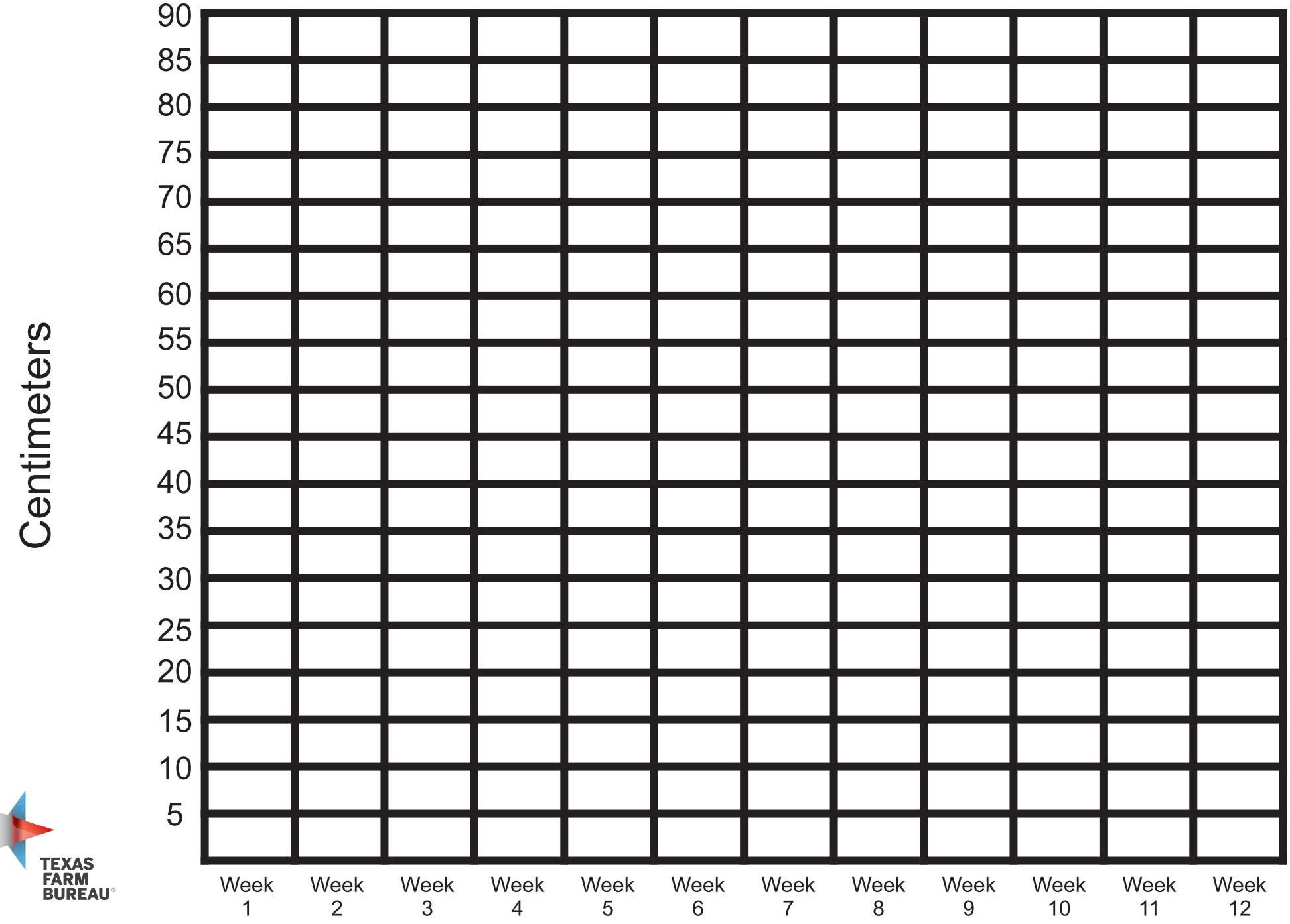
TEXAS FARM BUREAU

Use this chart to monitor the different growth patterns of your seeds. Record when:

You planted the seeds. Your seeds first germinate and roots appear. Seedling first appears.

Date	Seed #1 _____	Seed #2 _____	Seed #3 _____

Plant Growth Bar Graph



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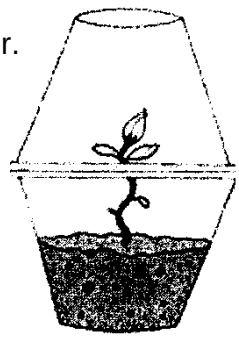
BUILD A MINI GREENHOUSE

Traditional Lesson Design

Materials Needed: Potting soil, two clear plastic cups, 1 bean seed, 1 corn seed, 1 sunflower seed, water, transparent tape, permanent marker

Directions:

- Place some soil in one of the cups, filling it about halfway up.
- Plant each of the three seeds equidistant next to the "wall" of the plastic cup so you can observe the germination and growth of your plants.
- Add 10 ml of water, or three squirts of a squirt bottle, and then place the other cup on top. Tape the cups together.
- Label seed type above each planting (on top cup)- bean, corn, sunflower.
- Once you've completed your mini greenhouse, observe it over time. Experiment by placing your greenhouse in different locations. If it doesn't grow in one spot, try another.
- Place your greenhouse in *indirect* sunlight.
- Most likely, your plant will quickly outgrow its container. When the plants touch the top of the upper cup, remove the tape and begin watering.



- Your plants will need to be transplanted to a larger container or into outside soil shortly thereafter.

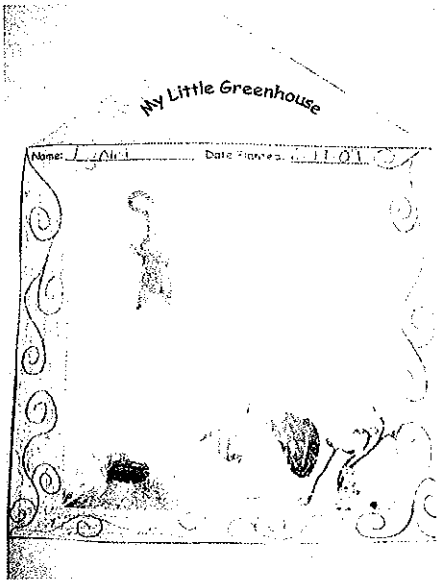
Pointers for making a successful greenhouse using this Ag in the Classroom plan:

- Seeds should be planted next to the "wall" of the cup so children can see them as they begin to germinate. To get the seeds where they can be seen, put the potting soil into the bottom cup, then use a popsicle stick to push the seeds down into the soil right up next to the "wall" of the cup. Make sure that each seed is visible through the wall of the cup.
- It is suggested that by planting 3 different seeds children can observe differences in germination and growth. Plant them in equal distances around the cup.
- Have children write their name and date on top (or bottom) cup with a permanent marker.
- Do not put too much water- basically, get the soil moist throughout. By keeping the top cup on, you are creating an enclosed water cycle where the water is reused, keeping your soil moist.
- Place greenhouses in indirect sunlight. Placing them in direct sunlight will cause them to become too hot and prevent germination and/or proper growth.

My Little Greenhouse

Objective

- Provide children with an opportunity to plant a seed and watch it germinate.



Materials

- template, attached
- cotton balls
- spray bottle with water
- seeds
- crayons, markers
- tape
- sandwich-size plastic bag

Background Knowledge

Greenhouses are able grow plants, such as ornamentals (plants grown and used for decoration) and vegetables, all year long because they stay warm inside. Some greenhouses use electric heat, while others harness the sun's warmth. Greenhouses have many windows, which allow the sunlight in and then trap it, so that it stays warm. In Virginia, bedding plants are the most commonly produced greenhouse item. In addition to bedding plants and perennials, growers may plant vegetables to be used as transplants or for consumption. Many growers will start their seeds in greenhouses and then move them to the fields when the weather is warm enough. The most common vegetable grown for consumption in a greenhouse is the tomato.

Procedure

1. Review with students the necessary conditions for seed germination – air, water, warmth.
2. Tell children that many plants need warm weather to grow and mature – such as tomatoes. How do we get these vegetables in the winter, when it's too cold to grow them outside? Either the crop is grown in warmer locations and then shipped to us, or the crop can be grown in greenhouses, which are able to keep a warm, controlled climate.
3. Provide children time to color and create their own mini-greenhouses.
4. Cut along the dotted lines of the greenhouse to make a window.
5. Take 2-3 cotton balls and lightly spray with water.
6. Place a seed in the middle of each cotton ball. Choose a different seeds to compare/contrast plant growth.
7. Place cotton balls along the bottom of the bag.
8. Seal the bag and tape behind the greenhouse.

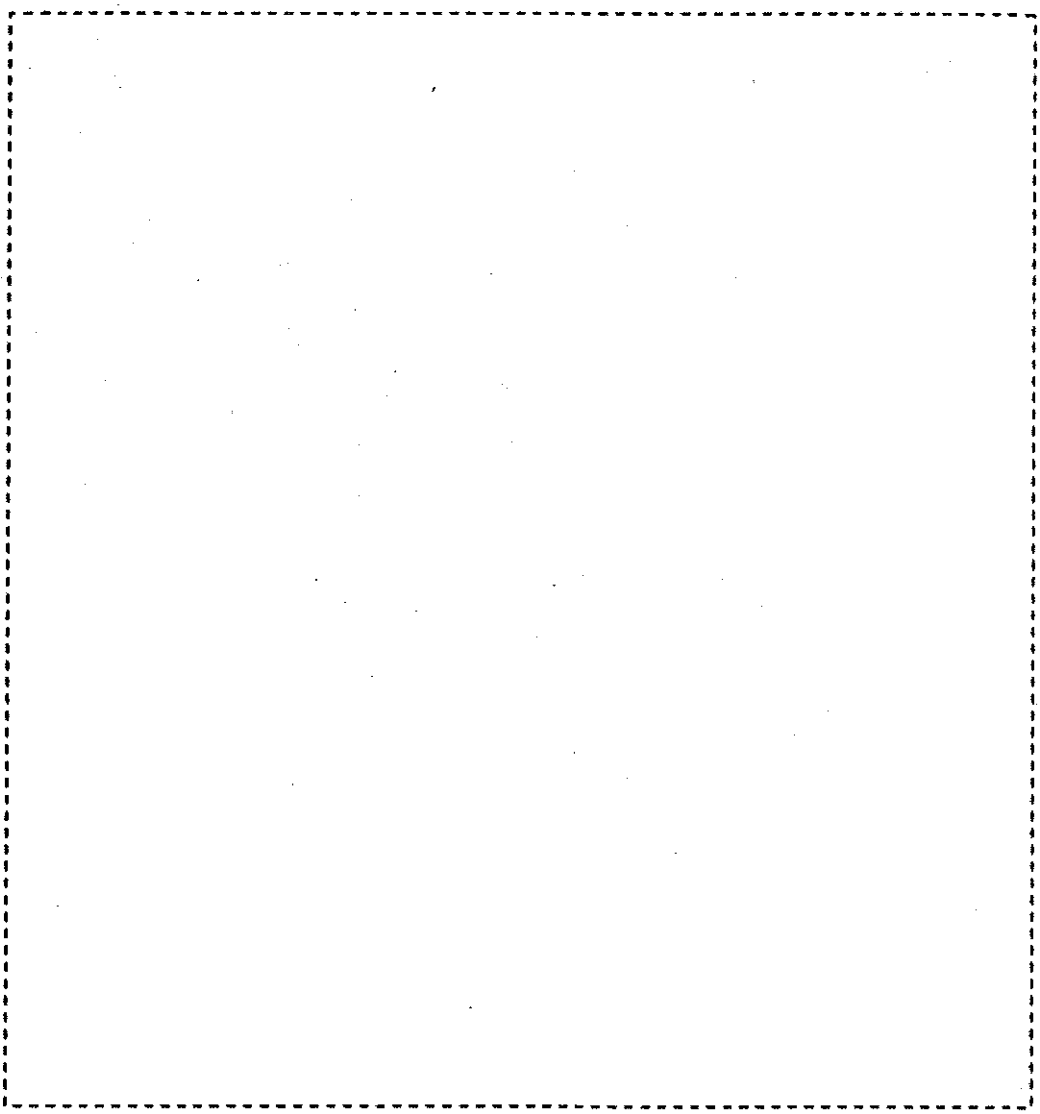
Place greenhouses in a location where seed growth can be observed – such as in a window or on a bulletin board.

Extension

Read your favorite garden book to children.

My Little Greenhouse

Name: _____ Date Planted: _____



Garden in a Glove

This activity teaches students about seed germination using gloves and cotton balls.

Materials Needed:

- Clear plastic glove
- 5 cotton balls
- 5 types of seeds, 3-4 seeds of each type
    - Examples: lettuce, carrot, cucumber, tomato and broccoli
- Pencil
- Water
- Sharpie
- “Hand” activity sheet for recording seed germination

Directions

1. Write the student’s name on the glove and label each finger with the different seed types.
2. Wet five cotton balls and wring them out.
3. Dip the cotton ball into 3-4 seeds of the same type.
4. Put the cotton ball with the seeds attached into the correctly labeled finger. A pencil can be used to push the cotton ball to the bottom of the finger.
5. After all fingers are full, gently blow up the plastic glove and close it shut.
6. Tape the glove to a window, chalkboard or wall.
7. The seeds will germinate in 3 to 5 days. Keep a plant diary and look at the seeds under a microscope.
8. Transplant the seeds about 1 to 2 weeks by cutting the tips of the fingers off of the glove. Transplant the cotton ball and small plants into prepared soil.
9. After growing to full size, the plants can be used to make a salad or snack.

