

Week 7

IGCSE Biology

Homework bundle for this week

本周作业合集

exercises.lol

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Name: _____ Score: _____

1. The products of photosynthesis are:
 - ☐ glucose and oxygen
 - ☐ carbon dioxide and water
 - ☐ starch and protein
 - ☐ water and minerals
2. A leaf is broad and flat mainly to:
 - ☐ have a large surface area to capture light
 - ☐ store water
 - ☐ protect the plant
 - ☐ attract insects
3. The green pigment that absorbs light for photosynthesis is:
 - ☐ chlorophyll
 - ☐ glucose
 - ☐ haemoglobin
 - ☐ starch
4. Which leaf layer contains the most chloroplasts?
 - ☐ the palisade layer
 - ☐ the waxy cuticle
 - ☐ the lower epidermis
 - ☐ the veins
5. A limiting factor is one that:
 - ☐ is in shortest supply and holds back the rate
 - ☐ always speeds the reaction up
 - ☐ has no effect
 - ☐ is the product
6. Which does a plant need for photosynthesis? (Select all that apply.)
 - ☐ light
 - ☐ carbon dioxide

- ☐ water
- ☐ protein

Tick every correct option.

7. Guard cells open and close the stomata.

- ☐ True
- ☐ False

8. Glucose made in photosynthesis is often stored as _____.

9. A leaf is _____ so that gases can diffuse in and out over short distances.

10. Stomata are pores that allow:

- ☐ gases to enter and leave the leaf
- ☐ water to be stored
- ☐ light to be absorbed
- ☐ sugar to be made

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1. **glucose and oxygen**

$\text{CO}_2 + \text{water} \rightarrow \text{glucose} + \text{oxygen}$.

2. **have a large surface area to capture light**

Large surface area maximises light capture.

3. **chlorophyll**

Chlorophyll in chloroplasts traps light energy.

4. **the palisade layer**

The palisade layer near the top absorbs the most light.

5. **is in shortest supply and holds back the rate**

The scarcest factor limits the rate.

6. **light; carbon dioxide; water**

Light, CO_2 and water (plus chlorophyll) are needed; protein is not a raw material.

7. **True**

They control gas exchange and water loss.

8. **starch**

Starch is the plant's storage carbohydrate.

9. **thin**

Thinness shortens the diffusion distance.

10. **gases to enter and leave the leaf**

Stomata let CO_2 in and O_2 out.

6.1 Photosynthesis

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS photosynthesis 光合作用 • rate 速率 • chlorophyll 叶绿素 • ions 离子 • carbon dioxide 二氧化碳

Objective

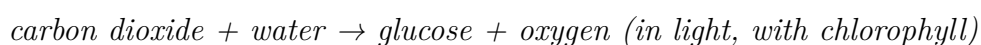
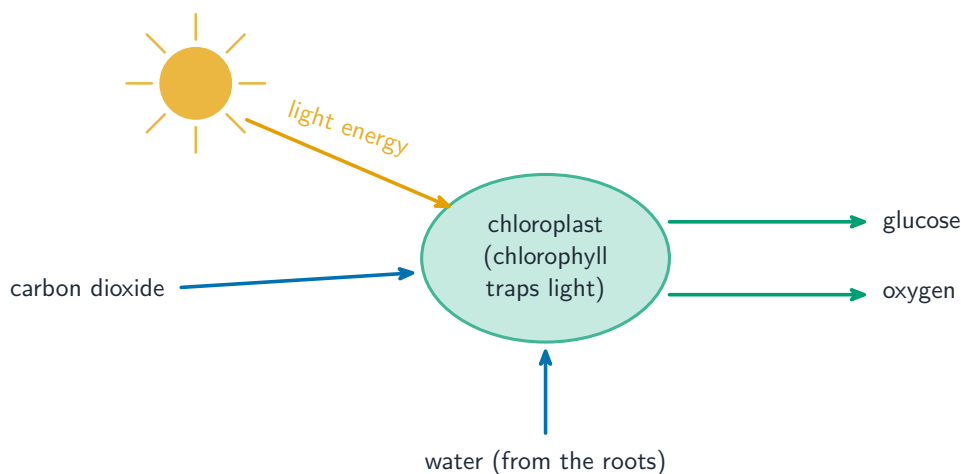
Build the skills to answer exam questions on **photosynthesis** 光合作用 — the equation, the role of **chlorophyll** 叶绿素, uses of glucose, minerals, and **limiting factors** 限制因素.

