

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_ PERIOD: \_\_\_\_\_

**PAP BIOLOGY LAB STATIONS – PLANTS**

**STATION 1: Monocot or Dicot?**

You will be examining 2 seeds to identify which is a monocot or dicot. Watch the video (<https://www.youtube.com/watch?v=gI2RxzAT-ww> ) and then answer the following questions.

1. Can pine trees, mosses, and ferns be classified as either monocot or dicot?
2. What is the name of the category of flowering plants?
3. Which evolved first, monocots or dicots? (See video)
4. Which root system do you think is better for preventing erosion? Why?
5. Which root system do you think is better for reaching water deep in the ground? Why?

**STATION 2: Angiosperms vs. Gymnosperms**

Read the article, answer the questions, and then examine the reproductive structures provided and determine whether they are angiosperms (A) or gymnosperms (G)

1. What is a gymnosperm?
2. Where are their seeds located?
3. How can you determine a male from a female cone?
4. Examine the cone before you- is it a male or female? How do you know?
5. What is an angiosperm?
6. How are gymnosperms and angiosperms similar with methods of dispersal?
7. The fertilized egg will become what structure in a plant?

Name	Angiosperms (A) or Gymnosperms (G)
Pine Cone	
Flower from weed	

**STATION 3: The Leaf**

Examine the slide of a cross-section of a leaf under the microscope and answer the following questions

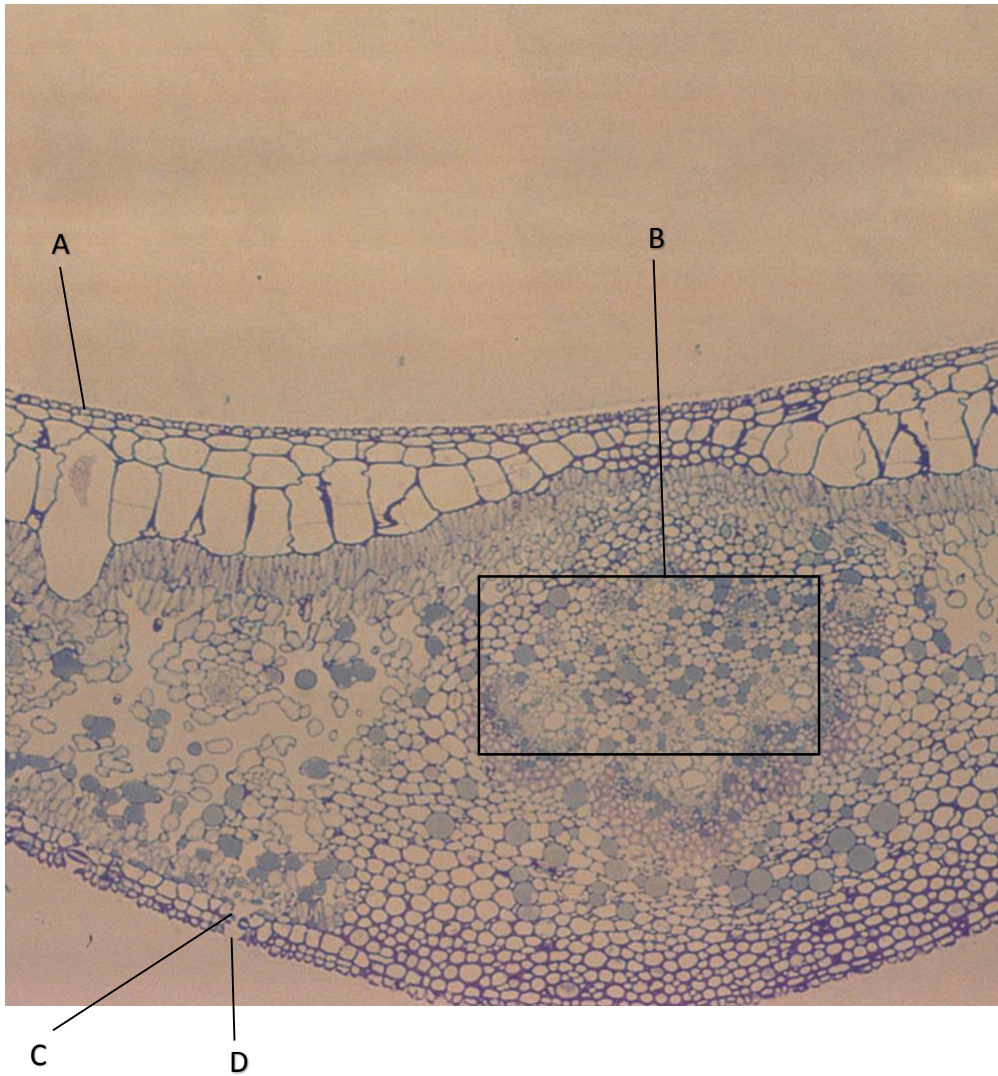
1. Label the following slide located on page 2 of this handout

