

Plants Week 9 Booklet

- Living vs. Non-Living
- Foss Investigation #6 Plant Reproduction & Growth
- Part 4: Flowers & Pollinators
- Not in Foss-
- Plant Defenses
- Plant Review



Word

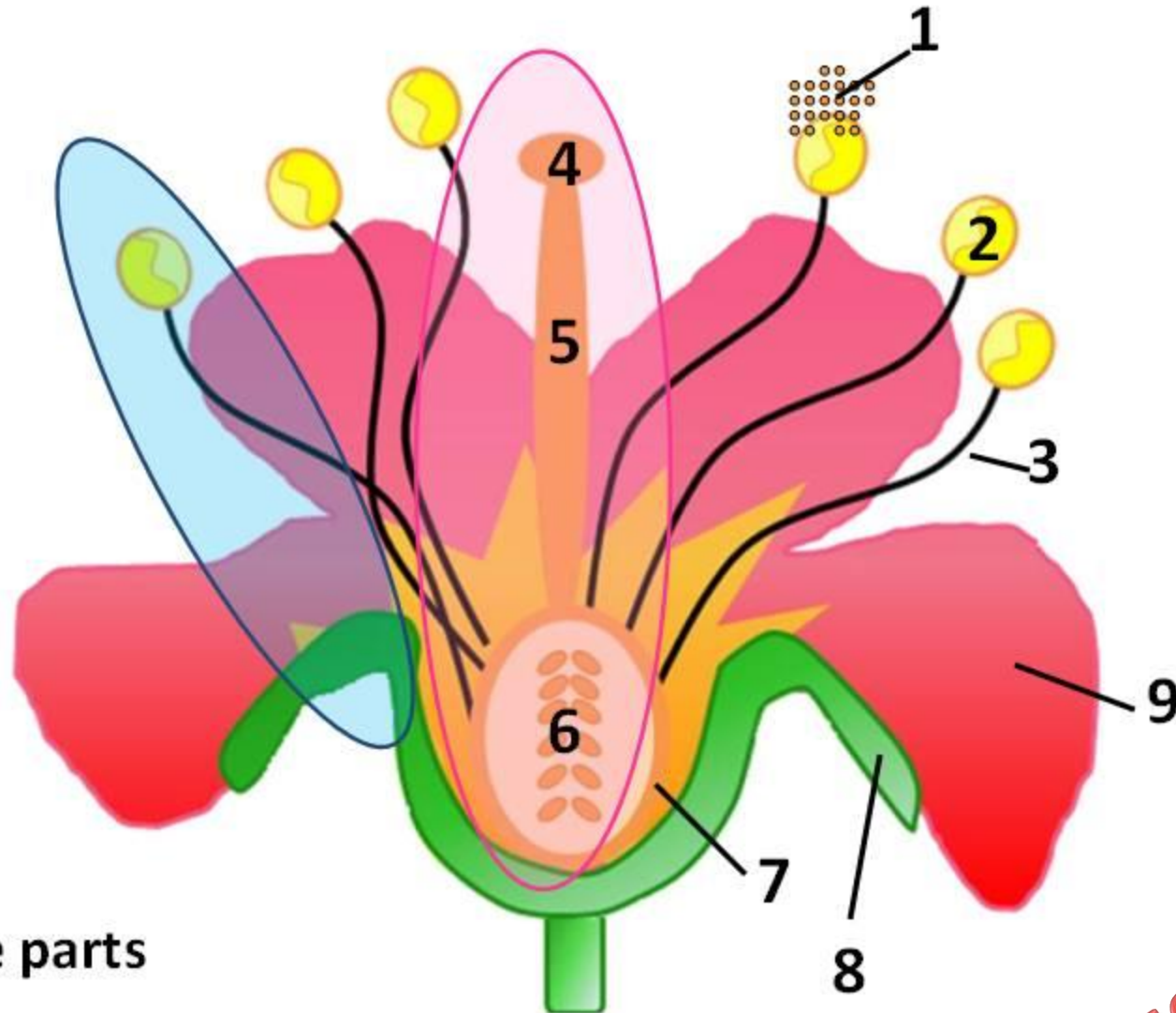
Definition

1. Stamen	The male organ of a flower that has an anther on a stalk (filament).
2. Pollen	Contains the sperm cells.
3. Anther	Produces the pollen that contains the sperm cells.
4. Filament	A long stalk that supports the anther on the male stamen.
5. Stigma	The sticky top where pollen grains land.
6. Style	A stalk down which the pollen tube grows after pollination has taken place on the female pistil.
7. Ovules	Fancy word for eggs.
8. Ovary	The fertilized egg (embryo) from which new plants are formed are found here. Contains the ovules where the egg cells are produced.
9. Sepal	The part of the flower that protects the bud before the flower blooms (often green and leaf-like) that enclose a developing bud.
10. Petal	Attracts pollinators to the flower with color and scent.
11. Pollen Tubes	Long tubes that allow the pollen to travel from the stigma to the ovary.
12. Pistil	The female organ of the flower that contains the stigma, style, ovary and ovules.
13. Germination	When a seed pops out and begins to grow.
14. Pollination	When pollen is carried to the sticky stigma by pollinators.
15. Fertilization	When sperm cells enter an egg creating an embryo.
16. Plant Defenses	Poisonous fruit and leaves, thorns and thigmotropism (plant responds to touch).
17. Fruit	Fertilized eggs become seeds and are protected in the ovule which becomes this later until seeds can be dispersed.

Study 20

FLOWER MODEL

1. Pollen
2. Anther
3. Filament
4. Stigma
5. Style
6. Ovules
7. Ovary
8. Sepal
9. Petal



Male parts



Female parts

Study 20

LAB: Part 4-Flowers and Pollinators

List five ways that pollen gets transferred from one flower to another?

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

BEE AND FLOWER

Teacher Master JJ



What is the bee doing on the flower?

Why did the bee go to that particular flower?

What will the bee do when it leaves?

What might happen if the bee went to another of the same kind of flower?

Pollinator	Response/Actions
Hummingbirds	
Butterflies	
Moths	
Flies	

Focus Question: What adaptations do flowering plants have to accomplish pollination?

Lab Part 4: Flowers and Pollinators

You are going to explore adaptations that flowering plants have evolved to make sure that pollination occurs. Think of the focus question. We will revisit it later, but jot down your initial answer here:

Part 1: Teachers will gather several flower types for observation or pictures if flowers are unavailable. All of the flowers are different, but each of them have the same structures that you diagrammed on your Parts of a Flower Sheet #51 in Booklet 8 (p. 16). Look at Pollination Syndrome A Worksheet #56. Look through the questions in Part 1.

