Part 4 Seeds, Roots, Leaves

Name:

Roots: The usually _____ portion of a plant that _____ buds, leaves, or nodes and serves as _____, draws minerals and _____ from the surrounding soil, and sometimes stores _____.

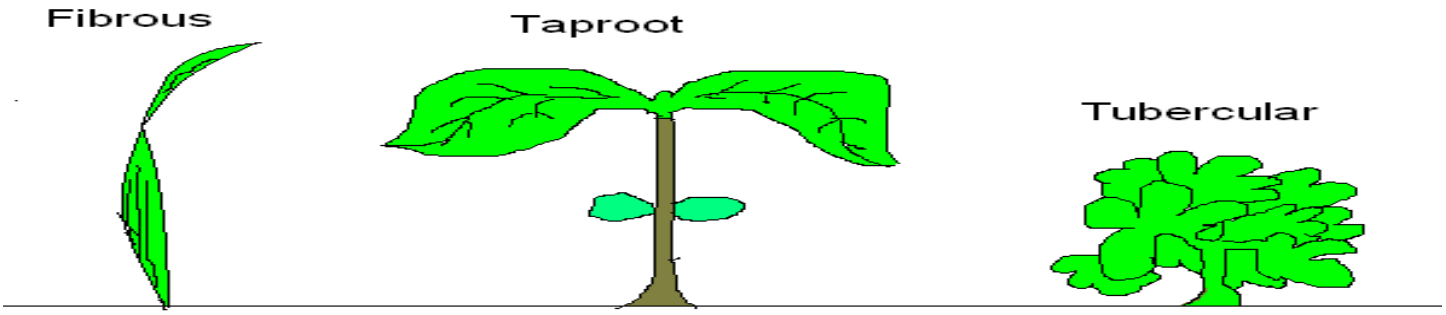
There are two types main types of roots.

Taproot: (Draw) _____ root with roots that branch off.
Fibrous root: (Draw) Many _____.
Other roots can be tubercular. (Tubers)

Draws minerals and water from the surrounding soil. Name three important plant nutrients.

Please sketch and then label some types of roots found when "weeding" around the school

Please draw the root type below the surface.



Root Hairs – Hairlike extensions of root to _____ water and nutrients. Very delicate (damaged when transplanted).

Water uptake is necessary for plants because…

Keeps plants _____and not wilted. Water fills cells and creates turgor pressure.
Water cools the plant down during warm weather.
Water is needed for _____
Water carries dissolved _____ and _____ throughout plant.

Part 4 Lesson 2 Hydroponics and Plant Tropisms

Hydroponics: The process of growing plants in sand, gravel, or liquid, with added nutrients but without _____

Describe some advantages to using hydroponics?

Plants get the nutrients they need primarily from the….

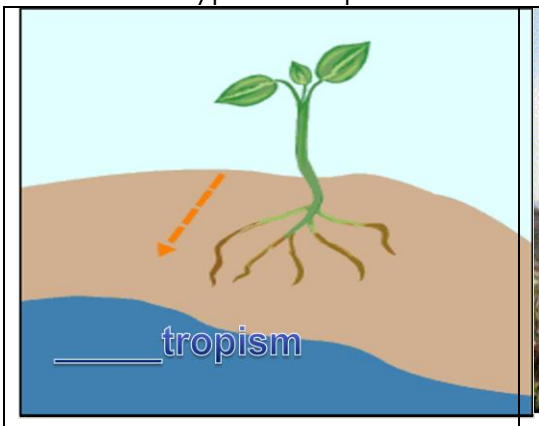
- A.) Soil and Water
- B.) Sun, Leaves, and Stems
- C.) Water and Air.
- D.) Soil only.

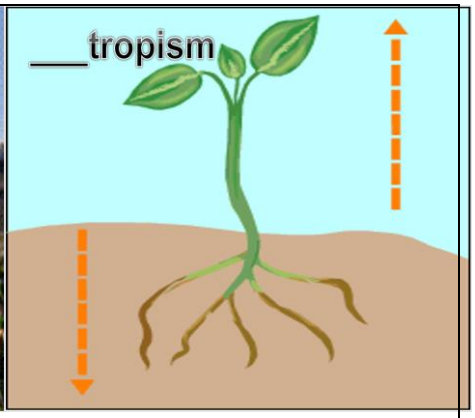
Tropism: Growth or turning movement of a plant in response to an environmental _____.
Light, water, gravity, temperature / seasons

Some Plant Tropisms

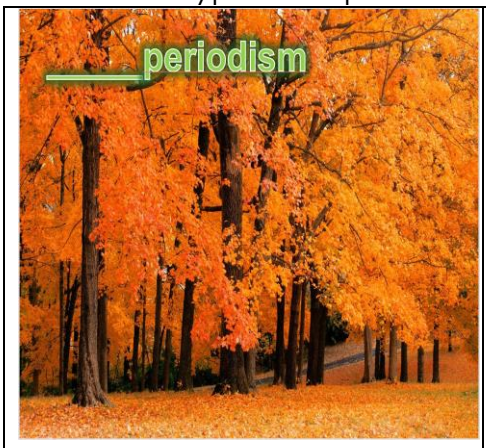
- Chemotropism, movement or growth in response to chemicals
- Geotropism (or gravitropism), movement or growth in response to gravity
- Heliotropism, diurnal motion or seasonal motion of plant parts in response to the direction of the sun, (e.g. the sunflower)
- Hydrotropism, movement or growth in response to water
- Phototropism, movement or growth in response to lights or colors of light
- Thermotropism, movement or growth in response to temperature
- Electrotropism, movement or growth in response to an electric field
- Thigmotropism, movement or growth in response to touch or contact
- Photoperiodism, is response to seasons

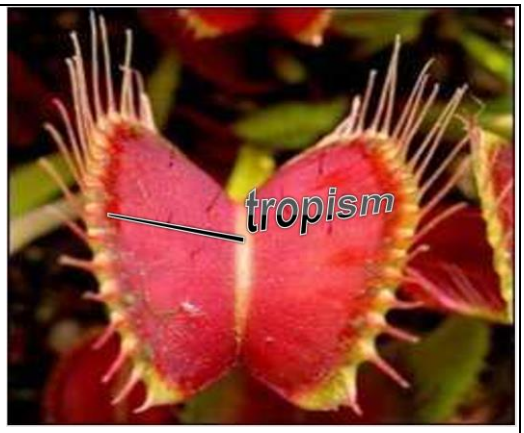
Name the type of tropism





Name the type of tropism





Part 4 Lesson 3 Plant Hormones

Plant hormones are _____ that affect flowering; aging; root _____; distortion, killing of leaves, stems, and other parts; prevention or promotion of stem _____; _____ enhancement of fruit; prevention of leafing and/or leaf fall; and many other conditions.

Some plant hormones.

Auxin: Promotes _____ elongation and bud dormancy.

-Phototropism: When plants grow toward a _____ source.

Gibberellins: Make stems longer.

Cytokinins: Promotes _____. They are produced in growing areas like the tips.

Abscisic Acid: Opens and closes _____, has role in seed dormancy.

Ethelyene: A gas that promotes fruit _____

Add some extra information about plant hormones in the space below.

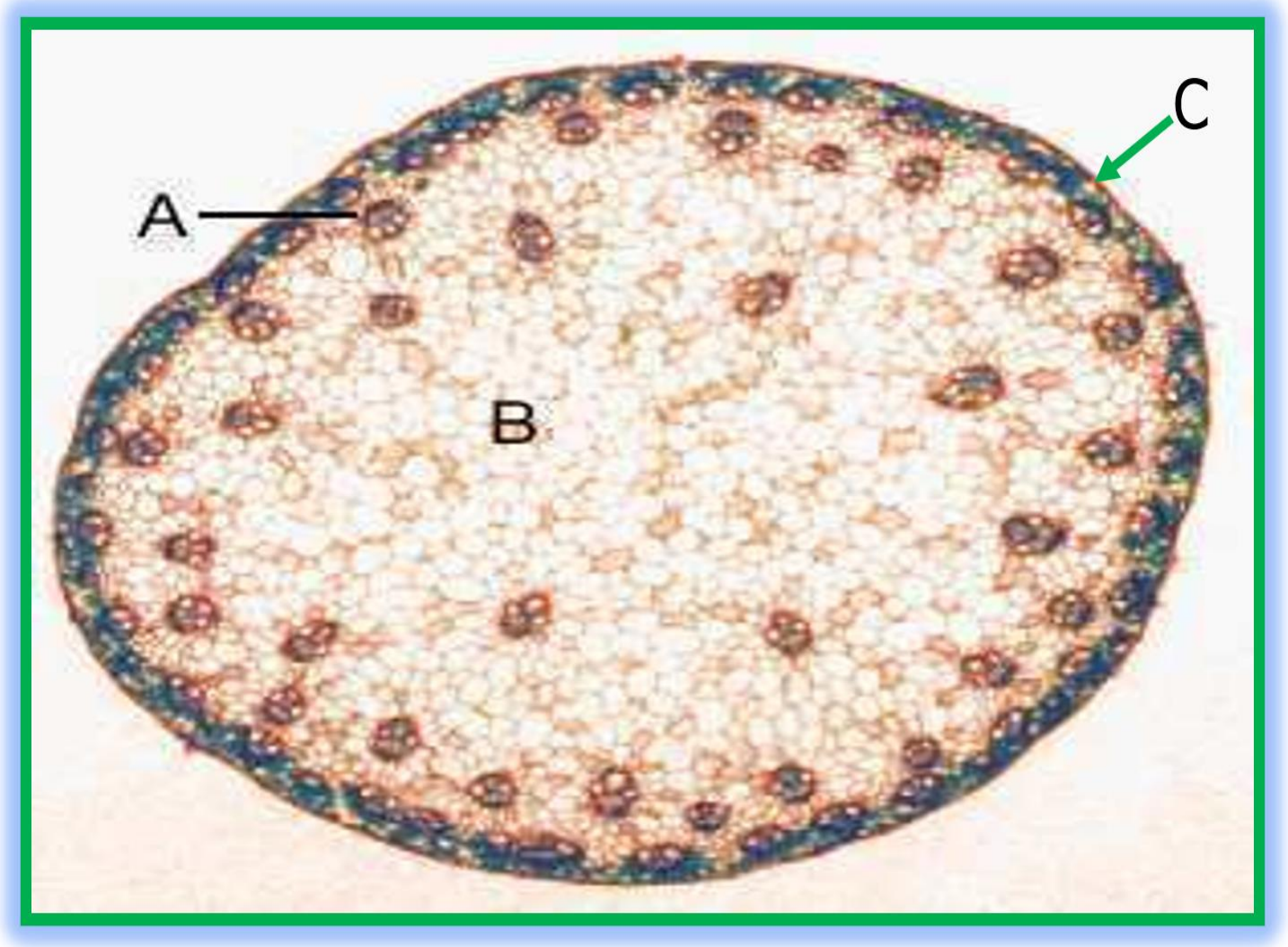
Part 4 Lesson 4 Plant Vascular Systems

3 types of plant tissues.

Dermal tissue: _____ layer of plant, protects, interacts with outside.
Ground Tissue: Below dermal tissue, _____, photosynthesis occurs here.
Vascular Tissue: Xylem and _____.

Name the three tissues below

A)	B)	C)



Vascular system: The vessels and tissue that carry or _____ fluids such as blood or lymph or sap through the body of an animal or plant.

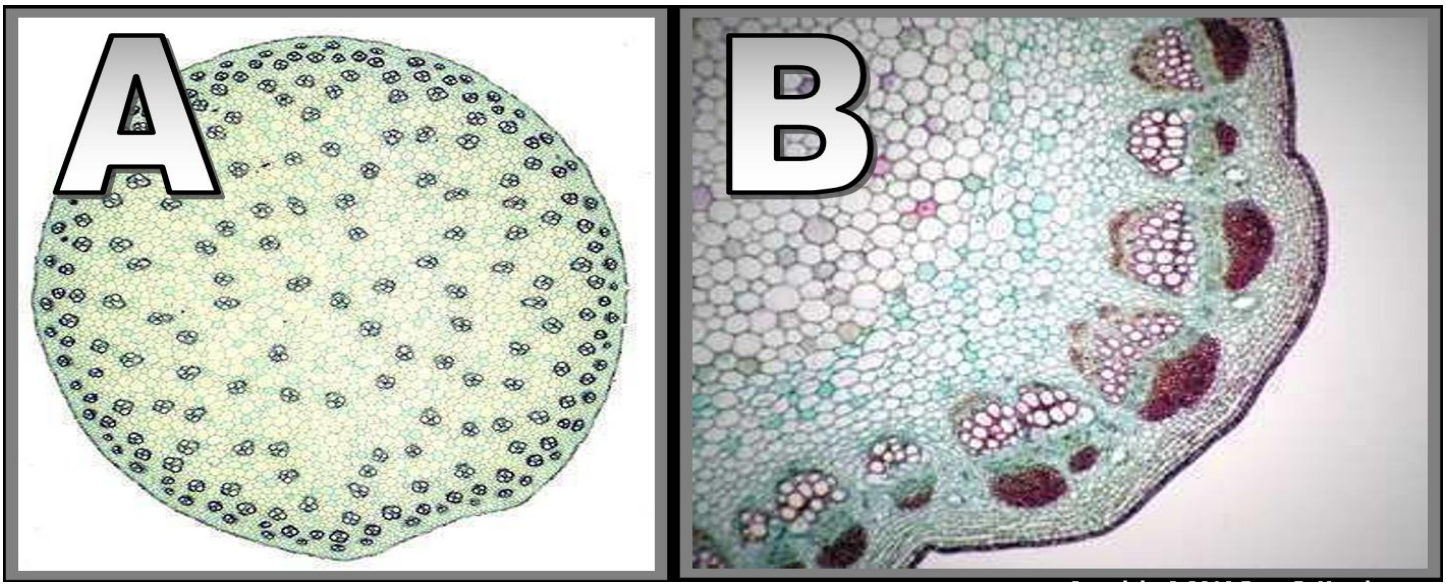
Xylem: (Zi-lem).

Tubes that _____and minerals move through.
Water travels _____ the tree from roots to leaves.
Old xylem doesn't transport water but _____ plant. (Xylem is wood).

Phloem: (Flow-em).

