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Internal and External Structures of the Leaf

The leaf is the main site of photosynthesis and so is where most food is made for the plant. The leaf therefore has many adaptations that make it suitable for making food for the plant. Below is a diagram showing how the inside of a leaf looks. Notice that even though a leaf blade is very thin, it consists of many layers that each have a specific function. Also take note that quite a few of the specialized plant cells that we learned about previously are located there.

External Features (Outer features)

1. Broad, flat laminae
2. Thin laminae
3. Petiole or leaf stalk hold the leaf lamina 90° to the sunlight
4. Laminae are spaced out around stems so they do not overlap and block sunlight

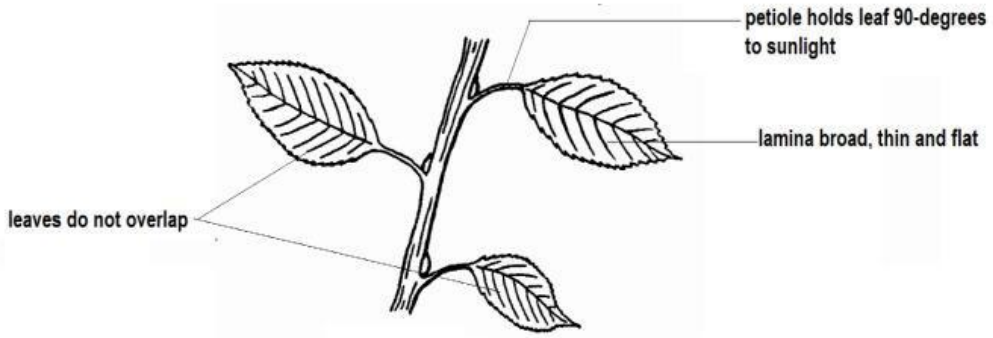


DIAGRAM SHOWING THE EXTERNAL FEATURES OF A LEAF

Internal Features (Inner features)

1. Carbon dioxide enters and oxygen leaves through stomata
2. Air spaces for gases to diffuse
3. Palisade cells contain the most chloroplasts
4. Palisade cells are elongated and arranged end to end
5. Chloroplasts can move to get into a position to trap as much sunlight as possible

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6. Root hair cells absorb as much water as possible from the soil.
7. Xylem vessels carry water and minerals from roots to leaves
8. Phloem sieve tubes transport glucose from leaves all around plant
9. Waxy cuticle prevents water loss needed for photosynthesis