Getters will get 4 hand lenses for each group. Teacher will give two of the same kind of flower to each group. Students are not to dissect or destroy these flowers as they will be used in every class. Students will work in pairs, but will then discuss their findings with their table group. All students must record their answers on the worksheet for 4-5 minutes.

After the teacher calls time, groups will take turns reporting any flower characteristics that they think will attract pollinators.

List the class common answers here: _____

Lab Part 4: Flowers and Pollinators

Part 2: Using the hard back science book as a resource, read “Flower Information” pages 82-85 as you do part 2. You should use this resource to make more detailed observations of your flowers. You should look for a flower that is similar to yours and look carefully at the diagram of the internal structures, specifically start thinking about where the nectar and or pollen are located. If a flower has nectar, it is found in a structure called the nectary.

Part 3: Using Notebook Sheet #57 Pollination Syndrome B, students should think about what pollinator might be attracted to their flower.

What kinds of structures would a pollinator need to reach a particular flower’s nectar?

What kinds of structures would a pollinator need to carry pollen?

What size might a pollinator be for your flower?

What part of a pollinator’s body (the back, the legs, the head, mouthparts, etc.) would most likely come in contact with and collect pollen?

Read the hard back science book Flowers and Pollinators page 86-92 and read the first section.

What do pollinators get out of their relationship with flowers?

What do flowers get out of their relationship with pollinators?

Lab Part 4: Flowers and Pollinators

Part 4: The Pollination Syndrome

The characteristics that a flower employs to attract a particular pollinator are collectively called a pollination syndrome. The pollination syndrome of a flower can be used to predict the type of pollinator that will help the flower successfully reproduce.

Turn to Part 4 on your Notebook Sheet #57 Pollination Syndrome B and read the rest of the Flowers and Pollinators article. Predict what kind or kinds of pollinators would be attracted to your flower and record your response in the table on part 4.

Groups will share findings when complete:

Groups should show the class their flower, say what kinds of pollinators would visit it and why.

Preview Database: [Pollinator Collection](#) and practice matching pollinators to flowers.

Teachers will access the online activity: “Pollinators Game” and play a few rounds with you.

Revisit Focus Question: What adaptations do flowering plants have to accomplish pollination?

Pollination Syndrome A

Part 1: Observe your flower.

1. Describe the shape and color of the flower.
2. Describe any scent the flower has.
3. List any other characteristics that you think might attract pollinators.

Part 2: Use the “Flower Information” resource.

Look for an example of a flower that is similar to yours.

4. Where are the anthers and the stigma located in relationship to each other?
5. Where would a pollinator find nectar?
6. Where would a pollinator find pollen?