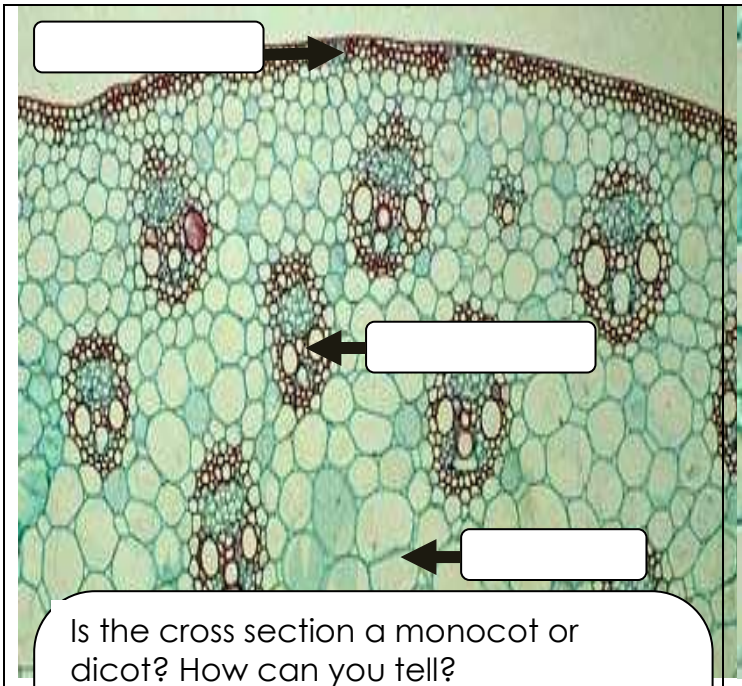
Tubes in the plant that _____(_____) moves through.

Which is a monocotyledon or a dicotyledon based on the plants vascular system.

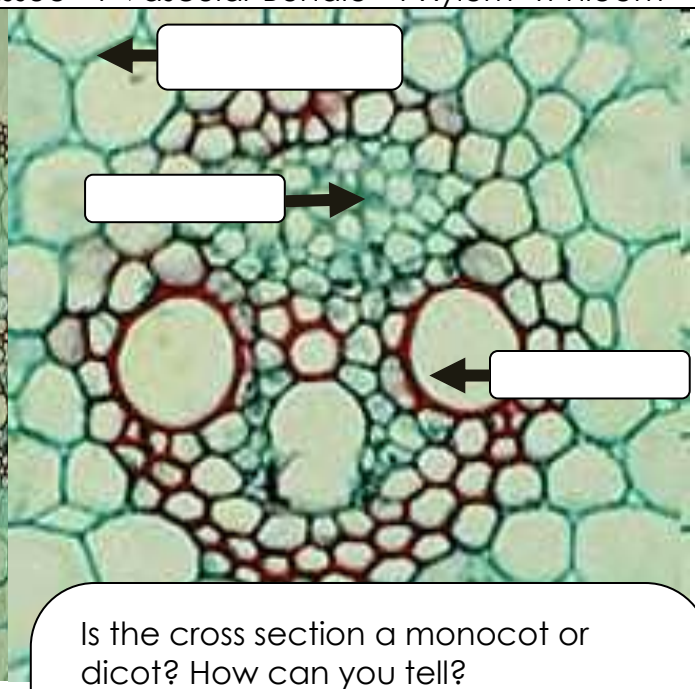


Please label the cross section below with the following terms.

◊ Ground Tissue ◊ Dermal Tissue ◊ Vascular Tissue ◊ Vascular Bundle ◊ Xylem ◊Phloem



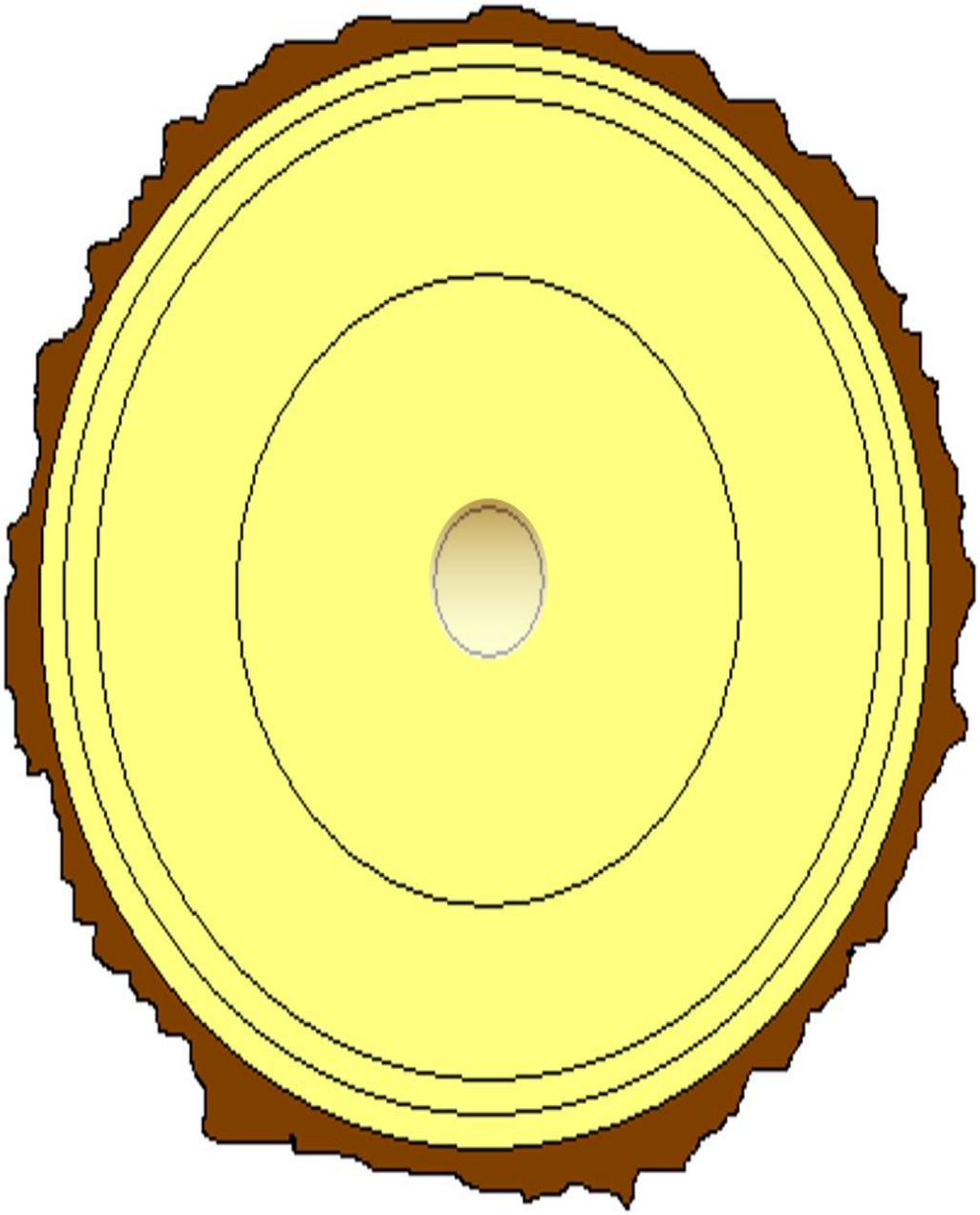
Is the cross section a monocot or dicot? How can you tell?



Is the cross section a monocot or dicot? How can you tell?

Part 4 Lesson 5 Woody Plants

Use the cross section of a tree cut below to add in important terms.



Pith: The soft spongy substance in the _____ of the stems of many plants and trees. Wood formation begins here.

Heartwood: Older, Darker, and _____ non-living central portion of the tree.

Sapwood: _____ wood, lighter in color, conducts water with xylem.

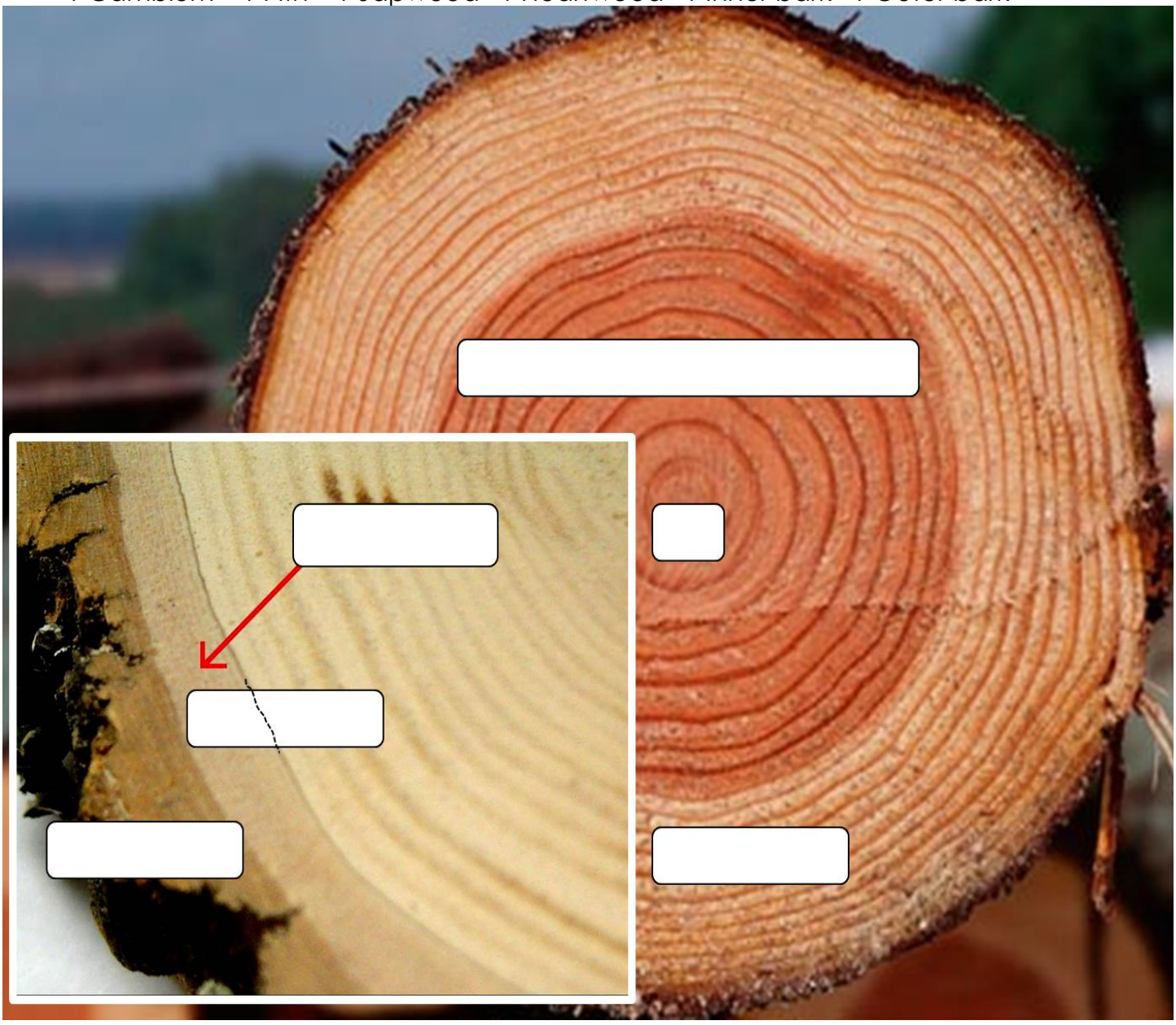
Cambium: Area just inside bark that makes _____. Adds girth which allows the plant to grow tall.

Inner Bark: Area just inside the bark, made of living tissue and contains the _____.

Outer bark: Outside of tree, provides _____.

◊ Please label the cross-section of the tree below with the correct terms.

◊ Cambium ◊ Pith ◊ Sapwood ◊ Heartwood ◊ Inner bark ◊ Outer bark



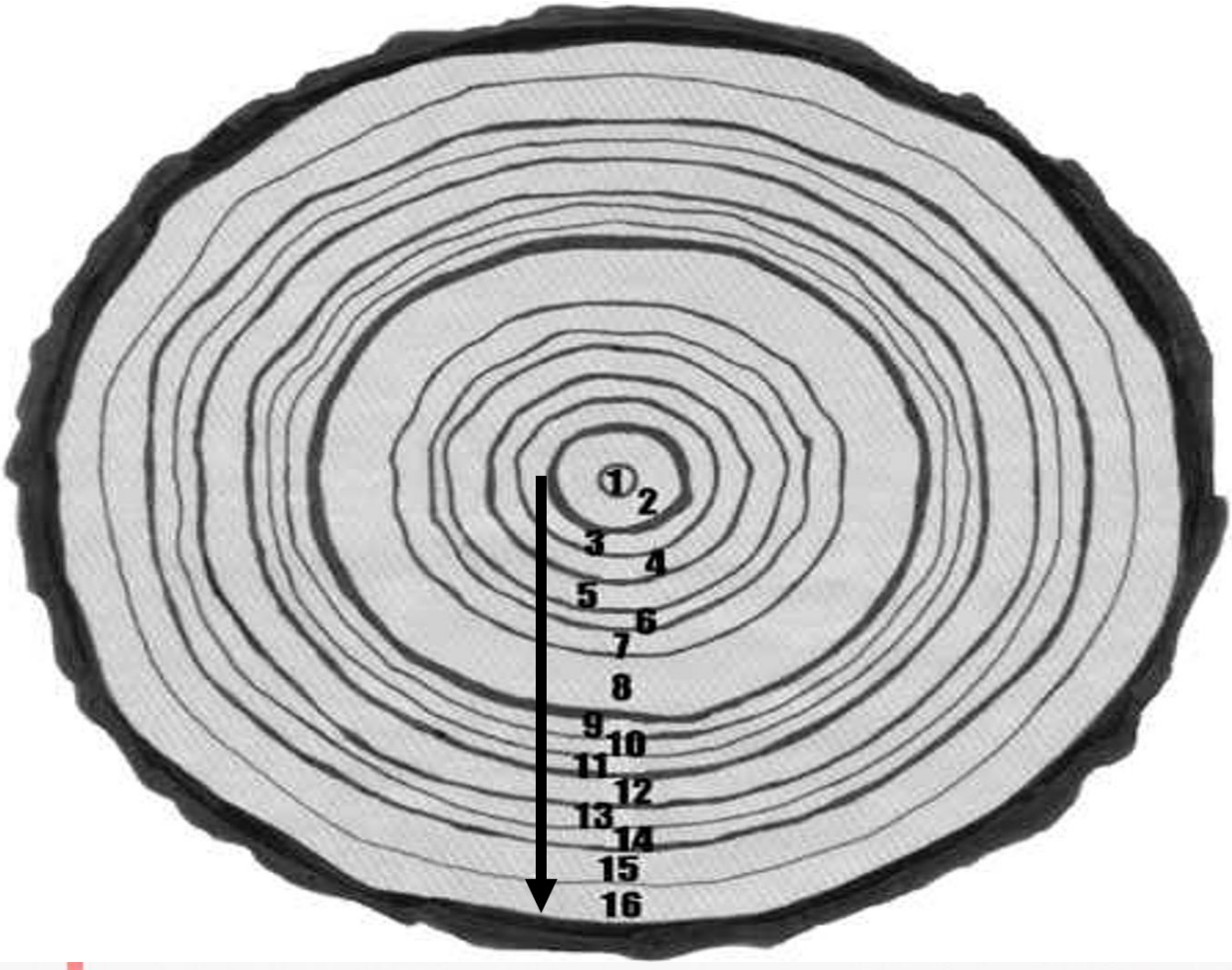
Part 4 Lesson 6 Dendrochronology.