Garden in a Glove

Vocabulary

Germination- to begin to grow, sprout

Transplant- to remove and plant in a new place

Instructions

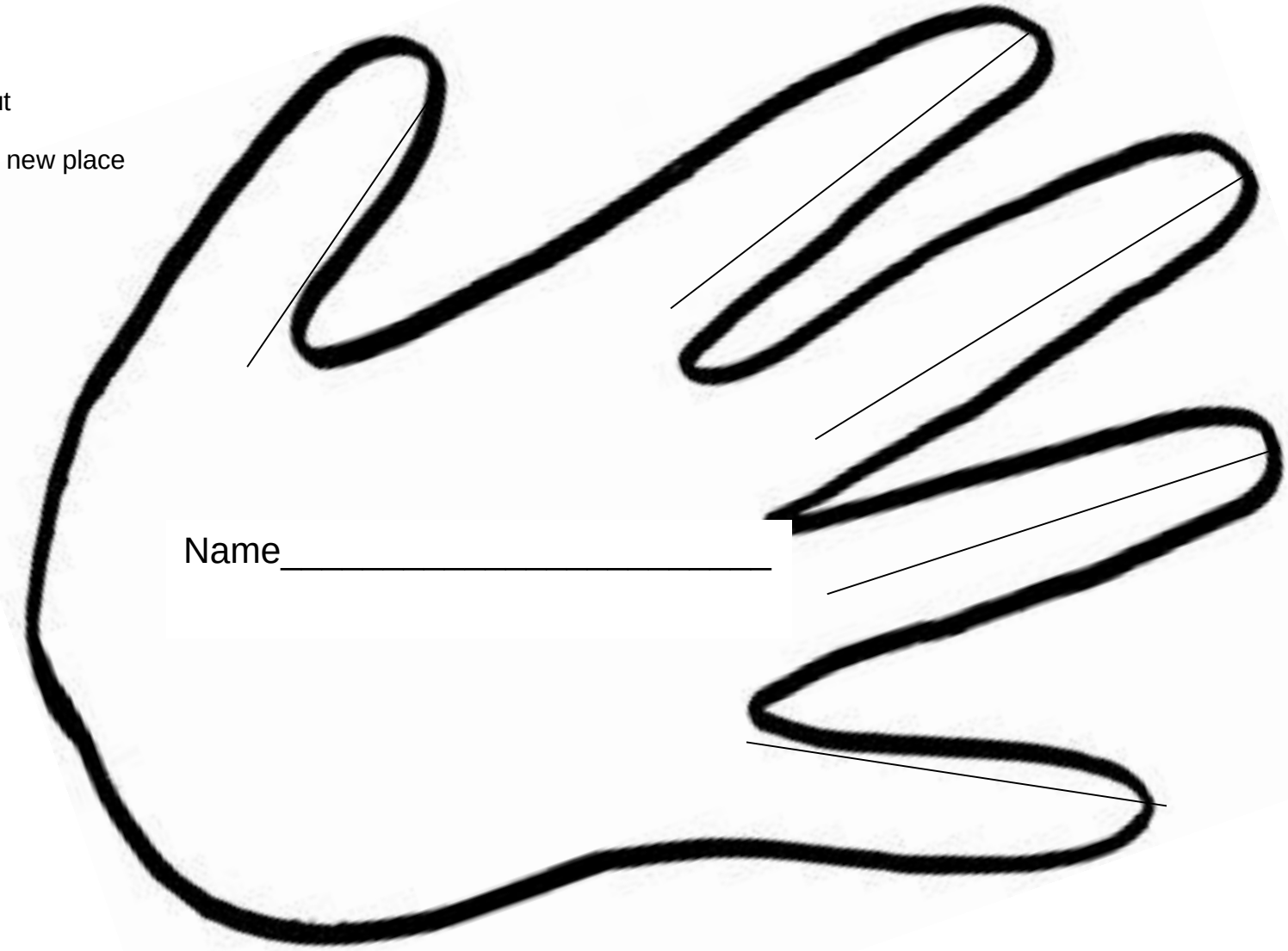
-Write your name on the palm of the hand of the glove and this paper.

-Write the seed names you planted on the correct fingers of the glove and this paper.

-Write the date when you first see the seed germinate.

-Number each finger in the order they germinate.

-Record any observations you notice about each plant.



-Transplant your plants after they have germinated.

Living Necklaces

Germination Observation

Materials:

4 ½ in. by 3 in. plastic “jewelry bags” or small baggies
Hole punch
Yarn
Cotton balls
Seeds such as corn, popcorn, or beans
Water

Directions:

Punch a hole in the top of the baggie. Be sure the hole is punched above the line so the bag can be sealed. Take two cotton balls, dampened with water and place two seeds in the baggie near the cotton ball. Seal the bag. Measure enough string to hang the *Living Necklaces* near the window in the classroom. The germinating seed will grow best with indirect sunlight. After germination has taken place the necklace may be taken home or may be transplanted.

How Does Your Garden Grow?

Objective

- Provide children with an opportunity to plant a seed and watch it germinate.

Materials

- Garden Grow template
- Crayons/markers
- Cotton balls
- Water
- Seeds
- Tape
- Snack size, zip-top plastic baggies

Background Knowledge

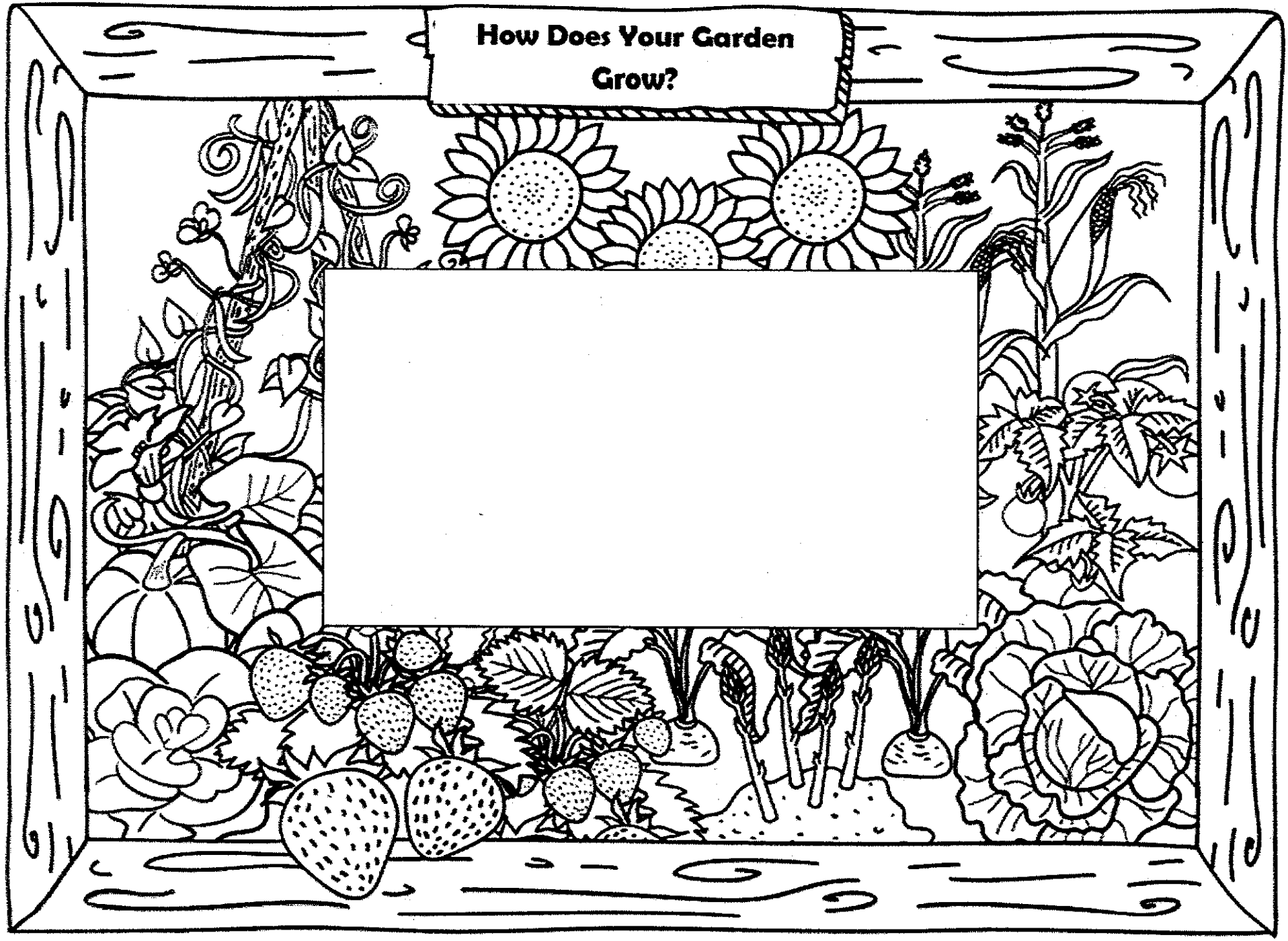
Seeds vary greatly in germination rate, amount of time needed for plant maturity, and growing conditions. Some seeds, like radishes, only need 4-6 weeks to grow to maturity, while corn and soybeans require several months. The purpose of this activity is to provide children with an opportunity to observe the germination process. Generally the smaller the seed the quicker it germinates.

Germination is when the seed sprouts and begins to grow. It is important for your students to know that it starts right when there is a bud present from the seed. Explain to your children that their sprout will need a while to grow and that every plant is different in the amount it takes for them to get to maturity. Ask them what their plant will need to grow. All plants need water, light, temperature, time, soil (nutrients), oxygen, and space to grow to full maturity.

Procedure

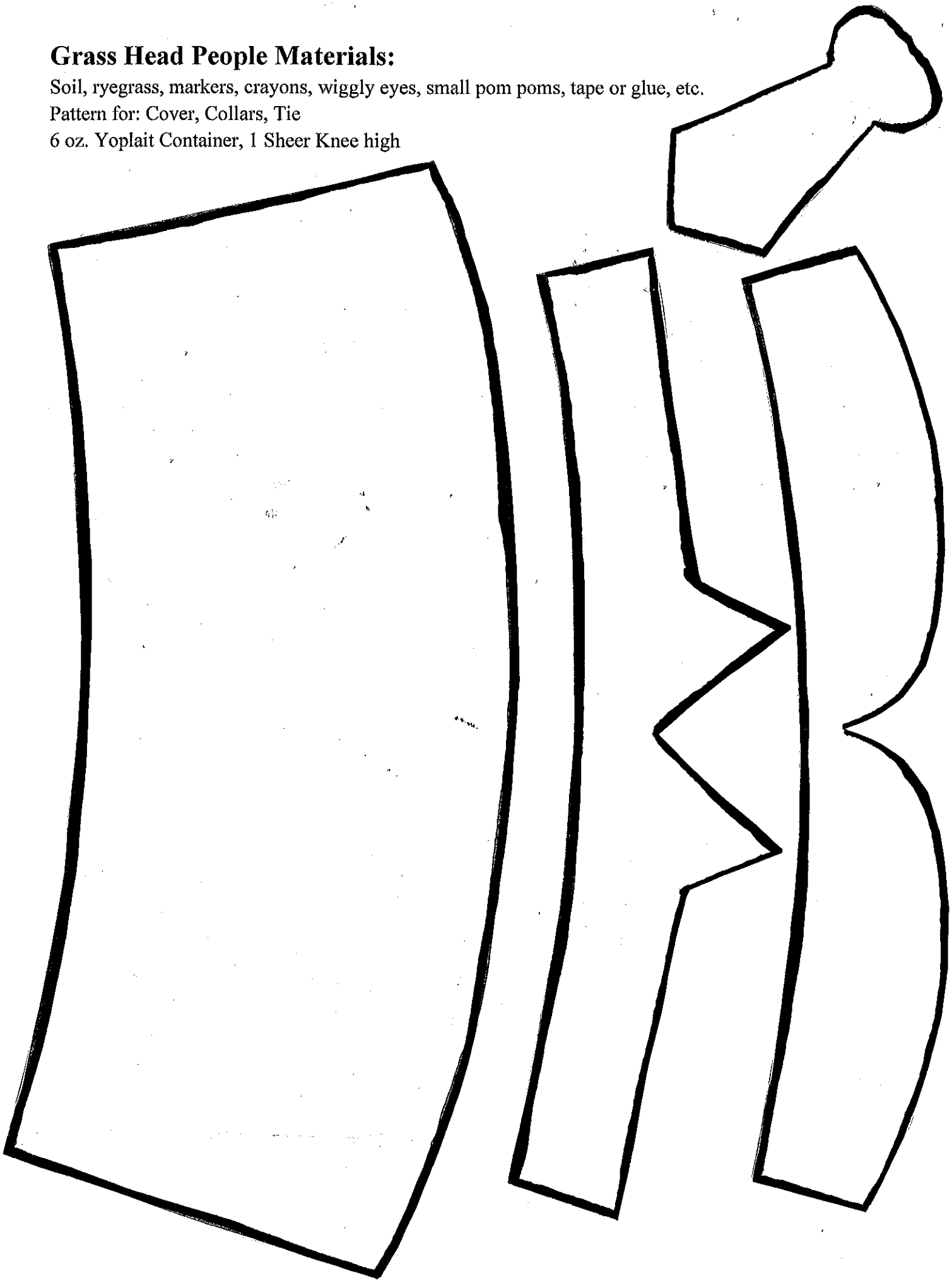
1. Allow time to color the "How Does Your Garden Grow?" template. The template has a number of plants parts to discuss such as leaves, seeds, flower, stem, and event roots.
2. Cut the center rectangle out of the template to create a frame to affix the plastic bag.
3. Use a spray bottle to wet a cotton ball for each type of seed that you will be planting. Place 1-2 seeds on each cotton ball. Each cotton ball should only have one type of seed planted on it. We recommend using 2 cotton ball with 2 types of seeds.

