Week 10

IGCSE Biology

Homework bundle for this week

本周作业合集

exercises.lol

Contents 目录

IGCSE Biology Name: _____ Score: _____

1. Xylem transports:
   - ☐ water and minerals up the plant
   - ☐ sugars down the plant
   - ☐ oxygen to the roots
   - ☐ sugars to the leaves
2. Water enters a root hair cell by:
   - ☐ osmosis
   - ☐ active transport
   - ☐ respiration
   - ☐ photosynthesis
3. Transpiration is the loss of:
   - ☐ water vapour from the leaves
   - ☐ sugars from the roots
   - ☐ oxygen from the stomata
   - ☐ minerals from the soil
4. Translocation is the transport of:
   - ☐ sugars in the phloem
   - ☐ water in the xylem
   - ☐ oxygen in the blood
   - ☐ minerals in the roots
5. Phloem transports:
   - ☐ sugars made in the leaves
   - ☐ only water
   - ☐ only minerals
   - ☐ oxygen
6. Which increase the rate of transpiration? (Select all that apply.)
   - ☐ more wind
   - ☐ higher temperature

☐ more light

☐ higher humidity

Tick every correct option.

7. Phloem can transport substances both up and down the plant.

   ☐ True ☐ False

8. Evaporation of water from the leaves helps pull water up the plant.

   ☐ True ☐ False

9. A plant wilts if it loses water faster than it can take it up.

   ☐ True ☐ False

10. Phloem can carry sugar both up and down the plant, depending on need.

    ☐ True ☐ False

IGCSE Biology

1. **water and minerals up the plant**

   Xylem carries water and minerals upward.

2. **osmosis**

   Water moves in by osmosis down the water gradient.

3. **water vapour from the leaves**

   Transpiration is water vapour loss, mainly through stomata.

4. **sugars in the phloem**

   Translocation moves sugars in the phloem.

5. **sugars made in the leaves**

   Phloem carries sugars (translocation).

6. **more wind; higher temperature; more light**

   Higher humidity slows transpiration; the others speed it up.

7. **True**

   Translocation moves sugars to wherever they are needed.

8. **True**

   This creates the transpiration stream.

9. **True**

   Flaccid cells can no longer support the plant.

10. **True**

    Direction depends on where the sources and sinks are.

IGCSE BIOLOGY • EXERCISE SHEET

8.1 Xylem and phloem

Name: _____ Class: _____ Date: _____ **Total: 27 marks**

KEY WORDS xylem 木质部 • phloem 韧皮部 • sucrose 蔗糖 • mineral ions 矿物质离子 • vascular bundles 维管束

Objective

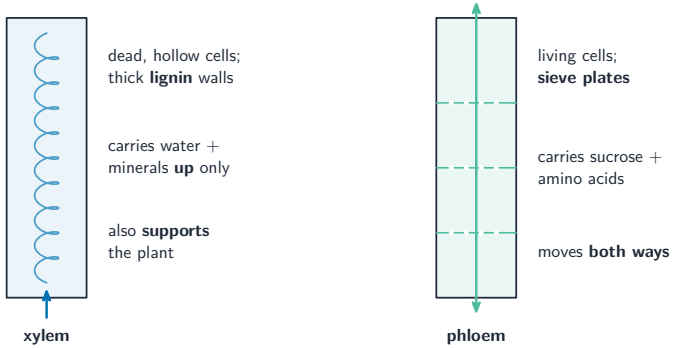
Build the skills to answer exam questions on **xylem and phloem** 木质部与韧皮部 — what each carries, where they are, and how xylem is adapted.

You must be able to:

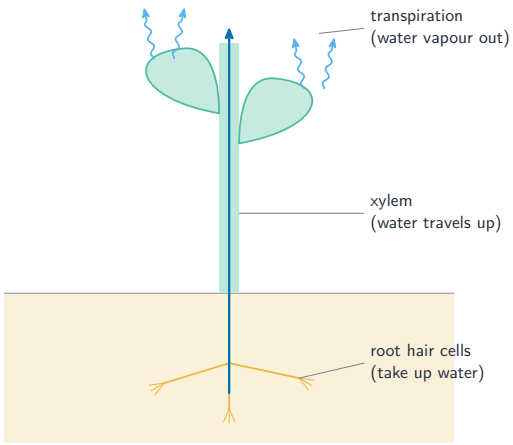
- state what xylem and phloem transport, and the direction
- describe the structure of xylem (dead, lignified tubes)
- locate xylem and phloem in a vascular bundle

1 Worked examples

The two transport tissues



Xylem: water + mineral ions, upward, + support. Phloem: sucrose + amino acids



Xylem and phloem run through the plant

- **xylem cells:** dead and hollow, with thick **lignin** walls; joined end to end into one pipe.

Two tissues, four contrasts

	xylem 木质部	phloem 韧皮部
carries	water and mineral ions	sucrose and amino acids
direction	**upwards only**, roots → leaves	**both ways**, source → sink
cells	dead, hollow, no end walls; lignified	living sieve tube elements with perforated sieve plates, plus companion cells
process	passive — pulled by transpiration	active — needs energy from the companion cells

Learn "source and sink", because that is what makes phloem two-way. A **source** is where sucrose is made or released — a photosynthesising leaf in summer, a storage organ in spring. A **sink** is where it is used or stored — a growing root tip, a developing fruit. The direction of flow depends on which organ is which **at that time of year**, so the same tuber is a sink in summer and a source in spring.

Why xylem is built as it is. The cells are **dead and hollow with no end walls**, forming a continuous tube of the lowest possible resistance; **lignin** in the walls keeps the vessel from collapsing under the tension of the transpiration pull, and waterproofs it.

Locating them in a diagram is a common one-mark question: in a root the xylem

is in the **centre** (in a star shape) with phloem between the arms; in a stem the vascular bundles are in a **ring** with xylem on the **inside** and phloem on the **outside**; in a leaf they are in the midrib and veins, xylem again on top.

