

ZOOLOGY/BOTANY

In order to provide OHS Zoology/Botany students with the best educational opportunities possible during this mandatory school closure, I have provided the following assignments for students to compete over the next few weeks.

Student Instructions:

- 1) If you have a printer, print out the assignments and handouts
- 2) If you don't have a printer, you can write the answers for each assignment on a piece of binder paper **or** you can email me at csickels@orlandusd.net requesting a packet. I will have the OHS office send a printed copy of the materials to your address. You must email me your request by **Monday, May 18th at noon**.
- 3) Once you complete each asterisked (*) assignment, take a picture of the completed assignment (all sides) and email it to csickels@orlandusd.net to receive credit toward the your class grade. All assignment with an asterisk (*) are due by **May 29th at 3pm**. Make sure that all images are clear and readable & show your name and class period.

EMBRYO DEVELOPMENT UNIT:

- Day 1: Read pages 634-641 in the Modern Biology textbook and copy the Embryo Development Notes – Day 1 into your notebook
- Day 2: Copy the Embryo Development Notes - Day 2 into your notebook and color the **Fruit Types Coloring Worksheet***
- Day 3: Copy the Embryo Development Notes - Day 3 into your notebook and color the **Seed & Fruit Dispersal Methods Coloring Worksheet***
- Day 4: Use your Biology textbook to complete the **Dispersal and Propagation Worksheet***
- Day 5: Copy the Embryo Development Notes - Day 4 into your notebook and complete the **Embryo Development Worksheet #1***
- Day 6: Copy the Embryo Development Notes - Day 5 into your notebook and answer the **Section 32-3 Review Questions (1-5)*** on page 640 in the Modern Biology textbook
- Day 7: Complete the **Embryo Development Worksheet #2***
- Day 8: Complete the **Embryo Development Word Search***

PLANT RESPONSES UNIT:

- Day 9: Read Ch. 33 from the Modern Biology textbook and complete the **Ch. 33 Reading Worksheet***
- Day 10: Copy the Plant Responses Notes (Day 1) into your notebook and complete the **Plant Movements WS***
- Day 11: Copy the Plant Responses Notes - Day 2 into your notebook and complete the **Plant Responses WS***
- Day 12: Copy the Plant Responses Notes - Day 3 into your notebook and complete the **Plant Hormones WS***
- Day 13: On a piece of binder paper, write the letter and answer for the **Ch. 33 Review Questions 1-15*** on page 660 in your Biology book

FLESHY FRUIT TYPES.

PERICARP★

EXOCARP_A

MESOCARP_B

ENDOCARP_C

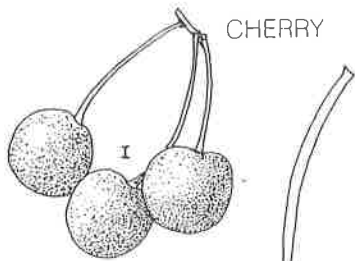
SEED_D

FUNICULUS_E

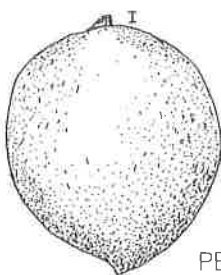
LOCULE_F

RECEPTACLE_G

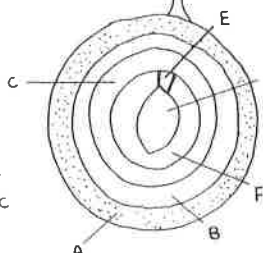
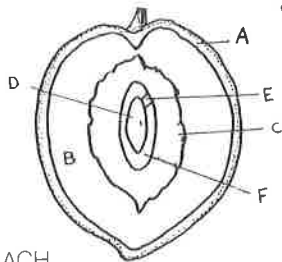
HYPANTHIUM_H



CHERRY



PEACH

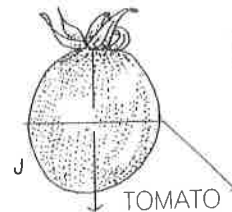


DRUPE

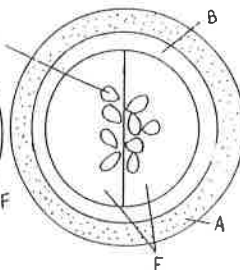
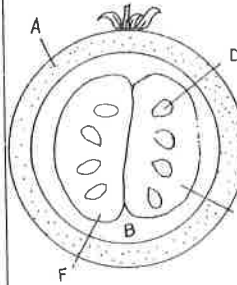
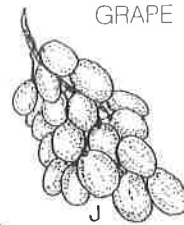
BERRIES★

BERRY

GRAPE

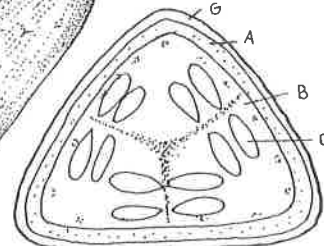
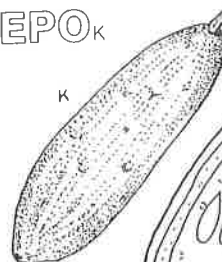