Pollination Syndrome B

Part 3: Possible Pollinators

Think about how an animal or insect pollinator might interact with your flower.

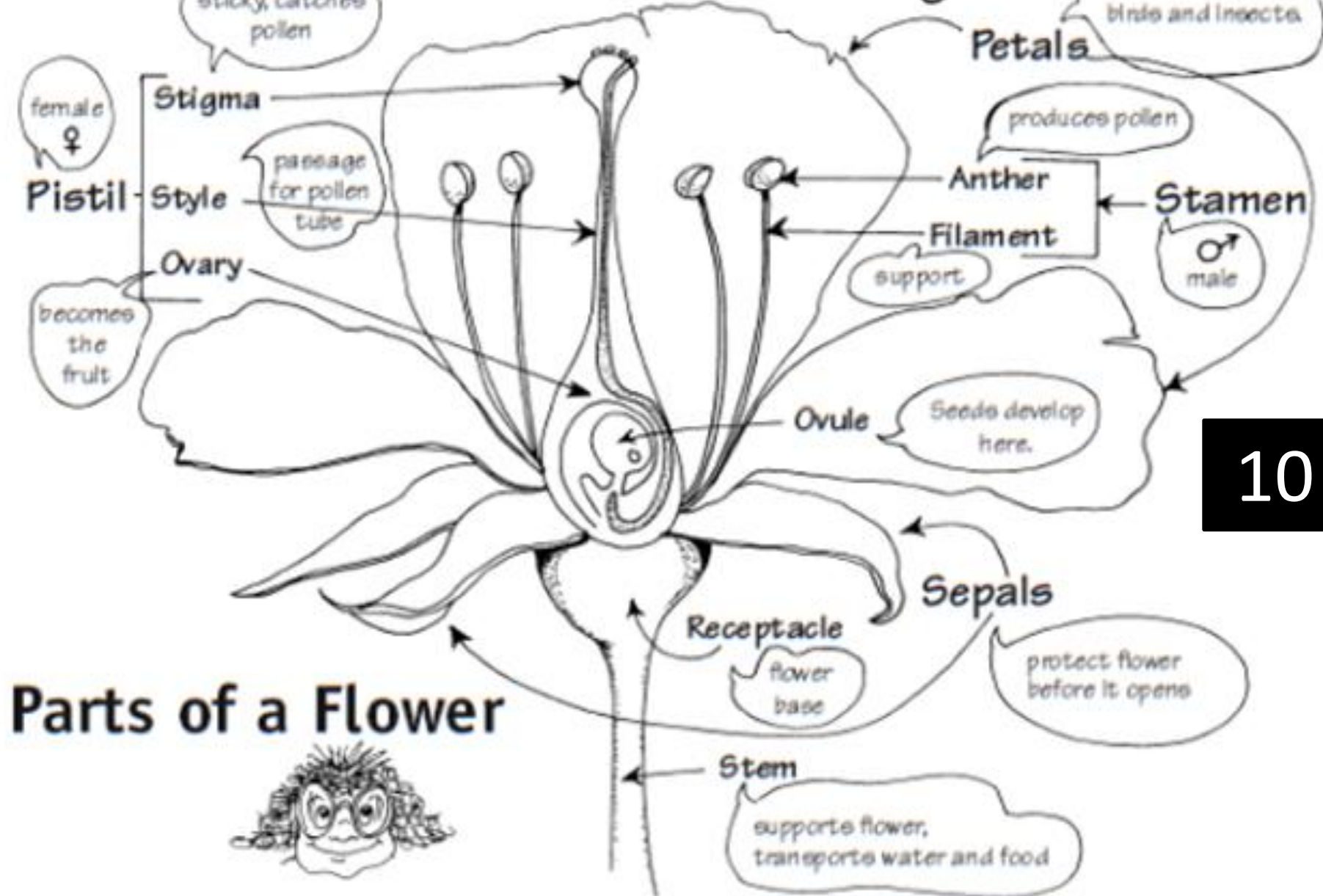
- 8. What characteristics might a *pollinator* have that would affect its ability to pollinate your flower?

Part 4: Use the “Flowers and Pollinators” resource.

Look at the tables in the resource. List your flower’s characteristics below. On the right-hand side, list what kinds of pollinators might be attracted to the flower, based on the characteristics (there may be only one, or there may be several possible pollinators).