Worked example. A ring of bark is removed all the way round a tree trunk. Explain why sugar accumulates above the ring and the roots eventually die.

1. The bark carries the phloem; removing it cuts the phloem but leaves the xylem, which is deeper in.
2. Sucrose made in the leaves is translocated down the phloem, so it accumulates just above the cut.
3. No sucrose can reach the roots, so they have no supply of glucose for respiration and die.
4. Water still reaches the leaves at first, because the xylem is intact — which is why the tree does not wilt immediately.

2 Practice

2.1 State what the xylem transports. [1]

2.2 State what the phloem transports. [1]

2.3 State one substance carried by xylem and one carried by phloem. [2]

2.4 Explain why xylem cells are dead and lignified. [2]

2.5 State what is meant by a source and a sink in translocation. [2]

3 Exam-style questions

3.1 Xylem vessels are well adapted to carry water because they are: [1]

- **A** living cells full of cytoplasm
- **B** dead, hollow tubes with lignin walls
- **C** thin-walled and branched
- **D** packed with chloroplasts

3.2 Xylem and phloem run through the plant.

(a) State the additional role of xylem (besides transport). [1]

(b) Explain how the structure of xylem suits carrying water. [2]

3.3 The diagram shows a transverse section through a plant stem, with the vascular bundles labelled.

(a) State where the xylem and the phloem are found in a stem, relative to each other. [2]

(b) Complete the table comparing xylem and phloem. [4]

Feature	Xylem	Phloem
substances carried		
direction of transport		
living or dead cells		
end walls		

(c) Explain why translocation in the phloem can occur in two directions but transport in the xylem cannot. [3]

(d) A complete ring of bark is removed from around a tree trunk. Explain why sugars build up above the ring, and why the roots eventually die. [4]

(e) Explain why the leaves do not wilt immediately after the bark is removed. [2]

Solutions

2.1 water and mineral ions (upward).

2.2 sucrose and amino acids.

2.3 Xylem: water or mineral ions; phloem: sucrose or amino acids.

2.4 Being dead and hollow with no end walls leaves a continuous tube offering little resistance to water flow; lignin strengthens the wall so the vessel does not collapse under the tension of the transpiration pull.

2.5 A source is where sucrose is made or released, such as a photosynthesising leaf; a sink is where it is used or stored, such as a growing root tip.

3.1 B. Xylem cells are dead, hollow tubes with lignin walls.

3.2 (a) it supports the plant.
(b) the cells are dead and hollow, so water flows through freely; they are joined end to end into one continuous lignified pipe.

3.3 (a) The vascular bundles form a ring; the xylem is on the inside of each bundle and the phloem on the outside.
(b) Carried: water and mineral ions / sucrose and amino acids. Direction: upwards only / both directions. Cells: dead / living. End walls: absent / present as perforated sieve plates.
(c) Phloem transports sucrose from a source to a sink; which organ is the source and which the sink changes with the season, so the direction of flow changes with it; xylem transport is driven by transpiration pulling water up from the roots, and that force only ever acts upwards.
(d) The bark contains the phloem, so removing the ring cuts the phloem while leaving the deeper xylem intact; sucrose translocated down from the leaves cannot pass the cut, so it accumulates above it; no sucrose reaches the roots; the root cells therefore have no glucose for respiration, cannot release energy, and die.
(e) The xylem is deeper in the stem and has not been cut, so water is still carried up to the leaves.

Name: IGCSE Biology: **w25 21**

12 What is a structural feature of xylem vessels?

A contain many mitochondria

B made up of cells joined end to end

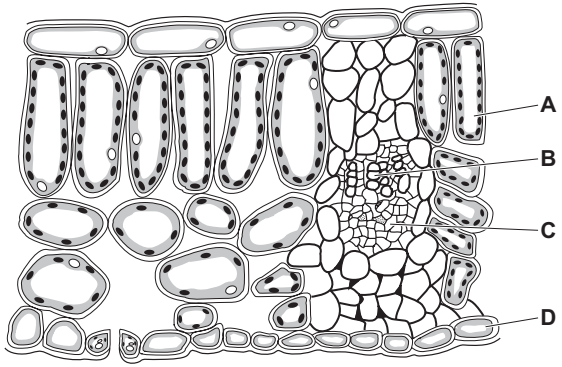
C presence of cross walls

D thin walls

IGCSE Biology: **w25 23**

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

Which part is the xylem?



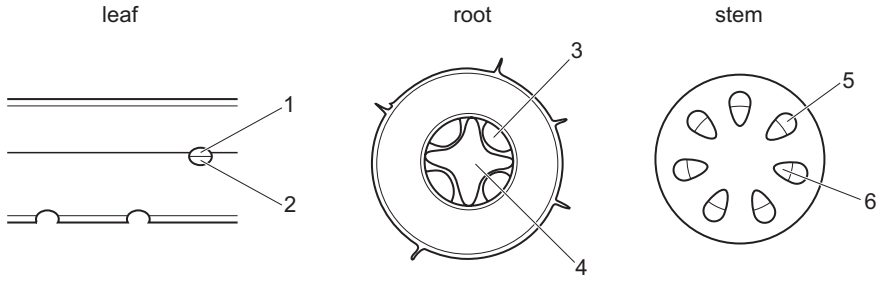
IGCSE Biology: **s25 22**

14 Which row shows the features of xylem vessels?

	vessel walls	mitochondria present
A	thick	yes
B	thick	no
C	thin	yes
D	thin	no

Name: IGCSE Biology: **s25 23**

13 The diagrams show cross-sections of a leaf, a root and a stem.



NOT TO SCALE

In which row do the numbers represent the xylem in the leaf, the root and the stem?