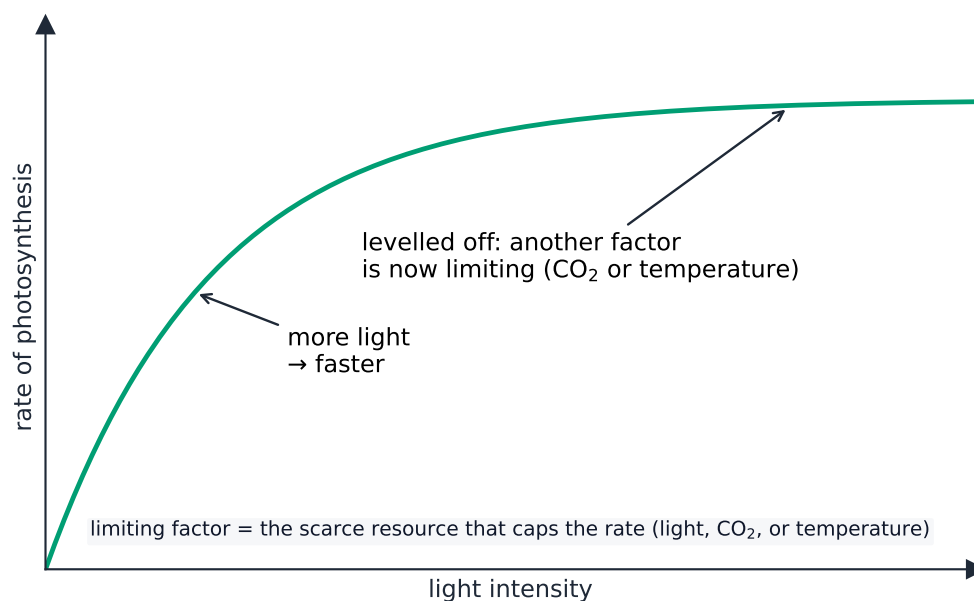
You must be able to:

- write the word (and balanced) equation for photosynthesis
- state the uses of glucose and the roles of nitrate and magnesium ions
- describe how light, CO₂ and temperature affect the rate

1 Worked examples

■ Equation and rate





More light → faster, until another factor becomes limiting

- glucose → starch (store), cellulose (walls), respiration, sucrose (transport).
- nitrate → amino acids; magnesium → chlorophyll.

2 Practice

2.1 Write the word equation for photosynthesis.

[2]

2.2 State the role of magnesium ions in a plant.

[1]

3 Exam-style questions

3.1 Photosynthesis can only take place where there is light and:

[1]

- A nitrate
- B chlorophyll
- C oxygen
- D protein

3.2 A graph shows photosynthesis rate rising with light intensity, then levelling off.

(a) Explain why the rate levels off at high light intensity. [2]

(b) Name one other factor that could then be limiting. [1]

3.3 State two uses a plant makes of the glucose produced in photosynthesis. [2]

Solutions

2.1 carbon dioxide + water → glucose + oxygen.

2.2 needed to make chlorophyll.

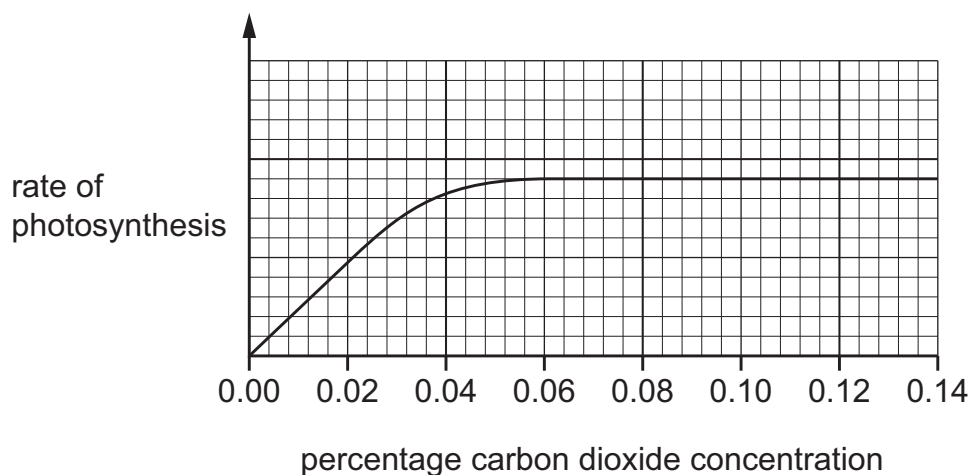
3.1 B. Photosynthesis needs chlorophyll (and light).