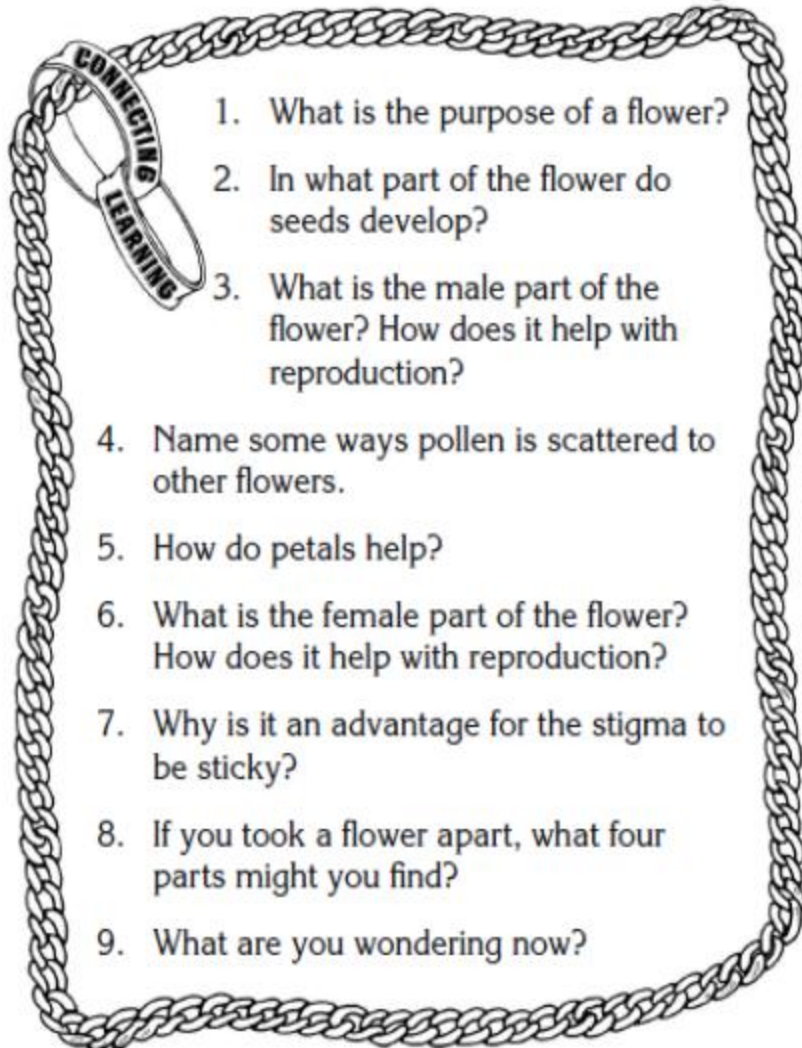
Flower characteristic	Pollinator(s)
Shape/size	
Color	
Scent	
Food	
Day/night timing	

A Flower Study




Answers to

A Flower Study



1. What is the purpose of a flower?
2. In what part of the flower do seeds develop?
3. What is the male part of the flower? How does it help with reproduction?
4. Name some ways pollen is scattered to other flowers.
5. How do petals help?
6. What is the female part of the flower? How does it help with reproduction?
7. Why is it an advantage for the stigma to be sticky?
8. If you took a flower apart, what four parts might you find?
9. What are you wondering now?

A Flower Study



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

PLANT REVIEW

Organisms that make their own food:

Flowerless plants reproduce by
_____.

Organisms that must find an external source of food:

Vascular Plants-vascular tissue: 1. _____ carries
2. _____
(carries _____)

The largest group of plants:

Group of plants that do not have true root, stems, or leaves:

Respiration

Transpiration

Pollination

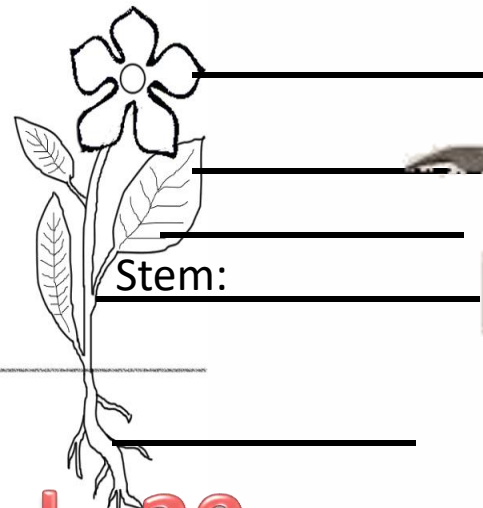
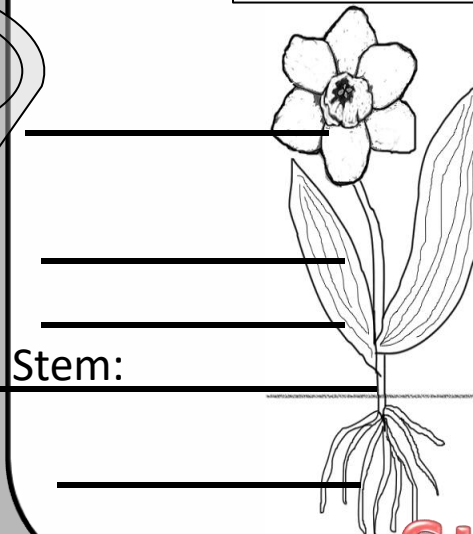
Germination