   Good seed choices include: pinto beans, lima beans, beets, cucumber, radishes, corn
4. Place the cotton balls with seeds inside the snack sized bag and zip the bag closed.
5. Tape the bag to the back of the frame to show the seeds planted on the cotton ball through the window.
6. Observe your seeds and track their germination and growth.


How Does Your Garden Grow?

Grass Head People Materials:

Soil, ryegrass, markers, crayons, wiggly eyes, small pom poms, tape or glue, etc.
Pattern for: Cover, Collars, Tie
6 oz. Yoplait Container, 1 Sheer Knee high



Grass Head People

Skills: Science and Writing

Objective: The student will observe germination of ryegrass and create a Grass Head Person. Students may also write a journal entry or story about their Grass Head Person.

Background: In Texas, ryegrass is used primarily as a forage crop for cattle. (Forage is a bulky food, such as grass or hay for horses and cattle.) Ryegrass can also be sewn as a cover crop and will keep soil from washing. It's even been used on construction sites!

Farmers and ranchers in Texas plant ryegrass in September or October. Germination can be expected after 2 to 3 days of rainy weather. When a planting has been lost, a farmer can plant as late as December or January. Cattle may graze in about 6 weeks.

Lloyd R. Nelson, Tex. Ag. Exp. Station

Procedure:

1. Take one knee high stocking and fill the toe with ryegrass. Use about 1 tablespoon. Be sure it's in the toe and not too deep. Put about a cup of soil in the stocking. Move the soil down until it forms a ball, with the ryegrass in the toe. Tie a knot in the stocking to form a ball. Trim off some of the stocking. Decorate the face with pom poms, wiggly eyes, or markers. Set aside.
2. Using the patterns, cut out the cover, and collars to create the body of your Grass Head Person. Choose bright colors for the body and contrasting colors or white for the collar. You can use hole punch circles for polka dots on the tie or to turn your collar into lace. Tape or glue the cover to the Yoplait container and add your choice of decorations.
3. Add water to your Yoplait container. Careful not to get your Grass Head Person's body wet! Place your Grass Head in the container with the stocking sticking in the water. You will need to watch the water level in the cup.
4. In a few days your Grass Head Person will have "hair." You can style your Grass Head Person's hair and even give it a haircut!
5. Write a story or journal entry about a day in the life of your Grass Head Person. Graph and record it's growth patterns. Conduct experiments with varying amounts of light and water.

Materials

Knee high hose
6 oz. Yoplait Yogurt Container
Soil and Ryegrass Seed
Pattern for cover and collars
Colored paper for collars and cover
Wiggly eyes, pom poms
Color pencil or crayons
Black Sharpie

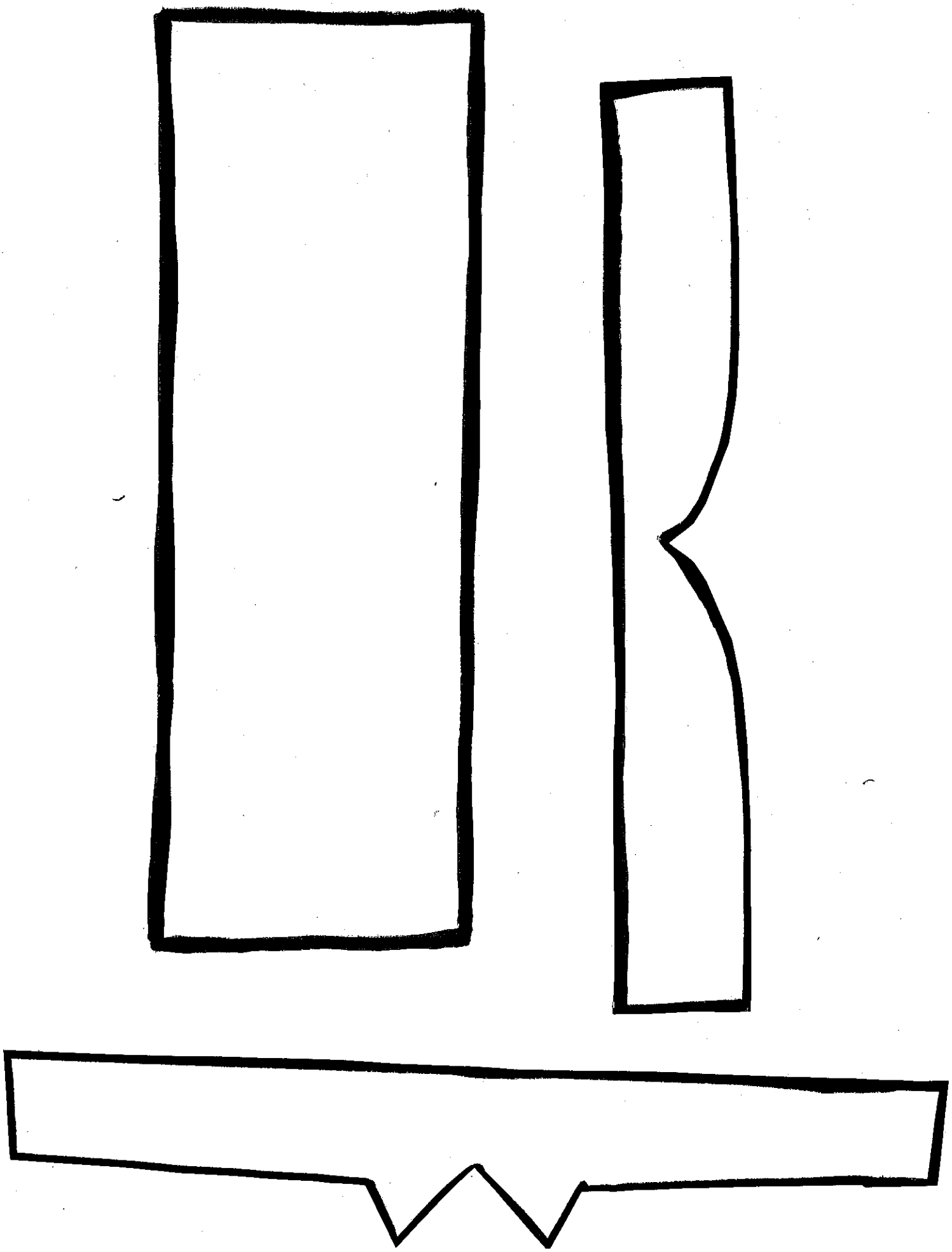
TEKS

Kindergarten
1A&C, 2A-E, 3B, 4A&B, 6A,7B&C, 9A&B, 10B
First Grade
1A&C, 2A-E,4A-B, 6A, 7B-C,9A&C,10B
Second Grade
1A&C, 2A-F,3B, 4A&B, 6A,7B&C, 8C, 9A-C, 10B
Third
1A&B, 2A-F,3A,4A, 5B-D,6A,7D,9B,10A
Fourth
1B, 2A-F, 3ACD, 4A, 5ABC,6A, 7A&C,8B,9AB,10
Fifth
1A&B, 2AF,3A,4A,5AD, 6A, 8B, 9BD

TEXAS FARM BUREAU®

Grass Head People

Brittany Maxwell, Pinterest



Oh Say Can You Seed?
By Bonnie Worth
Pages 18-24
Section C

The following activities can be used with Bonnie Worth's book, *Oh Say Can You Seed?* The page numbers are suggestions and align activities within the text.

- If possible, bring in a potted plant to show real plant parts. Use questions such as:
    - What does each plant part do for the plant?
    - Where are the roots?
    - Where are the seeds?
    - When does a plant produce its seeds?
    - Why are seeds produced at the end of the growing cycle?
    - Show TFB's Cabbage Cravings, Strawberries, Asparagus, Cotton

Read pages 18-25. Display vocabulary at this time.

- Flower- the part of the plant that will produce the seeds and where the fruit is formed, also where the pollen can be found and where the reproductive parts of the plant can be found.
- Stem-supports the plant
- Leaves- the part of the plant where photosynthesis occurs
- Fruit-the fleshy part of the plant where seeds are found
- Roots-the part of the plant growing underground. They help anchor the plant and pull in the water and nutrients or minerals.

Suggested Activities within this section are included for your reference and may span a time frame of a few days to a few weeks.

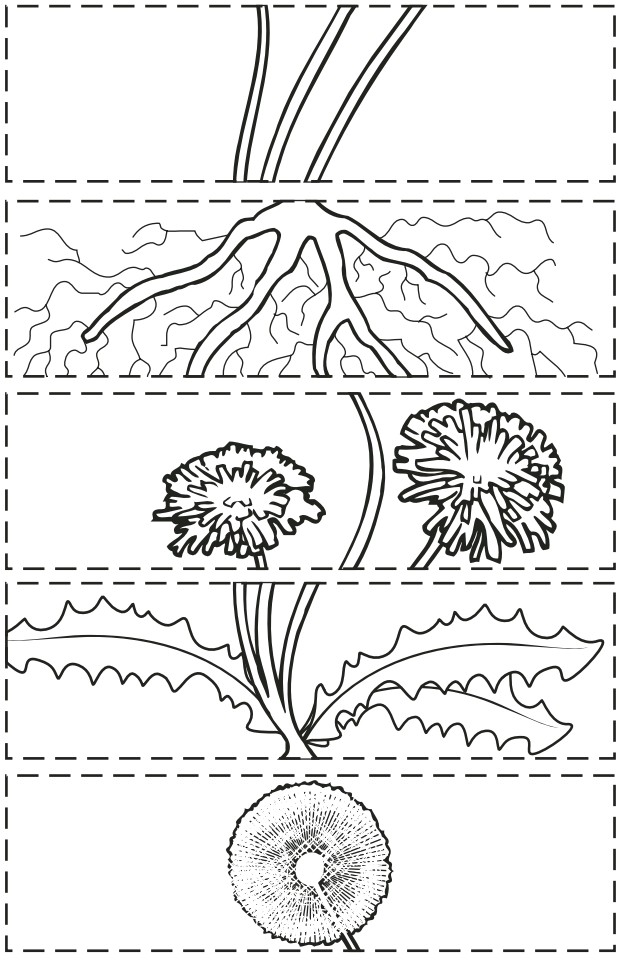
C1 Parts of a Plant (using a dandelion, 2 pages)
C2 Sunflower's Growth Wheel (4 pages
C3 Plant Parts Are Good To Eat! (2 pages)
C4 Florida's chart on plant parts (2 pages)
C5 Biology of Plants Information Page
C6 Plant Parts (2 pages)
C7 Native Plants of our School Yard- SAI Lesson (4 pages)
C8 Leaf Perimeter
AFBF Plant Parts Poster and *Tops and Bottoms* by Janet Stevens

PARTS OF A

SEED PLANT

BY

_____



Name _____ *Identifying parts of a seed plant*

Get Part Smart!

Most plants in the world are seed plants. Seed plants have roots, seeds, stems, and leaves. Some also have flowers that produce seeds.

Directions: Match the terms in the word bank to their definitions. Cut out the plant parts along the dotted lines. Glue each plant part to the chart to match its definition. Color the chart, cut it out, and then fold it down the center line as directed. Cut out the label, decorate it, and glue it to the front of the folded paper.

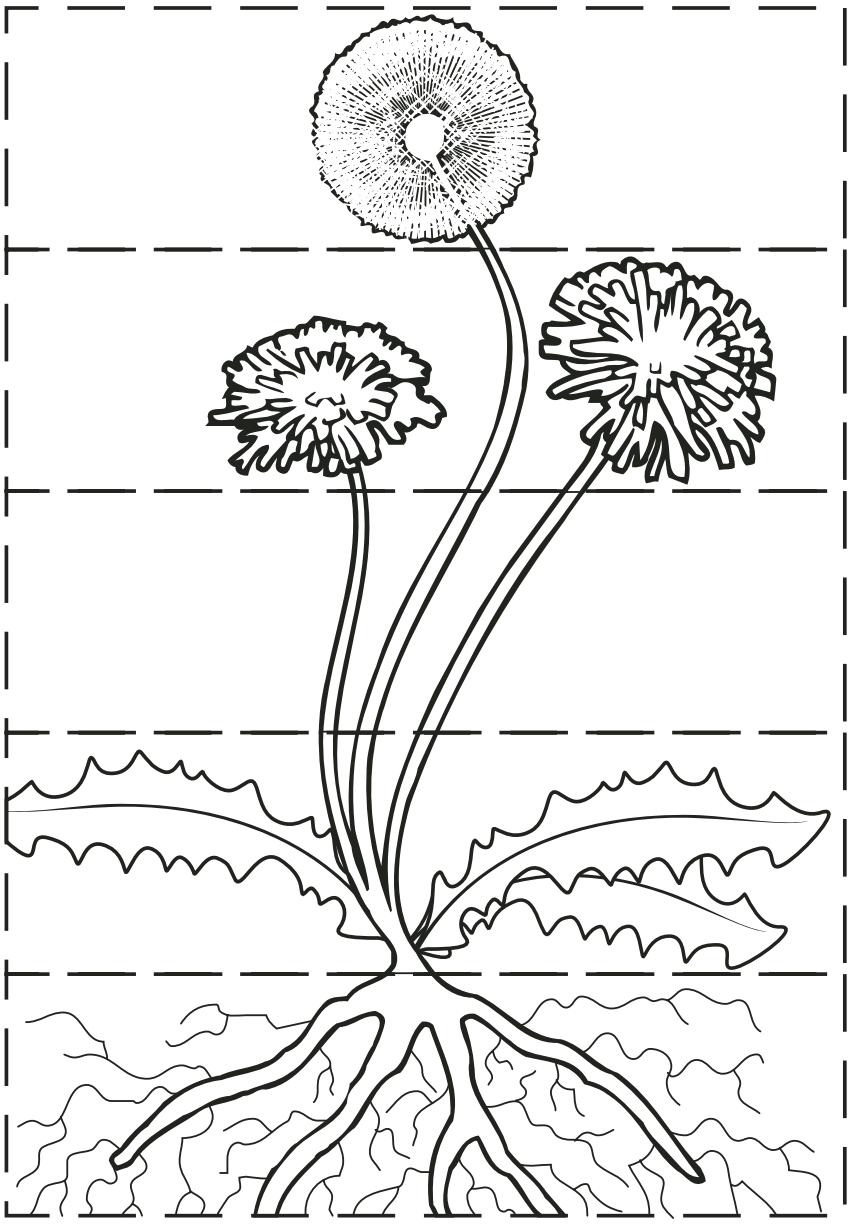
Word Bank

root leaf stem flower seed

PLANT PART AND FUNCTION	DRAWING
1. _____ —the part of a plant that contains an embryo capable of germinating and producing a new plant	
2. _____—produces cells that form seeds and allow a seed plant to reproduce	
3. _____ —carries water, minerals, and food to different parts of the plant; supports the leaves so that they can be exposed to sunlight	Fold here.
4. _____ —produces the food the plant uses to build tissue and carry out life activities; absorbs sunshine and uses it to make food for the plant	
5. _____ —anchors a plant; absorbs, stores, and transports substances to other parts of the plant	

Answer Key for “Get Part Smart!”