	leaf	root	stem
A	1	3	5
B	1	4	6
C	2	3	5
D	2	4	6

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

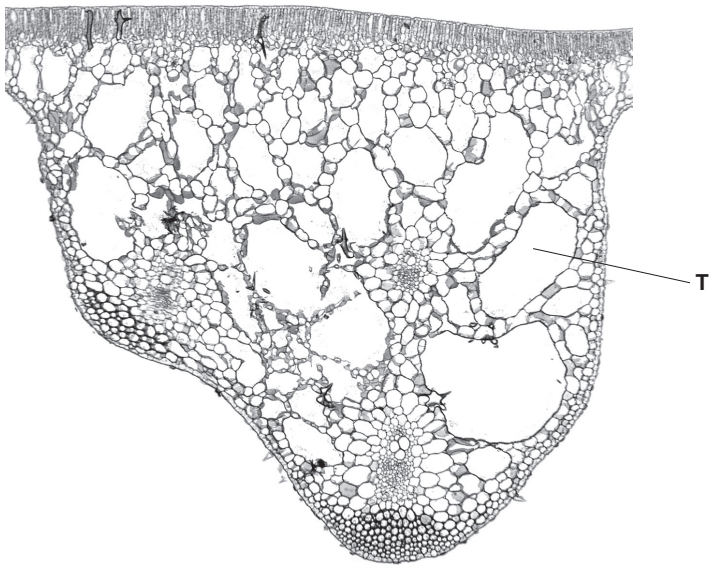


Fig. 5.1

(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.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(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]

IGCSE BIOLOGY • EXERCISE SHEET

8.2 Water uptake

Name: _____ Class: _____ Date: _____ **Total: 7 marks**

KEY WORDS root hairs 根毛 • surface area 表面积 • root hair cells 根毛细胞 • water uptake 水分吸收 • cortex 皮层

Objective

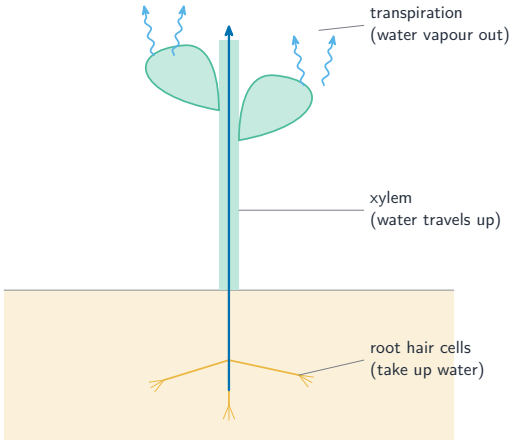
Build the skills to answer exam questions on **water uptake** 水分吸收 — **root hair cells** 根毛细胞 and the water pathway through the plant.

You must be able to:

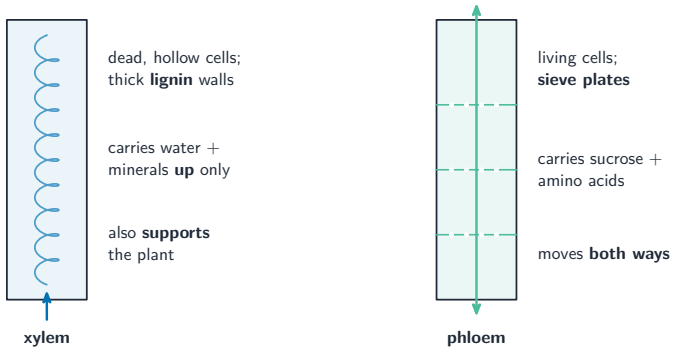
- describe how root hair cells take up water and mineral ions
- explain how root hairs increase the surface area
- state the water pathway through the plant

1 Worked examples

■ Root hairs and the pathway



Pathway: root hair cell → root cortex → xylem → mesophyll cells in the leaf



Water taken up travels in the xylem

- many **root hairs** → very large surface area → fast uptake of water and mineral ions.

2 Practice

2.1 Name the cells through which water enters a plant. [1]

2.2 State the water pathway from the soil to the leaf. [2]

3 Exam-style questions

3.1 Root hairs speed up water uptake because they: [1]

- **A** make food
- **B** give a large surface area
- **C** contain chloroplasts
- **D** store starch

3.2 A white flower is placed in water containing a coloured stain.

(a) State where the stain will appear in the plant. [1]

(b) Explain why this shows the route taken by water. [2]

Solutions

2.1 root hair cells.

2.2 root hair cell → root cortex → xylem → mesophyll (leaf).

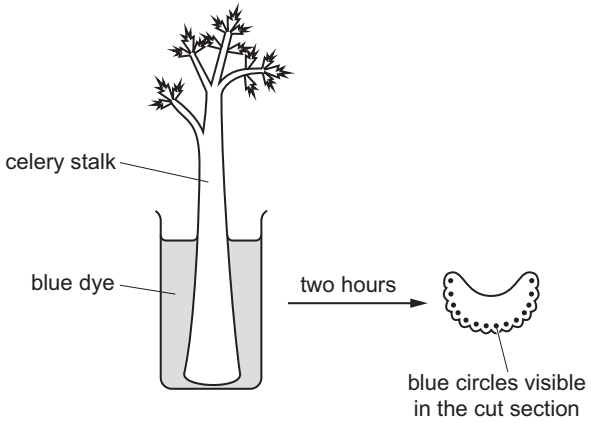
3.1 B. Root hairs give a large surface area for uptake.

3.2 (a) in the veins (xylem) / the petals.
(b) the stain is carried up the xylem with the water; so the coloured parts show the path the water took.

10 A student cut one stalk of celery from a celery plant.

They put the celery stalk into a beaker of blue dye.

The celery stalk was removed from the blue dye after two hours and was cut into sections.



What is shown by the blue circles in the cut sections of celery stalk?

A position of the cortex cells

B position of the palisade cells

C position of the phloem cells

D position of the xylem vessels

3 **(a)** Describe the pathway a water molecule takes from the soil to reach the xylem.

.....

.....

.....

.....

..... [2]

(b) A student investigated the effect of temperature on transpiration.

The student collected four small plants and placed them in beakers filled with water.

Fig. 3.1 shows the apparatus used.