3.2 (a) another factor is now limiting; e.g. CO₂ concentration or temperature is in short supply.

(b) carbon dioxide concentration (or temperature).

3.3 any two of: stored as starch; made into cellulose; used in respiration; converted to sucrose for transport.

- 8 The graph shows the rate of photosynthesis of a plant in full sunlight in different concentrations of carbon dioxide. All other factors were kept constant.



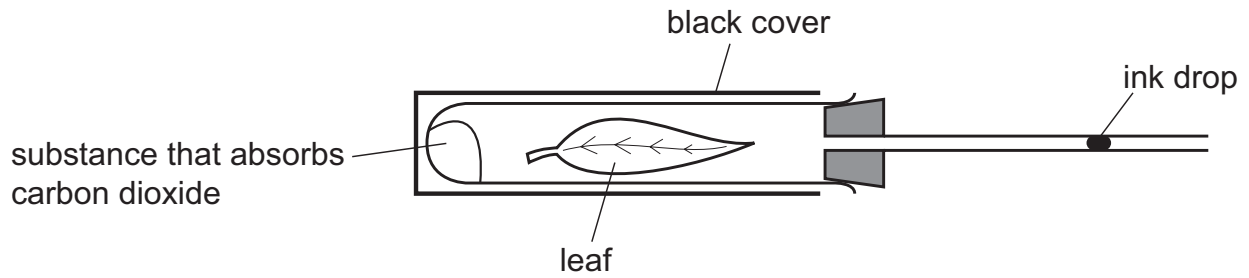
What limits the rate of photosynthesis at 0.02% carbon dioxide concentration?

- A carbon dioxide concentration
- B humidity
- C light intensity
- D temperature

- 8 Which substance contains magnesium ions?

- A cellulose
- B chlorophyll
- C glucose
- D glycerol

10 The diagram shows an experiment to investigate gas exchange in a leaf.



In which direction does the ink drop move and for what reason?

	direction	reason
A	towards the leaf	photosynthesis
B	towards the leaf	respiration
C	away from the leaf	photosynthesis
D	away from the leaf	respiration

- 5 (a) (i) State the balanced chemical equation for photosynthesis.

..... [2]

- (ii) Chlorophyll is needed for photosynthesis.

State the name of the mineral ion needed to make chlorophyll.

..... [1]

- (iii) State the name of the carbohydrate used for energy storage in a plant.

..... [1]

- (b) A plant shoot was placed in a light-proof box. A hole was cut in one side of the box and a light was shone into the box.

Fig. 5.1 shows the plant shoot at the start of the investigation and after one week.