Fertilization

Plant Processes

Photosynthesis

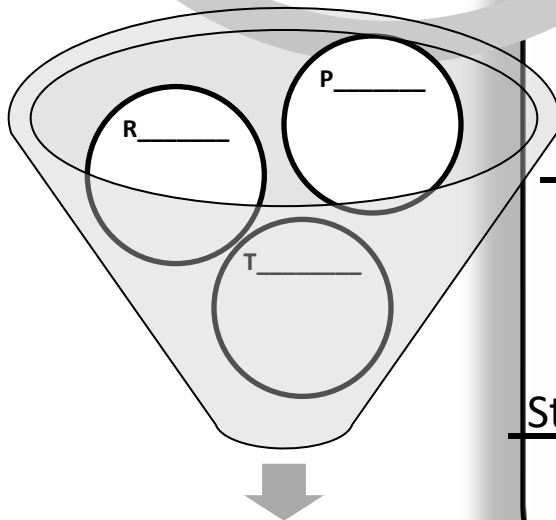
Label the characteristics of the monocots and dicots.



Study 20

Processes in the Leaf:

(Define each briefly in the circles)



Challenge Review

Use the word bank to fill in the Venn diagram.

1 cotyledon	Taproot	In 3's	Parallel veins	Long leaves	Flowering
2 cotyledons	Fibrous root	In 4's or 5's	Branching veins	Broad leaves	Seed producing

Monocots

Dicots

Use the word bank to fill in the chart below.

True roots, leaves, & stems	No true roots, leaves, & stems	Usually very small
Needs nutrients	Needs water	Usually green
Has xylem	Has phloem	Can grow very large

Vascular

- _____
- _____
- _____
- _____

Non Vascular

- _____
- _____

Both

- _____
- _____
- _____

Use the word bank to classify all of the plants below. Words may be used more than once.

Vascular	Seed producing	Monocot	Flowering
Nonvascular	Spore producing	Dicot	Cone-bearing