1. seed—the part of a plant that contains an embryo capable of germinating and producing a new plant
2. flower—produces cells that form seeds and allow a seed plant to reproduce
3. stem—carries water, minerals, and food to different parts of the plant; supports the leaves so that they can be exposed to sunlight
4. leaf—produces the food the plant uses to build tissue and carry out life activities; absorbs sunshine and uses it to make food for the plant
5. root—anchors a plant; absorbs, stores, and transports substances to other parts of the plant



A Sunflower's Life Cycle

From seed to flower, this wheel follows the growth of a sunflower.

Science Corner

Most plants grow from seeds. In flowering plants, the seeds develop inside flowers. (In pine trees and other evergreens, seeds form inside cones.) Male flower parts produce pollen, which must be carried to female flower parts by wind or animals in order to create seeds. A flower attracts bees, birds, and other pollinators with its bright colors, aromatic smell, and sweet nectar. As the animals fly from flower to flower, pollen sticks to their bodies and falls off on other flowers. When pollen reaches a plant's female parts, seeds are produced. The flowers then wither and fruits form containing the seeds.

Fruits help protect seeds and get them to good growing places. When an animal eats a juicy fruit, the seeds pass unharmed through the animal's digestive system and may be carried miles away before being dropped as part of the animal's waste. Some seeds have wing-like parts that catch the wind, while others have tiny hooks that stick to animals.

When a seed reaches a good growing spot and conditions are just right (e.g., enough water, warm temperatures, and so on), the seed germinates, or begins to grow, into a new plant. A young plant is called a seedling. The seedling's roots grow down into the ground to absorb water and minerals from the soil. Its stem grows up toward the light so its leaves can make food. Once the plant flowers, it can make seeds, and the whole process starts again.

Materials

- reproducible pages 49 and 50
- scissors
- paper fastener
- tape
- colored pencils, crayons, or markers (optional)

More To Do

Plant Watch

Invite students to select a plant that grows in their backyard, the schoolyard, or the park and watch it grow and change through the seasons. Have them draw pictures of the plant and keep a log of what happens to it. Does the plant flower? What animals, if any, visit the flowers? Does the plant lose its leaves in autumn? Encourage students to report their findings to the class.

Resources

***The Tiny Seed* by Eric Carle (Little Simon, 2009)**

Vibrant illustrations and engaging text take readers on a journey following a seed as it is carried away by the wind to a growing place, where it develops into a new plant that flowers and makes more seeds. Comes with seeded paper so readers can grow their own flowers.

***I Wonder Why Trees Have Leaves: And Other Questions About Plants* by Andrew Charman (Kingfisher, 2003)**

This charming question-and-answer book offers plenty of facts about the world of plants.

http://www2.bgfl.org/bgfl2/custom/resources_ftp/client_ftp/ks2/science/plants_pt2/dispersal.htm

Click on the different dispersal methods to watch mini animations of how seeds travel away from their parent plants.

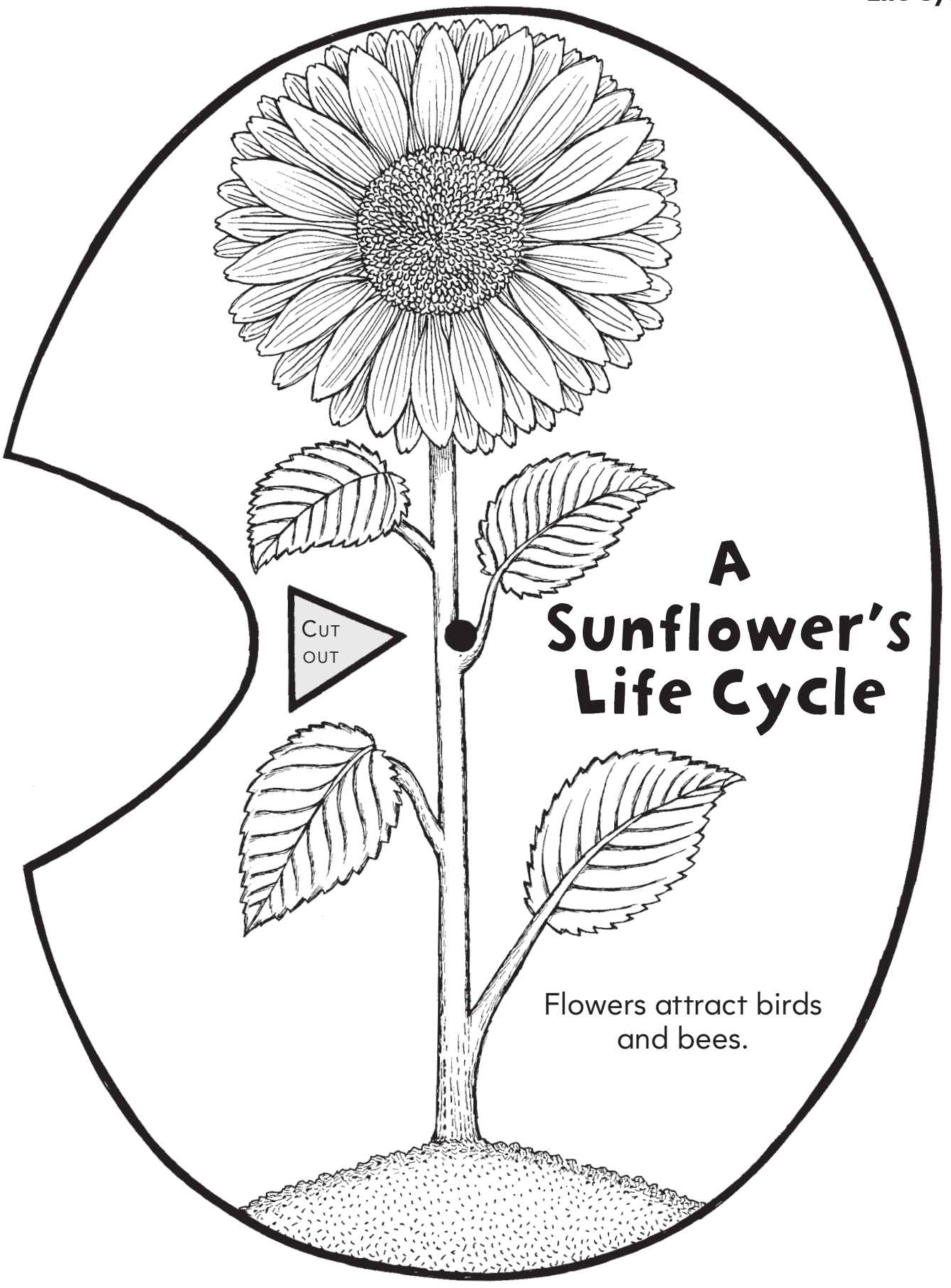
Making the Wheel

1. Photocopy pages 49 and 50. Color, if desired.
2. Cut out the four pieces, including the bird and bee pieces, along the thick outer lines.
3. Cut open the CUT OUT window on the sunflower along the thick solid lines.
4. Place the sunflower on top of the wheel. Push the paper fastener through the centers of both pieces to join them, as shown.
5. Tape the bird to the left side of the sunflower and the bee to the right.

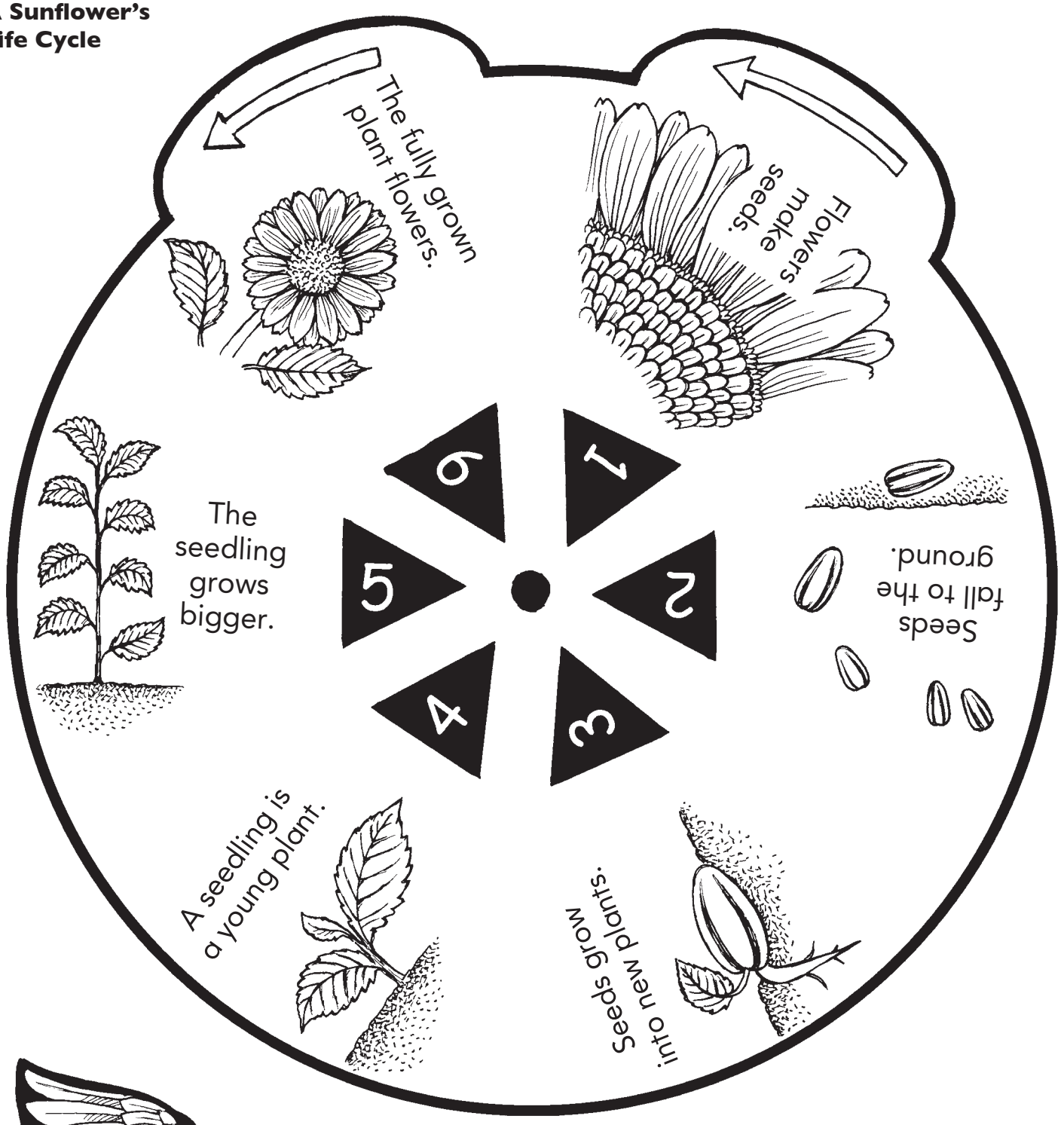
Teaching With the Wheel

To learn about a flowering plant's life cycle, invite students to color, assemble, and read their wheels. Have them turn the wheel until the number 1 appears in the triangle. Have them keep turning the wheel in sequence to number 6. Check for understanding by asking them these questions:

1. What is a young plant called? (*Seedling*)
2. What makes seeds? (*Flowers*)
3. What spreads seeds? (*Birds*) What spreads pollen? (*Bees*)