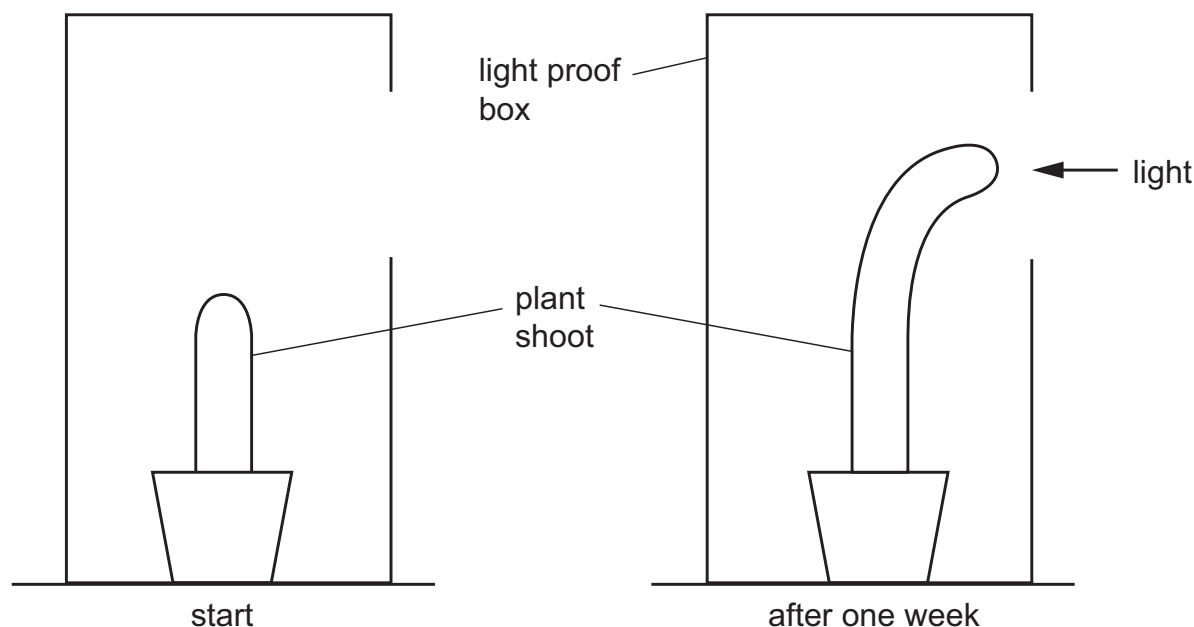


Fig. 5.1

- (i) Identify the tropic response shown by the plant shoot in Fig. 5.1.

..... [1]

(ii) Explain the chemical control of the tropic response shown by the plant shoot in Fig. 5.1.

[4]

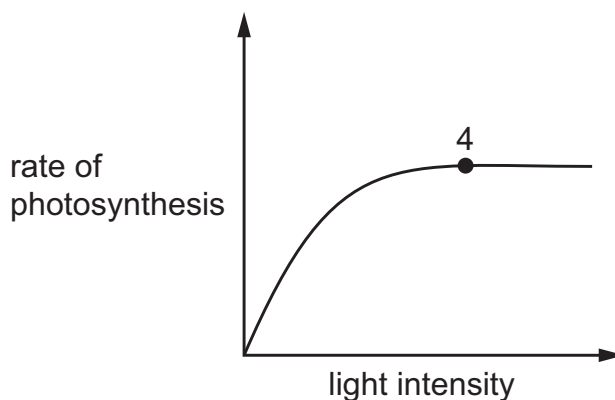
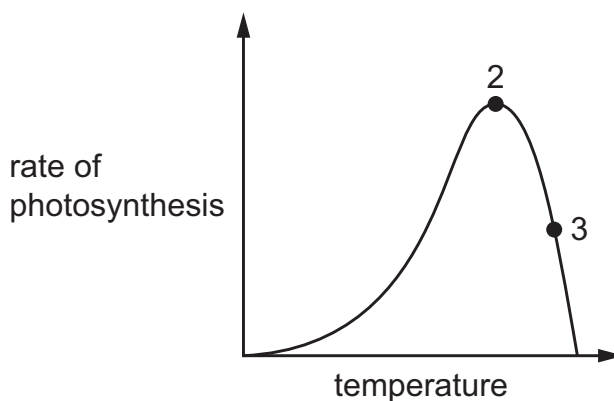
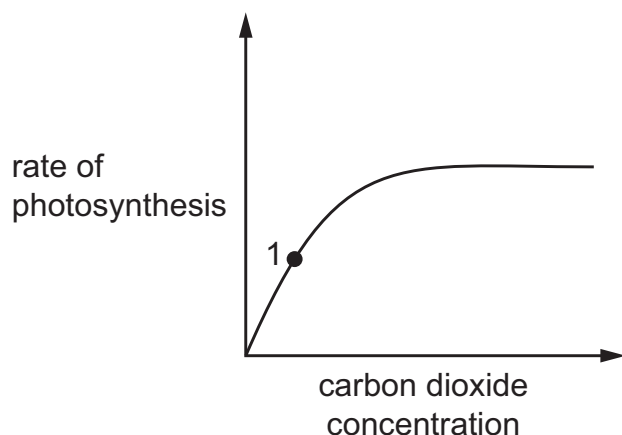
(iii) Explain how the type of tropic response shown in Fig. 5.1 is an advantage to a plant.

[2]

[Total: 11]

- 9 A student investigated how the rate of photosynthesis is affected by carbon dioxide concentration, temperature and light intensity.

The graphs show the results.



What is a correct statement for these results?

- A Carbon dioxide concentration is a limiting factor at 1.
- B No enzymes are denatured at 3.
- C Light intensity is a limiting factor at 4.
- D Temperature is a limiting factor at 2.

- 6 What is the balanced chemical equation for photosynthesis?