1. Rose bush

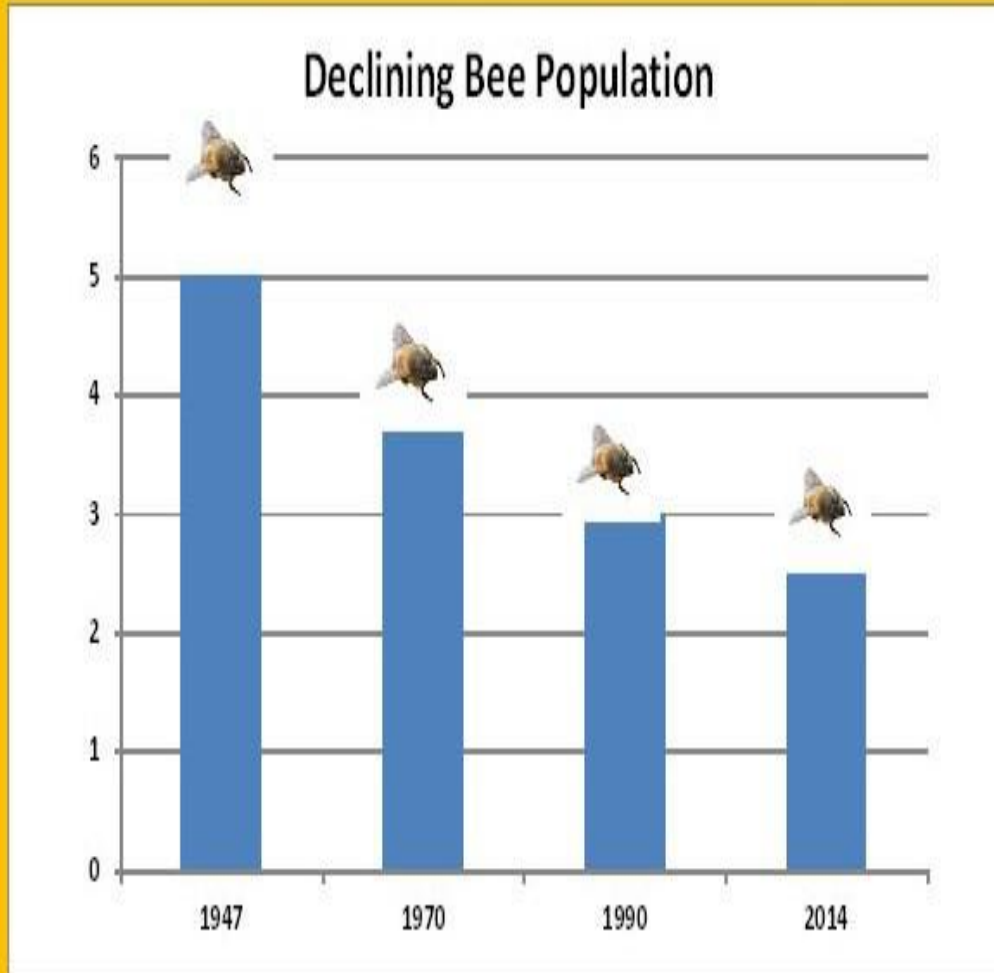
2. Pine tree

3. Liverwort

4. Fern

Scientific Argument: Claim, Evidence, Reasoning

6.E.2A.2



Find a fact: What is the trend according to this graph?

Answer: _____

Using the graph, use your scientific argument skills to make a claim, find evidence and reasoning about the declining bee population and possible causes for this today.

Claim: _____

Evidence:

14

Reasoning:

How to Solve One-Step Dimensional Analysis Problems

#1 A family hot tub holds 500 gallons of water. How many cubic meters is this?

#2 A mother filled up a bathtub with 45 gallons of water to give her child a bath. How many cubic meters is this?

Steps to Dimensional Analysis

- Step 1: Write out your problem.
- Step 2: Write all conversion factors as fractions.
- Step 3: Include all units with all numbers.
- Step 4: Arrange conversion factors, so that units cancel diagonally (what goes up, must come down).
- Step 5: Numbers on top are multiplied.
- Step 6: Numbers on bottom are divided.

Conversion

264.2 gal = 1 cubic meter


Review

16

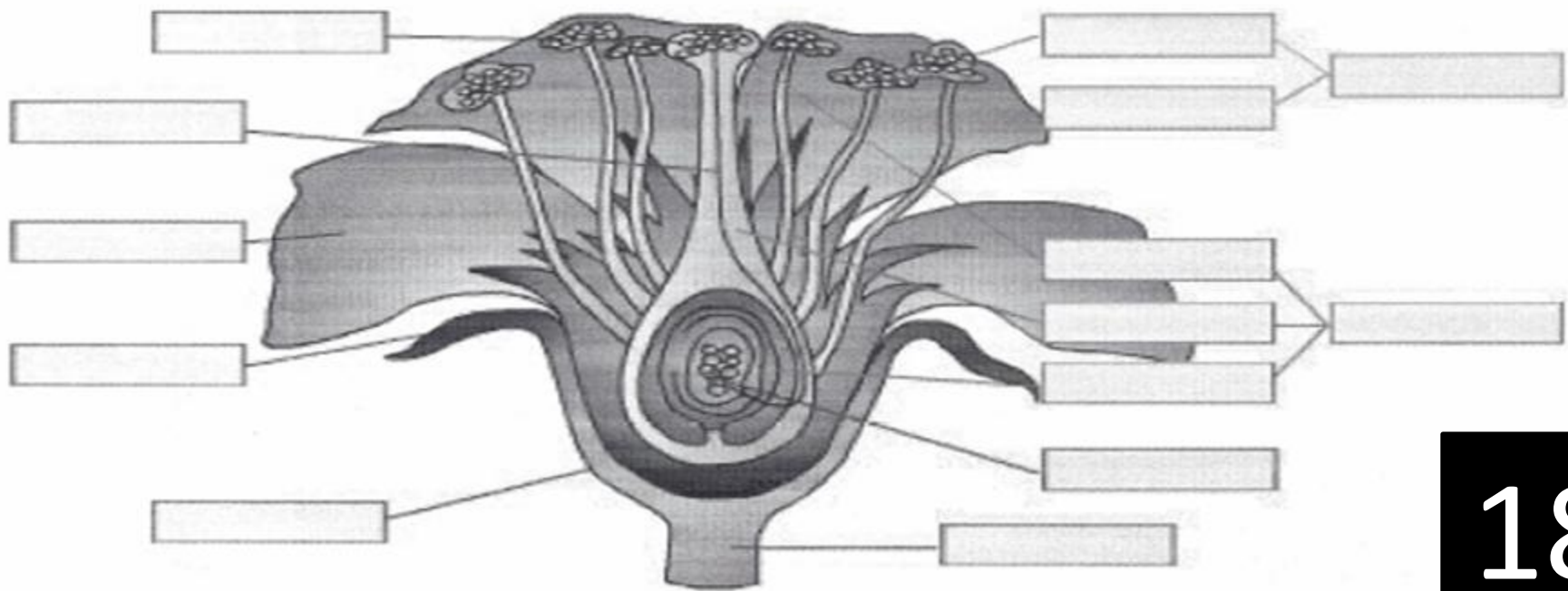
Study 20

1. _____ pollen
2. _____ anther
3. _____ filament
4. _____ stigma
5. _____ style
6. _____ ovules
7. _____ ovary
8. _____ sepal
9. _____ petal
10. _____ pollen tubes
11. _____ pistil
12. _____ germination
13. _____ pollination
14. _____ fertilization
15. _____ plant defenses
16. _____ stamen
17. _____ fruit