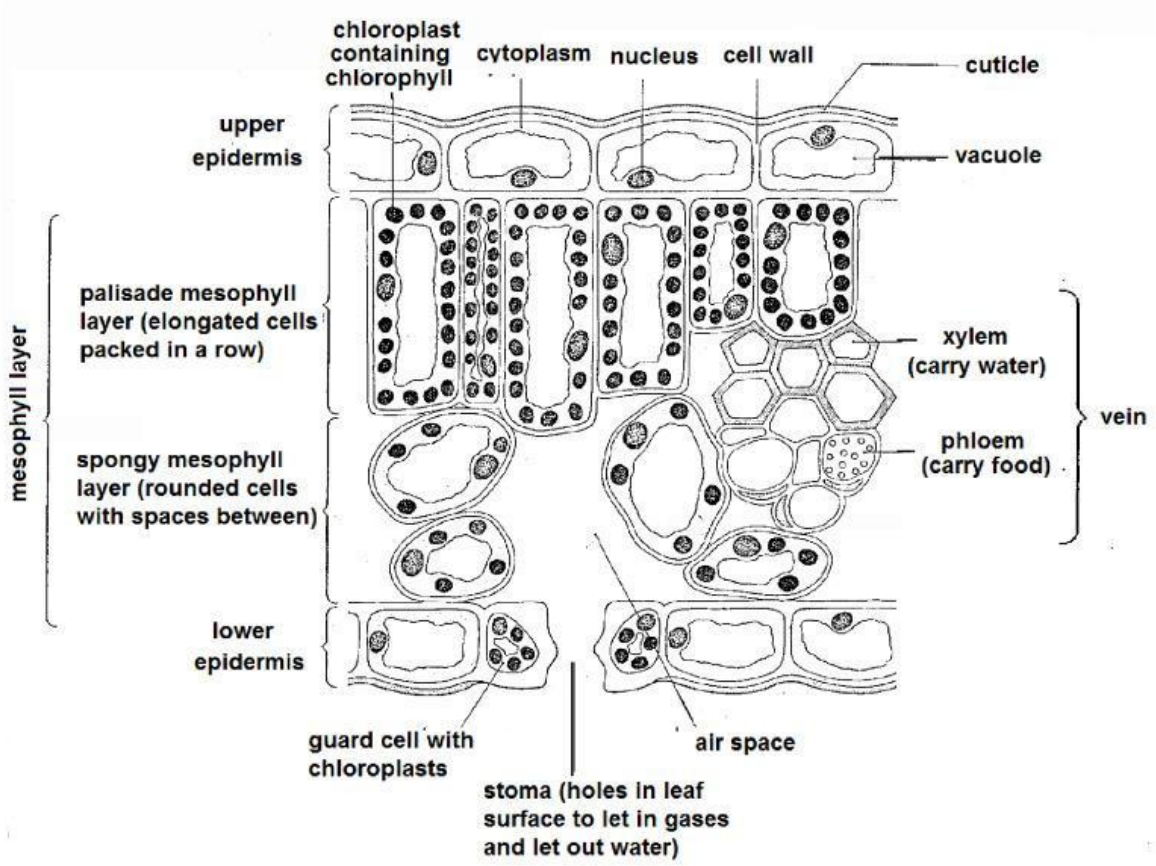


DIAGRAM SHOWING THE INTERNAL FEATURES OF A LEAF

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Student's Work

Answer the following questions based on information on pages 23-24.

Multiple Choice Questions. Circle the letter of the correct answer.

1. Which part of the leaf holds the lamina at the correct angle to sunlight?

a) Xylem vessels
b) Stomata
c) Petiole
d) Phloem

2. Which layer of cells contains the most chloroplasts for photosynthesis?

a) Root hair cells
b) Palisade cells
c) Guard cells
d) Phloem

3. What is the main function of the waxy cuticle?

a) Prevents water loss
b) Absorbs carbon dioxide
c) Transports glucose
d) Traps sunlight

4. Which of the following transports glucose around the plant?

a) Xylem vessels
b) Palisade cells
c) Phloem sieve tubes
d) Root hair cells

True or False. Write TRUE if the statement is true and FALSE if it is false

5. Laminae are spaced around the stem so they do not overlap and block sunlight. _____
6. Air spaces inside the leaf help gases to diffuse. _____
7. Root hair cells are found in the leaf blade. _____
8. Palisade cells are elongated and arranged end to end. _____
9. Carbon dioxide enters and oxygen leaves through the stomata.

_____

Prepared by: Simone Haughton 2010, 2011, 2012, 2013, 2019, 2025

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Fill in the Blanks below using the key words.

laminae	**leaf**	**palisade cells**	**petiole**
phloem	**root hair**	**waxy cuticle**	**xylem**

10. The _____ is the main site of photosynthesis in the plant.

11. The broad, flat _____ provide a large surface area for photosynthesis.

12. _____ hold the leaf lamina at 90° to sunlight.

13. _____ contain the most chloroplasts.

14. The _____ prevents water loss needed for photosynthesis.

15. _____ vessels carry water and minerals from the roots to the leaves.

16. _____ sieve tubes transport glucose from leaves around the plant.

17. _____ cells absorb as much water as possible from the soil.

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Short Answer Questions

18. Why is the leaf blade thin as well as broad?

_____

_____

19. Explain how chloroplasts inside palisade cells help in photosynthesis.

_____

_____

20. Describe the role of stomata in gas exchange.

_____

_____

21. What prevents water loss from the leaf?

_____

22. Which specialized plant cells in the roots absorb water from the soil?

_____

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Student's Work

Photosynthesis Review

1. Complete the paragraph using the words below.

food	starch	oxygen	by-product	xylem	stomata
air	Carbon dioxide	roots	soil	diffuses	

_____ + water --> glucose + _____.Carbon dioxide comes from the _____. It enters the plant through holes in the leaves called the _____. Water comes from the _____. It _____ into the plant through the _____ and travels up the stem via the _____. Glucose is the _____ and is stored as _____. Oxygen is the _____ of this reaction.