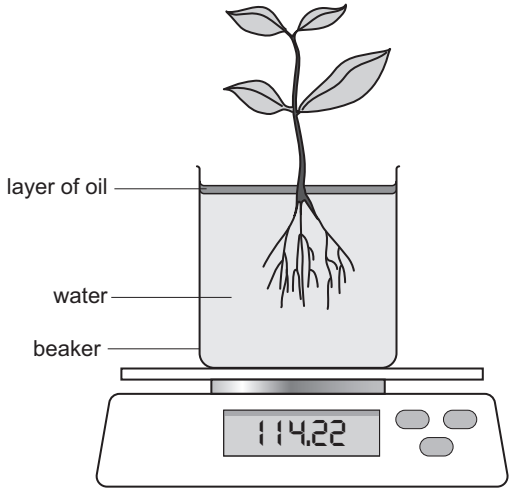


Fig. 3.1

For each plant, the student measured the initial masses of the equipment, water and plant.

Each plant was placed in a different temperature-controlled room for three hours.

After three hours, the student measured the final masses of the equipment, water and plants.

The results are shown in Table 3.1.

Table 3.1

temperature / °C	initial mass / g	final mass / g	transpiration rate / g per hour
15	138.2	135.5	0.9
20	136.1	132.5	1.2
25	137.8	128.5	3.1
30	135.7	118.3	

(i) Using the information in Table 3.1, calculate the transpiration rate in the plant kept at 30 °C.

..... g per hour [1]

(ii) Describe **and** explain the difference in the results for the plants kept at 15 °C and 25 °C.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iii) The investigation was repeated with a plant kept at 25 °C in a lower humidity environment.

Predict the effect of these conditions on the transpiration rate.

Explain your prediction.

.....

.....

.....

.....

..... [2]

(iv) Complete the sentences about water movement through the xylem.

The xylem transports water and ..... .

Xylem cells form a long continuous ..... with thick walls

containing cellulose and ..... .

Water moves upwards in the xylem because of transpiration ..... .

This draws up a ..... of water molecules, held together by

..... between water molecules.

[6]

(c) **(i)** Explain why wilting occurs.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) Marram grass, *Ammophila arenaria*, is a xerophyte.

Fig. 3.2 is a photomicrograph of a cross-section of a marram grass leaf.

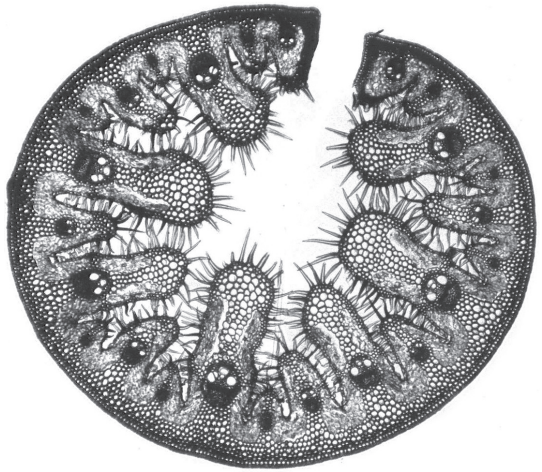


Fig. 3.2

Explain **one** way that the marram grass leaf shown in Fig. 3.2 is adapted to reduce transpiration.

.....

.....

.....

.....

..... [2]

[Total: 20]

1 A student investigated the effect of temperature on the movement of water in celery stalks. The water contained a blue dye.

In plant stems such as a celery stalk, water moves in the xylem tissue within the vascular bundles.

The student used this method:

Step 1 Take two stalks of celery and cut them so that they are both 10 cm long.

Step 2 Prepare an ice-cold water-bath **C** and a warm water-bath **W**.

Place a beaker of blue dye into each water-bath, as shown in Fig. 1.1.

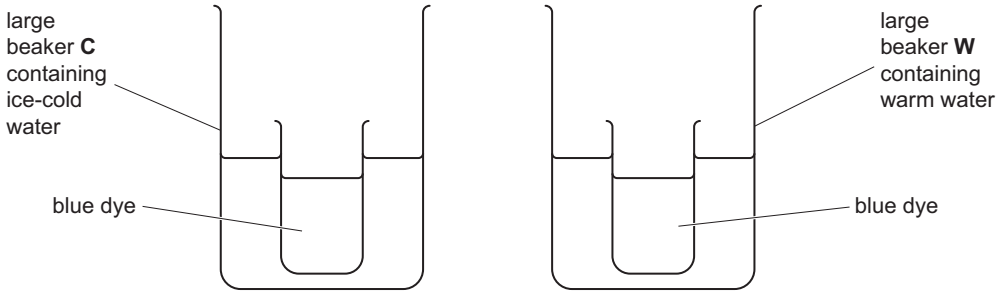


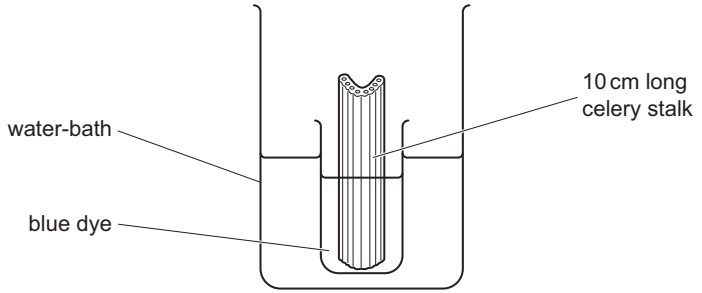
Fig. 1.1

Step 3 Measure the temperatures of the water in water-bath **C** and water-bath **W**.

Step 4 Let the blue dye equilibrate in the water-baths for three minutes.

Step 5 After three minutes, place one celery stalk into each beaker of blue dye, as shown in Fig. 1.2.

Keep the celery stalks in the blue dye for ten minutes.



not to scale

Fig. 1.2

Step 6 After ten minutes, measure the final temperatures of the water in water-bath **C** and water-bath **W**.

(a) (i) Complete Table 1.1 by calculating the change in the water temperature for each water-bath.