- A. The male organ of a flower that has an anther on a stalk (filament).
- B. The part of the flower that protects the bud before the flower blooms (often green and leaf-like) that enclose a developing bud.
- C. The female organ of the flower that contains the stigma, style, ovary and ovules.
- D. The sticky top where pollen grains land.
- E. A stalk down which the pollen tube grows after pollination has taken place on the female pistil.
- F. When sperm cells enter an egg creating an embryo.
- G. When a seed pops out and begins to grow.
- H. Fertilized eggs become seeds and are protected in the ovule which becomes this later until seeds can be dispersed.
- I. The fertilized egg (embryo) from which new plants are formed are found here. Contains the ovules where the egg cells are produced.
- J. Contains the sperm cells.
- K. A long stalk that supports the anther on the male stamen.
- L. Poisonous fruit and leaves, thorns and thigmotropism.
- A. Fancy word for eggs.
- B. Attracts pollinators to the flower with color and scent.
- C. Long tubes that allow the pollen to travel from the stigma to the ovary.
- D. When pollen is carried to the sticky stigma by pollinators.
- E. Produces the pollen that contains the sperm cells.

In the last column, draw a big star (★) next to two (2) items that are the hardest concepts for you. 

Topic Title	What I Learned	What I'm Still Confused About
Flower Parts/Functions, Fruit formation (Pollination, Fertilization, Germination)	1. 2.	
Processes in the Leaf (photosynthesis, respiration, transpiration)	1. 2.	
Plant Groups (Vascular/Nonvascular, Flowering/Cone Bearing, Seed/Spore producing)	1. 2.	
Characteristics of Monocots/ Dicots, Vascular tissue (xylem/phloem)	1. 2.	
Sexual Reproduction Asexual Reproduction	1. 2.	
Controlled Experiments (in./dependent variables, control/experimental group)	1. 2.	
Classification of Organisms, 5 Kingdoms, and Scientific Names, Fungi, Protists	1. 2.	
Tropisms & Tips and Tricks to Remember Any Plant Content	1. 2.	



**Pistils go to OSS: Pistils have: _____, _____, and _____

- A. The male part of the flower is called the **stamen**. It consists of two structures, a long, thin **filament** topped by an **anther**. Label these three structures in the Gizmo, and then add these terms to the diagram above.
- B. The female part of the flower is called the **pistil**. It consists of a sticky top surface called the **stigma**, a shaft called the **style**, and an **ovary** that encloses small structures called **ovules**. Label all five parts in the Gizmo and in the diagram above.
- C. Male sperm cells are contained within **pollen** grains. After a pollen grain moves from the anther to the stigma, a **pollen tube** grows through the style to an ovule. Label the last two structures in the Gizmo and in the diagram above.

Identify: Identify the following parts from their descriptions.

- a. These grains contain male reproductive cells (sperm cells): _____
- b. This structure contains female reproductive cells (egg cells): _____
- c. This colorful structure attracts pollinators to the flower: _____
- d. This structure has a sticky surface to trap pollen grains: _____
- e. This structure produces and stores pollen: _____
- f. These structures allow sperm cells to move through the style: _____
- g. These structures protect the maturing flower bud: _____
- h. This structure contains the female organs of a flower: _____
- i. This structure contains the male organs of a flower: _____

19

Question: How are seeds formed in fruits?

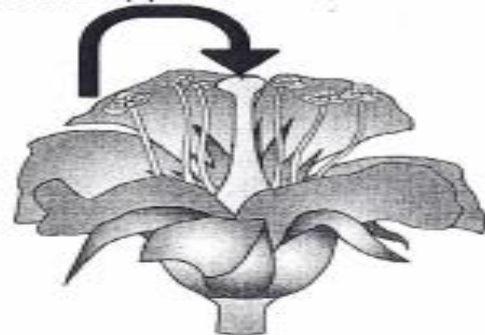
1	
2	
3	
4	
5	

SPONGE BOB'S TEETH

Name _____

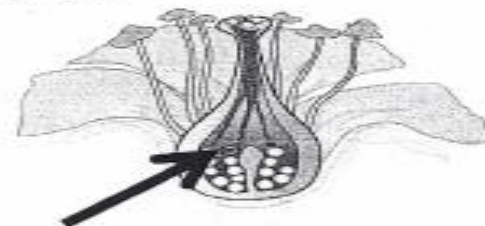
Want to know why Sponge Bob only has two teeth? It's because when he was just a young sponge he tried to eat an apple whole! Yes, that's right! When he chomped into the apple he broke his teeth on the seeds! SpongeBob never understood how those pesky seeds got into the apple!