- A $3\text{CO}_2 + 3\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 3\text{O}_2$
- B $6\text{CO}_2 + 6\text{O}_2 \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O}$
- C $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- D $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow 6\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

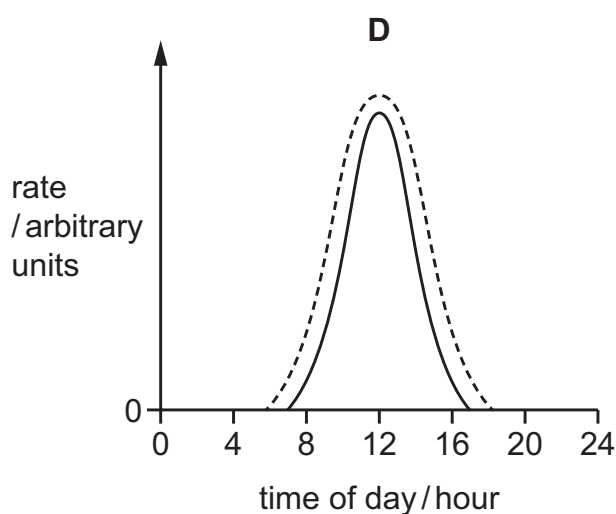
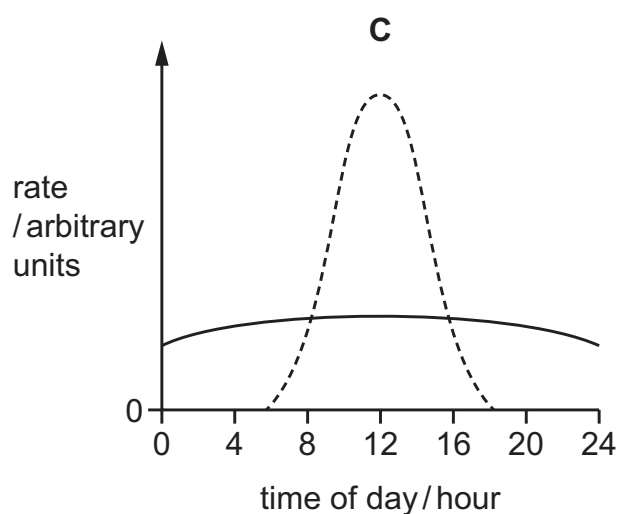
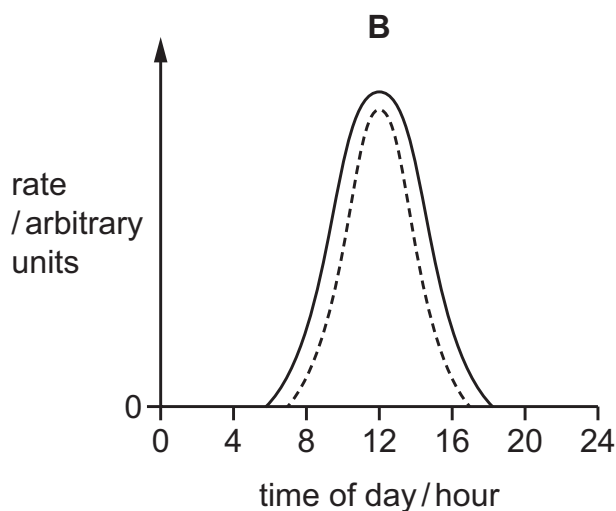
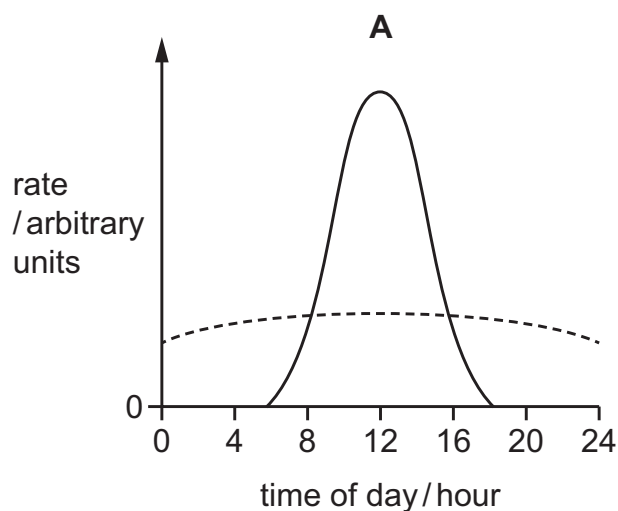
- 10** The graphs show how the rate of photosynthesis and the rate of respiration in a plant changed over a 24-hour period.