TOMATO



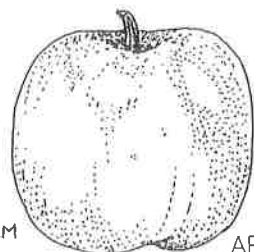
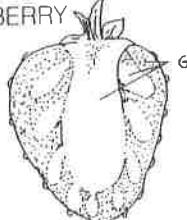
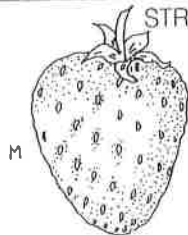
PEPO_K

CUCUMBER

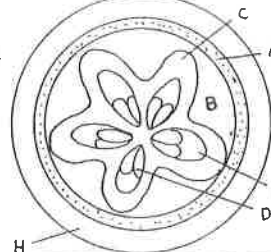
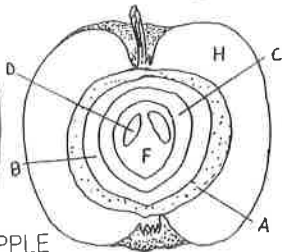


ACCESSORY_M

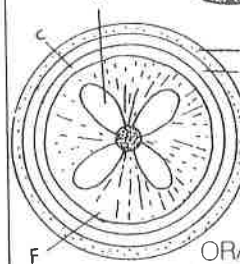
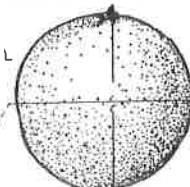
STRAWBERRY



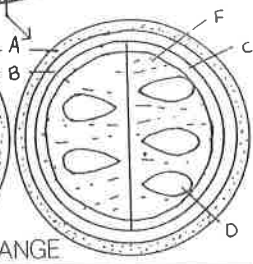
APPLE



HESPERIDIUM_L

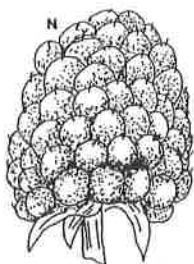


ORANGE

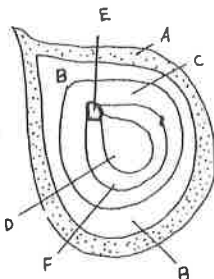
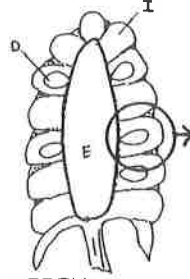


AGGREGATE_N

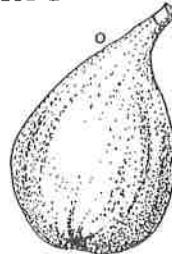
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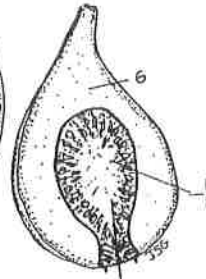
BLACKBERRY



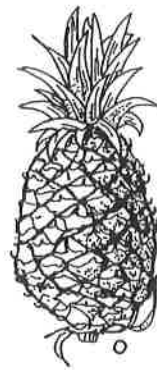
MULTIPLE_O



FIG



CHAMBER



PINEAPPLE

INDEHISCENT FRUITS

PERICARP **A**

LOCULE **B**

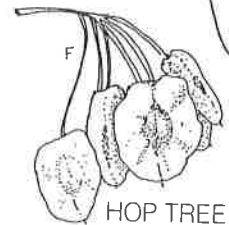
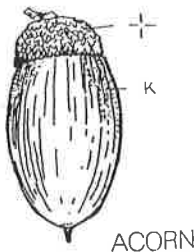
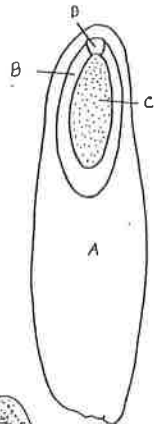
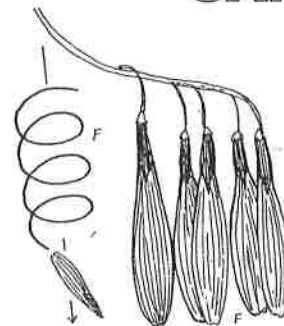
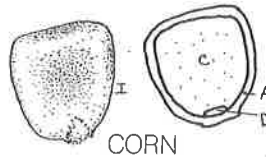
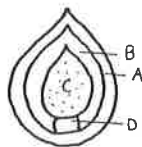
SEED **C**