1. Bees can reach the pollen from a flower because the **f**_____ holds the anther up high in a flower. Bees and butterflies can then carry **p**_____ from the **a**_____ of the **s**_____ to the sticky **s**_____ of the **p**_____. This process is called **p**_____.



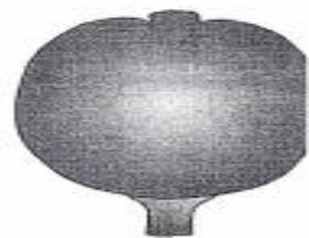
2. The pollen will then travel down through the long **s**_____ and into the **o**_____ by creating **p**_____ **t**_____.

3. The pollen grains will then join with the **o**_____ inside of the ovary to form lots of baby plants called, **e**_____. This process is called **f**_____.



4. The embryos are protected inside of **s**_____. The seeds have 3 parts: The **s**_____ **c**_____ is the tough outside part of the seed. The food stored within the seed called the **c**_____. The cotyledon feeds the plant baby called the **e**_____.

5. When the seeds have developed enough, the **o**_____ will begin to swell many times its original size. The ovary enlarges to form a **f**_____.



PARTS OF A SEED

WORD BANK

anther	fertilization	ovary	pollen tubes	stamen
cotyledon	filament	ovules	pollination	stigma
embryos	fruit	pistil	seed coat	style
embryos	ovary	pollen	seeds	

STRUCTURAL ADAPTATIONS/PROCESSES FLOWERING PLANTS USE FOR DEFENSE, SURVIVAL & REPRODUCTION

6.L.5B.3 Develop and use models to compare structural adaptations and processes that flowering plants use for defense, survival and reproduction.

Structural Adaptations for Reproduction

Parts of the flowering plant that function in reproduction include:

Flowers

- Flowers produce seeds.
- Many flowers contain both male and female organs needed to produce new flowers.
- Flower petals are often colorful or have a scent to attract insects and other animals.

Stamen

- The male organ of a flower that has an anther on a stalk (filament).
- The anther produces the pollen that contains the sperm cells.

Pistil

- The female organ of the flower that contains
 - The ovary, which contains the ovules where the egg cells are produced,
 - The stigma, which is the sticky top where pollen grains land, and
 - The style, which is a stalk down which the pollen tube grows after pollination has taken place.

Seed

- The ovule that contains the fertilized egg (embryo) from which new plants are formed.
- A fruit that is formed from the ovary often protects them.

Extended Knowledge

Plants use a variety of parts to produce new plants such as:

Tubers, bulbs

- These are all types of underground stems.
- The “eyes” or buds of tubers, for example potatoes, grow into roots and shoots to produce a new plant.
- Bulbs, for example onions, are big buds made of a stem and special types of leaves.

STRUCTURAL ADAPTATIONS/PROCESSES FLOWERING PLANTS USE FOR DEFENSE, SURVIVAL & REPRODUCTION

6.L.5B.3 Develop and use models to compare structural adaptations and processes that flowering plants use for defense, survival and reproduction.

Structural Adaptations for Reproduction

Runners

- These are all types of stems that run along the ground.
- New strawberries or some ivy grow from the tips of runners.
- Many lawn grasses grow from runners.

Stem Cuttings

- When a piece of cut stem is planted, roots may form from the cutting, and then a full plant develops.
- Sugar cane and pineapple are examples of plants grown from stem cuttings.

Roots

- Some fruit trees and bushes send up “suckers” or new shoots from the roots.
- Some plants have roots that can produce new plants from root pieces, such as a sweet potato.



Plant cells have larger vacuoles compared to animal cells to store more food and water. This helps plants to store up the water they need in order to perform the process of photosynthesis.

Assessment Guidance

The objective of this indicator is to develop and use models to compare structural adaptations and processes that flowering plants use for defense, survival and reproduction. Therefore, the primary focus of assessment should be for students to construct models that represent (or use simulations to investigate), compare, and contrast structural adaptations and processes flowering plants use for survival. This could include but is not limited to students creating models to describe how various structures of flowering plants help them to grow, develop, reproduce, and survive. In addition to develop and use models, students should ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; obtain, evaluate, and communicate information; and construct devices or define solutions.