2. True and False. Write TRUE if the statement is true and FALSE if it is false.

1. Photosynthesis happens in the roots of a plant. _____

2. Chlorophyll is the green pigment that helps plants absorb sunlight. _____

3. Plants use carbon dioxide and water to make glucose and oxygen during photosynthesis.

_____

4. Oxygen is a waste product of photosynthesis. _____

5. Photosynthesis can take place in the dark. _____

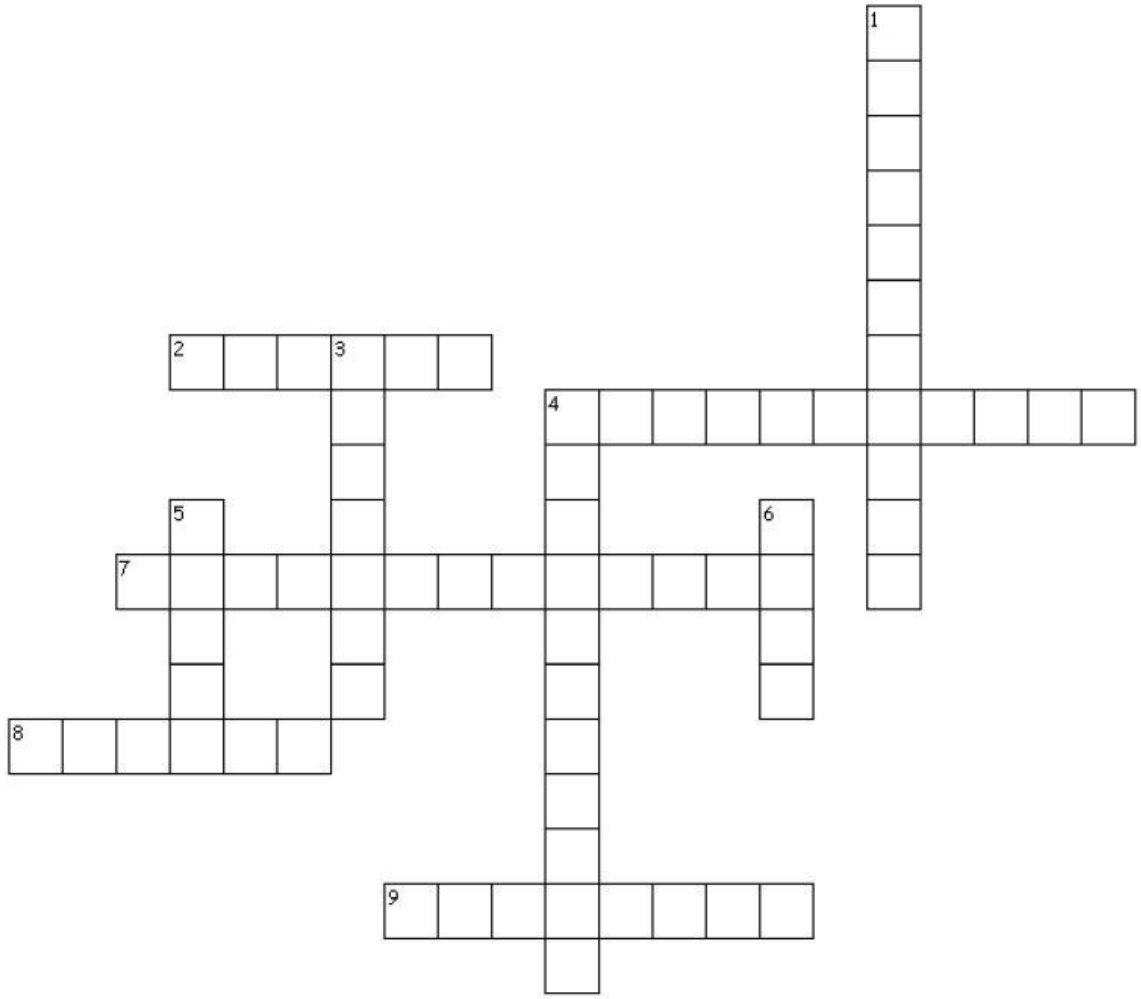
6. Glucose made in photosynthesis is used only for making flowers. _____