FUNICULUS **D**

NUT

GRAIN

SAMARA



DEHISCENT FRUITS

PERICARP **A**

FUNICULUS **C**

SPLIT **E**

SEPTUM **G**

SEED **B**

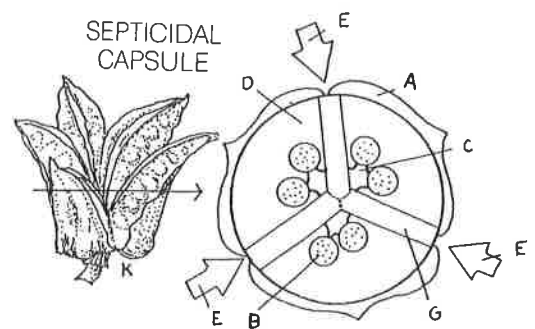
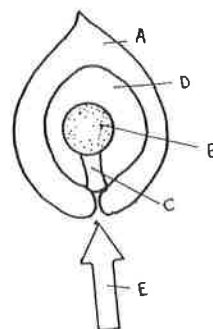
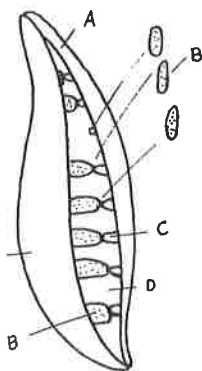
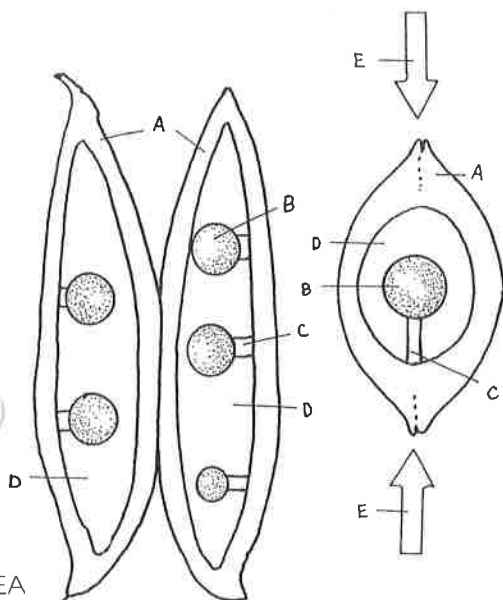
LOCULE **D**

REPLUM **F**

LEGUME

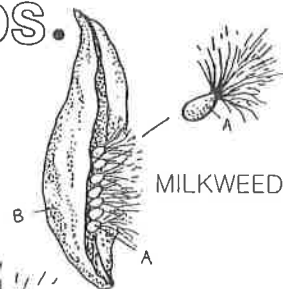
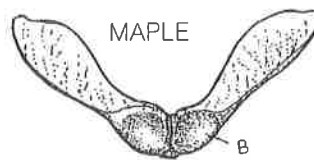
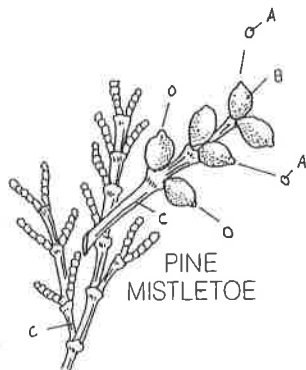
FOLLICLE

CAPSULE

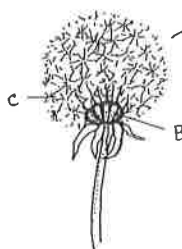


SEED AND FRUIT DISPERSAL METHODS.