Which graph shows the correct rate of photosynthesis and rate of respiration?

key

—— photosynthesis

----- respiration



6.2 Leaf structure

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS stomata 气孔 • mesophyll 叶肉 • cuticle 角质层 • palisade mesophyll 栅栏叶肉 • air spaces 气腔

Objective

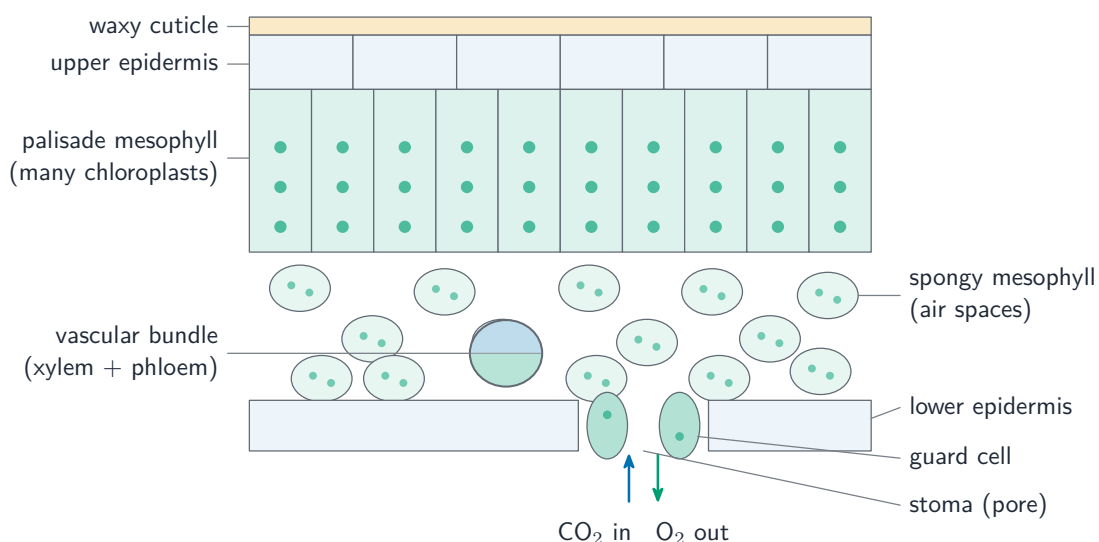
Build the skills to answer exam questions on **leaf structure** 叶的结构 — the tissues of a leaf and how each is **adapted** 适应 for photosynthesis and gas exchange.

You must be able to:

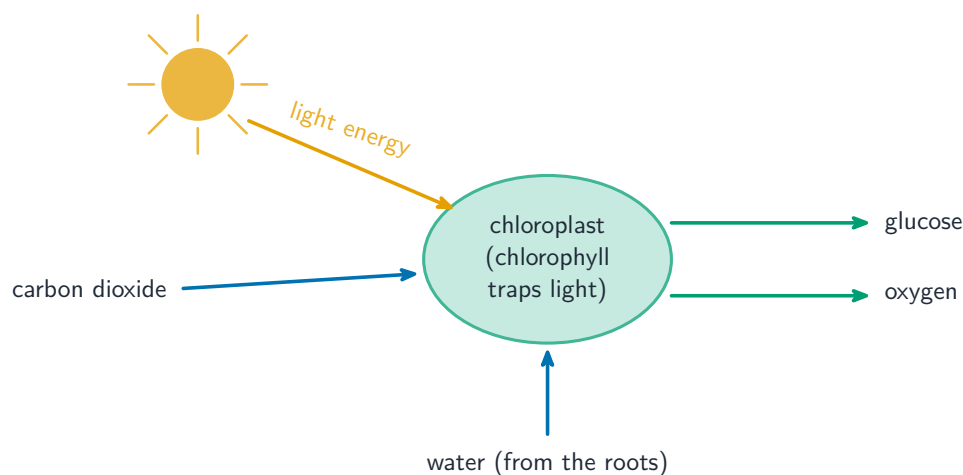
- name the leaf tissues and give the job of each
- explain how leaf features suit photosynthesis
- describe the role of stomata and guard cells

1 Worked examples

■ The leaf in cross-section



Each tissue is adapted for photosynthesis and gas exchange



The leaf is the organ of photosynthesis

- **palisade mesophyll:** packed with chloroplasts, near the top → most photosynthesis.
- **spongy mesophyll:** air spaces → gases move easily.
- **stomata** (lower surface) with **guard cells** → let CO₂ in, O₂ out.