The cambium also adds a _____ of cells each year.

Scientists can _____ the tree and examine factors such as climate based on these rings.

Dendrochronology: The _____ of past events through study of tree ring growth

Please describe some info about the tree cut below.



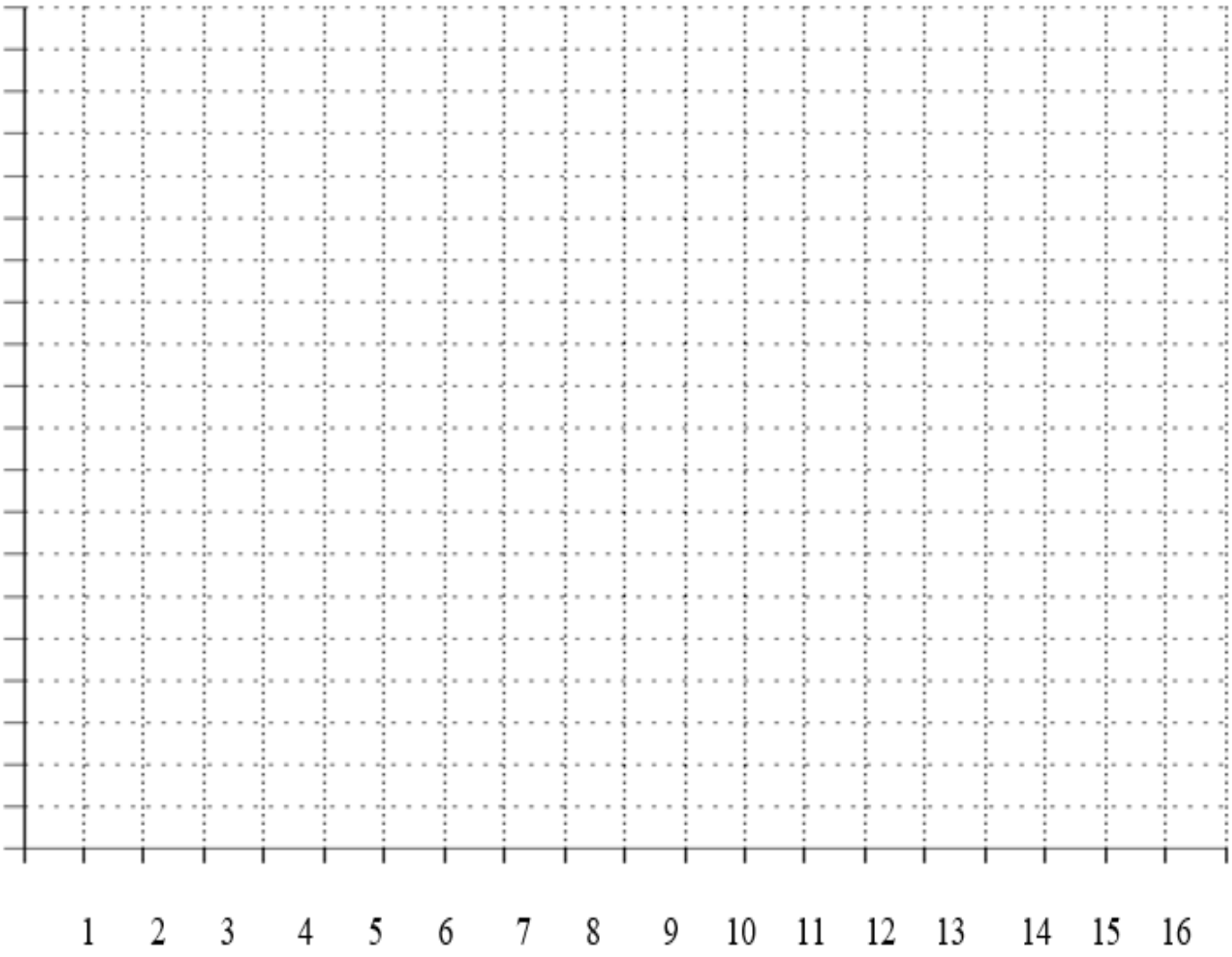
Annual Rings Pith to Cambium	Width in millimeters (mm)	Notes
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		

Can you label, Cambium, Pith, Heartwood, Sapwood, Inner Bark, Outer Bark How old is this tree?_____

Procedure

A.) Age the tree according to its annual rings.

B.) Measure the length of each annual ring and graph in a line graph over time in millimeters.



C.) What years showed the most growth?_____

_____

_____

D.) What years showed the least growth?_____

_____

_____

E.) What patterns did you notice?_____

_____

_____

◊ Please calculate the trees age by adding the years from the outside in. The tree was just cut.

◊ Assume the tree was just cut, What year showed the most growth _____

◊ Assume the tree was just cut, What year showed the least growth _____

◊ What is the science of dating past events by using annual tree rings called?

_____

Part 4 Lesson 7 Leaf Processes

A leaf is a plant _____, that is _____, contains _____, and is usually _____ so _____ can penetrate.

The big three aspects of light and plants.

Quality (how good)
Quantity (how much)
Duration (how long)

Why do leaves turn color in the fall?

Plastids (AKA Chloroplast)

-Organelle in _____

-Contain the green pigment _____

-Has stacks called _____

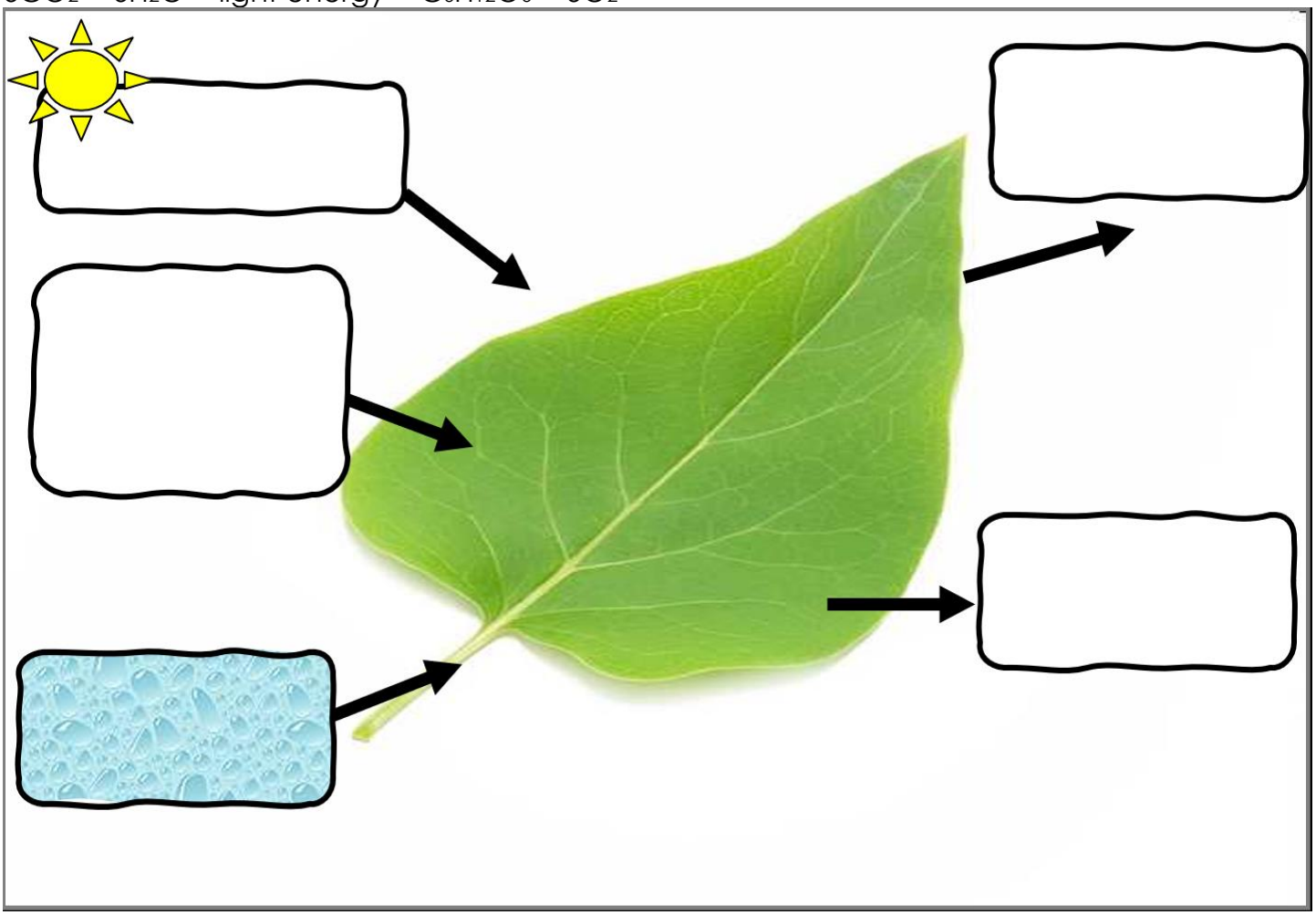
-Do _____ (Make the sugar)

-Has its own unique _____.

Photosynthesis – Plants make sugar from _____. Light energy is turned into _____ energy (sugars – carbon based).

Part 4 Lesson 8 Photosynthesis

$6CO_2 + 6H_2O + \text{light energy} = C_6H_{12}O_6 + 6O_2$



Photosynthesis is the process by which light energy is utilized to convert _____and _____ into food to be used by plants.

_____ is released into the air during the process. (O_2) Waste

Light or solar energy is captured by _____ (CHLOR-oh-phil), the green pigment in leaves.

It is then converted into _____ energy which is stored as starch or sugar.

These starches and sugars are stored in roots, stems and fruits. They are available to the plant as food or fuel.

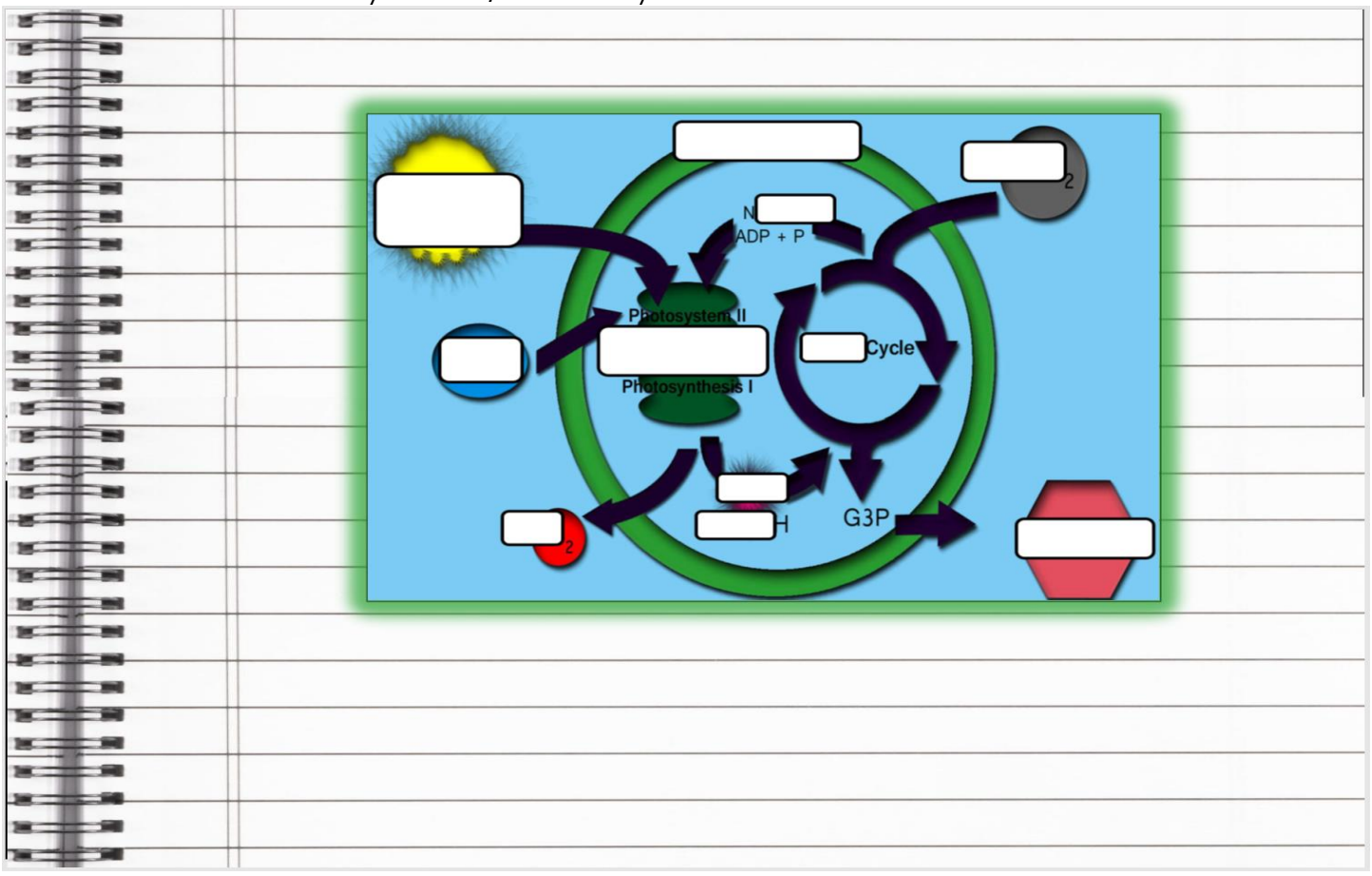
Part 4 Lesson 9 Photosynthesis Continued

Photosynthesis

-Produces _____ from energy.
-Occurs only in cells with _____.
-_____is produced. Waste Product
-_____ is used.
-Carbon _____ is used.
-Occurs in _____.