A-

B-

C -

D -



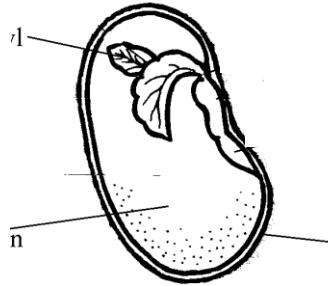
**STATION 4: Bean Germination and Roots**

Read the text and then answer the following questions before you examine the seed and germinating plants before you.

1. Compare the functions of roots with those of leaves and stems
2. How do roots hairs help a plant absorb water and nutrients? Use the term “surface area” in your response.
3. What types of plants do not need extensive root systems?
4. House plants can be killed by over-watering. Why?
5. What are the structures found within every seed?
6. Why is moisture important in germination?
7. Where does the embryo get its energy from during germination? How does that compare to when its leaves have unfolded?
8. How does a monocot compare to a dicot? State 2 ways. Give examples of each.

Now, examine the seeds and then germinating bean seedling, and answer the questions below.

9. Label the parts of the dissected bean seed below:



10. Describe the surface texture of the roots. What structure gives the roots this texture?
11. How does the form of these structures relate to their function?
12. Both roots and stems have an outer layer of cells, the epidermis. What structures do roots have that stems do not? How does this difference reflect the functions of the cells?
13. Plants such as mosses lack true roots. They have structures called rhizoids that anchor them to the ground but do not play a major role in absorption and transportation. In what habitats must plants of this type live? Explain your reason.
14. Is this seedling an example of a monocot or dicot? Why?

Watch the video (<http://www.discovery.com/tv-shows/other-shows/videos/assignment-discovery-shorts-germinating-seed/>) and answer the following questions

15. What are the fuzzy white structures on the growing embryo? What process is making the root grow longer into the soil?
16. After the embryo grows, what is the first structure that comes out of the seed? What is the second?

#### **STATION 5: Leaves**

Watch the video (<https://www.youtube.com/watch?v=co0JdqUlycg>) and answer the following questions:

1. What are the reactants in photosynthesis?
2. What are the products of photosynthesis?
3. Which part of the plant engages in photosynthesis? (Root, stem, or leaf)
4. Why is the top side of the leaf darker than the bottom side?
5. Why do leaves have a large surface area?
6. How does CO<sub>2</sub> enter the leaf? Where are these structures located- on the top or underside of the leaf? What structure controls whether it is open or close? Why does it open or close?
7. Why are leaves thin?
8. Where does water enter the plant? Which structure transports it to the leaf?
9. Why do the vascular bundles form veins?
10. What is the function of the cuticle?
11. Where does the majority of photosynthesis occur?
12. What structure transports sugars?

### **STATION 6: Transpiration in plants**

Watch the video (<https://www.youtube.com/watch?v=U4rzLhz4HHk> ) and then answer the following questions

1. What process absorbs water through the root hairs into the plant?
2. What happens to most of the water when it enters the plant? What is it called?
3. What structure determines if the stomata is open or close?
4. What is the size of the xylem cells?
5. Explain how water gets pulled up from the xylem.
6. Why is transpirational pull important to plants?
7. Which side of the plant engages in more transpiration? Why does this side engage in more transpiration?