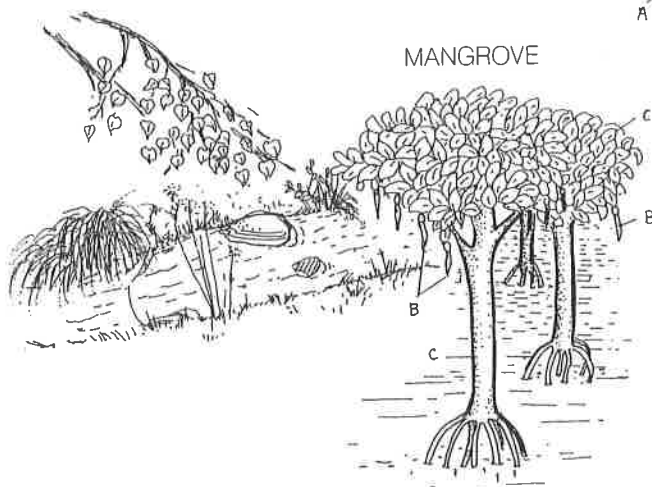
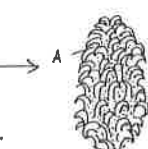
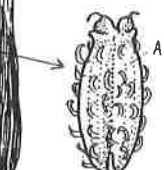
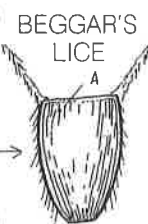
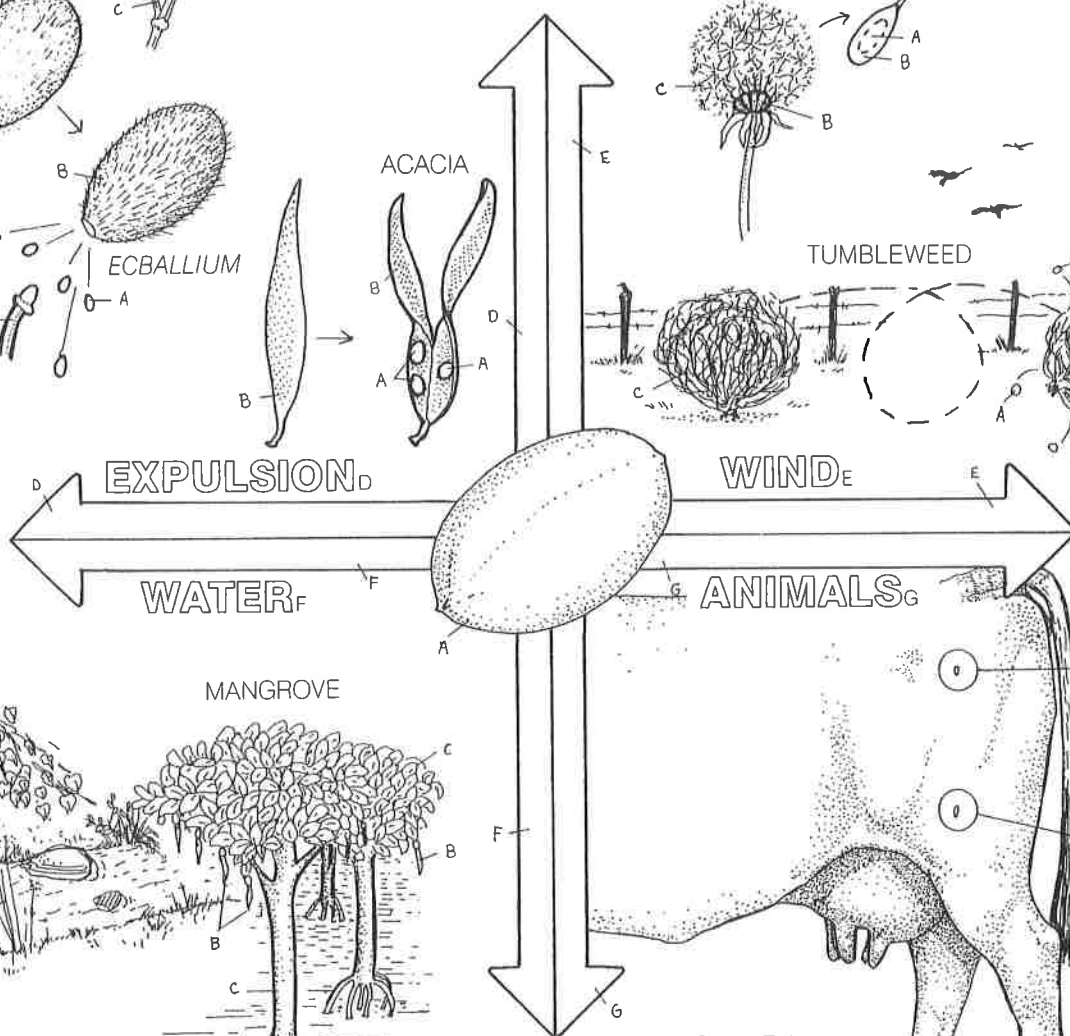
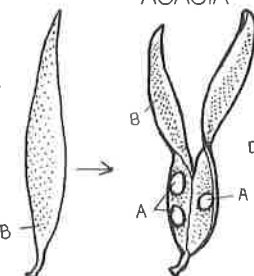
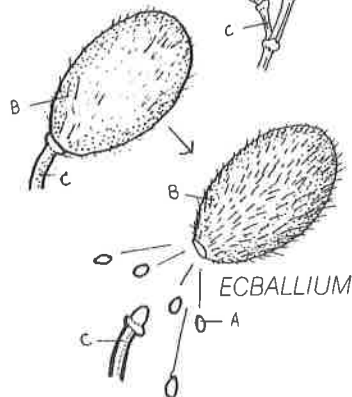
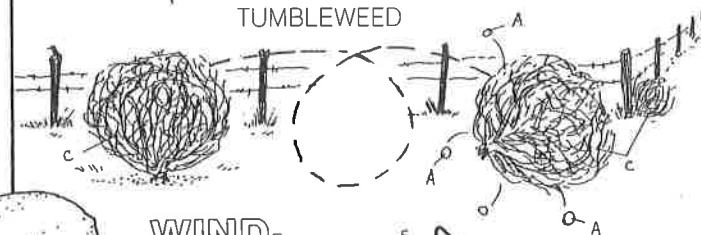
SEED^A
FRUIT^B
PARENT
PLANT^C



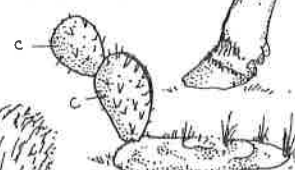
DANDELION



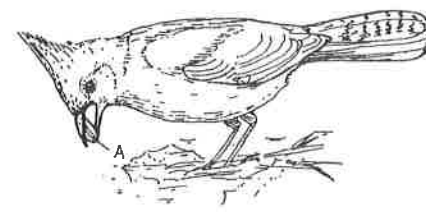
TUMBLEWEED



OPUNTIA



COCONUT



SECTION 32-3 REVIEW

DISPERSAL AND PROPAGATION

VOCABULARY REVIEW Define the following terms.

1. radicle _____
2. hypocotyl _____

3. epicotyl _____

4. plumule _____

5. hilum _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. One structure that is not an adaptation for fruit or seed dispersal is the
 - a. "parachute" on a milkweed seed.
 - b. pair of wings on a pine seed.
 - c. air chamber in a coconut.
 - d. cotyledon of a corn grain.
- _____ 2. Fruits are classified partly on the basis of how
 - a. they are dispersed.
 - b. many seeds they contain.
 - c. many pistils or flowers form the fruit.
 - d. large they are.
- _____ 3. Which of the following plants has mature seeds that contain endosperm?
 - a. corn
 - b. lima bean
 - c. pea
 - d. pine
- _____ 4. The first visible sign of seed germination is the
 - a. growth of the shoot.
 - b. emergence of the radicle.
 - c. appearance of the cotyledons above the soil.
 - d. unfolding of the plumule's embryonic leaves.
- _____ 5. Vegetative propagation refers to the
 - a. sexual reproduction of plants that are consumed as vegetables.
 - b. growth of the leaves and stems of a plant.
 - c. use of vegetative structures to produce new plants.
 - d. crossing of two strains of plants to produce hybrid vegetables.