Which of the following statements is false of photosynthesis? and the answer is… A.) Photosynthesis requires sunlight, carbon dioxide, and water. B.) Oxygen and glucose are produced in photosynthesis. C.) Carbon Dioxide and water are produced. D.) In photosynthesis, plants use radiant energy from the sun to create chemical energy in the form of sugars. E.) None of the above.	Which of the following equations is true of photosynthesis? $6O_2 + C_6H12O_6$ Energy → $6CO_2 + 6H_2O$ $C_6H_{12}O_6 + 6O_2$ → Energy + Chloroplasts. $6O_2 + 6CO_2 + 6O_2$ → Energy + $C_6H_{12}O_6$ $6CO_2 + 6H_2O$ + Energy → $C_6H_{12}O_6 + 6O_2$ $6O_2 + 6CO_2$ + → Energy + $C_6H_{12}O_6 + 6O_2$ Energy + $6H_2O$ → Energy + $6O_2 + 6CO_2$ $CO_2 + 3H_2O$ + Energy → $C_6H_{12}O_6 + O_2$ $6CO_2 + 6H_2O$ → Energy + $6CO_2 + 6O_2$ Energy → $6O_2 + C_6H_{12}O_6 + 6CO_2$

Record some notes and diagrams from one of the advanced photosynthesis videos from the slideshow below. Photosynthesis / Calvin Cycle



Note: The Calvin cycle reactions can be divided into three main stages: carbon fixation, reduction, and regeneration of the starting molecule

Transpiration: The _____of water from plants.
It occurs during _____.
Helps pull _____ up the xylem from roots.
_____ the leaf.

Guard Cell and Stoma: Openings in leaf (stoma) controlled by guard cells that allow gases in and out of leaf.

Use the space below for notes and additional space for Part 4.

Across

1. Older, Darker, and harder non-living central portion of the tree.
8. This hormone promotes cell division. They are produced in growing areas like the tips.
9. The soft spongy substance in the center of the stems of many plants and trees. Wood formation begins here.
10. The type of tissue below dermal tissue, stores energy, photosynthesis occurs here.
11. The usually underground portion of a plant that lacks buds, leaves, or nodes and serves as support, draws minerals and water from the surrounding soil, and sometimes stores food.
12. Inner Bark: Area just inside the bark, made of _____ tissue and contains the phloem.
14. Main root with roots that branch off.
16. Area just inside bark that makes new tissues. Adds girth which allows the plant to grow tall.
19. Plants make sugar from sunlight. Light energy is turned into chemical energy (sugars are carbon based).
20. D_____ tissue: The type of tissue / outside layer of plant, protects, interacts with outside.

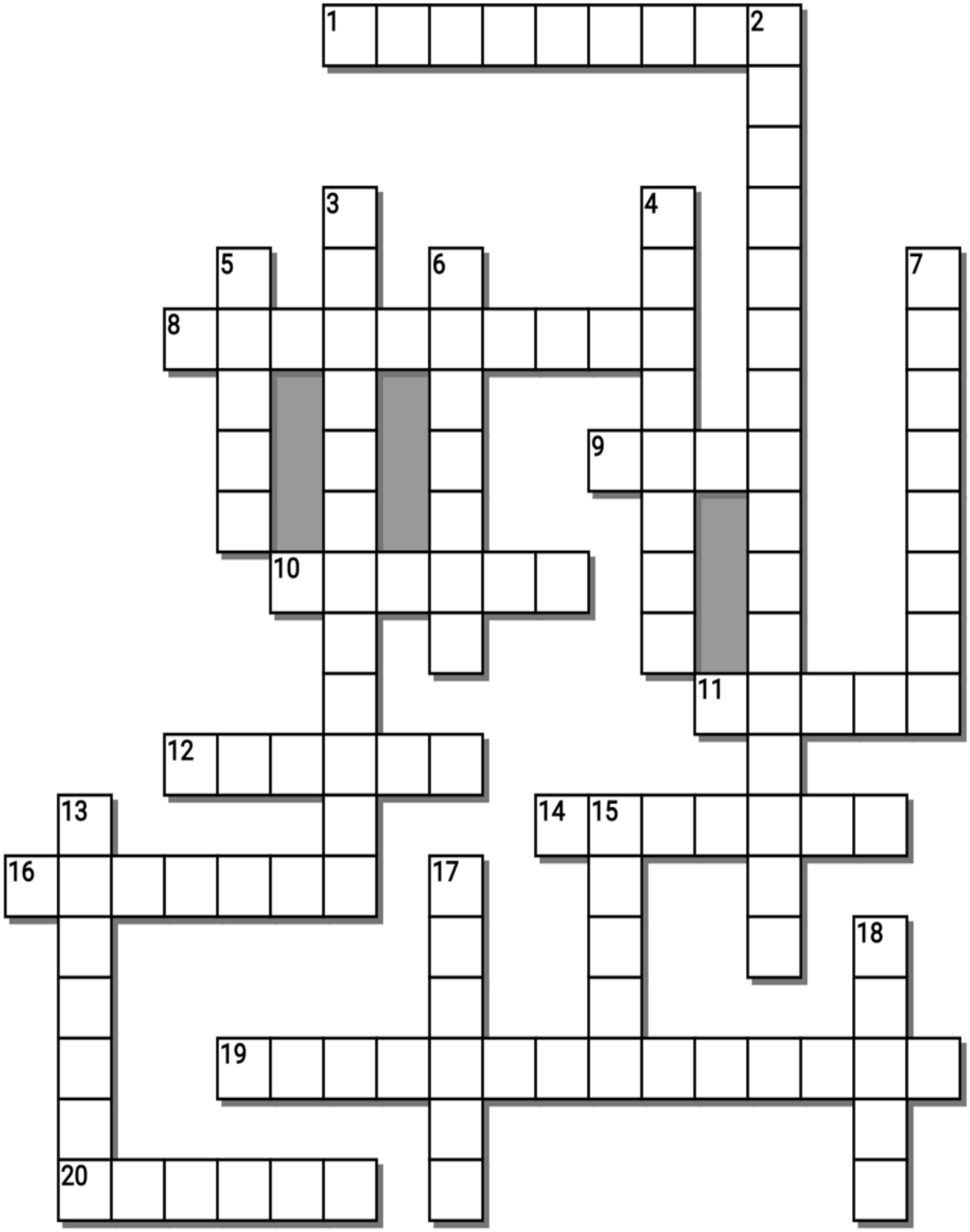
Down

2. The dating of past events through study of tree ring growth.
3. When plants grow toward a light source.
4. A_____ Acid: Opens and closes stomata, has role in seed dormancy.
5. The tubes that water and minerals move through.
6. F_____ Root: Type of root with many branches
7. Plant _____ are chemicals that affect aspects of the plants life.
13. Living wood, lighter in color, conducts water with xylem.
15. This hormone promotes stem elongation and bud dormancy.
17. The tubes in the plant that food (sugar) moves through.
18. Root _____: Hairlike extensions of root to absorb water and nutrients. Very delicate (damaged when transplanted).

----------Teacher can remove this word bank to make the puzzle more challenging----------

Possible Answers

ABSCISIC, AUXIN, CAMBIUM, CYTOKININS, DENDROCHRONOLOGY, DERMAL, FIBROUS., GROUND, HAIRS, HEARTWOOD, HORMONES, LIVING, PHLOEM, PHOTOSYNTHESIS, PHOTOTROPISM, PITH, ROOTS, SAPWOOD, TAPROOT, XYLEM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Part 4 Review Game Lesson 10

Name:

1-10 = 10 pts * = Bonus + 1 pt,
(Secretly write owl in correct space +1 pt)
Final Question = 5 pt wager

Due: Today
Score ____ / 100

ROUTE 66	GROWING UP	IF I COULD I WOULD	LEAVE ME BE	SEE THE LIGHT Bonus round 1 pt each
1)	6)	11)	16)	*21)
2)	7)	12)	17)	*22)
3)	8)	13)	18)	*23)
4)	9)	14)	19)	*24)
5)	10)	15)	20)	*25)

Final Question Wager ___ /5 Answer: _____

Part 4 Seeds, Roots, Leaves

Name:

Roots: The usually underground portion of a plant that lacks buds, leaves, or nodes and serves as support, draws minerals and water from the surrounding soil, and sometimes stores food.

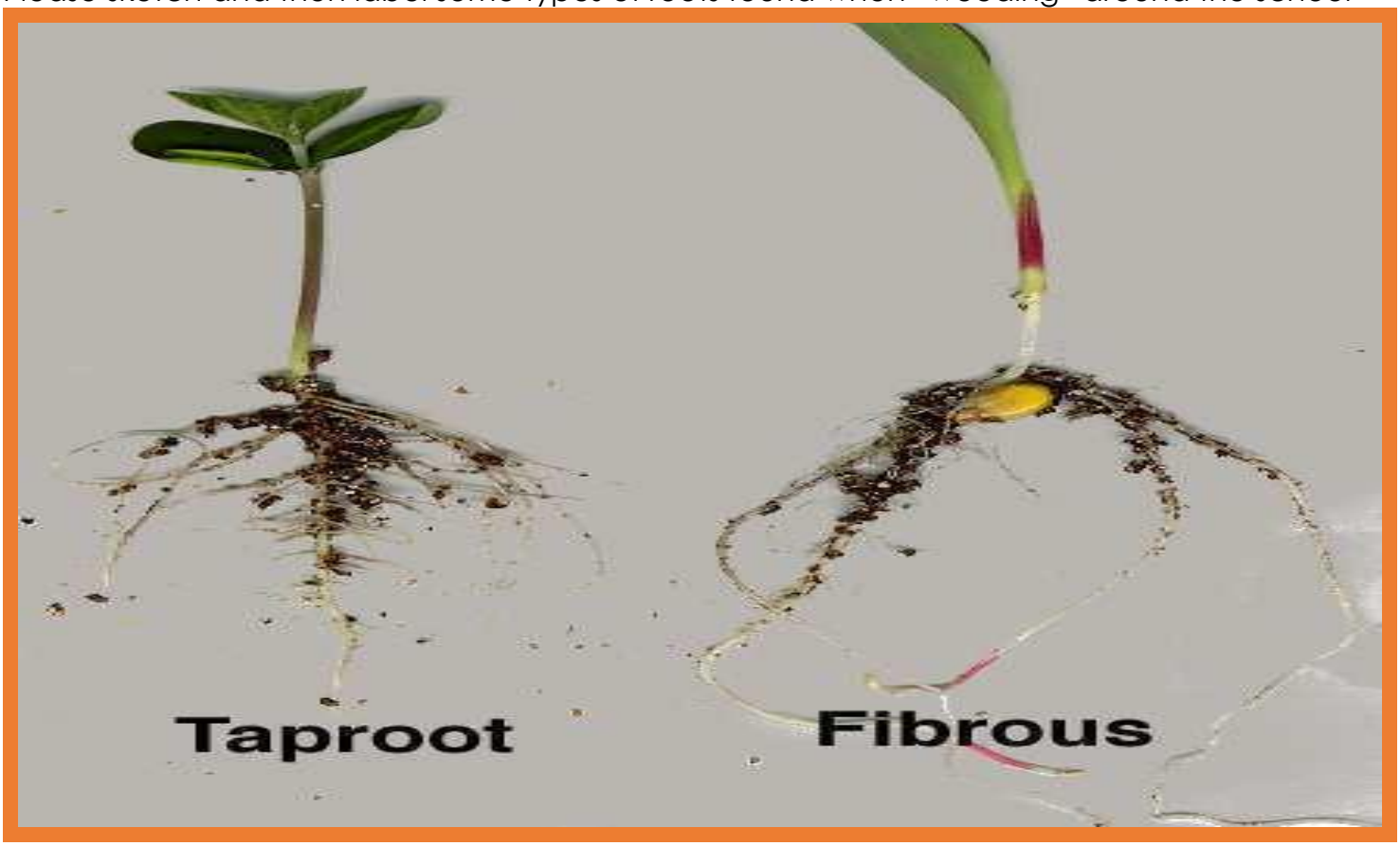
There are two types main types of roots.