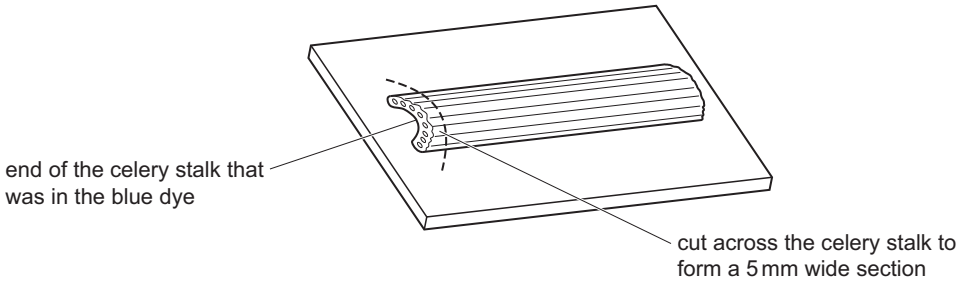
Table 1.1

water-bath	water temperature in step 3 / °C	water temperature in step 6 / °C	change in water temperature / °C
C	4	15	.....
W	40	28	.....

[1]

Step 7 Remove the celery stalk from the blue dye in water-bath **C** and put it on a white tile.

Step 8 Cut a section across the celery stalk 5 mm from the end that was in the blue dye, as shown in Fig. 1.3.



not to scale

Fig. 1.3

Step 9 Examine the xylem tissue of the cut section of celery stalk to see if the blue dye is visible.

Fig. 1.4 shows the position of the xylem tissue in a cut section of a celery stalk.

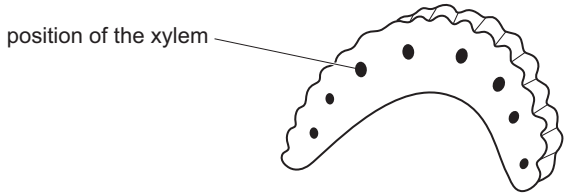


Fig. 1.4

Step 10 If the blue dye is still visible in the celery stalk, cut another 5 mm wide section from the dyed end of the remaining part of the celery stalk.

Continue cutting 5 mm wide sections from the celery stalk until the blue dye is no longer visible in the cut section.

Step 11 Count the number of sections you have cut from the celery stalk that contain the blue dye.

Step 12 Repeat steps 7 to 11 with the celery stalk from water-bath **W**.

The student's results are shown in Fig. 1.5.

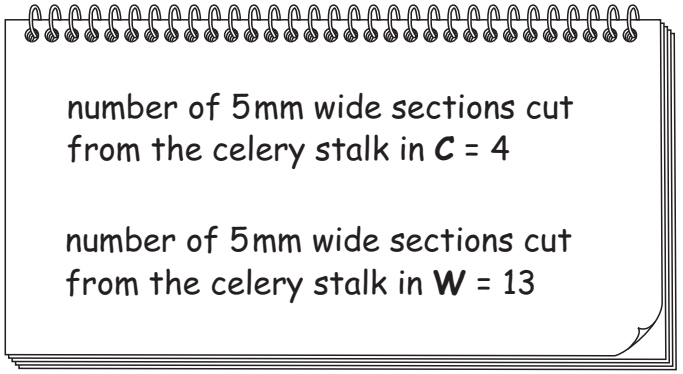


Fig. 1.5

(ii) Prepare a table and record the results shown in Fig. 1.5.

Include the number of sections cut and the total distance moved by the blue dye in each celery stalk.

[4]

(iii) Calculate the rate of movement of the blue dye in the celery stalk in beaker **W**.

Include the unit.

..... [2]

(iv) State a conclusion for this investigation.

.....

.....

..... [1]

(v) This investigation was only done once.

Explain why it is better to repeat an investigation.

.....

.....

..... [1]

(b) Identify **two** variables that were kept constant in this investigation.

1 .....

2 .....

[2]

(c) **(i)** The data you have recorded in Table 1.1 may indicate that there is a source of error with the method used in this investigation.

Identify the possible error, and describe an improvement to the method to reduce the effect of this error.

error .....

.....

improvement .....

.....

.....

[2]

(ii) In step 9, it is difficult to determine precisely the final position of the blue dye in the xylem.

Suggest an improvement to the method that would reduce this source of error.

.....

.....

..... [1]

(d) Xylem forms cylinder-like structures in a celery stalk.

Calculate the volume of a cylinder which is 100 mm long and has a diameter of 0.06 mm.

Use this formula: $v = \pi r^2 h$

Use a value for π of 3.14.

Give your answer to **two** decimal places.

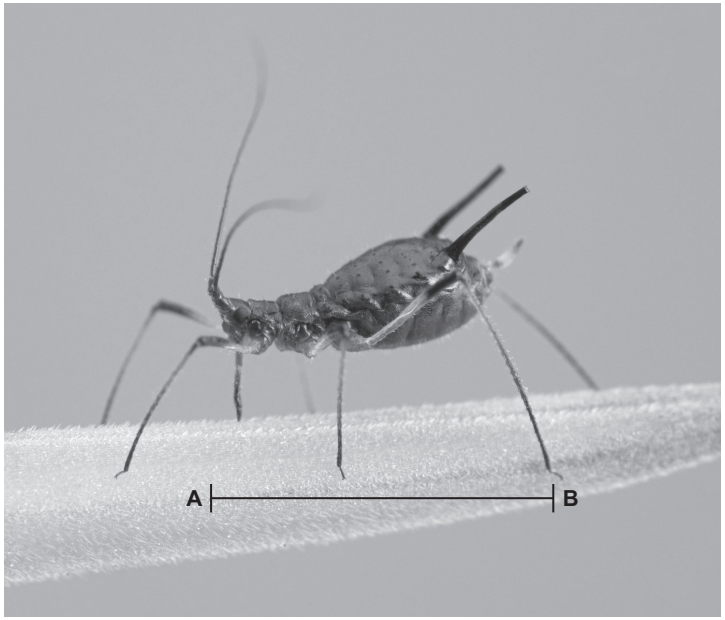
Space for working.