SHORT ANSWER Answer the questions in the space provided.

1. Name the category of fruit to which each of the following belongs: raspberry, pineapple, pea pod.

2. Identify four environmental factors or conditions that are required for the germination of at least some seeds.

3. What is the main advantage of asexual reproduction?

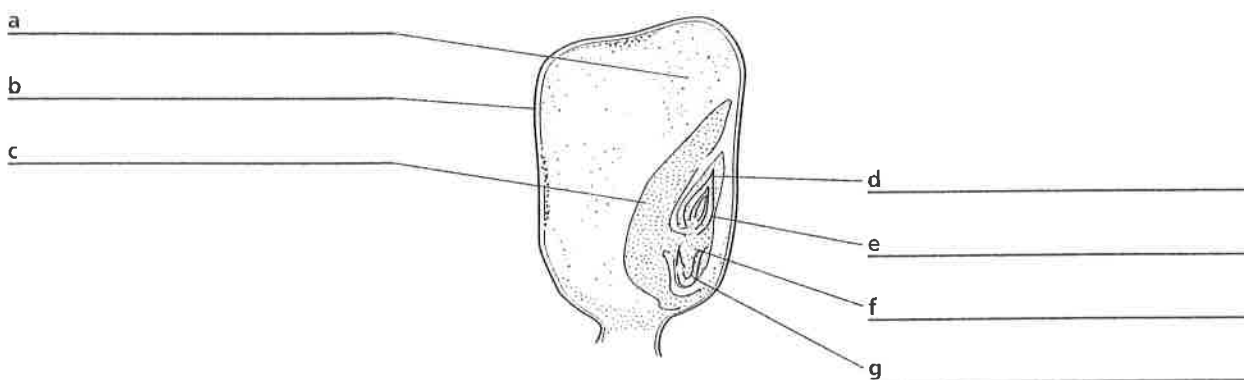
What is the main disadvantage of asexual reproduction?

4. Name four plant structures that are adapted for vegetative reproduction.

5. Name three common methods of seed dispersal, and give an example of each method.

6. **Critical Thinking** Because plants make their own food through photosynthesis, why is it necessary for plant seeds to contain food reserves?

STRUCTURES AND FUNCTIONS Identify the structures labeled *a–g* in the diagram of a corn grain shown below.



EMBRYO DEVELOPMENT WORKSHEET #1

1. What are the five types of seed dispersal? Describe each.

- a)
- b)
- c)
- d)
- e)

2. What is germination?

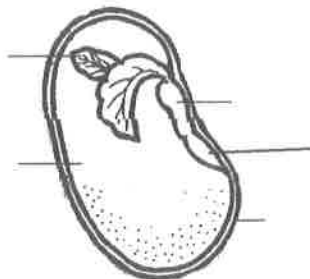
3. What specific type of fruit is best suited for aerocory? _____

4. What are the three functions of a seed?

- a)
- b)
- c)

5. When the zygote undergoes mitosis, the _____ is formed.

6. Label the parts of the seed on the diagram below.



7. What are the three types of fruits? Define each.

- a)
- b)
- c)

8. What are the five requirements for germination to occur?

- a) _____ d) _____
- b) _____ e) _____
- c) _____

9. For each of the following, identify the specific fruit type to which each belongs.

_____ Ash	_____ Peanut
_____ Watermelon	_____ Pear
_____ Rice	_____ Tulip
_____ Acorn	_____ Avocado
_____ Poppy	_____ Pumpkin
_____ Columbine	_____ Olive
_____ Grapefruit	_____ Eggplant

10. What are the five main parts of a seed? Define each.

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____

11. List the three types of simple fruits and define each.

- a) _____
- b) _____
- c) _____

12. What are the three methods of inducing germination? Describe each method.

- a) _____
- b) _____
- c) _____

EMBRYO DEVELOPMENT WORKSHEET #2

1. A fruit with a hard, stony pit is called a:

POME LEGUME HESPERIDIUM BERRY DRUPE

2. What are the two types of seed dormancy?

a) _____ b) _____

3. Which of the following gives rise to the embryonic leaves of a seed?

RADICLE EPICOTYL MEGASPOROCYTE HYPOCOTYL COTYLEDON

4. A fruit develops from the _____ of a flower.

5. Which of the following is not a fleshy, simple fruit?

POME LEGUME HESPERIDIUM BERRY DRUPE

6. The _____ surrounds and protects the developing embryo.

7. Grasses, corn, and wheat are all examples of:

MONOCOTYLEDONS DICOTYLEDONS HYPOCOTYLEDONS

8. Which dispersal method involves seed pods that ripen and fling seeds to a new location away from the parental plant?

9. Seeds with wings, dust-like seeds, and seeds with tiny hairs or fuzz are all specialized for which type of dispersal?

GRAVICHORY ZOOCHORY AEROCHORY HYDROCHORY EXPELOCHORY

10. Which dispersal method involves a seed being transported away from the parental plant to a new location by way of a stream? Use the scientific term.