Taproot: (Draw) Main root with roots that branch off.
Fibrous root: (Draw) Many branches.
Other roots can be tubercular. (Tubers)

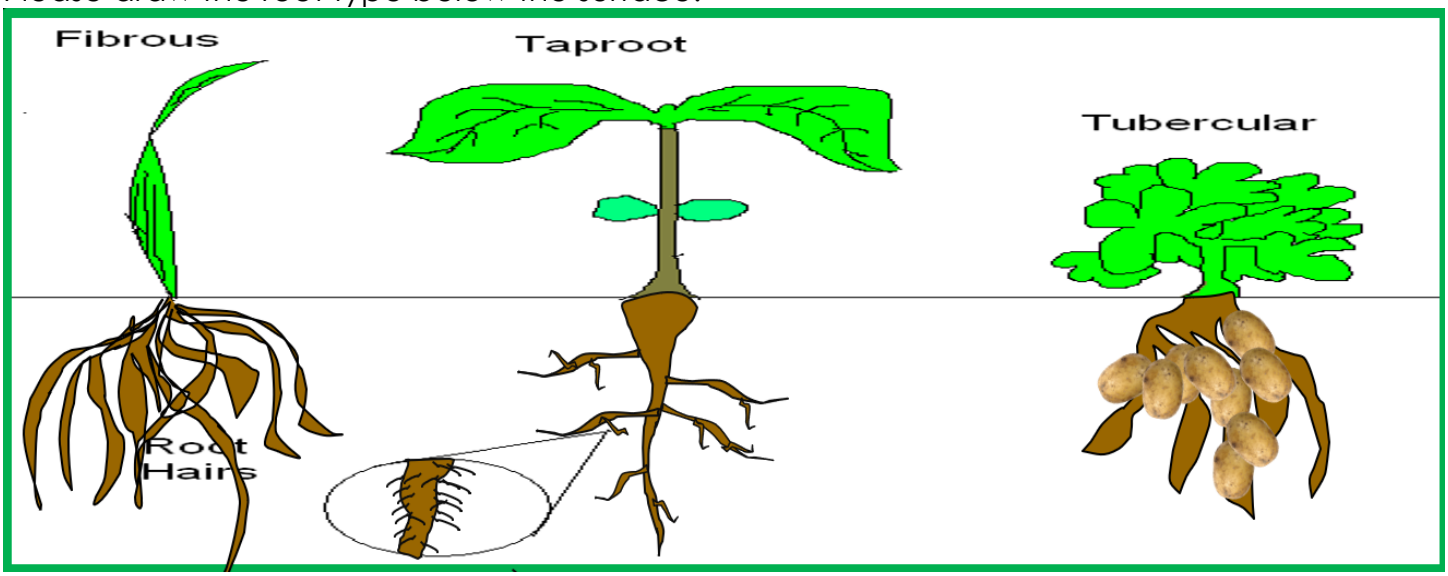
Draws minerals and water from the surrounding soil. Name three important plant nutrients.

nitrogen 7 N 14.007	15 P 30.973762 Phosphorus	19 K 39.0983 Potassium
Nitrogen	Phosphorus	Potassium

Please sketch and then label some types of roots found when "weeding" around the school



Please draw the root type below the surface.



Root Hairs – Hairlike extensions of root to absorb water and nutrients. Very delicate (damaged when transplanted).

Water uptake is necessary for plants because…

Keeps plants rigid and not wilted. Water fills cells and creates turgor pressure.
Water cools the plant down during warm weather.
Water is needed for photosynthesis
Water carries dissolved nutrients and minerals throughout plant.

Part 4 Lesson 2 Hydroponics and Plant Tropisms

Hydroponics: The process of growing plants in sand, gravel, or liquid, with added nutrients but without soil

Describe some advantages to using hydroponics?

- Maximizes Space. Hydroponics requires far less space than plants grown in soil. ...
- Conserves Water. ...
- Facilitates a Micro-Climate. ...
- Produces Higher Yields. ...
- Require Less Labor. ...
- Needs No Soil. ...
- Produces Higher Quality Food. ...
- Reduces Supply Chain.

Plants get the nutrients they need primarily from the….

- A.) Soil and Water
- B.) Sun, Leaves, and Stems
- C.) Water and Air.
- D.) Soil only.

Tropism: Growth or turning movement of a plant in response to an environmental stimulus.
Light, water, gravity, temperature / seasons

Some Plant Tropisms

- Chemotropism, movement or growth in response to chemicals
- Geotropism (or gravitropism), movement or growth in response to gravity
- Heliotropism, diurnal motion or seasonal motion of plant parts in response to the direction of the sun, (e.g. the sunflower)
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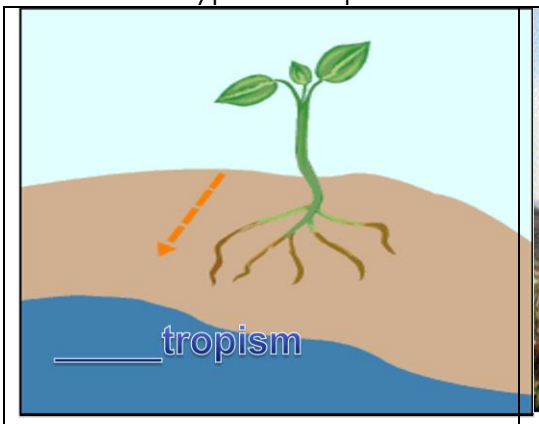
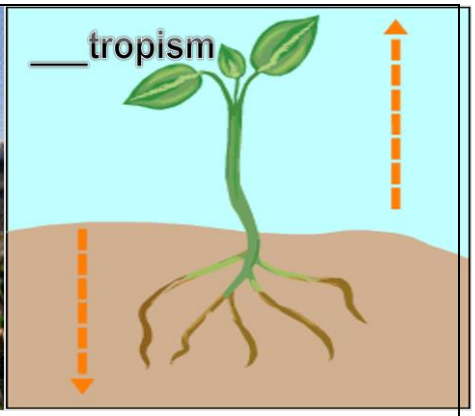
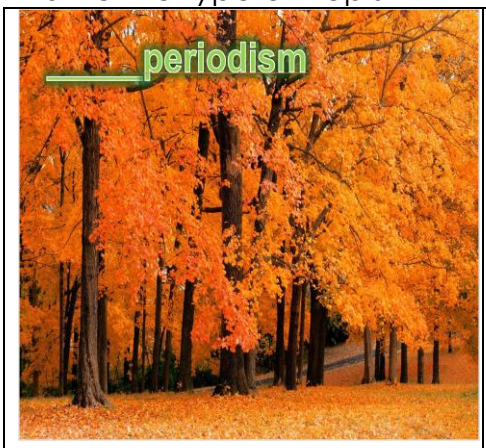
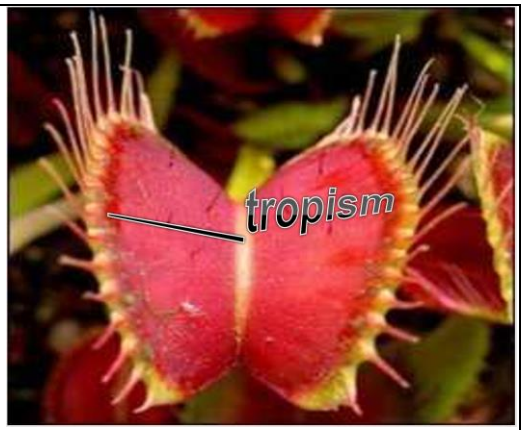
- Thermotropism, movement or growth in response to temperature
- Electrotropism, movement or growth in response to an electric field
- Thigmotropism, movement or growth in response to touch or contact
- Photoperiodism, is response to seasons

Name the type of tropism

		
PHOTOTROPISM maybe HYDROTROPISM	HELIOTROPISM	GEO / GRAVITROPISM

Name the type of tropism

		
PHOTOPERIODISM	THERMOTROPISM	THIGMOTROPISM

Part 4 Lesson 3 Plant Hormones

Plant hormones are chemicals that affect flowering; aging; root growth; distortion, killing of leaves, stems, and other parts; prevention or promotion of stem elongation; color enhancement of fruit; prevention of leafing and/or leaf fall; and many other conditions.

Some plant hormones.

Auxin: Promotes stem elongation and bud dormancy.
-Phototropism: When plants grow toward a light source.
Gibberellins: Make stems longer.
Cytokinins: Promotes cell division. They are produced in growing areas like the tips.
Abscisic Acid: Opens and closes flowers, has role in seed dormancy.
Ethelyene: A gas that promotes fruit ripening

Add some extra information about plant hormones in the space below.

Auxins: These are primarily growth-promoting substances that contribute to the elongation of shoots, but at high concentrations they can inhibit growth of lateral buds preventing branching. Auxins are generally produced in apical buds, young leaves, and developing seeds. In addition to being used as plant growth regulators, auxins can also be used as herbicides (2,4-D and other phenoxy herbicides). In apple production, NAA and NAD are synthetic auxins that can be used to thin fruit, inhibit water sprout and sucker growth, and prevent pre-harvest fruit drop. Carbaryl, while not strictly an auxin, has a similar chemical structure and has similar activity in fruit thinning.

Gibberellins also promote growth. They are produced in very young leaves, developing seeds, fruit, and roots. Gibberellins cause cell elongation during shoot growth, and are involved in regulation of dormancy. Commercially, gibberellins have been used to improve fruit size, prevent fruit russeting, and induce lateral branching. Several growth retardants, including Apogee, limit biosynthesis of gibberellins and thus inhibit shoot growth.

Cytokinins promote cell division. They are thought to be produced in the roots and by young fruit. Cytokinins are involved in apical dominance, branching, and stimulating bud initiation. Benzyladenine is a synthetic cytokinin used for fruit thinning (Maxcel). Combinations of benzyladenine and gibberellins (ex. Promalin®) are used to improve fruit shape and to stimulate lateral branching.

Abscisic acid (ABA) is a growth inhibitor. ABA is produced in mature leaves along with many other plant tissues where it controls the dormancy of buds and seeds and inhibits shoot growth. It also appears to be involved in plant response to water stress. Commercial formulations of ABA (ProTone can be used to accelerate color development in grapes, for post-bloom thinning of apples and to accelerate fall defoliation in a number of fruit crops.

Ethylene: This is the only known gaseous plant hormone. Many plant organs synthesize ethylene, and it moves readily in the air surrounding the tree. Usually, ethylene has an inhibitory effect on plants and is most commonly associated with plant stress. It promotes abscission of leaves and fruits, inhibits shoot elongation, favors caliper development, and, along with auxin, inhibits lateral bud development. On the other hand, it can break

dormancy in buds and seeds and causes rapid ripening of apples. In apples, ethylene is involved in the transition of fruit from being physiologically mature to ripe. Once exposed to ethylene, their storage life is shortened.

University, U. S. (n.d.). *Naturally occurring plant hormones: Intermountain Fruit*. Naturally Occurring Plant Hormones | Intermountain Fruit | USU. Retrieved July 19, 2022, from https://intermountainfruit.org/growth-regulation/hormones

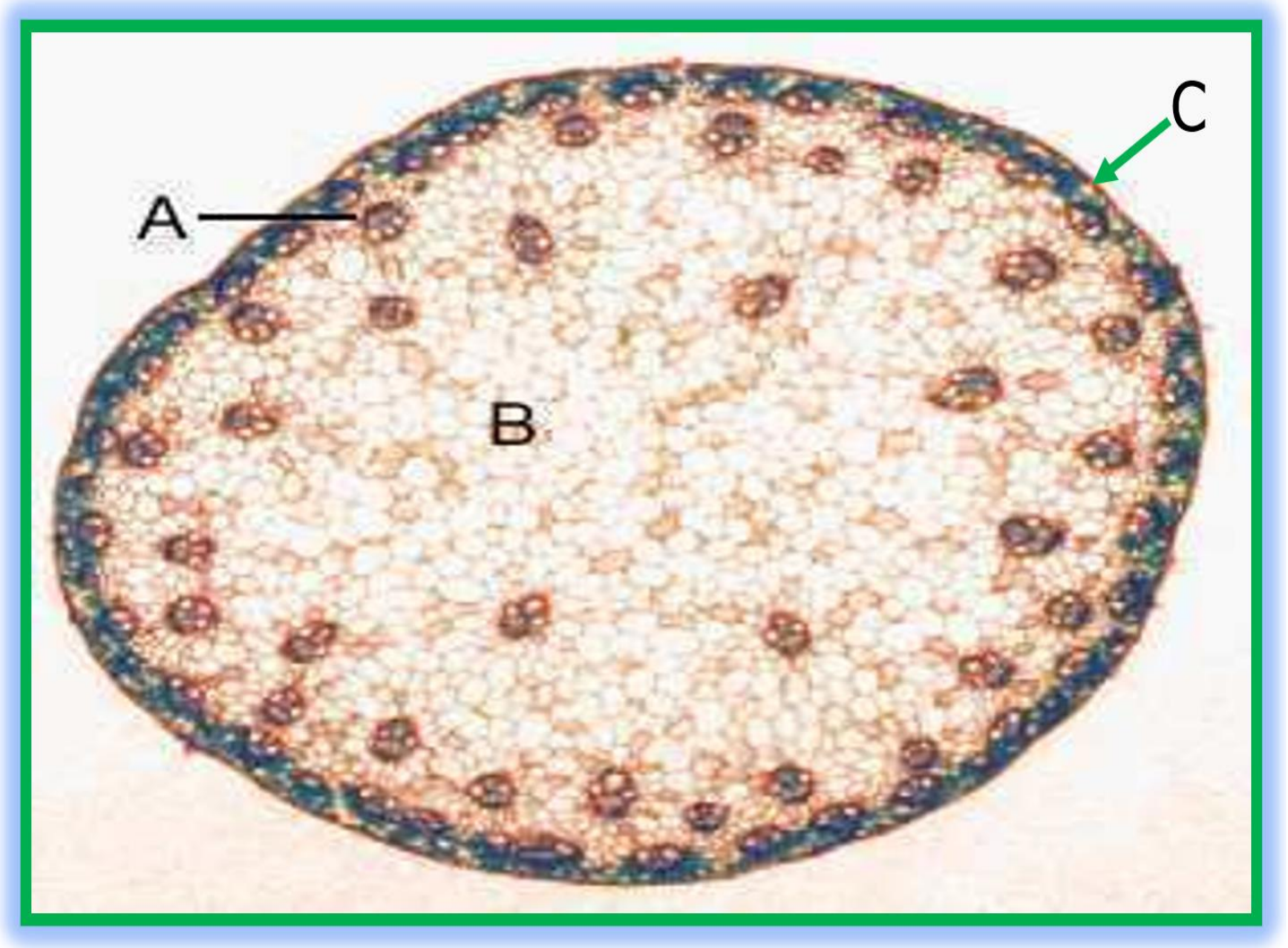
Part 4 Lesson 4 Plant Vascular Systems

3 types of plant tissues.

Dermal tissue: Outside layer of plant, protects, interacts with outside.
Ground Tissue: Below dermal tissue, stores energy, photosynthesis occurs here.
Vascular Tissue: Xylem and Phloem.

Name the three tissues below

A) Vascular Tissue	B) Ground Tissue	C) Dermal Tissue



Vascular system: The vessels and tissue that carry or circulate fluids such as blood or lymph or sap through the body of an animal or plant.

Xylem: (Zi-lem).