2 Practice

2.1 Name the leaf tissue where most photosynthesis happens. [1]

2.2 State the function of the stomata. [1]

3 Exam-style questions

3.1 Palisade mesophyll cells are well suited to photosynthesis because they: [1]

- A have no chloroplasts
- B are packed with chloroplasts near the top of the leaf
- C are deep in the leaf
- D have a thick cuticle

3.2 A leaf is broad and thin.

(a) Explain how being broad helps the leaf. [1]

(b) Explain how the air spaces in the spongy mesophyll help. [2]

3.3 State the role of the guard cells. [2]

Solutions

2.1 the palisade mesophyll.

2.2 they let carbon dioxide in and oxygen out (gas exchange).

3.1 B. Palisade cells are packed with chloroplasts near the top.

3.2 (a) a large surface area catches more light.

(b) the air spaces let gases (CO_2 and O_2) move easily to and from the cells.

3.3 the guard cells open and close the stomata to control gas exchange (and water loss).

- 9 A student wrote some statements about the palisade mesophyll and spongy mesophyll tissues.
- 1 The spongy mesophyll tissue is near the stomata for gas exchange.
 - 2 Only palisade mesophyll cells have chloroplasts for photosynthesis.
 - 3 Palisade cells are closely packed but there are air spaces in the spongy mesophyll tissue.

Which statements are correct descriptions of the two tissues?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

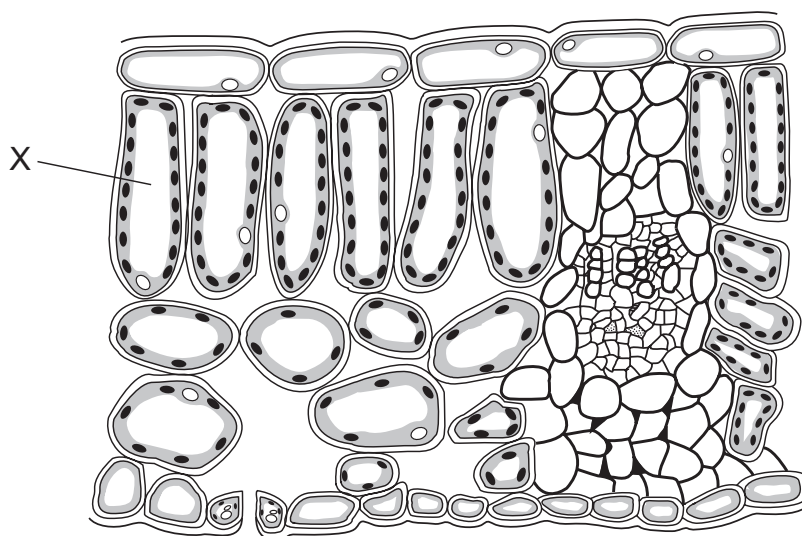
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- 8 Which descriptions of adaptations for photosynthesis are correct for spongy mesophyll tissue?

	air spaces for efficient gas exchange	long, rectangular cells to absorb light
A	yes	yes
B	yes	no
C	no	yes
D	no	no

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- 10 The diagram shows a cross-section of part of a leaf.

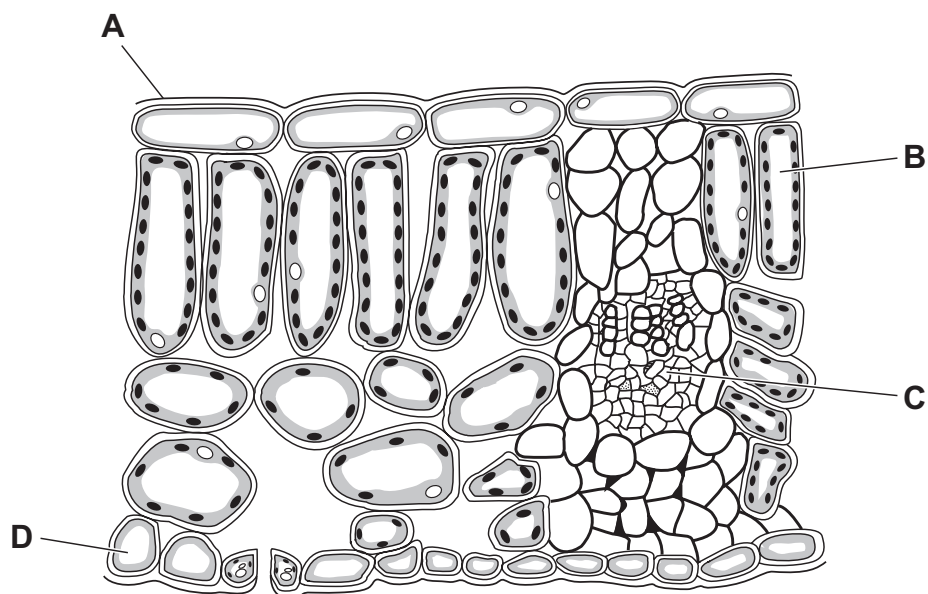


What is the cell labelled X?