### **STATION 7: Sexual reproduction in flowering plants**

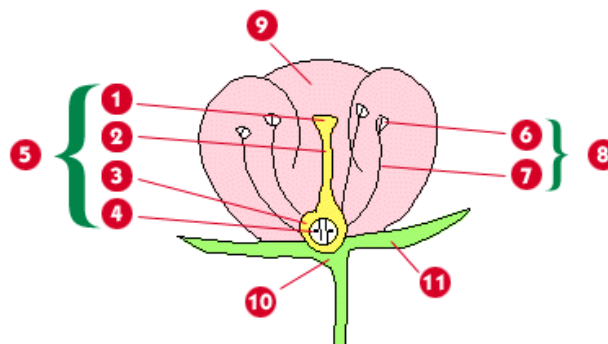
Watch the video (<https://www.youtube.com/watch?v=CkBNEM2mD30> ) and then answer the following questions

1. Where is a plant's sperm located?
2. What is the name of the process in plants that is equivalent to sex in humans?
3. How is a seed made?
4. What are the various ways that pollen are transported?
5. What similarities do you notice for all flowers share that are pollinated by bees, butterflies, and hummingbirds?

### **STATION 8: Is it a fruit or vegetable?**

Sometimes, a plant organ that is biologically a fruit is called a “vegetable” in everyday English. This is because these fruits have lower amounts of the sugar fructose and are used in savory rather than sweet cooking.

First, label the parts of a flower below



1. Which structures are the female parts of the flower?
2. Which structures are the male parts of the flower?
3. The flower is adapted for pollination by which method? How?

Then watch a video (<https://www.youtube.com/watch?v=bwCpQflmQG4> ) on how fruits are made and then answer the following questions

4. What does a fruit consist of?
5. Therefore which part of the flower becomes a fruit?
6. The fruit is adapted for pollination by which method? How?

Watch another video (<https://www.youtube.com/watch?v=bUjVHUf4d1I> ) and the answer the following:

7. How many fertilizations occur in flowering plants?
8. How many reproductive cells are initially in the ovule? Is it diploid or haploid? What process does it undergo to produce 4 haploid megaspore?
9. 8 haploid nuclei are produced from which process?
10. What are the parts of the pollen grain?
11. Where must the pollen grain land to start fertilization?
12. How does the male gamete meet the female gamete?
13. When one sperm cells fuse with the egg cell, and the other fuses with both central nuclei, what will each develop into? Are the structures each haploid, diploid, or triploid?
14. How can you tell if a plant organ is a fruit? From what you know and have learnt, specify 2 characteristics that all fruits possess that vegetables don't.
  - a)
  - b)
15. For the table below, specify whether each is a fruit or vegetable

Name	Fruit (F) or vegetable (V)
Strawberry	
Cucumber	
Celery	
Sweet potato	
Kiwi	
Apples	
Squash	
Bananas	
Lemon	
Tomatoes	
Cherry	
Oranges	
Watermelon	
Avocados	
Zucchini	
Bell peppers	
Pumpkins	
Broccoli	
Spinach	
Cauliflower	
Potato	

### **Station 9: Methods of dispersal of seeds**

Read the online article at <http://www.mbgnet.net/bioplants/seed.html> and watch the videos and answer the following questions

1. What are the 3 ways animals disperse seeds?
  - a.
  - b.
  - c.
2. What are 3 adaptations for wind dispersal?
  - a.
  - b.
  - c.
3. What is 1 adaptation for dispersal by water?
  - a.

### **Station 10: Plant tropisms**

Watch the video (<https://www.youtube.com/watch?v=pi3P3uJOsN4&spfreload=1>) and answer the following questions below

1. What is a tropism?
2. How does positive tropism differ from negative tropism?
3. How does phototropism, geotropism, and thigmotropism differ?
4. In the case of negative thigmotropism, why is this a useful adaptation?
5. How is positive thigmotropism a useful adaptation?

### **Station 11: Nitrogen fixation**

Watch the video (<https://www.youtube.com/watch?v=4NKGs4bj7cc>) and answer the following questions below

1. Where do all animals get their nitrogen?
2. What is nitrogen fixation?
3. Peas and beans and nitrogen fixing bacteria are an example of what type of symbiotic relationship?