..... mm^3 [2]

(e) Celery plants can be damaged by insect pests feeding on them. This can reduce the growth of the celery plants.

A black aphid and the larvae of a leaf miner fly are both insect pests that damage celery plants.

Fig. 1.6 is a photograph of a black aphid.



magnification ×35

Fig. 1.6

Fig. 1.7 is a photograph of a leaf miner fly.

magnification ×11

Fig. 1.7

(i) Line **AB** represents the body length of the black aphid.

Measure the length of line **AB** in Fig. 1.6.

length of line **AB** ..... mm

Calculate the actual body length of the black aphid using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ in Fig. 1.6}}{\text{actual body length of the black aphid}}$$

Give your answer to **one** significant figure.

Space for working.

..... mm
[3]

(ii) State **three** ways that the leaf miner fly shown in Fig. 1.7 differs from the black aphid shown in Fig. 1.6.

1 .....

.....

2 .....

.....

3 .....

.....
[3]

(f) Fig. 1.8 is a photograph of a celery leaf.

Fig. 1.8

Draw a large diagram of the celery leaf shown in Fig. 1.8.

[4]

IGCSE BIOLOGY • EXERCISE SHEET

8.3 Transpiration

Name: _____ Class: _____ Date: _____ **Total: 22 marks**

KEY WORDS transpiration 蒸腾作用 • humidity 湿度 • temperature 温度 • wind speed 风速 • stomata 气孔

Objective

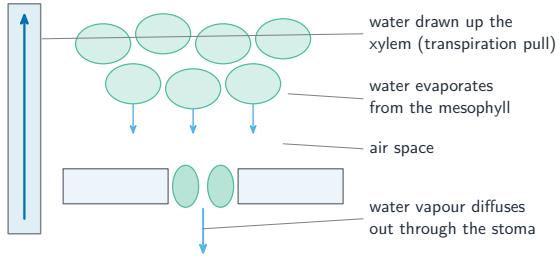
Build the skills to answer exam questions on **transpiration** 蒸腾作用 — what it is, the factors affecting its rate, and the **transpiration pull** 蒸腾拉力.

You must be able to:

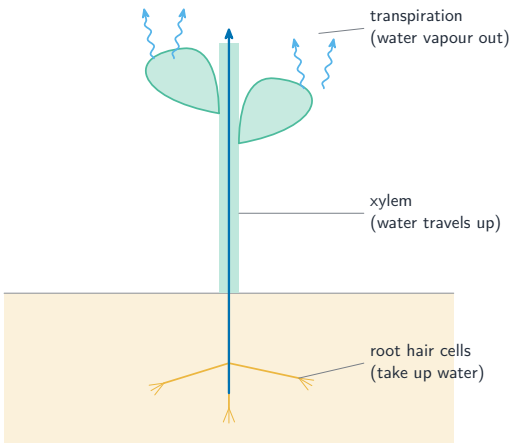
- describe transpiration (evaporation then diffusion out of the stomata)
- explain how temperature, wind and humidity affect the rate
- describe how the transpiration pull moves water up the xylem

1 Worked examples

■ **Transpiration**



Water evaporates from the wet mesophyll into the air spaces, then diffuses out of the stomata



Transpiration pulls water up the xylem pathway

- **faster when:** hotter (more evaporation), windier (vapour carried away), drier air.
- **transpiration pull:** water leaving the leaf pulls a column of water up the xylem.

2 Practice

2.1 Define transpiration. [1]

2.2 State the effect of higher wind speed on transpiration rate. [1]

3 Exam-style questions

3.1 Transpiration is fastest in conditions that are: [1]

- **A** cold, still and humid
- **B** hot, windy and dry
- **C** cold and dark
- **D** warm and very humid

3.2 Water vapour is lost from the leaves.

(a) Describe the two steps by which water leaves the leaf. [2]

(b) Explain why a higher temperature increases the rate of transpiration. [2]

3.3 Explain how the transpiration pull moves water up the xylem. [2]

3.4 A student measured the mass lost by a leafy shoot in four conditions, each for one hour.

Condition	Mass lost / g
A still air, 20 °C	1.2
B moving air (fan), 20 °C	2.8
C still air, 30 °C	2.1
D still air, 20 °C, in a plastic bag	0.3

(a) Explain the result for each of **B**, **C** and **D** compared with **A**. [6]

(b) State why measuring mass loss is a fair way to measure the rate of transpiration. [2]

(c) Describe how water moves from the soil, through the plant, to the air. [3]

(d) State **two** variables the student had to keep the same for the comparison to be fair. [2]

Solutions

2.1 the loss of water vapour from the leaves (of a plant).

2.2 it increases the rate.

3.1 B. Hot, windy and dry conditions give the fastest transpiration.

3.2 (a) water evaporates from the wet mesophyll cells into the air spaces; the water vapour diffuses out through the stomata.
(b) higher temperature makes water evaporate faster from the mesophyll, so more diffuses out.

3.3 as water leaves the leaf it pulls more water up behind it; the water molecules stick together and are drawn up the xylem as a column.

3.4 (a) **B** — moving air blows away the water vapour outside the stomata, keeping the concentration gradient steep so diffusion out is faster. **C** — higher temperature gives the water molecules more energy, so they evaporate from the mesophyll cells faster and diffuse faster. **D** — the bag traps water vapour, so the air just outside the leaf becomes very humid; the gradient is almost gone, so almost no water diffuses out.
(b) Almost all the mass a shoot loses is water leaving through the stomata; so the mass lost each hour is a good measure of how much water has been transpired.
(c) Water is absorbed from the soil by the root hair cells by **osmosis**; it travels up the stem in the **xylem** vessels; it evaporates from the mesophyll cell surfaces and diffuses out through the stomata as water vapour.
(d) The same shoot, or shoots with the same leaf area, so the surface losing water is the same; the same starting time and length of run, and the same light intensity, since light opens the stomata.