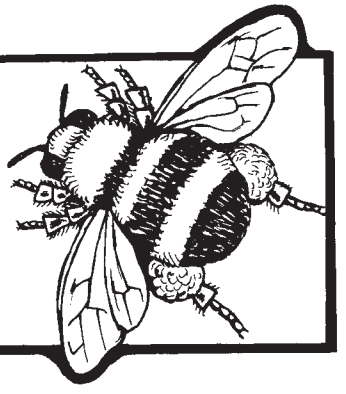


A Sunflower's Life Cycle



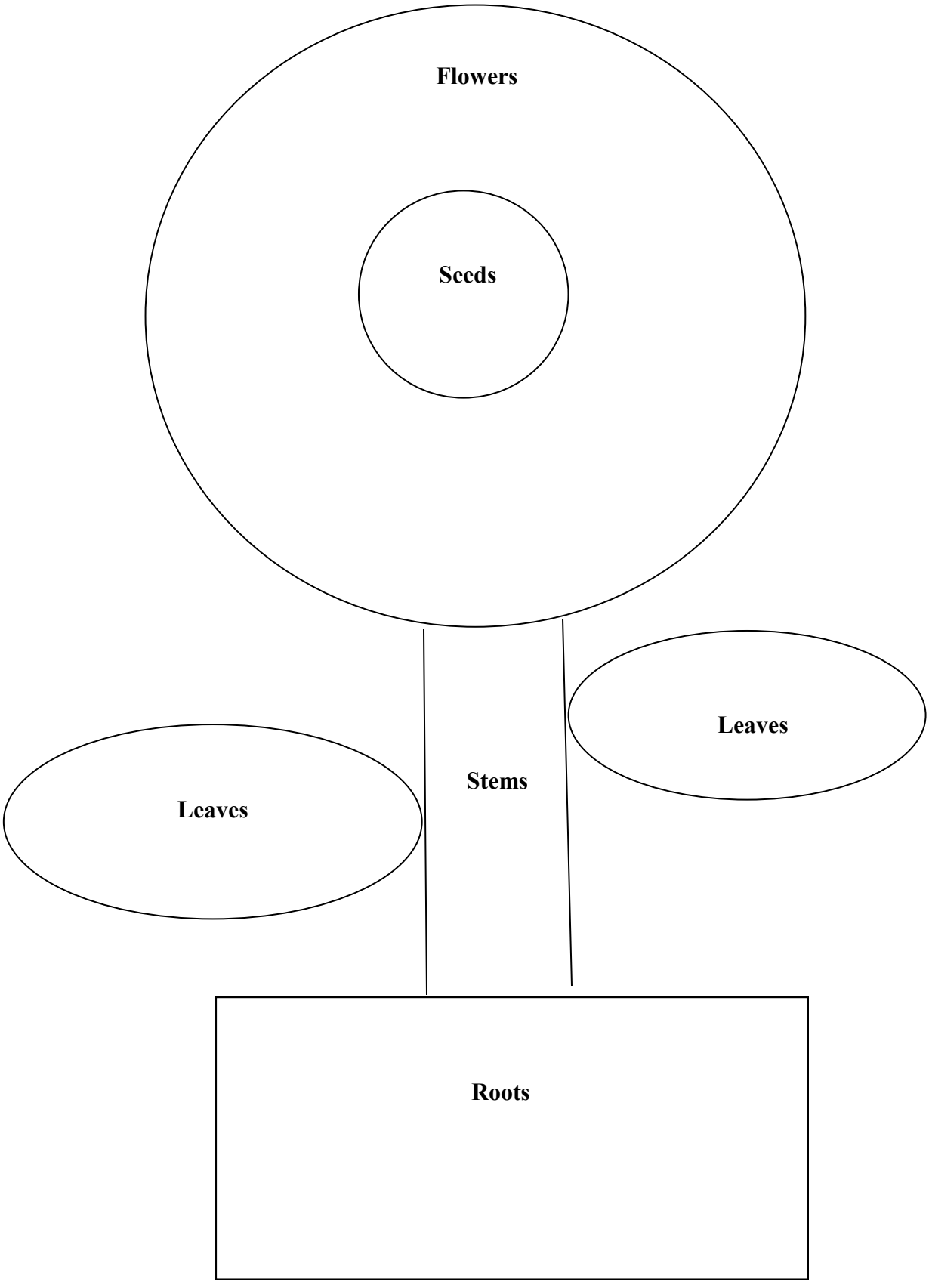
Birds help spread the sunflower's seeds.

Bees help carry pollen from flower to flower.



Name_____ Date_____

Plant parts are good to eat!



Plant Parts Are Good to Eat!

Did you know that the vegetables and fruits we eat are really plant parts? Check out the plant parts that are showing up on your plates. Farmers call these specialty crops.

Roots-carrot, radish, beet, turnip, parsnip, sweet potato

Stems-celery, asparagus, potato (fleshy underground stem called a tuber)

Leaves-lettuce, cabbage, spinach, onion (bulb), garlic (bulb), parsley, dill, rosemary, thyme, sage, collards, Brussel sprouts

Flowers-broccoli, cauliflower, artichoke, capers

Seeds-corn, peas, peanuts, black-eyed peas, kidney beans, pinto beans, black beans

Activity 1:

1. Read or review the book *Tops and Bottoms* by Janet Stevens.
2. Have students categorize vegetables that were in the story into groups (TOPS, BOTTOMS, MIDDLES).
3. Introduce other vegetables (not in the story) and sort them into the three groups.

Activity 2:

1. Using the list above, choose real plant parts for each student to choose from.
2. Have students wash their hands and then create their Edible Plant Parts page.
3. If possible, provide Ranch Dressing or Peanut Butter for students to eat with their Plant Parts.

What's a specialty crop?

Specialty crops are fruits, vegetables, tree nuts, culinary herbs and spices, medicinal plants, nursery, floriculture, and horticulture crops. In other words, all the yummy fresh foods we love to eat and those that keep us healthy, and make our surroundings better.

Did you know?

Texas ranks among the top 10 states for specialty crop production, shipping produce nationwide. However, much of the fruits, vegetables and nuts grown in Texas stay right here, for us to enjoy!

Like fresh onions? Texas is the country's 2nd largest grower harvesting 120,000 to 220,000 tons annually according to the US Department of Agriculture.

How about watermelons? Texas usually plants more watermelons than any other state. 29,000 acres were planted in 2012.

Pecans are one of the states highest-value crops per acre. In 2012, 16 percent of the US Pecan crop came from Texas.

www.texasagriculture.gov/

Name _____Date_____

*Use the phrases about plant parts on the bottom of the page to fill in the following table. Write the phrases under the correct headings. One has been done for you.

"Oh Say Can You Seed?"

Roots	Stem	Leaves	Flowers
Grow underground			

Use the phrases below to fill in the table about plant parts.

grows underground

acts like a pipe to carry water up the plant

photosynthesis occurs

pollen is found

food-making for the plant is done here

absorbs minerals from the ground

look twisty and hairy

is where the leaves are attached

anchors the plant

gives the plant support

petals

oxygen is released

have different "edges"

stamen

stoma is found

nectar is found

Completed Chart

Grows underground Anchors the plant Look twisty and hairy Absorbs minerals from the ground	Acts like a pipe to carry water up the plant Is where leaves are attached Gives the plant support	Photosynthesis occurs Food-making is done here Stoma is found Oxygen is released Have different "edges"	Pollen is found Nectar is found Petals Stamen

Plant Parts

What do different plant parts do?
Plant parts do different things for the plant.
Roots:

Roots act like straws absorbing water and minerals from the soil. Tiny root hairs stick out of the root, helping in the absorption. Roots help to anchor the plant in the soil so it does not fall over. Roots also store extra food for future use.

Stems:
Stems do many things; they support the plant. They act like the plant's plumbing system, conducting water and nutrients from the roots and food in the form of glucose from the leaves to other plant parts. Stems can be herbaceous like the bendable stem of a daisy or woody like the trunk of an oak tree.

Helpful terms:
Herbaceous: plants with stems that are usually soft and bendable. Herbaceous stems die back to the ground every year.
Woody: Plants with stems, such as tree trunks, that are hard and do not bend easily. Woody stems usually don't die back to the ground each year.
Photosynthesis: A process by which a plant produces its food using energy from sunlight, carbon dioxide from the air, and water and nutrient from the soil.
Pollination: The movement of pollen from one plant to another. Pollination is necessary for seeds to form in flowering plants.

What's the difference between a fruit and a vegetable?
A fruit is what a flower becomes after it is pollinated. The seeds for the plant are inside the fruit. Vegetables are other plant parts. Carrots are roots. Asparagus stalks are stems. Lettuce is leaves. Foods we often call vegetables when cooking are really fruits because they contain seeds inside.

Play a Plant Parts Game:

A celery stalk, the part of celery that we eat, is a special part of the leaf structure called a petiole. A petiole is a small stalk attaching the leaf blade of a plant to the stem. In celery, the petiole serves many of the same functions as the stem. It's easy to see the "pipes" that conduct water and nutrients in a stalk of celery. (you can use red food color to "dye" the pipes red so you can easily see them)

Leaves:
Most plants' food is made in their leaves. Leaves are designed to capture sunlight which the plant uses to make food through a process called photosynthesis.
Flowers:
Flowers are the reproductive part of most plants. Flowers contain pollen and tiny eggs called ovules. After pollination of the flower and fertilization of the ovule, the ovule develops into a fruit.
Fruit:
The fruit provides a covering for seeds. Fruit can be fleshly like an apple or hard like a nut.
Seeds:
The seeds contain new plants. Seeds form in the fruit.

Biology of Plants: Plant Parts
http://www.mbgnet.net/bioplants/parts.html

Name_____**Date**_____

Plant Parts We Eat

Food Items	Seeds	Stems	Roots	Leaves	Fruit or Flowers

Colors on Our Plate

Red	Yellow/Orange	White	Green	Dark/Colors
apples	cantaloupe	cauliflower	asparagus	almonds
cherries	carrots	mushrooms	broccoli	beans
strawberries	corn	pears	cabbage	beets
tomatoes	grapefruit	potatoes	celery	blackberries
watermelon	peaches	rice	cilantro	blueberries
	pumpkins		collard greens	pecans
	squash		cucumber	radishes
			green grapes	wheat
			lettuce	
			okra	
			peas	
			spinach	

Texas Farm Bureau Summer Agricultural Institute

Patricia Little
Sabrina Swedlund
Mary Ann Johnson

Native Texas Plants and Grasses of Our School Yard

Objective: Students observe, identify, and evaluate the diversity of plant life within a 1 sq. meter area of the school landscape.

Final assessment: Published Texas Native Plant journal based on native Texas plants of the school community.

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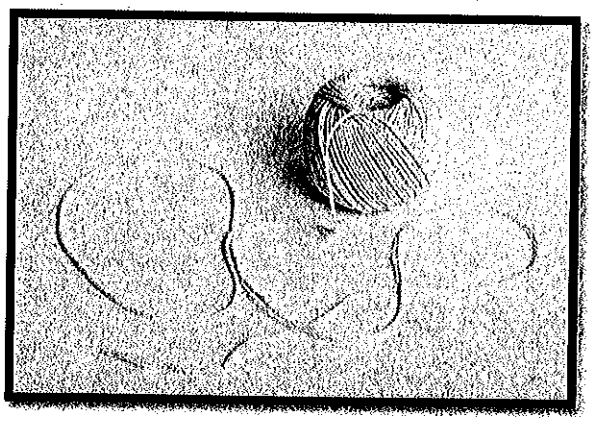


Essential Idea: 1 square meter of area will stay the same regardless of shape.

Activity One Guiding Question:
"How big is one square meter of area?"

Materials:
One ball of string or twine (enough for each group of 4 students to have a 4 meter long piece)
1 meter stick per group
Model loop

Activity One:
Teacher holds up premade loop of string. Demonstrate, using a meter stick, that the string is actually 4 lengths of 1 meter. Review how to find area (length X width = square area) and verify that the teacher's loop is 1 square meter.

Teacher elongates loop and into a rectangle. "Now what is the area?" Answer should be 1 square meter. Teacher changes the rectangle into a circle. "Now what is the area?" Answer should be 1 square meter.

In groups, students work together to measure out a little over 4 meters (approximately 12 feet) of string. Once they've cut their length, have them tie the two ends together.

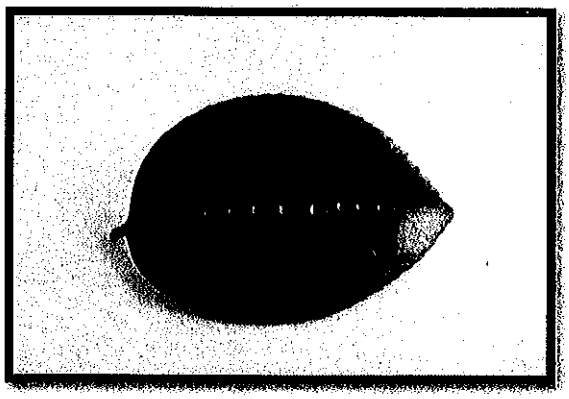
.....

Essential Idea: Students isolate 1 square meter of school landscape from which to take plant samples.

Activity Two Guiding Question:
"What different species of plant life inhabit our school community?"

- Is that species native to Texas?
- If not, how did it get here?

Materials:
Ideally – large open space with a variety of plant life



Per student:
Field journal (four 8½ x 11 sheets of paper, fold in half – hamburger-style)
Pencil (or colored pencils if available)

Per group:
1 square meter area loop
4 survey flags
Collecting bowl
Small pair of scissors

Activity Two:
Out of doors, groups spread out and select an area of field to sample.

Each member of the group takes a side of their square meter loop, creating a square. They set the square down on the ground and stake out their area using rocks or survey flags to hold the corners.

Student may include trees, shrubs, or larger plants by untying the string and re-tying around the object. (*Remember: the larger object may take up more space, reducing the number of smaller plant life.)*

On page one of their Field Journal, students write the date, time, and location of collection. Descriptions should include any identifying landmarks for future reference. One page two, they sketch the area of the field or school yard in which they are sampling. Again, include identifying landmarks for future reference.