### **Station 12: Tree Rings**

Watch the video (<https://www.youtube.com/watch?v=xmZO7aRgcW4>) and answer the following questions below

1. What can tree rings tell you about environmental conditions?
2. What do "skinny rings" indicate?

### **Station 13: Surface tension of water**

Surface tension refers to water's ability to "stick to itself." Surface tension can be measured and observed by dropping water (drop by drop) onto a penny.

1. How many drops of water can fit on a penny? \_\_\_\_\_

2. How does surface tension play a role in the movement of water in a plant?

### **Station 14: Adaptations**

Read the link (<http://www.mbgnet.net/bioplants/adapt.html>) and answer the following questions below:

1. What is an adaptation?
2. Click on “desert”. Describe 5 characteristics of a desert.
3. List 5 adaptations of plants that live in a desert.
4. Explain why possessing spines increases the fitness of a cactus.
5. Click on “grassland”. Describe 5 characteristics of a grassland.
6. List 5 adaptations of plants that live in a grassland.
7. Click on “tropical rainforest”. Describe 5 characteristics of a tropical rainforest.
8. List 5 adaptations of plants that live in a tropical rainforest.
9. Click on “temperate rain forest”. Describe 5 characteristics of a temperate rain forest.
10. List 3 adaptations of plants that live in a temperate rain forest.
11. Click on “temperate deciduous forest”. Describe 5 characteristics of a temperate deciduous forest.
12. List 3 adaptations of plants that live in a temperate deciduous forest.
13. Click on “taiga”. Describe 5 characteristics of a taiga.
14. List 5 adaptations of plants that live in a taiga.
15. Click on “tundra”. Describe 5 characteristics of a tundra.
16. List 5 adaptations of plants that live in a tundra.
17. Click on “in water”. List 5 adaptations of plants that live in water.

### **Independent Learning**

The following videos are helpful resources to solidify the concepts learned in this unit

- Plants overview: [https://www.youtube.com/watch?v=X4L3r\\_XJW0I](https://www.youtube.com/watch?v=X4L3r_XJW0I)
- Plant evolution: <https://www.youtube.com/watch?v=4l4LKCq2eJs>
- Plant transport: xylem and phloem, transpiration: [https://www.youtube.com/watch?v=xGCnuXxbZGk&index=12&list=PLXwnjgs\\_UWplQhMZ1YObcd338AHkQzPHW](https://www.youtube.com/watch?v=xGCnuXxbZGk&index=12&list=PLXwnjgs_UWplQhMZ1YObcd338AHkQzPHW)
- Plant control: <https://www.youtube.com/watch?v=HdwIclKSoBY>
- Plant structure and adaptations: <https://www.youtube.com/watch?v=DGpPHrLF-5M>
- Root structure: [https://www.youtube.com/watch?v=rt0txLZK6\\_0](https://www.youtube.com/watch?v=rt0txLZK6_0)
- Plant reproduction in angiosperms: <https://www.youtube.com/watch?v=HLYPm2idSTE>
- How plants defend themselves: <https://www.youtube.com/watch?v=zVbponLWnK8>
- Stomata and gas exchange: <https://www.youtube.com/watch?v=Br4gJuQsIMl>
- Transpiration: <https://www.youtube.com/watch?v=At1BJJDcXhk>

- Tropisms and hormones: <https://www.youtube.com/watch?v=pCFstSMvAMI>
- Plant and animal defense: <https://www.youtube.com/watch?v=Sf-0mUgz3KA>
- Desert adaptations: <https://www.youtube.com/watch?v=TlbpYeuVKpl>
- Plant nutrition and transport: <https://www.youtube.com/watch?v=bsY8j8f54I0>
- Nonvascular plants: <https://www.youtube.com/watch?v=iWaX97p6y9U>
- Vascular plants: <https://www.youtube.com/watch?v=h9oDTMXM7M8>
- Plants and bees: <https://www.youtube.com/watch?v=ExaQ8shhkW8>