11 Which process moves water from the surfaces of the mesophyll cells into the air spaces during transpiration?

A active transport

B circulation

C evaporation

D osmosis

12 The mass of water lost from a plant was investigated.

The leaves of the plant were covered with a type of grease that acts as a waterproof barrier.

The environmental conditions remained the same throughout the experiment.

The table shows the results of the investigation.

treatment	mass lost in seven days / g
no grease applied	12.0
grease applied only to the upper surface of every leaf	8.7
grease applied to both surfaces of every leaf	0.0

What is the mean daily rate of water loss through the upper surface of the leaves?

A 0.47 g / day **B** 1.24 g / day **C** 1.71 g / day **D** 3.30 g / day

13 Which environmental conditions will result in the highest rate of transpiration?

	high air humidity	very windy	low air temperature
A	no	no	yes
B	no	yes	no
C	yes	yes	yes
D	yes	no	no

5 A student investigated the effect of humidity on water vapour loss in plant leaves. As water vapour was lost, the mass of the leaves decreased.

Similar-sized leaves were collected from one species of plant.

The leaves were divided into two groups, **A** and **B**. The leaves in group **A** were placed in a low humidity environment and the leaves in group **B** were placed in a high humidity environment. The leaves in each group were kept in their environment for 12 hours.

The temperature in each environment was maintained at 20 °C.

The mass of the leaves in each group was measured at the start of the investigation and then every hour throughout the 12-hour period.

The student calculated the mass of water vapour lost as a percentage of the starting mass of the leaves for each group.

Fig. 5.1 shows the student's results.

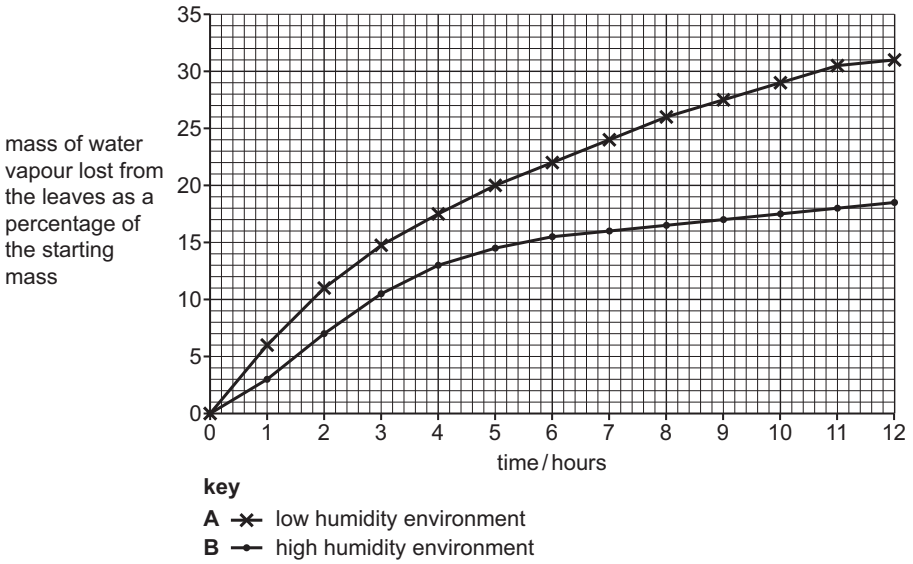


Fig. 5.1

(a) (i) State the name of the process by which water vapour is lost from plant leaves.

..... [1]

(ii) Compare **and** explain the effects of high and low humidity shown in Fig. 5.1.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(iii) The students repeated the investigation at a temperature of 35 °C.

The leaves were kept in a low humidity environment.

Draw a line **on the graph** in Fig. 5.1 to predict the results of this investigation. [1]

(b) Humans also lose water vapour from their bodies by sweating.

(i) Explain how sweating helps a person to maintain a constant internal body temperature.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State **one** other way that humans lose water vapour from their bodies.

.....

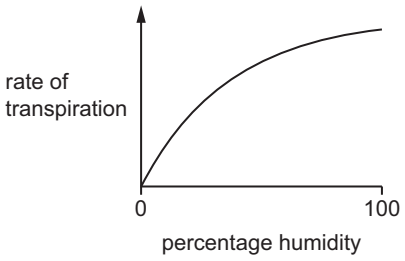
.....

..... [1]

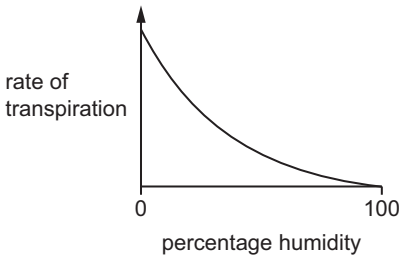
[Total:11]

13 Which graph shows the effect of humidity in the air on the rate of transpiration in a plant?

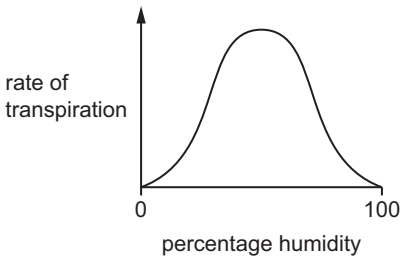
A



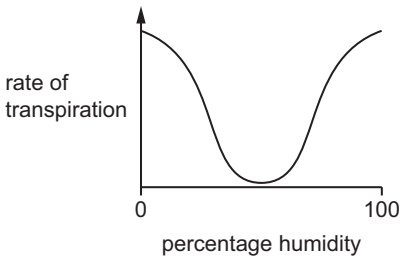
B



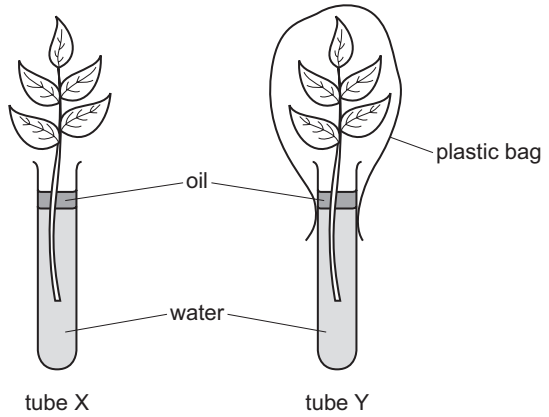
C



D



15 A student wanted to investigate the effect of humidity on transpiration. She set up two sets of apparatus with identical-sized plants of the same species.