Using scissors, students take plant samples (leaves/blades of grass/flower) from their 'gridded' area and place them in their sample bowl.

.....

Essential Idea: Students identify plant samples taken from their school yard using:
http://aggie-horticulture.tamu.edu/ornamentals/nativeshrubs/indexscientific.htm
(select photo gallery index). The same site has indices for grasses, trees, and wildflowers.

Activity Three Guiding Question (continuing):
"What different species of plant life inhabit our school community?"
- Is that species native to Texas?
- If not, how did it get here?

Materials:
Ideally – one computer with internet access per student.

Per student:
Field journal (four 8 ½ x 11 sheets of paper, fold in half – hamburger-style)
Pencil (or colored pencils if available)

Per group:
Collecting bowl with samples

Activity Three:
Working as a group, students divide their samples amongst group members. Each member should be responsible for 2 – 3 samples.

Students tape samples (one per page) into their field journal. Students should also sketch their sample (in color) on the page and write a brief description of their sample.

Using the Texas A&M website (or Tarleton equivalent, if available), students work to identify their samples. They must determine the common name, scientific name, whether or not the species is native to Texas, and whether or not it is native to their community/state region. Information should be recorded with their sample in their field journal.

.....

Essential Idea: Students create a field guide identifying plant life in their school community.

Activity Four Guiding Question (continuing):
"How can we inform/teach future students about our local plant life?"

Materials:
Ideally – one computer with a word processing program per student.

Per student:
Field journal (four 8 ½ x 11 sheets of paper, fold in half – hamburger-style)

Activity Four:
Each student selects one plant sample (quantities can be adjusted, depending upon student).

Using word processing software, students create a page complete with pictures of their plant/tree/shrub/grass. They include a description of the plant; where it is located; how it can be utilized; perennial or annual; seed or bulb; season; climate it prefers; etc.

After printing, pages are assembled into book form and placed in classroom or school library.

Native Texas Plants of Our School Yard
Summer Ag 2012

The following lesson was created at a Summer Ag Institute in year's past. Send us the way you're using Ag in the Classroom concepts within your classroom. Who knows next year, we might be including one of your lessons!

We feel this lesson could be used with *Oh Say Can You Seed?* in the following ways:

Math:

- Perimeter and Area
- Metric and Standard Conversions

Science:

- Comparison of leaf structure and function
- Plant parts
- Soil conditions in your area
- Observation Skills
- Publishing
- Journaling

We hope you enjoy Patricia, Sabrina, and Mary Ann's lesson!

Leaf Area and Perimeter

Practice measurement with objects found in nature.

Objectives

Students will calculate area and perimeter for a given space, using a leaf as a guideline.

CCSS 3MDD8 and SOL 3.9

Materials

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

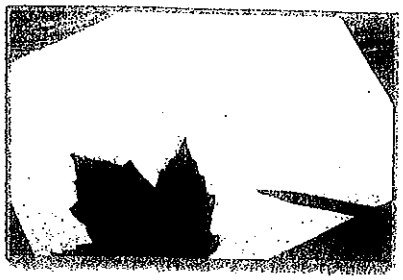
Background Knowledge

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

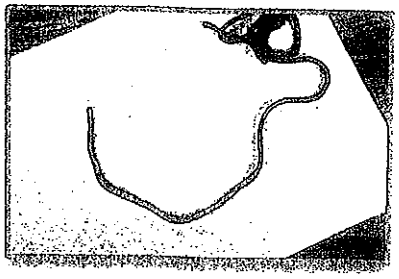
A.

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"



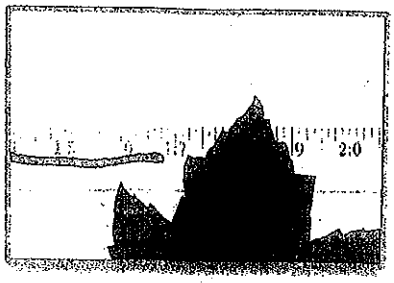
B.

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 student 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.



Oh Say Can You Seed?
By Bonnie Worth
Pages 25-29
Section D

The following activities can be used with Bonnie Worth's book, *Oh Say Can You Seed?* The page numbers are suggestions and align activities within the text.

- Use Texas Farm Bureau's videos: Rodney Shronk-sunflowers growing Cotton-Britton Pointer, Cora Lamar-Strawberries
- Use a video on Photosynthesis such as: https://www.youtube.com/watch?v=eo5XndJaz-Y This video has upper level concepts.

Read pages 25-29 Display vocabulary at this time.
Photosynthesis: the process by which plants make their own food by using sunlight
Stoma or stomata: the pores on the leaf which take in the Carbon Dioxide
Carbon Dioxide: a gas naturally occurring in air, absorbed by plants in photosynthesis
Oxygen: essential to respiration, produced by plants

Suggested Activities within this section are included for your reference and may span a time frame of a few days or longer.

Play Agrium's Photosynthesis quiz at:
http://seedsurvivor.com/agrium-games/quiz/index.htm

D1 Numbered Heads (About Photosynthesis) 3 pages
D2 Career Matchup (2 pages)
D3 Career Matchup Key
D4 Photosynthesis Who? (2 pages)
D5 Writing Prompt (1 page)

Photosynthesis Cards-Color Electronic Version (available by request)

Numbered Heads Together

Photosynthesis

Directions:

Have students “number off” in groups of 4. Provide each student with a copy of the text page entitled “About Photosynthesis…”. Students may read in groups.

When all groups have completed the reading activity, instruct students that you will be asking questions that can be answered by referring to the text just read. You may collect the text sheets or leave them for groups to reference depending on your teaching goals.

Ask the question and allow each group to put their “heads together” and confer regarding the correct response. When the consultation has ended, call a number (one through four) at random and require members of each group with that number to stand. Select one of the standing students to respond to the question on behalf of his/her group. Members of the whole group are asked to concur or dispute the answer given.

Continue this process until all questions have been asked and all “numbered heads” have had opportunities to respond.

Numbered Heads Together

"About Photosynthesis…"
Questions and Answers

1. What is the name of the process by which green plants make their own food?

   Answer: Photosynthesis

2. What Greek phrase gives us the origin of the word "photosynthesis"?

   Answer: "putting light together"

3. What is the name of the green chemical inside a plant's leaf?

   Answer: Chlorophyll

4. What part of the plant acts as a tiny chemical factory?

   Answer: Chloroplasts

5. What two substances mix together to make sugar for the plant and oxygen for the environment?

   Answer: Carbon dioxide and water

6. Sugar molecules are only made in the presence of what factor?

   Answer: sunlight

About Photosynthesis…

How do you get the food you need each day? Do you buy it at a supermarket? Do you dine in a restaurant? Do you enjoy lunch in a school cafeteria? Did you ever take the time to grow some of your own food in a garden or on a farm? However you get your food, you must use energy to do so. You must also get energy in order to live and work each day.

Living things that use energy are called consumers. Animals are consumers. Living things that produce their own energy are called producers. Green plants are producers and they provide energy for themselves as well as for the consumers of the world.

Green plants are the only living things that make their own food from the light of the sun. They are able to trap the energy from the sunlight, turn it into food, store the food, and use the food energy whenever they need it. Animals, including human beings, are also able to use the stored energy from plants for the energy they need to survive.

The food-making process used by plants is called **photosynthesis**. Two Greek words come together to make the word, **photosynthesis. Photo** means "*light*", and **synthesis** means "*putting together*". The process of photosynthesis is very complicated, but basically, here is what happens.

When sunlight strikes a leaf, a special green chemical, called **chlorophyll** begins its work. Chlorophyll is found in a tiny plant part called the **chloroplast** and it acts like a small food factory. Inside the chloroplasts, water and carbon dioxide from the air combine to make oxygen, and sugar. This process could not take place without the presence of chlorophyll and sunlight. Sugar molecules are only made in the presence of sunlight.

When the sugar is produced, it travels through the veins of the leaf just as our blood travels through the veins in our bodies. The sugars are carried throughout the plant to feed it. As this process takes place, oxygen is released into the air for use by animals, including people!

All living things depend on photosynthesis to be nourished. Plants make their own food using photosynthesis. Some animals eat plants. Other animals eat plants and/or animals to thrive and grow. If it were not for the process of photosynthesis, life could not continue on planet earth.

Name_____**Date**_____

Career Match Up

Once you understand the purpose and the process of photosynthesis, you can think about how important it is to people all over the earth. Match each person below with a reason why photosynthesis is important to the work that he/she does. Add reasons of your own to describe the importance of photosynthesis to each person.

Botanist ( )

_____
_____
_____

Air Quality Specialist ( )

_____
_____
_____

Farmer ( )

_____
_____
_____

Rancher ( )

_____
_____
_____

Greenhouse/Nursery Operator ( )

_____
_____
_____

Forester ( )

_____
_____
_____

1. I depend on photosynthesis to feed my growing crops once the seeds I plant have germinated. Without photosynthesis, I couldn't produce the fruits, vegetables, and grains you love to eat!
2. Without photosynthesis, the trees I produce would not grow tall and strong. They would also not be able to return the oxygen to the air that people and animals need to survive.
3. My whole job is growing plants for your home, lawn, and public landscapes. Without photosynthesis I wouldn't have any work to do at all!
4. I am a scientist who studies plants. I want to know everything there is to know about them. I know the process of photosynthesis inside and out. Where would I be without photosynthesis?
5. My work would be sad work indeed without photosynthesis. Just think of all the dangerous air reports I would have to issue if photosynthesis did not exist.
6. The cattle and other livestock I raise depend on good grass to eat in order to thrive and grow. What if that grass didn't make food for itself and my animals?

Career Match Up Answer Key

Career Match Up

Botanist – 4; Air Quality Specialist – 5; Farmer – 1; Rancher – 6;

Greenhouse/Nursery Operator – 3; Forester - 2

Challenge

Suggest to students that all of the careers listed above are considered to be agricultural careers. Challenge students to make a statement about the connection of each career with the world of work called farming.

Name_____ **Date**_____

Photosynthesis – Who Needs It?

Directions: The list below contains the top agricultural commodities in Texas. Circle "Yes" or "No" to indicate whether the commodity is dependent upon photosynthesis for survival and growth. In the third column, give reasons for your answer choice.

Commodity	Yes or No	Tell Why
Cattle and Calves	Yes or No	
Hogs	Yes or No	
Greenhouse/nursery	Yes or No	
Turkeys	Yes or No	
Broilers	Yes or No	
Cotton	Yes or No	
Chicken eggs	Yes or No	
Grapes	Yes or No	
Soybeans	Yes or No	
Corn	Yes or No	
Dairy products	Yes or No	
Christmas Trees	Yes or No	
Sweet potatoes	Yes or No	
Wheat	Yes or No	
Peanuts	Yes or No	
Blueberries	Yes or No	
Cucumbers	Yes or No	
Tomatoes	Yes or No	
Hay	Yes or No	
Potatoes	Yes or No	
Strawberries	Yes or No	
Cabbage	Yes or No	
Apples	Yes or No	
Aquaculture	Yes or No	
Corn, sweet	Yes or No	

Ag Connections Answer Sheet
for Teachers

Photosynthesis- Who Needs It?

No need to check each response individually because every agricultural commodity depends on the process of photosynthesis to survive and grow. Ask students to share the responses they placed in the “Tell Why” column. It goes without saying that plants are dependent on photosynthesis to make food for themselves. Photosynthesis allows plants to sustain their growth and to produce the fruits and vegetables upon which animals and people depend for nourishment. Although it may seem to be an indirect connection at first, all of the animals listed as agricultural commodities depend on photosynthesis too. The energy found in the plants that animals consume is transferred to consumers when they eat meat.

Name_____**Date**_____

Writing Prompt

Imagine that you are a Texas farmer. You awaken one summer morning, turn on the news, and learn that for the next two weeks the process of photosynthesis will be stopped. No house plants, trees, or crops will use the process of photosynthesis to make their own food. Write a story about what happens when farmers learn that there will be no photosynthesis for two weeks.

Oh Say Can You Seed?
By Bonnie Worth
Pages 30-35
Section E

The following activities can be used with Bonnie Worth's book, *Oh Say Can You Seed?* The page numbers are suggestions and align activities within the text.

Engagement Activity

- Use Texas Farm Bureau's videos: Mark Chamblee- Tyler rose grower, Rodney Shronk-sunflowers
- Ask students about the differences they have seen in flowering plants. How are they the same?

Read pages 30-35 Display vocabulary at this time.
Pollen-a powdery substance discharged from the male part of a flower
Pistil-the female part of the flower, when complete consisting of the ovary, style, and stigma
Ovule-unfertilized seeds contained in the ovary
Stamen-the male fertilizing part of a flower, consisting of the anther and filament
Petal-modified leaves that surround the reproductive parts of flowers, often brightly colored to attract pollinators
Pollen tube-transports the pollen to the unfertilized seeds
Sepal-small and green. These resemble leaves, act as protection for the flower bud before it opens

Suggested Activities within this section are included for your reference and may span a time frame of a few days or longer.