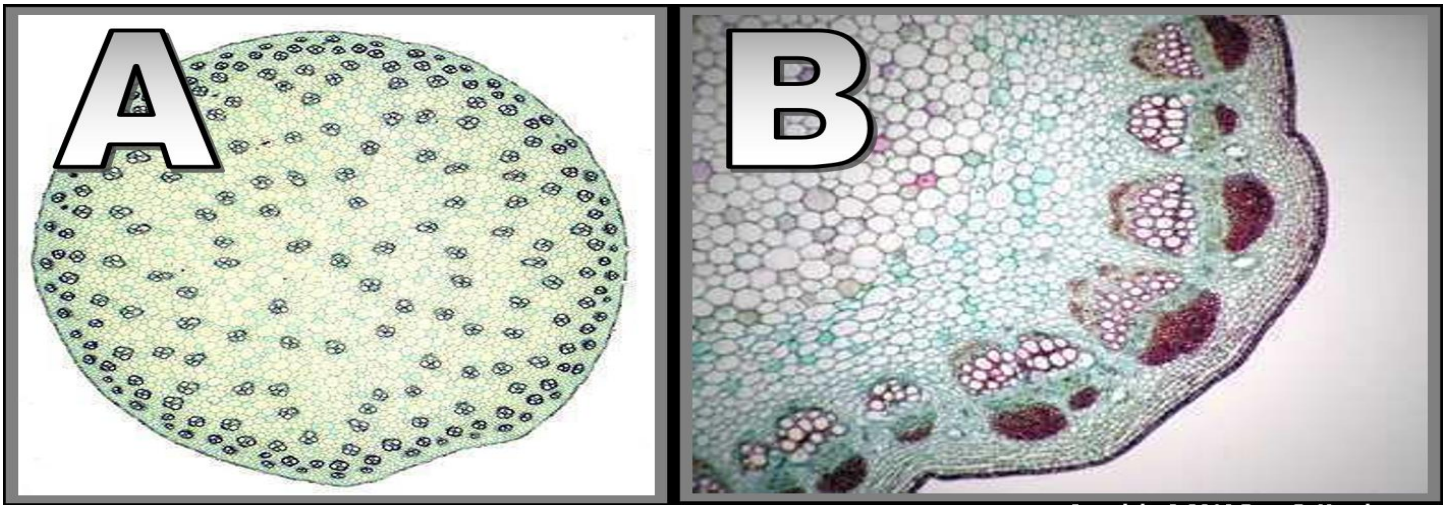
Tubes that water and minerals move through.
Water travels up the tree from roots to leaves.
Old xylem doesn't transport water but supports plant. (Xylem is wood).

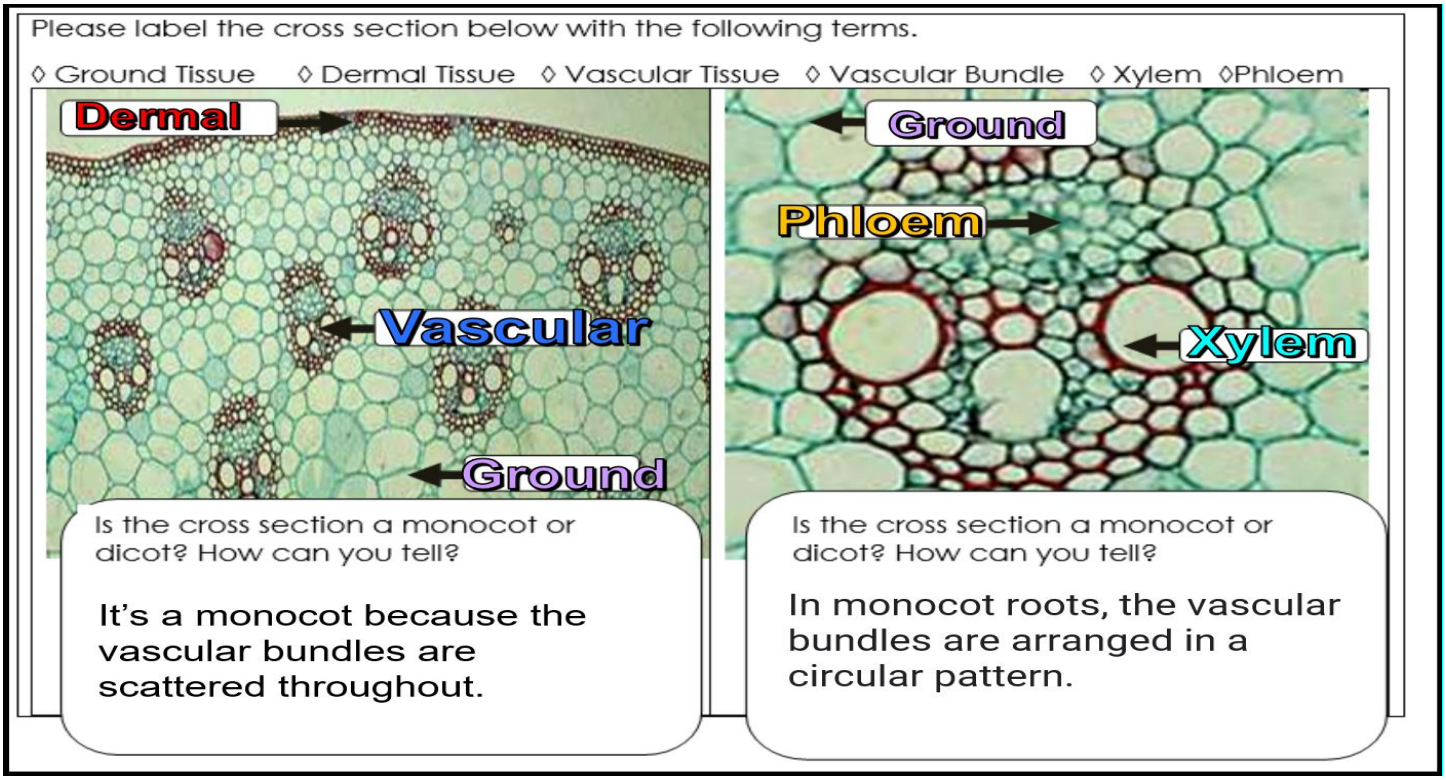
Phloem: (Flow-em).

Tubes in the plant that sugar (food) moves through.

Which is a monocotyledon or a dicotyledon based on the plants vascular system.

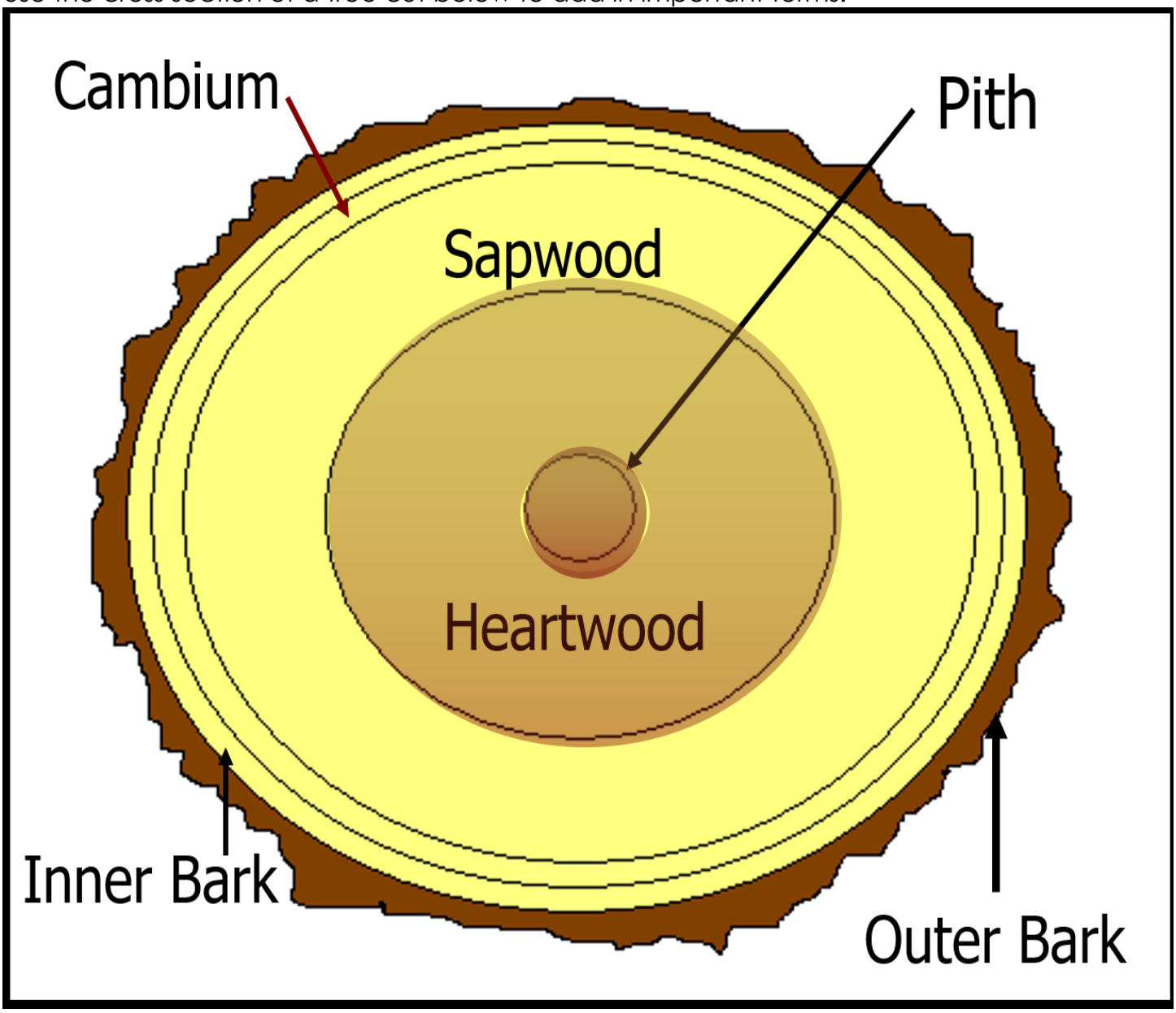
A= Monocotyledon	B=Dicotyledon





Part 4 Lesson 5 Woody Plants

Use the cross section of a tree cut below to add in important terms.



Pith: The soft spongy substance in the center of the stems of many plants and trees. Wood formation begins here.

Heartwood: Older, Darker, and central non-living central portion of the tree.

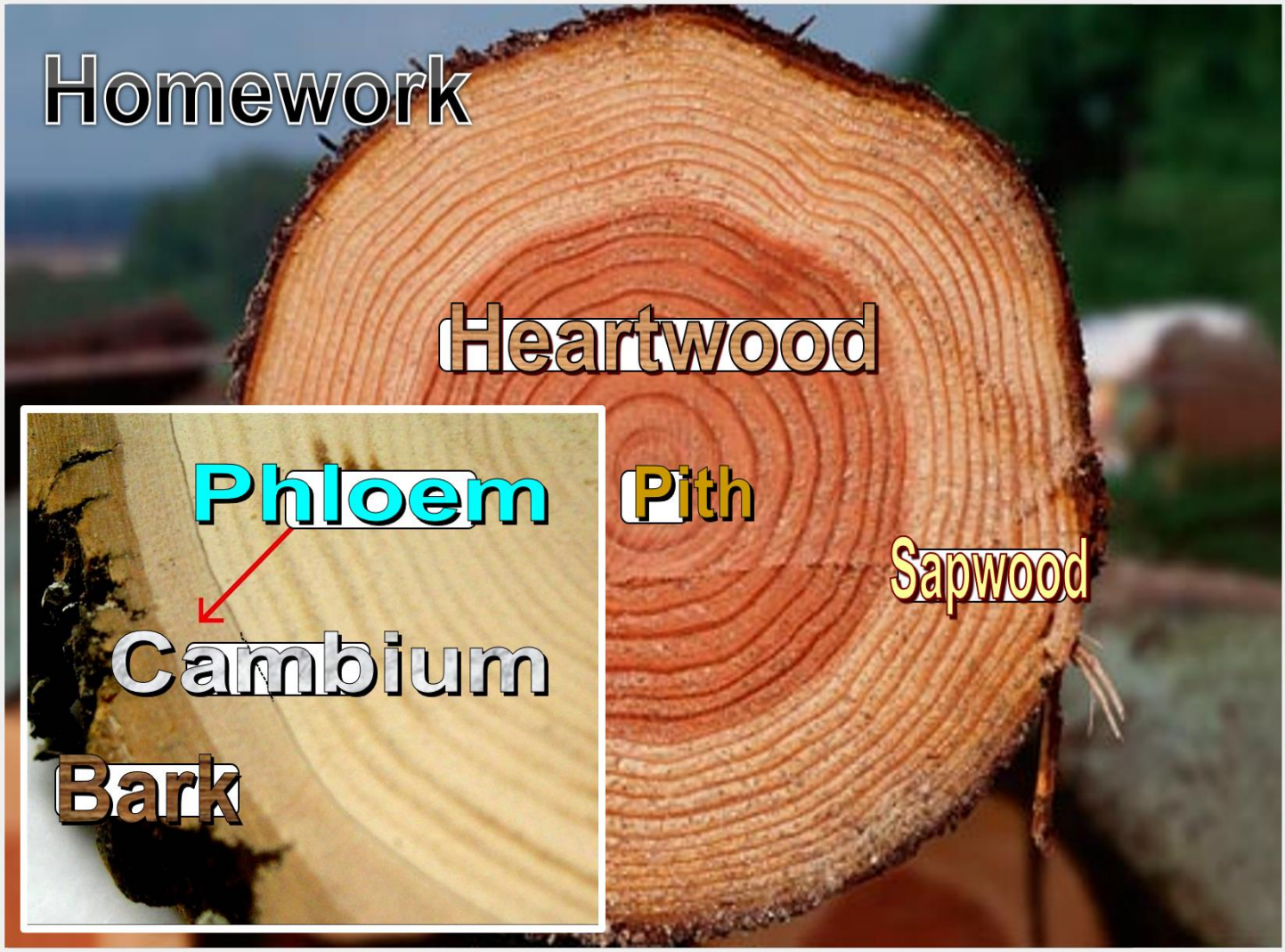
Sapwood: Living wood, lighter in color, conducts water with xylem.

Cambium: Area just inside bark that makes new growth. Adds girth which allows the plant to grow tall.

Inner Bark: Area just inside the bark, made of living tissue and contains the phloem.

Outer bark: Outside of tree, provides protection.