11. Apples and pears are examples of which type of fruit?

POME LEGUME HESPERIDIUM BERRY DRUPE

12. Double fertilization directly gives rise to a(n):

TUBE CELL EMBRYO TESTA ZYGOTE RADICLE

13. The development of a seed into a mature plant is called _____.

14. Green bean, pea, and peanut plants are all examples of:

MONOCOTYLEDONS

HYPOCOTYLEDONS

DICOTYLEDONS

15. In the space provided, put the list in order by writing the numbers 1 through 6 in the space provided.

- _____ The cotyledons shrivel and drop off
- _____ The primary roots form
- _____ The primary leaves form and begin photosynthesis
- _____ The radical elongates through mitosis
- _____ The seed absorbs water from the surrounding environment
- _____ The hypocotyl straightens and the epicotyl emerges

16. Which of the following is the portion of a seed that stores carbohydrates for the developing embryo?

RADICLE

EPICOTYL

TESTA

COTYLEDON

HYPOCOTYL

17. A pineapple is an example of a _____ fruit whereas a raspberry is an example of a _____ fruit.

18. Follicles and capsules are both examples of what specific type of fruit?

MULTIPLE

FLESHY

DEHISCENT

AGGREGATE

INDEHISCENT

19. The _____ represents the embryonic root of a seed.

20. What are the three methods used to break dormancy in order to induce germination?

a)

b)

c)

21. Which of the following is not a requirement for seed germination?

WATER

CARBON DIOXIDE

LIGHT

TEMPERATURE

OXYGEN

22. Samaras and grains are both examples of what type of fruit?

MULTIPLE

FLESHY

DEHISCENT

AGGREGATE

INDEHISCENT

23. Which of the following gives rise to the embryonic stem of a seed?

RADICLE

EPICOTYL

MEGASPOROCYTE

HYPOCOTYL

COTYLEDON

24. After fertilization, the _____ of a flower develops into the fruit.

EMBRYO DEVELOPMENT WORD SEARCH

DIRECTIONS: Fill-in the missing vocabulary terms for each statement below and then find your answers in the word search on the back of this page.

1. A(n) _____ fruit develops from several pistils in a single flower.
2. Some seeds use wings to help them drift on air currents to a new area via _____.
3. Tomatoes and grapes are simple, fleshy fruits with a thin exocarp and are called a _____.
4. A _____ is a simple, dehiscent fruit that splits in a variety of directions when it dries.
5. In seeds, the _____ are the portion that stores the starch to feed the embryo.
6. Simple fruits that split to disperse the seeds are called _____ fruits.
7. Expulsion is also known as forcible _____.
8. _____ is a state of suspended activity or growth in an embryo.
9. A _____ is a fleshy fruit that has a hard, thickened endocarp surrounding the seed.
10. The zygote goes through multiple rounds of mitosis to form the _____.
11. The embryonic leaves that eventually perform photosynthesis are called the _____.
12. A _____ is a simple fruit that splits on only one surface when it dries.
13. _____ is the process of a seed developing into a mature plant.
14. As a simple, indehiscent fruit, a _____ has a thin ovary wall that fuses to the testa.
15. A(n) _____ is a type of berry that has a leathery exocarp.
16. The type of seed dispersal that requires an ocean, a lake, or a stream is called _____.
17. _____ removes chemical inhibitors that prevent germination.
18. Green beans, peas, and peanuts are all examples of a _____ which are dehiscent fruits.
19. A(n) _____ is the specific type of indehiscent fruit that has a woody ovary not fused to the seed.
20. The _____ is the portion of the pistil that contains the ovules and develops into the fruit.
21. A _____ is the type of fleshy fruit that includes cucumbers, squash, and pumpkins.

22. A(n) _____ has a papery endocarp that surrounds the seeds of the fruit.
23. The _____ is the very first structure of the seed that develops during germination.
24. The specific type of indehiscent fruit that uses aerochory for seed dispersal is called a _____.
25. _____ can be caused by abrasion by rocks, chewing rodents, or stomach acids.
26. _____ occurs when seeds become wet and then are exposed to low temperatures.
27. The seedcoat of a seed is also known as the _____.
28. When squirrels bury nuts in the ground, they are assisting with _____.

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

29. What are the three growth cycles of plants? Describe each.

- a)
- b)
- c)

30. The formation of the embryo is called _____.

31. What are the three functions of seed dormancy?

a)

b)

c)

32. What are the three functions of a seed?

a)

b)

c)

33. What are the three main categories of fruits? Describe each.

a)

b)

c)

34. What are the two types of dormancy? Describe each.

a)

b)

35. What are the five requirements of germination?

a)

d)

b)

e)

c)

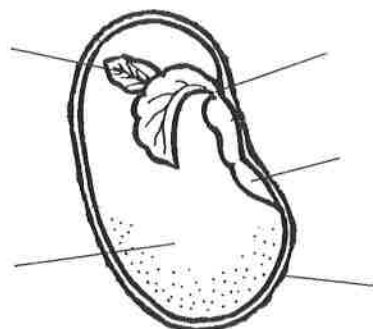
36. What are the three functions of a fruit?

a)

b)

c)

37. Label the parts of the seed diagram to the right.



CHAPTER 33 READING WORKSHEET

DIRECTIONS: Read pages 646 - 658 in the Modern Biology textbook to answer the following questions.