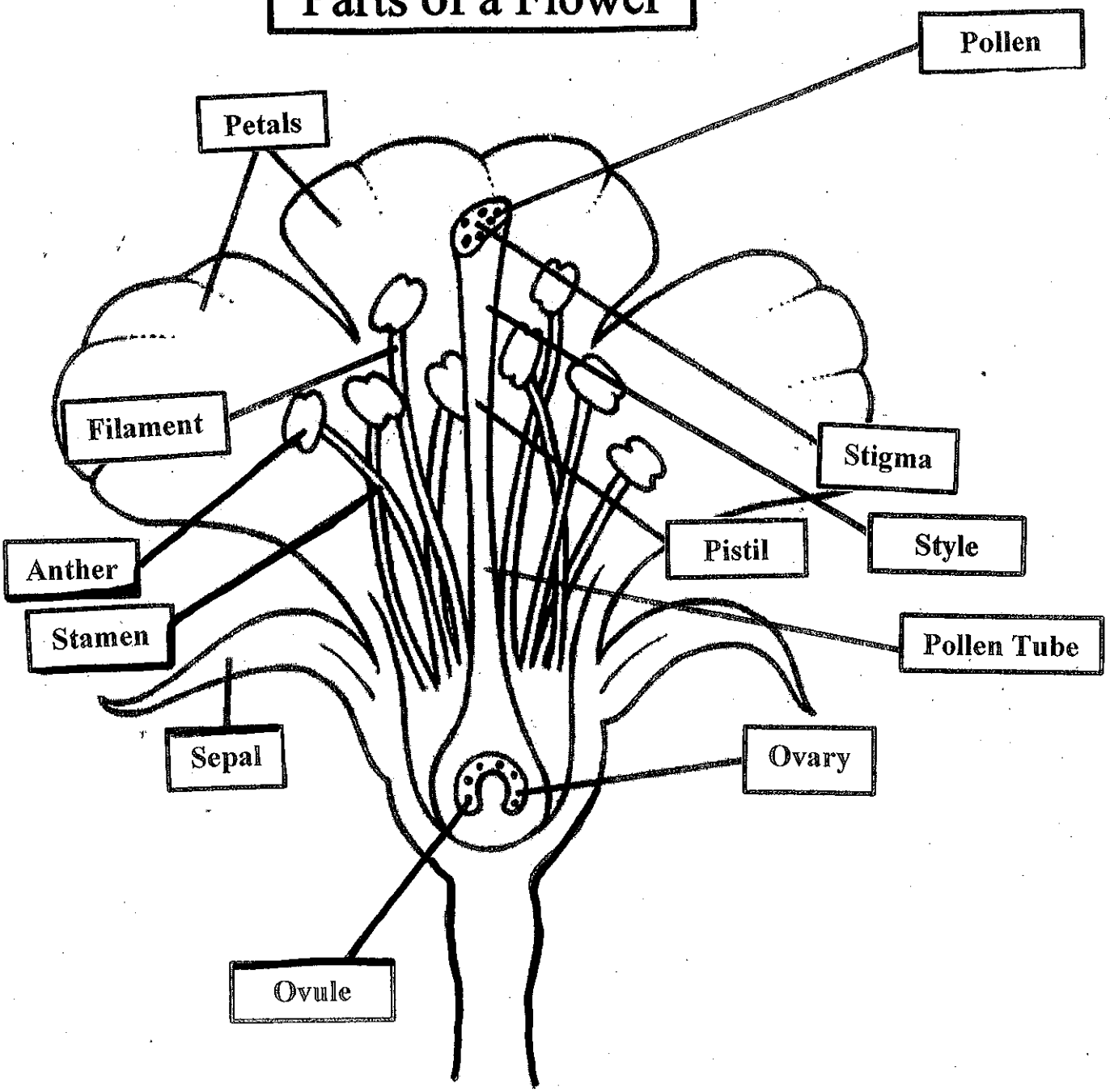
E1 Parts of a Flower (TFB 3 pages)
E2 Parts of Flower Word Search
E3 Parts of Flower Word Search Key
Upon Request: Pollinator Unit from Honey Board

Parts of a Flower
Vocabulary

1. petals: the brightly colored showy part of the flower that attracts insects and other pollinators
2. stamens: the male parts of the flower, consists of the filament and anther
    a. filament: the short slender stalk that supports the anther
    b. anther: a sac-like structure that contains pollen
3. pistil: the female part of the flower. The pistil consists of the stigma, style and ovary.
    a. stigma: the top part of the pistil. It's sticky so it can catch and hold pollen
    b. style: tube-like structure that connects the stigma and the ovary
    c. ovary: the enlarged portion at the base of the pistil
4. sepals: small and green. These resemble leaves, act as protection for the flower bud before it opens
5. ovules: egg cells that become a seed after fertilization
6. pollen: yellowish, dust-like powder needed for fertilization
7. pollen tube: the passageway by which the pollen reaches the ovules for fertilization

Name_____ Date_____

Parts of a Flower



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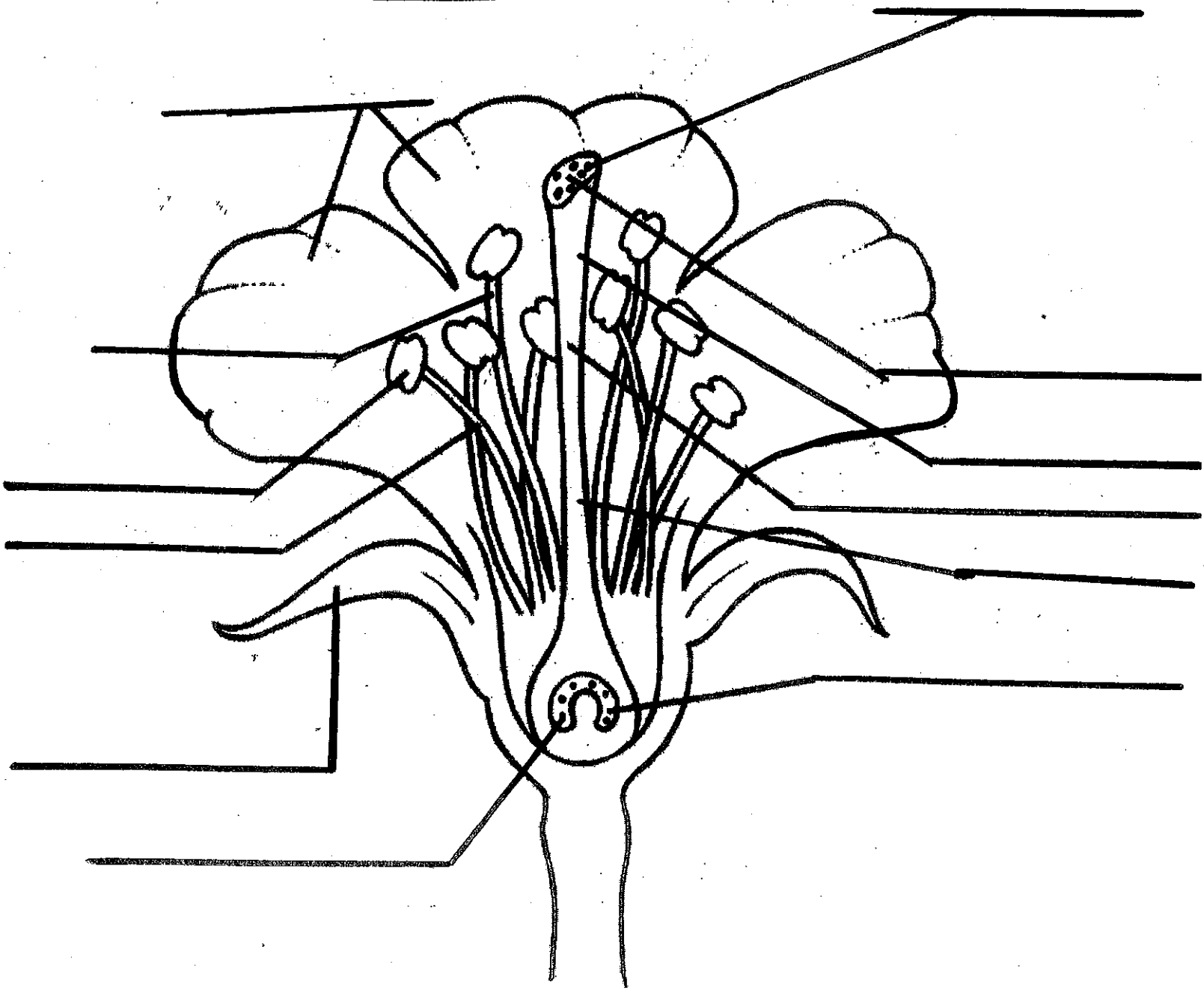
Parts of a Flower



Name_____**Date**_____

Parts of a Flower

Directions: Find and circle the parts of a flower. Use the list below for help.

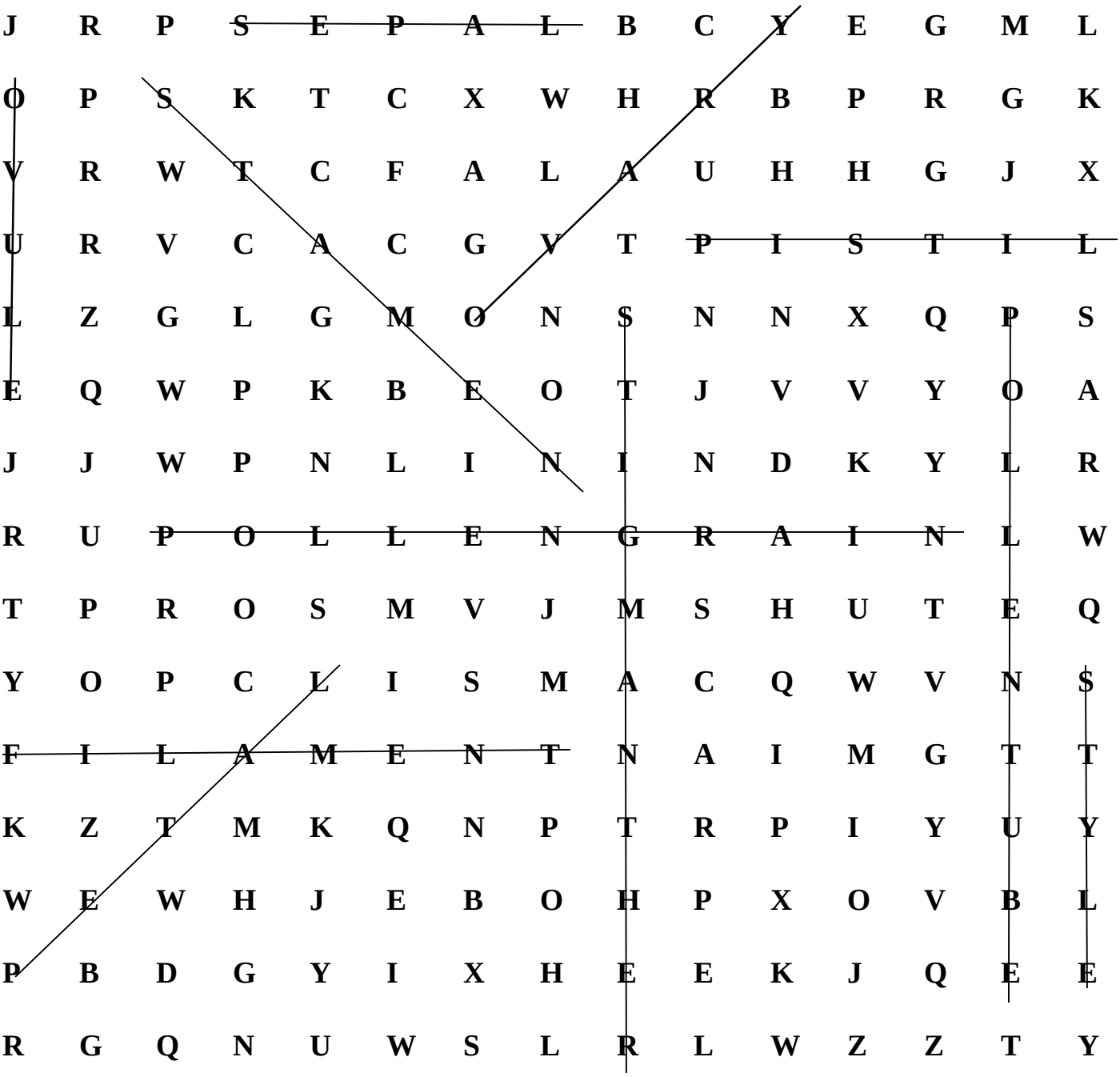
J	**R**	**P**	**S**	**E**	**P**	**A**	**L**	**B**	**C**	**Y**	**E**	**G**	**M**	**L**
O	**P**	**S**	**K**	**T**	**C**	**X**	**W**	**H**	**R**	**B**	**P**	**R**	**G**	**K**
V	**R**	**W**	**T**	**C**	**F**	**A**	**L**	**A**	**U**	**H**	**H**	**G**	**J**	**X**
U	**R**	**V**	**C**	**A**	**C**	**G**	**V**	**T**	**P**	**I**	**S**	**T**	**I**	**L**
L	**Z**	**G**	**L**	**G**	**M**	**O**	**N**	**S**	**N**	**N**	**X**	**Q**	**P**	**S**
E	**Q**	**W**	**P**	**K**	**B**	**E**	**O**	**T**	**J**	**V**	**V**	**Y**	**O**	**A**
J	**J**	**W**	**P**	**N**	**L**	**I**	**N**	**I**	**N**	**D**	**K**	**Y**	**L**	**R**
R	**U**	**P**	**O**	**L**	**L**	**E**	**N**	**G**	**R**	**A**	**I**	**N**	**L**	**W**
T	**P**	**R**	**O**	**S**	**M**	**V**	**J**	**M**	**S**	**H**	**U**	**T**	**E**	**Q**
Y	**O**	**P**	**C**	**L**	**I**	**S**	**M**	**A**	**C**	**Q**	**W**	**V**	**N**	**S**
F	**I**	**L**	**A**	**M**	**E**	**N**	**T**	**N**	**A**	**I**	**M**	**G**	**T**	**T**
K	**Z**	**T**	**M**	**K**	**Q**	**N**	**P**	**T**	**R**	**P**	**I**	**Y**	**U**	**Y**
W	**E**	**W**	**H**	**J**	**E**	**B**	**O**	**H**	**P**	**X**	**O**	**V**	**B**	**L**
P	**B**	**D**	**G**	**Y**	**I**	**X**	**H**	**E**	**E**	**K**	**J**	**Q**	**E**	**E**
R	**G**	**Q**	**N**	**U**	**W**	**S**	**L**	**R**	**L**	**W**	**Z**	**Z**	**T**	**Y**

ANTHER	**POLLEN TUBE**	**FILAMENT**
OVARY	**OVULE**	**PETAL**
SEPAL	**STAMEN**	**STIGMA**
STYLE	**PISTIL**	**POLLEN GRAIN**

Name_____ **Date**_____

Parts of a Flower

Directions: Find and circle the parts of a flower. Use the list below for help.