The masses of the water in both tubes were measured at the start of the investigation and again after five days. The table shows the results of the investigation.

tube	mass of the water in the tube at the start / g	mass of the water in the tube at the end / g
X	40.3	34.6
Y	41.0	39.4

Which statement describes and explains these results?

A Transpiration in tube Y was higher than in tube X as the plastic bag decreased the humidity.

B Transpiration in tube Y was higher than in tube X as the plastic bag increased the humidity.

C Transpiration in tube Y was lower than in tube X as the plastic bag decreased the humidity.

D Transpiration in tube Y was lower than in tube X as the plastic bag increased the humidity.

15 Which conditions cause the highest rate of transpiration?

A high temperature, high wind speed and high humidity

B high temperature, high wind speed and low humidity

C low temperature, low wind speed and low humidity

D low temperature, low wind speed and high humidity

IGCSE BIOLOGY • EXERCISE SHEET

8.4 Translocation

Name: _____ Class: _____ Date: _____ **Total: 6 marks**

KEY WORDS sinks 库 • translocation 转运 • sources 源 • phloem 韧皮部 • sucrose 蔗糖

Objective

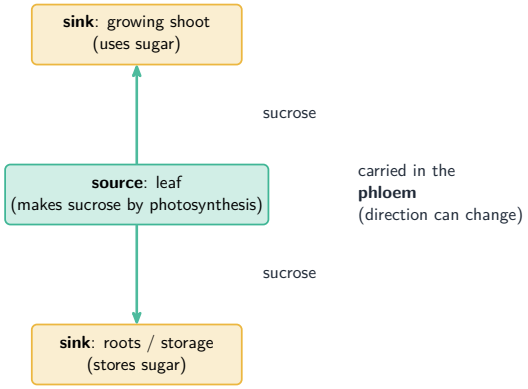
Build the skills to answer exam questions on **translocation** 转运 — the movement of sucrose and amino acids in the phloem from **sources** 源 to **sinks** 库.

You must be able to:

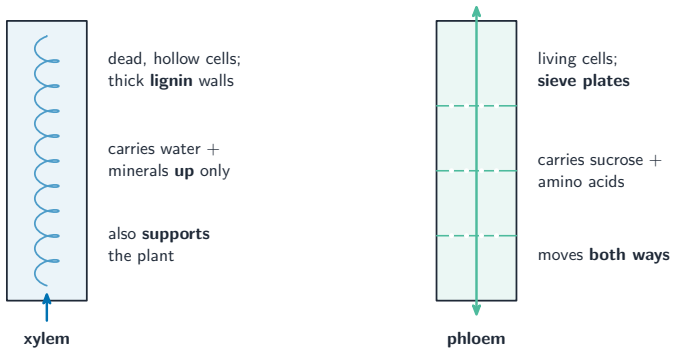
- define translocation
- identify sources and sinks
- explain why the direction can change

1 Worked examples

■ Sources and sinks



Translocation moves sucrose/amino acids from a source to a sink; the direction can change



Translocation moves sugars in the phloem

- **source:** releases sucrose (e.g. a photosynthesising leaf, or a store being used).
- **sink:** uses or stores it (e.g. growing roots, a storage organ).

2 Practice

2.1 Define translocation. [1]

2.2 Give one example of a source. [1]

3 Exam-style questions

3.1 Translocation moves substances in the: [1]

- **A** xylem, upward only
- **B** phloem, from source to sink
- **C** xylem, from leaves to roots
- **D** air spaces

3.2 A leaf making sugar in summer acts as a source.

(a) Name a sink that the sugar might be transported to. [1]

(b) Explain why a potato tuber can be a sink in summer but a source in spring. [2]

Solutions

2.1 the movement of sucrose and amino acids in the phloem (from source to sink).

2.2 a photosynthesising leaf (or a storage organ releasing sugar).

3.1 B. Translocation moves substances in the phloem from source to sink.

3.2 (a) growing roots / a storage organ.
(b) in summer it stores sugar, so it is a sink; in spring it releases stored sugar to grow new shoots, so it becomes a source.

Name: IGCSE Biology: **w25 21**

13 During the growing season, tomato plants produce flowers and fruits.

Which parts of a growing tomato plant are sources, and which parts are sinks?

	flowers	fruits	leaves
A	sink	sink	source
B	sink	source	sink
C	source	sink	source
D	source	source	sink

IGCSE Biology: **w25 22**

13 What is translocation?

A the movement of amino acids and water from sink to source

B the movement of starch and water from source to sink

C the movement of sucrose and amino acids from source to sink

D the movement of sucrose and mineral ions from sink to source

IGCSE Biology: **w25 23**

14 Which statements describe sources and sinks?

1 Palisade mesophyll cells only act as sinks.

2 Roots can act as sinks.

3 Sink cells only receive glucose from the phloem.

4 Spongy mesophyll cells can act as sources.

A 1, 2, 3 and 4

B 1, 3 and 4 only

C 1 and 3 only

D 2 and 4 only

Name: IGCSE Biology: **s25 21**

14 In some countries, spring is the time of year when daffodil plants have green leaves and produce flowers.

Which parts of the daffodil plants act as sources and sinks in spring?

	flowers	leaves
A	sink	sink
B	source	source
C	sink	source
D	source	sink

IGCSE Biology: **s25 23**

14 Which structures in humans and in plants normally carry amino acids?

	arteries	phloem
A	yes	yes
B	yes	no
C	no	yes
D	no	no