- A** epidermis
B guard cell
C palisade mesophyll
D spongy mesophyll

9 The diagram shows part of a cross-section of a leaf.

Which structure is a palisade mesophyll cell?



11 The photomicrograph shows part of the lower surface of a leaf.



What is the structure labelled X?

- A guard cell
- B palisade mesophyll cell
- C spongy mesophyll cell
- D xylem vessel

- 5 (a) Fig. 5.1 shows a cross-section of a leaf.

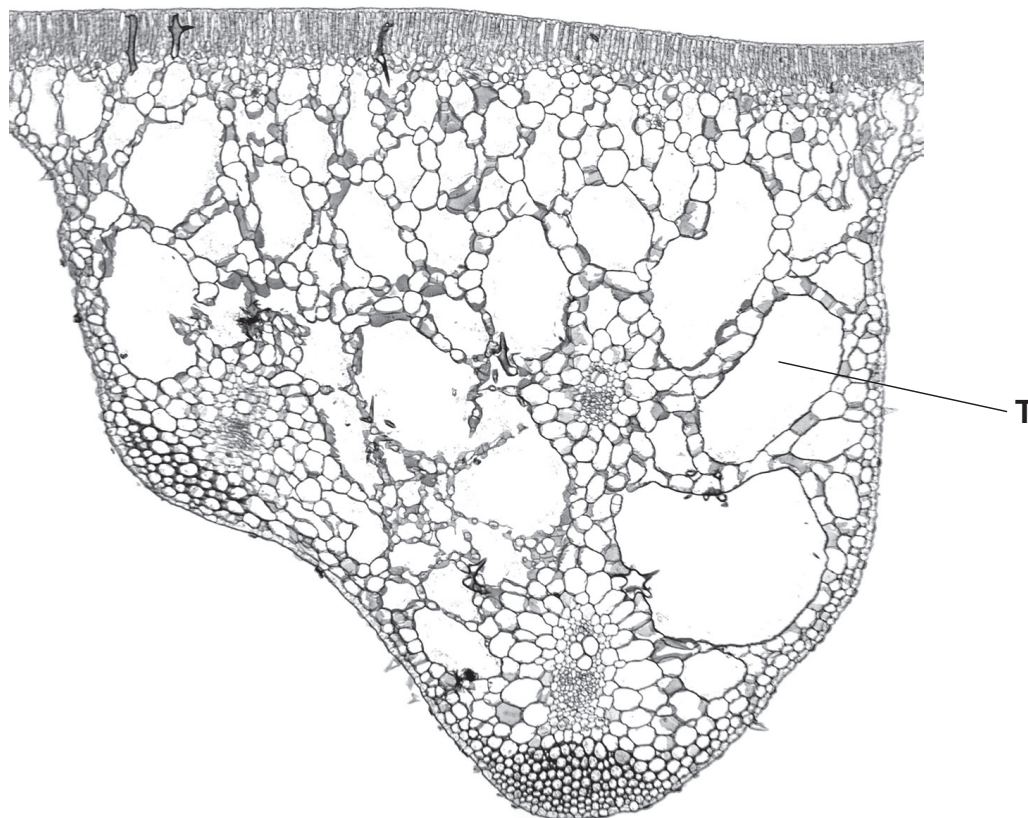


Fig. 5.1

- (i) On Fig. 5.1, draw a circle around **one** vascular bundle. [1]
- (ii) On Fig. 5.1, draw a label line and the letter **X** to identify the palisade mesophyll tissue. [1]
- (iii) State the name of the cell structure in palisade mesophyll cells where photosynthesis occurs. [1]
-
- (iv) Describe the functions of the tissues in a vascular bundle in a leaf.
-
-
-
-
-
-
-
-

(b) The leaf shown in Fig. 5.1 is from an aquatic plant adapted to live in water. The leaves float on the surface of the water.

(i) State the term used to describe plants that are adapted to live in water.

..... [1]

(ii) Identify feature **T** shown in Fig. 5.1 **and** explain how this feature adapts the leaf to float on the surface of the water.

feature **T**

explanation

..... [2]

(iii) Explain **one** other adaptation of this group of aquatic plants.

.....

.....

..... [2]

[Total: 12]