J	R	P	S	E	P	A	L	B	C	Y	E	G	M	L
O	P	S	K	T	C	X	W	H	R	B	P	R	G	K
V	R	W	T	C	F	A	L	A	U	H	H	G	J	X
U	R	V	C	A	C	G	V	T	P	I	S	T	I	L
L	Z	G	L	G	M	O	N	S	N	N	X	Q	P	S
E	Q	W	P	K	B	E	O	T	J	V	V	Y	O	A
J	J	W	P	N	L	I	N	I	N	D	K	Y	L	R
R	U	P	O	L	L	E	N	G	R	A	I	N	L	W
T	P	R	O	S	M	V	J	M	S	H	U	T	E	Q
Y	O	P	C	L	I	S	M	A	C	Q	W	V	N	S
F	I	L	A	M	E	N	T	N	A	I	M	G	T	T
K	Z	T	M	K	Q	N	P	T	R	P	I	Y	U	Y
W	E	W	H	J	E	B	O	H	P	X	O	V	B	L
P	B	D	G	Y	I	X	H	E	E	K	J	Q	E	E
R	G	Q	N	U	W	S	L	R	L	W	Z	Z	T	Y

ANTHER
OVARY
SEPAL
STYLE
POLLEN TUBE
OVULE
STAMEN
PISTIL
FILAMENT
PETAL
STIGMA
POLLEN GRAIN

Oh Say Can You Seed?
By Bonnie Worth
Pages 36-43
Section F

The following activity can be used with Bonnie Worth's book, *Oh Say Can You Seed?* The page numbers are suggestions and align activities within the text.

- Ask students if, after playing outside, they've had burs or stickers stuck to their socks or shoe strings? How about their dogs? Explain that these are unusual seeds in that they rely on others to transport them about.

Read pages 36-41.The glossary of terms used in the book is found on pp.42 and 43. Ask students to share experiences with the kinds of seeds they see in the book. Did they realize these were seeds?

Suggested Activity:
Have each student bring an old sock, preferably one with a nubby texture. If possible, one sock from each student can be used, or one per group. Students will also need a flower pot, or container with soil in it. Tell students they will be collecting some unusual seeds today. Find an area of the playground or school yard with some plant growth. Choose carefully and not where the grass is too high. Have students put the socks on the outside of their shoe. After they have walked through the grassy areas. The seeds should stick to the socks. When returning to the classroom cut the sock open and place it over the soil. Use a water bottle to spritz the sock, keeping it damp. In a few days there should be lots to observe.

Seed Dispersal Experiment-Field Study

OBJECTIVE: **Learn about seed Dispersal by performing an experiment mimicking a dispersal technique found in nature.**

Materials: **scissors, a clean sock, plant mister, flower pot full of damp potting soil, uncut grassy field**

Procedures:

1. **Students will take turns putting the sock on one foot and walking through the grass. Choose your area carefully.**
2. **After all the students have had a chance to "collect seeds," cut the sock up one side and spread over the pot full of damp soil.**
3. **Mist the sock until it is damp every day (not soaking wet). Place pot in a sunny spot.**
4. **Over the next two weeks, most the sock every day and note if there is any green growth.**
5. **After a month, look at all the plant growth on the sock and talk about how the seeds got there.**

CONCLUSIONS:

Talk about the physical structures seeds might have to help them be spread from one place to another—sticking, floating, blowing. Talk about how milkweed and dandelion seeds blow in the wind, how maple seeds spin away as they fall and how burrs stick to your clothes (and animals) when they are touched.

CRITICAL THINKING:

Which human inventions may have mimicked these adaptive structures in plants?

Name _____

Glossary for "*Oh Say Can You Seed?*"
(pp. 42-43 of text)

1. Carbon dioxide: The gas humans and animals breathe out, and green plants use to make food.
2. Cotyledon: The first leaf or pair of leaves within the embryo. A part of the seed that stores food.
3. Edible: Fit to eat
4. Embryo: The part of a seed that develops into a new plant, including the stem, leaves and roots.
5. Fertilization: Male (or sperm) cells contained in pollen reach the female (or egg) cells in the ovules and the combination grows into seeds.
6. Minerals: Materials that is neither animal nor vegetable. Found in rocks and soil, they help animals and plants to grow.
7. Nectar: The sweet liquid secreted by a flower to attract pollinators like bees, butterflies and hummingbirds.
8. Numero: The Spanish word for "number".
9. Ovule: The part of the plant in the ovary that contains egg cells and becomes a seed after fertilization.
10. Oxygen: The gas humans and animals breathe in order to stay alive, and green plants produce when making food.
11. Photosynthesis: The process in which green plants, powered by the energy of the sun, combine carbon dioxide and water to produce sugar inside their leaves and release oxygen into the air.
12. Pistil: The ovule-bearing, female reproductive part of a flowering plant that includes the stigma, style and ovary.
13. Plantain: A kind of banana that is best eaten when cooked.
14. Pollen: The minute grains that are produced in the anthers of a flower and contain male sex cells.
15. Stamen: The male reproductive part of a flowering plant that includes the anthers and the filaments that support the anthers.

Language Ideas:

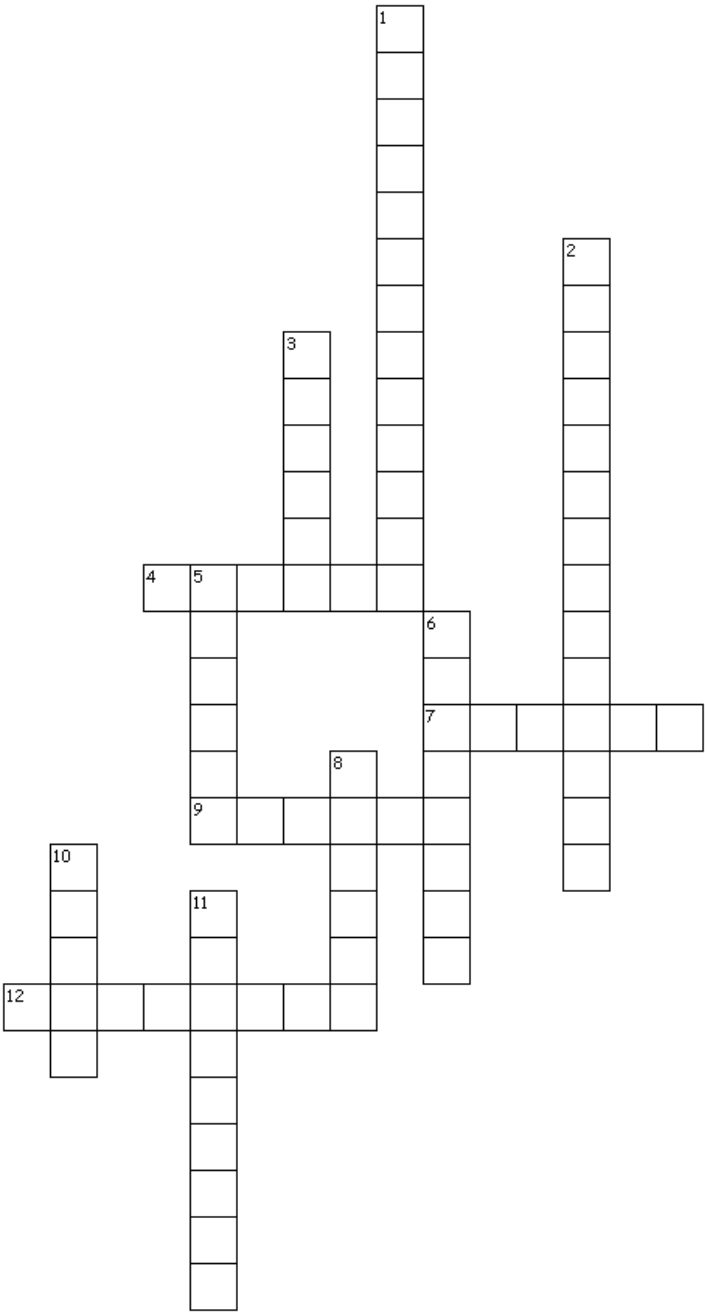
Use these vocabulary words to have students illustrate the meanings, make a plant dictionary, put in alphabetical order, use in sentences, make a plant booklet, etc.

Lesson Extension:

On a separate page, draw a diagram of a plant. Be sure to include the roots, stem, leaves and flowers. **Label each part**.

Courtesy of Florida Agriculture in the Classroom, Inc.

Name_____**Date**_____



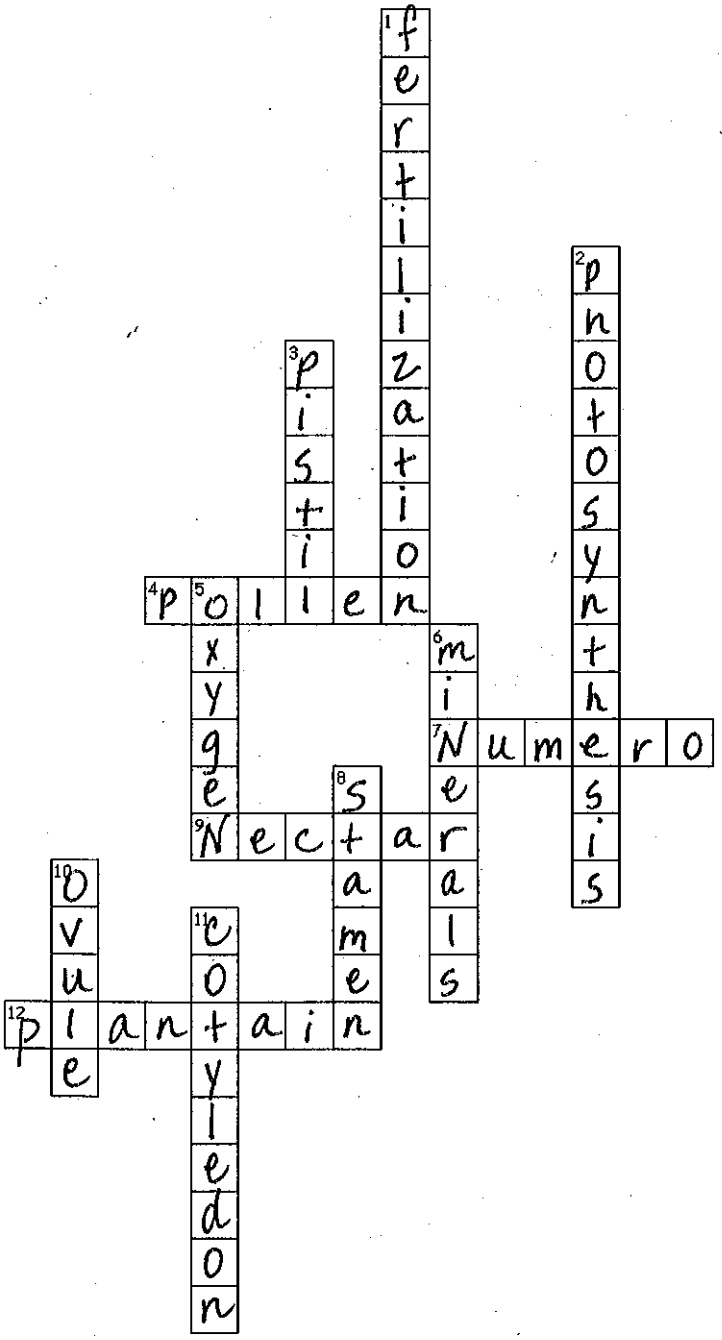
Crossword Puzzle Clues for
Oh Say Can You Seed?

Across
4. The minute grains that are produced in the anthers of a flower and contain male sex cells.
7. Spanish word for "number".
9. The sweet liquid secreted by a flower to attract pollinators like bees, butterflies, and hummingbirds.
12. A kind of banana that is best eaten when cooked.

Down
1. When the male cells contained in pollen reach the female cells in the ovules and cause them to grow into seeds.
2. The process by which green plants, powered by the energy of sunlight, combine carbon dioxide and water to produce sugar inside their leaves and release oxygen into the air.
3. The ovule-bearing, female reproductive part of a flowering plant that includes the stigma, style, and ovary.
5. The gas humans and animals must breathe in order to stay alive and which green plants produce when making food.
6. Materials that are neither animal nor vegetable, found in rocks and soil and help animals and plants to grow.
8. The male reproductive part of a flowering plant that includes the anthers and the filaments that support the anthers.
10. The part of the plant in the ovary that contains egg cells and becomes a seed after fertilization.
11. The first leaf or pair of leaves within the embryo that stores food.

Oh Say Can You Seed? Puzzle #2

Key



Crossword Puzzle Clues for
Oh Say Can You Seed?

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