◊ Please label the cross-section of the tree below with the correct terms.
◊ Cambium ◊ Pith ◊ Sapwood ◊ Heartwood ◊ Inner bark ◊ Outer bark

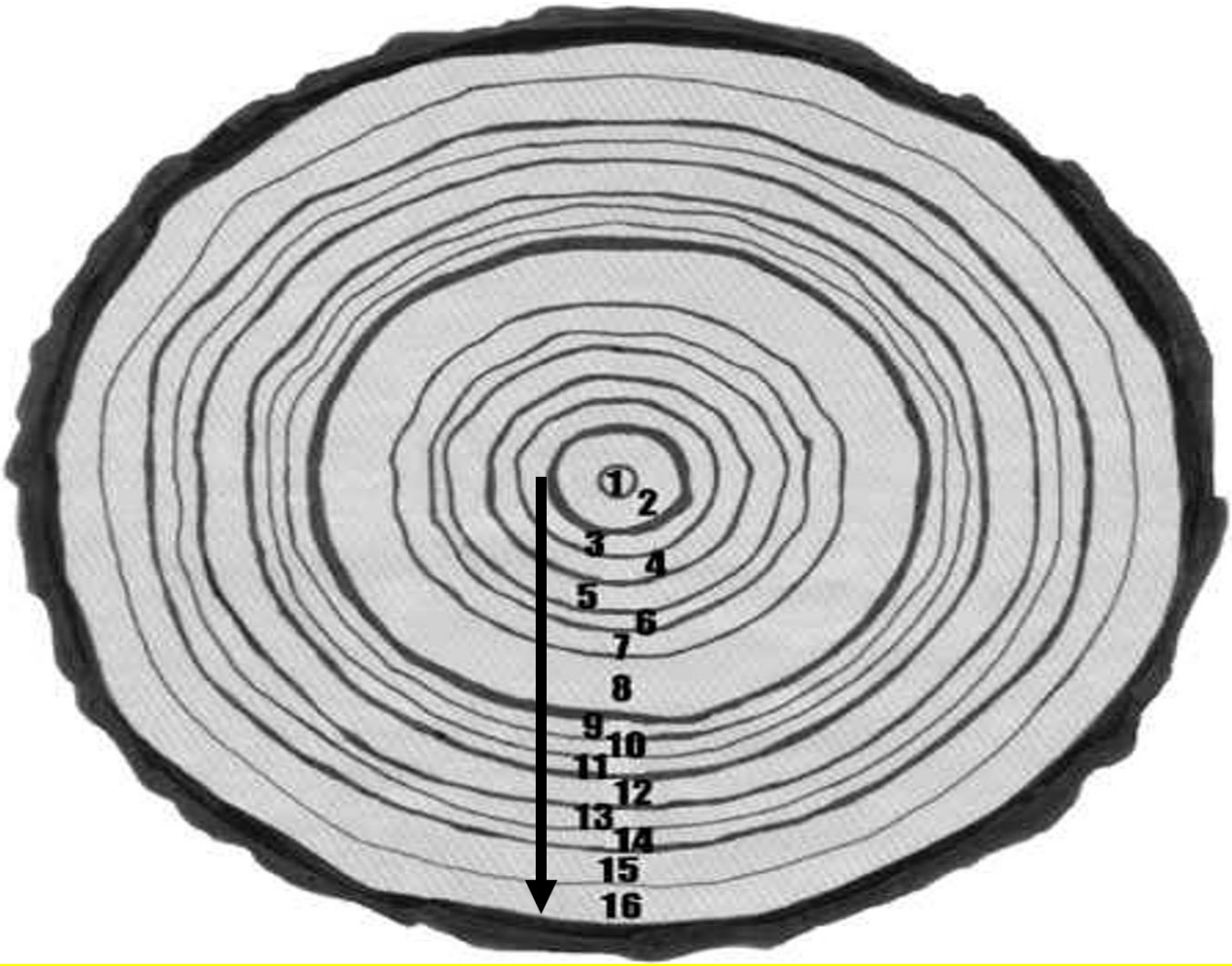


Part 4 Lesson 6 Dendrochronology.

The cambium also adds a new layer of cells each year.
Scientists can date the tree and examine factors such as climate based on these rings.

Dendrochronology: The dating of past events through study of tree ring growth

Please describe some info about the tree cut below.



The tree is approximately 16 years of age based on the number of annual tree rings. Year 8 was the largest growth year which may have been a wet year. Year 9,10, and 11 were likely dry years as the tree did not have thick rings those years.

Annual Rings Pith to Cambium	Width in millimeters (mm)	Notes
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		

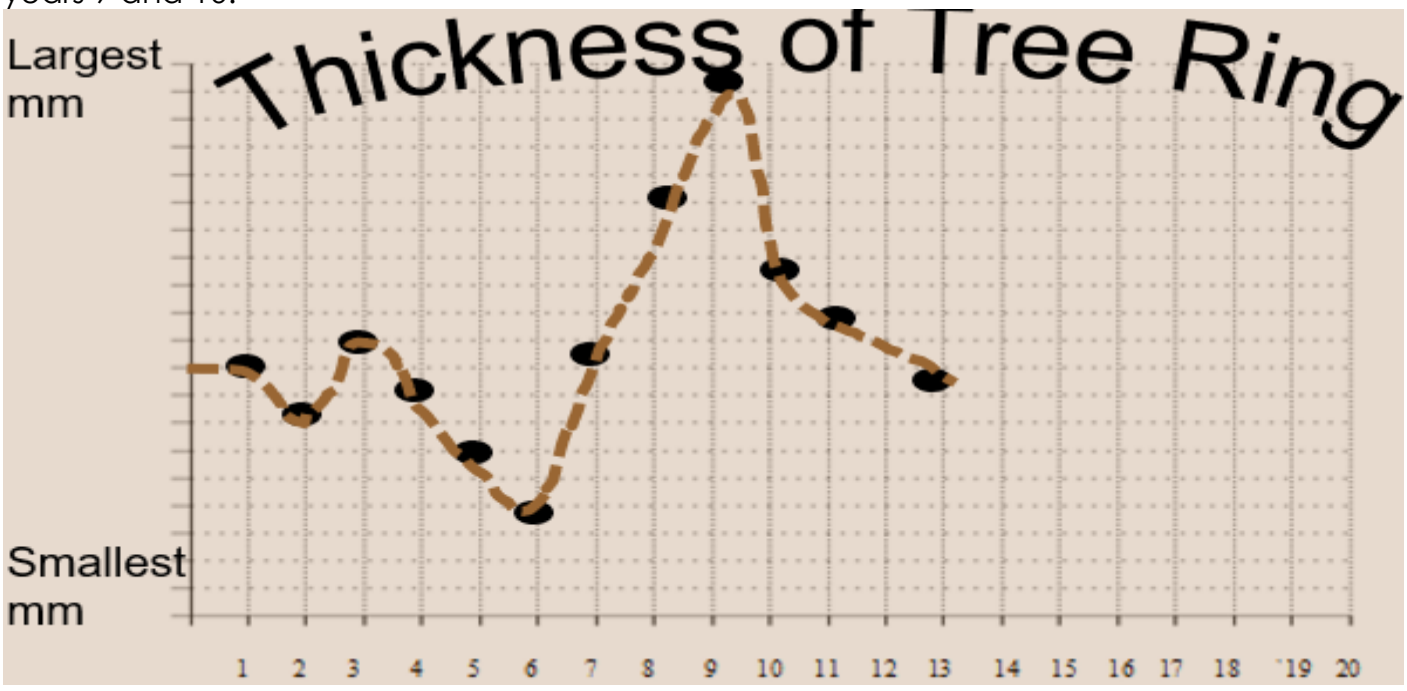
Can you label, Cambium, Pith, Heartwood, Sapwood, Inner Bark, Outer Bark How old is this tree?_____

Procedure

A.) Age the tree according to its annual rings.

B.) Measure the length of each annual ring and graph in a line graph over time in millimeters.

The tree is about 13 years old. It has less growth in years 4,5, and 6, with significant growth in years 9 and 10.



C.) What years showed the most growth? The most growth occurred in years 9 and 10

D.) What years showed the least growth? The least growth occurred in years 4,5, and 6.

E.) What patterns did you notice? The last several years have all seen significant growth.

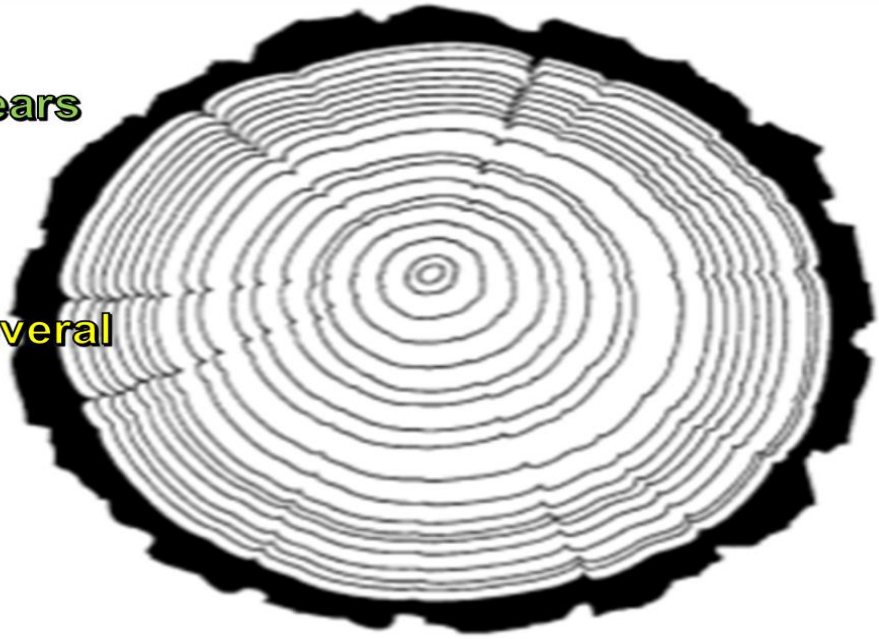
◊ Please calculate the trees age by adding the years from the outside in. The tree was just cut. 19/20 Years

◊ Assume the tree was just cut, what year showed the most growth Year 10

◊ Assume the tree was just cut, what year showed the least growth The last several

◊ What is the science of dating past events by using annual tree rings called?

Dendrochronology



Part 4 Lesson 7 Leaf Processes

A leaf is a plant organ, that is photosynthetic, contains chlorophyll, and is usually thin so light can penetrate.

The big three aspects of light and plants.

Quality (how good)
Quantity (how much)
Duration (how long)

Why do leaves turn color in the fall?

As the season changes, temperatures drop and days get shorter. Trees get less direct sunlight, and the chlorophyll in the leaves breaks down. The lack of chlorophyll reveals yellow and orange pigments that were already in the leaves but masked during the warmer months by the green pigments.

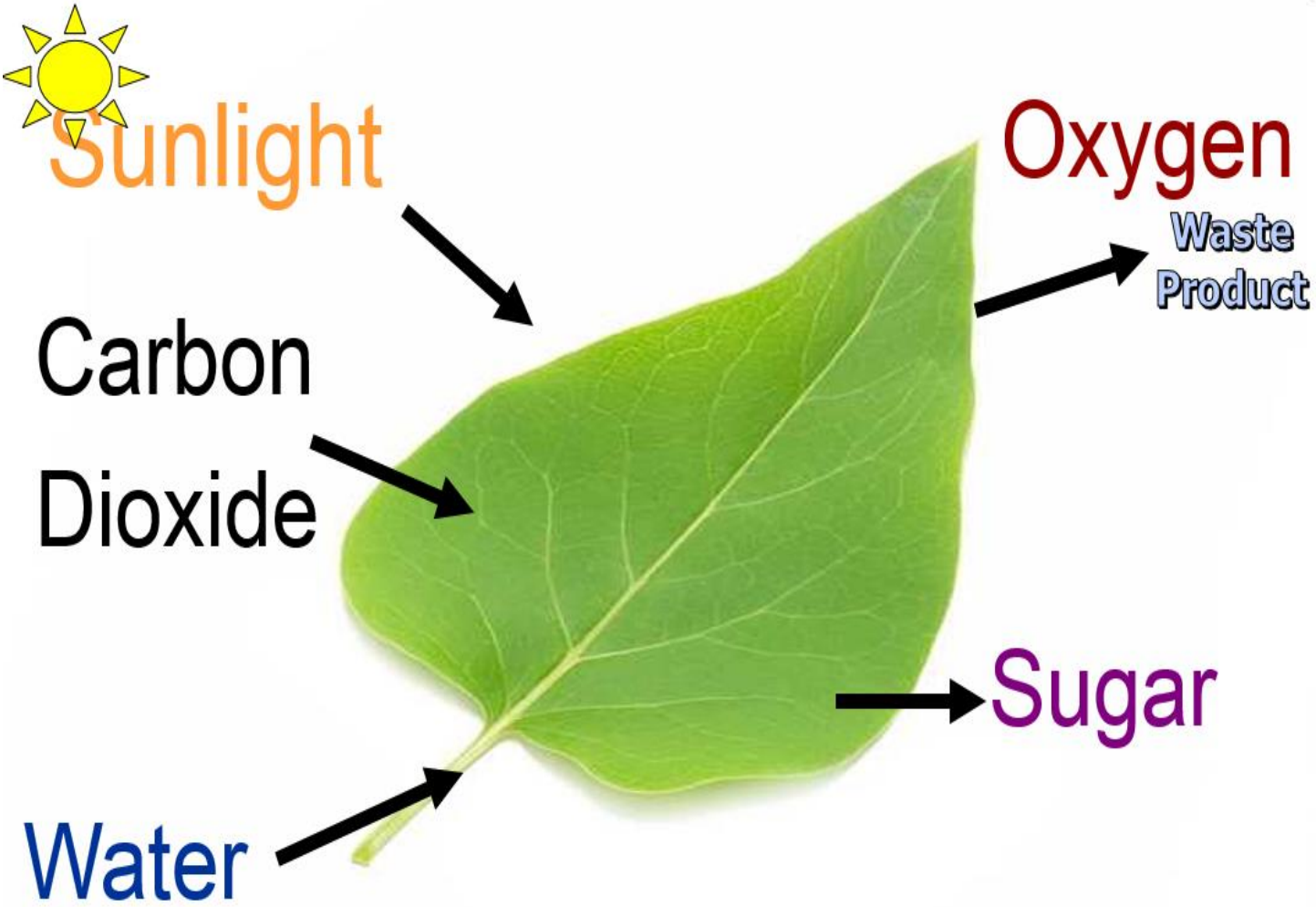
Plastids (AKA Chloroplast)

-Organelle in plants (some protists and bacteria)
-Contain the green pigment chlorophyll
-Has stacks called thylakoids
-Does Photosynthesis_ (Make the sugar)
-Has its own unique DNA.