1. What is a plant hormone?
2. What are the five major groups of plant hormones?
 - a) _____
 - b) _____
 - c) _____
 - d) _____
 - e) _____
3. What would be the affect on a strawberry if the seeds were removed & less indoleacetic acid was produced?
4. What role does IAA play in elongation?
5. The effect of a hormone on a plant often depends on what?
6. If a shoot tip is removed, what begins to grow? _____
7. The plant hormone _____ stimulated some Bird's Nest Ferns to grow larger leaves than other Bird's Nest Ferns of the same age.
8. What affect does ethylene have on green citrus fruit?
9. What are the three benefits of leaf abscission?
 - a) _____
 - b) _____
 - c) _____
10. Absciscic acid causes the closure of _____ in response to drought.
11. What is a growth retardant?
12. Which group of plant hormones would promote cell division and includes kinetin? _____
13. Which group of plant hormones is important in tropisms? _____

14. Explain how positive tropism differs from negative tropism.
15. What are the four types of tropism? Describe each.
- a)
 - b)
 - c)
 - d)
16. What are nastic movements?
17. What are the two types of nastic movements? Describe each.
- a)
 - b)
18. What is photoperiodism?
19. Based on their response to the photoperiod, list and describe the three groups that plants can be divided into.
- a)
 - b)
 - c)
20. How do flower growers induce a winter flowering of long day plants?
21. What are the two forms of phytochrome? Describe the function of each.
- a)
 - b)
22. What is the benefit of farmers using vernalization?
23. What is bolting?
24. What are the three plant pigments found in leaves that are usually hidden by the green chlorophyll?
- a)
 - b)
 - c)

SECTION 33-2 REVIEW

PLANT MOVEMENTS

VOCABULARY REVIEW Define the following terms, and provide one example of a type of plant or a plant part to which each term applies.

1. thigmotropism _____

2. thigmonastic movement _____

3. nyctinastic movement _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. The positive phototropism shown by shoots is caused by the movement of
 - a. auxin to the shaded side of the shoot.
 - b. auxin to the lighted side of the shoot.
 - c. ethylene to the shaded side of the shoot.
 - d. ethylene to the lighted side of the shoot.
- _____ 2. The coiling of a morning glory stem around a fence post is an example of
 - a. phototropism.
 - b. chemotropism.
 - c. thigmotropism.
 - d. a thigmonastic movement.
- _____ 3. The opposite responses of stems and roots to gravity are thought to be due to the
 - a. inhibition of cell elongation in the lower side of the stems and the stimulation of cell elongation in the lower side of the roots.
 - b. stimulation of cell elongation in the lower side of the stems and the inhibition of cell elongation in the lower side of the roots.
 - c. inhibition of cell elongation in the lower side of both the stems and the roots.
 - d. stimulation of cell elongation in the lower side of both the stems and the roots.
- _____ 4. Unlike tropisms, nastic movements are
 - a. always positive.
 - b. always negative.
 - c. restricted to flowers.
 - d. independent of the direction of stimuli.
- _____ 5. The daily change in the orientation of the prayer plant's leaves is an example of
 - a. solar tracking.
 - b. a nyctinastic movement.
 - c. a thigmonastic movement.
 - d. gravitropism.

SHORT ANSWER Answer the questions in the space provided.

1. What is the adaptive advantage of positive phototropism? _____

What is the adaptive advantage of positive gravitropism? _____

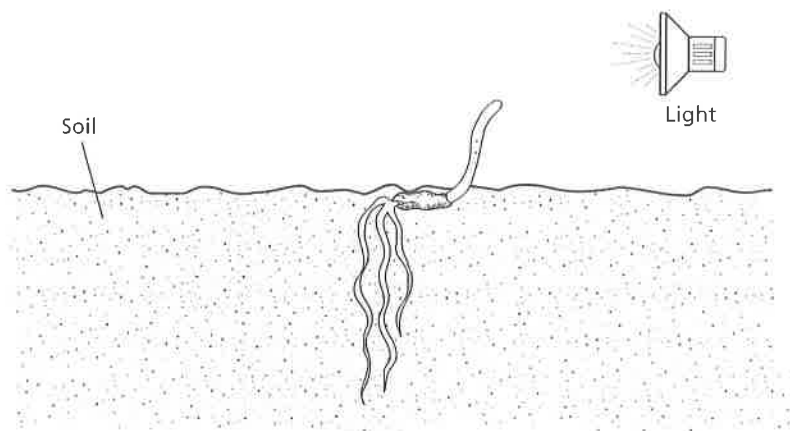
2. What type of plant hormone is thought to be involved in all plant tropisms that involve cell elongation? _____

3. What cellular events make nastic movements possible? _____

4. What are three adaptive advantages of thigmonastic movements? _____

5. **Critical Thinking** The Venus' flytrap obtains nitrogen and minerals by closing its leaves around insects and then digesting the insects. Why would a thigmonastic movement be more useful than thigmotropism for this type of plant response? _____

STRUCTURES AND FUNCTIONS Use the diagram of a seedling below to answer the following questions.