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PHOTOSYNTHESIS

3. Complete the following cross-word puzzle about photosynthesis.



ACROSS	DOWN
2. THIS GAS IS MADE DURING PHOTOSYNTHESIS. 4. THE ORGANELLE WHERE PHOTOSYNTHESIS OCCURS. 7. PLANTS USE THIS GAS FOR PHOTOSYNTHESIS. 8. EXCESS GLUCOSE IS STORED AS THIS. 9. THE ENERGY USED TO DRIVE THE PROCESS OF PHOTOSYNTHESIS.	1. THIS WORD MEANS 'SELF-FEEDING'. 3. THE MAIN PRODUCT OF PHOTOSYNTHESIS. 4. GREEN PIGMENT WHICH TRAPS SUNLIGHT. 5. PLANTS TAKE THIS FROM THE SOIL FOR PHOTOSYNTHESIS. 6. THE MAIN SITE OF PHOTOSYNTHESIS.

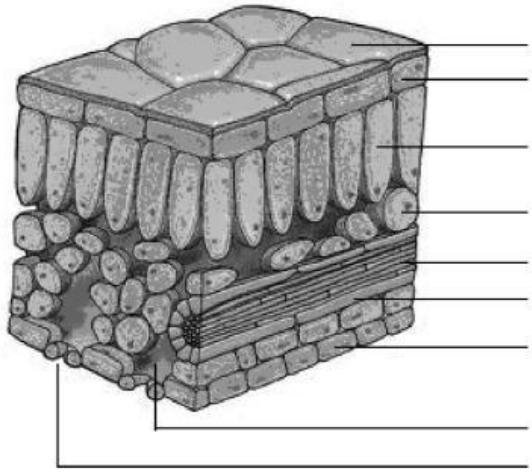
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4. Label the following 3-dimensional diagram of a section through the leaf. Include a suitable title. Use the word bank.

air space	lower epidermis	palisade layer	phloem	spongy layer
stoma	upper epidermis	waxy cuticle	xylem	



Cranium Builder

Answer the following questions by circling the letter of the correct answer. [4 marks]

1. Which of the following is not an importance of photosynthesis?

   A. Make food for plants
   B. Make light.
   C. Make oxygen for animals.
   D. Make food for animals.

2. Which is a product of photosynthesis?

   A. carbon dioxide B. light
   C. oxygen D. water

3. Which of the following is not an external feature of the leaf making it adapted for photosynthesis?

   A. Broad B. Flat
   C. Permeable D. Thin

4. Which type of cell has the most chloroplasts?

   A. mesophyll B. xylem
   C. phloem D. epidermal

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Experiment Time

PHOTOSYNTHESIS LAB: TESTING A GREEN LEAF FOR STARCH

Let's go down to the lab again and put our skills to further practice. As we perform today's experiments, use the table below to guide you as you record important information. Afterwards, write the complete lab reports in your writing books using the previously learned format.

TEST	**TESTING A GREEN LEAF FOR STARCH**
METHOD	Heat some water in a beaker over a Bunsen burner. Place a green leaf into the boiling water for 30 seconds to kill it. Pour some alcohol into a boiling tube and place it to heat in the hot water. Place the leaf into the alcohol and leave it until it starts to turn green and the leaf starts to turn white. Remove the leaf. Dip it into the hot water to soften it. Place it onto a white spotting tile and cover it completely with iodine solution. Wait for a colour change.
APPARATUS/ REAGENTS	
OBSERVATIONS	
CONCLUSIONS	

LIVEWORKSHEETS