Photosynthesis – Plants make sugar from light. Light energy is turned into chemical energy (sugars – carbon based).

Part 4 Lesson 8 Photosynthesis

$6CO_2 + 6H_2O + \text{light energy} = C_6H_{12}O_6 + 6O_2$



Photosynthesis is the process by which light energy is utilized to convert carbon dioxide_and water into food to be used by plants.

Oxygen is released into the air during the process. (O_2) Waste

Light or solar energy is captured by chlorophyll (CHLOR-oh-phil), the green pigment in leaves.

It is then converted into chemical energy which is stored as starch or sugar.

These starches and sugars are stored in roots, stems and fruits. They are available to the plant as food or fuel.

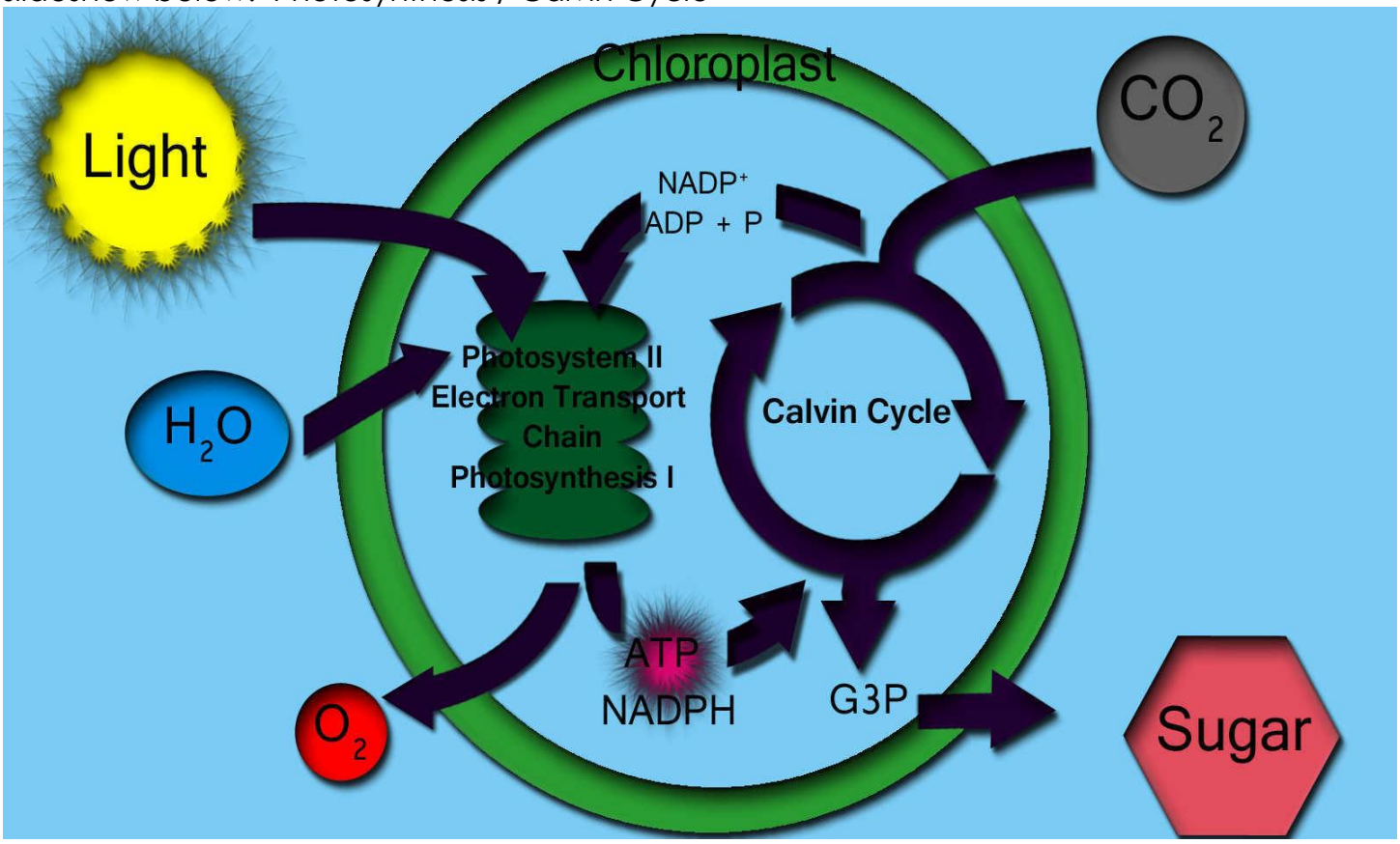
Part 4 Lesson 9 Photosynthesis Continued

Photosynthesis

-Produces sugar from energy.
-Occurs only in cells with chloroplasts.
-Oxygen is produced. Waste Product
-water is used.
-Carbon dioxide is used.
-Occurs in light.

Which of the following statements is false of photosynthesis? and the answer is… A.) Photosynthesis requires sunlight, carbon dioxide, and water. B.) Oxygen and glucose are produced in photosynthesis. C.) Carbon Dioxide and water are produced. D.) In photosynthesis, plants use radiant energy from the sun to create chemical energy in the form of sugars. E.) None of the above.	Which of the following equations is true of photosynthesis? $6O_2 + C_6H12O_6$ Energy → $6CO_2 + 6H_2O$ $C_6H_{12}O_6 + 6O_2$ → Energy + Chloroplasts. $6O_2 + 6CO_2 + 6O_2$ → Energy + $C_6H_{12}O_6$ $6CO_2 + 6H_2O$ + Energy → $C_6H_{12}O_6 + 6O_2$ $6O_2 + 6CO_2$ + → Energy + $C_6H_{12}O_6 + 6O_2$ Energy + $6H_2O$ → Energy + $6O_2 + 6CO_2$ $CO_2 + 3H_2O$ + Energy → $C_6H_{12}O_6 + O_2$ $6CO_2 + 6H_2O$ → Energy + $6CO_2 + 6O_2$ Energy → $6O_2 + C_6H_{12}O_6 + 6CO_2$

Record some notes and diagrams from one of the advanced photosynthesis videos from the slideshow below. Photosynthesis / Calvin Cycle



Note: The Calvin cycle reactions can be divided into three main stages: carbon fixation, reduction, and regeneration of the starting molecule

Transpiration: The evaporation of water from plants.
- It occurs during respiration.
- Helps pull water up the xylem from roots.
- Occurs in the leaf.

Guard Cell and Stoma: Openings in leaf (stoma) controlled by guard cells that allow gases in and out of leaf.

Use the space below for notes and additional space for Part 4.
Plants provide us with food, fiber, shelter, medicine, and fuel. The basic food for all organisms is produced by green plants. In the process of food production, oxygen is released. This oxygen, which we obtain from the air we breathe, is essential to life.

Across

1. Older, Darker, and harder non-living central portion of the tree.
8. This hormone promotes cell division. They are produced in growing areas like the tips.
9. The soft spongy substance in the center of the stems of many plants and trees. Wood formation begins here.
10. The type of tissue below dermal tissue, stores energy, photosynthesis occurs here.
11. The usually underground portion of a plant that lacks buds, leaves, or nodes and serves as support, draws minerals and water from the surrounding soil, and sometimes stores food.
12. Inner Bark: Area just inside the bark, made of _____ tissue and contains the phloem.
14. Main root with roots that branch off.
16. Area just inside bark that makes new tissues. Adds girth which allows the plant to grow tall.
19. Plants make sugar from sunlight. Light energy is turned into chemical energy (sugars are carbon based).
20. D_____ tissue: The type of tissue / outside layer of plant, protects, interacts with outside.

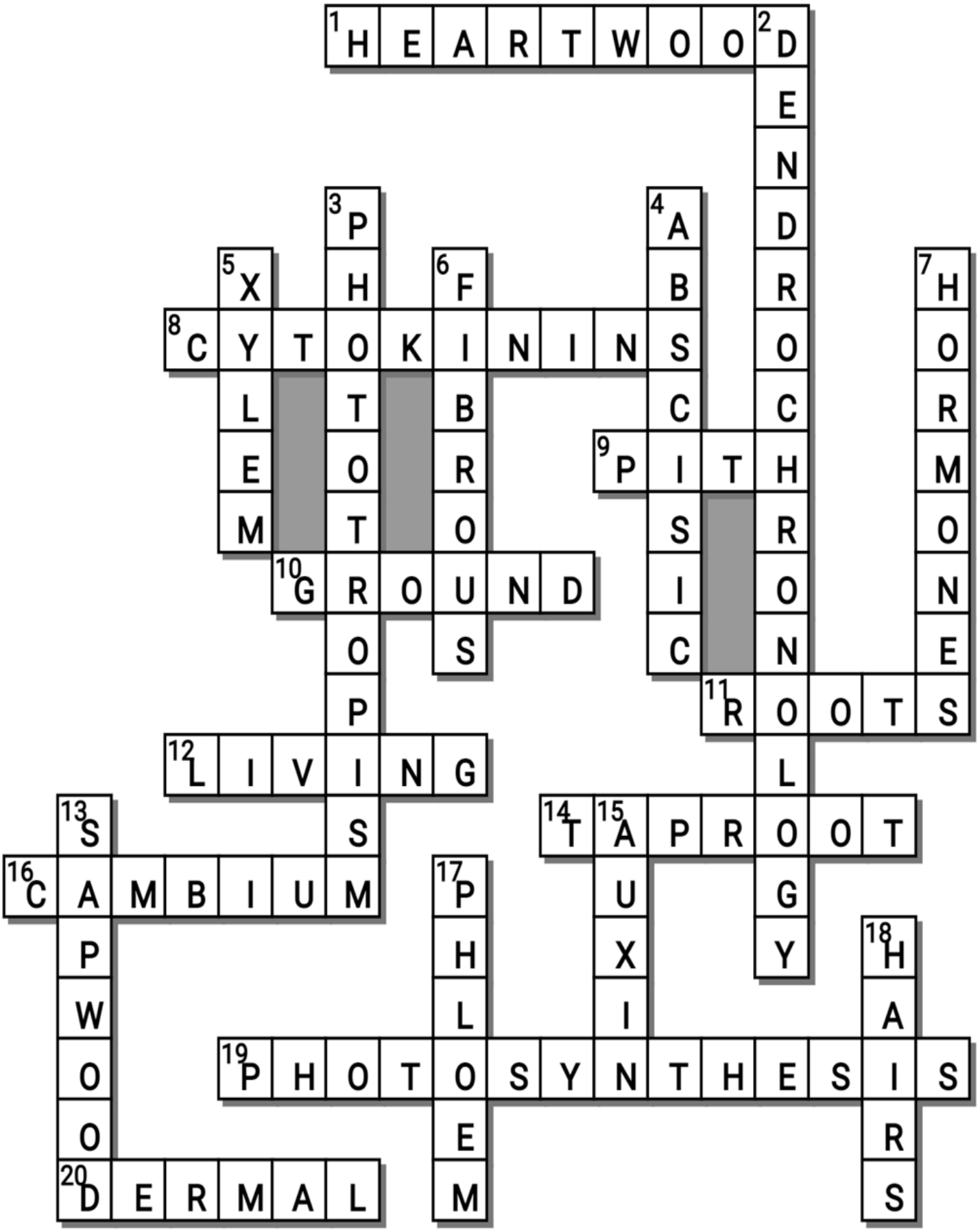
Down

2. The dating of past events through study of tree ring growth.
3. When plants grow toward a light source.
4. A_____ Acid: Opens and closes stomata, has role in seed dormancy.
5. The tubes that water and minerals move through.
6. F_____ Root: Type of root with many branches
7. Plant _____ are chemicals that affect aspects of the plants life.
13. Living wood, lighter in color, conducts water with xylem.
15. This hormone promotes stem elongation and bud dormancy.
17. The tubes in the plant that food (sugar) moves through.
18. Root _____: Hairlike extensions of root to absorb water and nutrients. Very delicate (damaged when transplanted).

----------Teacher can remove this word bank to make the puzzle more challenging----------

Possible Answers

ABSCISIC, AUXIN, CAMBIUM, CYTOKININS, DENDROCHRONOLOGY, DERMAL, FIBROUS., GROUND, HAIRS, HEARTWOOD, HORMONES, LIVING, PHLOEM, PHOTOSYNTHESIS, PHOTOTROPISM, PITH, ROOTS, SAPWOOD, TAPROOT, XYLEM


1 HEARTWOOD
2 END
3 PHOTOTROPISM
4 ABSCISIC ACID
5 XYLEM
6 FLOWERING
7 HORMONE
8 CYTOKININS
9 PITH
10 GROUND
11 ROOTS
12 LIVING
13 SAPWOOD
14 TAPROOT
15 AUXIN
16 CAMBIUM
17 PHLOEM
18 HAIRS
19 PHOTOSYNTHESIS
20 DERMAL

Part 4 Review Game Lesson 10

Name:

1-10 = 10 pts * = Bonus + 1 pt,
(Secretly write owl in correct space +1 pt)
Final Question = 5 pt wager

Due: Today
Score ____ / 100

ROUTE 66	GROWING UP	IF I COULD I WOULD	LEAVE ME BE	SEE THE LIGHT Bonus round 1 pt each
1) Letter B	6) Letter A	11) LETTER C	16) A=Cambium B=Sapwood C=Heartwood D=Pith	*21) Rainbow Brite
2) Taproot Fibrous Root	7) HYDROPONICS	12) A =Ground Tissue, B = Dermal Tissue C= Vascular Tissue	17) Dendro- -chronology	*22) Gandalf
3) Tubercular Root	8) Plant Hormones	13) PHLOEM	18) Photosynthetic, Chlorophyll, Thin, Light	*23) Bot
4) Letter D	9) Gibberellins	14) XYLEM	19) Letter E	*24) Princess and The Frog
5) Letter C	10) Auxin Phototropism	15) Letter A Cambium	20) Transpiration	*25) Enders Game

Final Question Wager ___ /5 Answer: Stoma