1. What tropisms are being exhibited by the various parts of this seedling? _____

2. What hormones are involved in these responses? _____

SECTION 33-3 REVIEW**PLANT RESPONSES****VOCABULARY REVIEW** Define the following terms.

1. photoperiodism _____

2. vernalization _____

3. bolting _____

4. critical night length _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. Long-day plants flower
 - a. in the fall.
 - b. when the day length is longer than 12 hours.
 - c. when the day length is shorter than a critical number of hours.
 - d. when the night length is longer than a critical number of hours.
- _____ 2. Flower growers can induce winter flowering in a long-day plant by
 - a. spraying the plant with gibberellin.
 - b. exposing the plant to low temperatures.
 - c. covering the plant in the late afternoon with an opaque cloth.
 - d. exposing the plant to a low level of light in the middle of the night.
- _____ 3. Plants monitor changes in day length with the pigment
 - a. anthocyanin.
 - b. phytochrome.
 - c. chlorophyll.
 - d. carotenoid.
- _____ 4. Crop plants whose flowering is stimulated by vernalization are usually sown in the
 - a. fall.
 - b. winter.
 - c. spring.
 - d. summer.
- _____ 5. The fall colors displayed by many tree leaves are caused partly by the
 - a. stimulation of carotenoid synthesis that occurs only in the fall.
 - b. disappearance of chlorophyll, which allows the carotenoids to become visible.
 - c. migration of chlorophyll from the stems into the leaves.
 - d. replacement of carotenoids by anthocyanins.

SHORT ANSWER Answer the questions in the space provided.

1. Identify three processes that are affected by photoperiodism in at least some plant species.

2. Name one short-day plant and identify the time of year when it flowers.

Name one long-day plant and identify the time of year when it flowers.

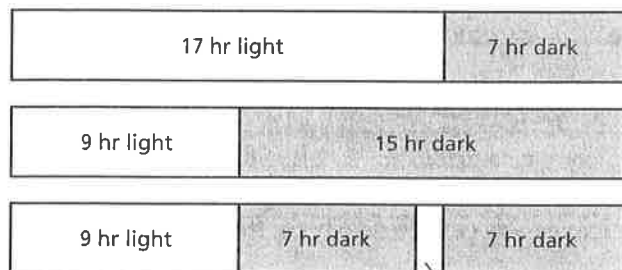
3. Identify three plant processes in which phytochrome is involved.

4. How can plants whose flowering is stimulated by vernalization be prevented from flowering?

5. **Critical Thinking** Spinach is a long-day plant with a critical night length of 10 hours. Why is spinach not usually grown in the northern United States during the summer?

STRUCTURES AND FUNCTIONS Use the diagram below to fill in lines a–f.

The diagrams below represent three different conditions of day and night length. A short-day plant, with a critical night length of 14 hours, and a long-day plant, with a critical night length of 8 hours, are grown under each condition. On the lines, indicate whether each plant will flower under each condition.



1 hr light

Does short-day
plant flower?

Does long-day
plant flower?

a _____

b _____

c _____

d _____

e _____

f _____

SECTION 33-1 REVIEW**PLANT HORMONES****VOCABULARY REVIEW** Define the following terms.

1. plant hormone _____

2. apical dominance _____

3. ethephon _____

4. abscission _____

5. cytokinin _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. The major effect of indoleacetic acid is to
 - a. inhibit the enlargement of fruit.
 - b. stimulate cell growth.
 - c. stimulate dormancy.
 - d. inhibit germination.
- _____ 2. After a shoot has had its tip removed, apical dominance can be maintained artificially by the application of
 - a. GA.
 - b. 2,4-D.
 - c. ABA.
 - d. NAA.
- _____ 3. One of the effects of gibberellins is to stimulate
 - a. germination.
 - b. ripening.
 - c. dormancy.
 - d. abscission.
- _____ 4. Ethylene differs from other plant hormones in that it
 - a. has only inhibitory effects on plants.
 - b. is produced only in seeds.
 - c. is a gas at room temperature.
 - d. affects only the plant that produces it.
- _____ 5. By varying the ratio of auxins to cytokinins in a tissue-culture medium, botanists can selectively stimulate the formation of
 - a. roots or shoots.
 - b. stems or leaves.
 - c. flowers or fruits.
 - d. seeds or lateral buds.

SHORT ANSWER Answer the questions in the space provided.

1. Why does the removal of seeds from a strawberry fruit prevent the fruit from enlarging? _____

2. Identify three agricultural uses of gibberellins. _____

3. Identify three agricultural uses of ethylene or ethephon. _____

4. How is it adaptive for a water-stressed plant to produce ABA? _____

5. **Critical Thinking** Absciscic acid was originally named “dormin.” Why was that an appropriate name for this hormone? _____

STRUCTURES AND FUNCTIONS The drawings below show two plants of the same species and the same age. The plant on the right was treated with a hormone. The plant on the left was not. Which of the five major groups of plant hormones was used to treat the plant on the right? Explain your answer.

