

SCIENCE

INTERACTIVE ASSESSMENT QUESTIONS BASED ON STANDARD PRACTICAL EXERCISES FOR REVISION AND EXAMINATION PRACTICE

Biology Part 3

LEARNING VERSION

IN THIS LEARNING VERSION ANSWERS ARE IMMEDIATELY AND VISIBLY MARKED, CORRECT ANSWERS ARE INDICATED ON REQUEST, AND END OF SECTION TOTALS AND PERCENTAGES SHOWN ON SCREEN.

SOME OF THE MORE DIFFICULT QUESTIONS HAVE DROP DOWN HELP BOXES WHICH REVEAL INFORMATION WHEN THE CURSOR IS PASSED OVER THE QUESTION MARK. WHEN PRINTED OUT ONLY THE QUESTIONS SHOW, THEREFORE THIS CAN BE USED AS A PAPER VERSION FOR TESTS IF REQUIRED.

The questions are of the Multiple Choice style, where the phrase “Which ONE of the following ...” is implied, but is not always stated.

So that students are reminded of the type of question that requires short written answers, which unfortunately cannot be automatically marked, each topic has one short passage with missing words, which must be identified in their correct sequence.

NB The practical work presented should be familiar to students, either as demonstrations or as procedures they might have carried out themselves in the lab.

The material is NOT presented as a practical guide, and while the methods followed safety guidelines, specific safety issues are NOT dealt with. Visit www.cleapps.org.uk

CONTENTS

The following practical topics have been selected according to exam question frequency to form the basis of revision and examination practice.

Part 1

Diffusion and Osmosis

Heart, Lungs & Smoking

Part 2

Enzyme Reactions

Respiration

Fermentation

Part 3

Leaf Structure and Function

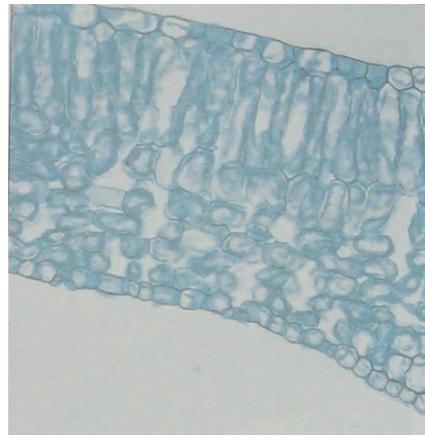
Photosynthesis

Tropisms

Leaf Structure and Function

There are two main groups of flowering plants with respect to leaf structure. Those with grass-like leaves, and those with broader flatter leaves. Despite the slight differences in their structure the leaves all function in the same way. All the questions here relate to the broader flatter leaves.

Practical - If a leaf is cut across in a thin section (transverse section) mounted on a slide and viewed under a microscope, its internal structure can be seen. This is shown in the photograph and drawing below:



Only some cells are drawn in detail

HELP BOX
 PASS CURSOR OVER QUESTION MARK FOR HELP WITH QUESTION NUMBER 1



Photosynthesis requires light, chlorophyll, carbon dioxide and water.

1. Which of the following features of this type of leaf does **NOT** make it more efficient at carrying out photosynthesis?

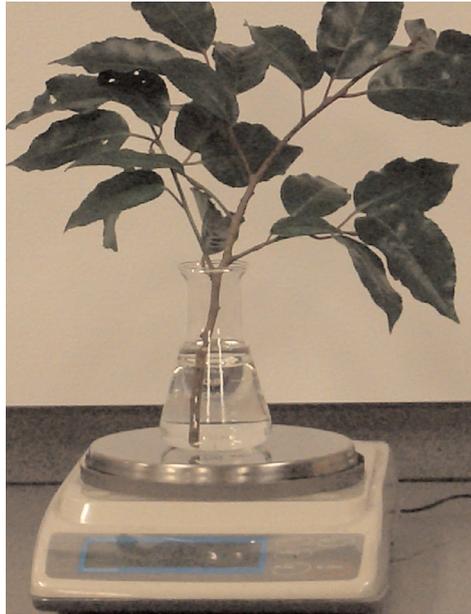
- A - Many chloroplasts in the upper most layers of palisade cells.
- B - Waterproof waxy cuticle or surface film.
- C - Large surface area when compared to its volume ie relatively thin.
- D - Holes in the leaf for the exchange of gases with its surroundings.

2. Which of the following statements about the exchanges between a leaf and the surrounding air is **NOT** correct?

- A - In the dark water vapour enters the leaf.
- B - In the light oxygen leaves the leaf.
- C - In the dark carbon dioxide leaves the leaf.
- D - In the light carbon dioxide enters the leaf.

Leaf Structure and Function

Practical - A woody shoot with leaves was set up as shown in the photograph. The water in the flask was covered by a layer of oil. The initial reading of the balance was noted, and then a series of readings was taken over a period of time, these are shown in the table.



**Mass in g at
30 min intervals**

0	210
30	207
60	205
90	203
120	200
150	196

3. Which of the following is the best explanation of why the balance recorded a loss of mass over the period of time shown in the table?

- A** - The shoot was taking water up from the flask.
- B** - The water in the flask was evaporating.
- C** - The shoot was using up its stores of starch.
- D** - The leaves were losing water vapour to the air.

4. Which of the following, in comparison to the above experiment, would you expect to occur if the experiment was repeated with a fan blowing a stream of air over the leaves of the shoot?

- A** - There would be a loss of mass at a slower rate.
- B** - There would be a smaller loss of mass.
- C** - There would be the same loss of mass.
- D** - There would be a greater loss of mass.

Leaf Structure and Function

HELP BOX

PASS CURSOR OVER
QUESTION MARK
FOR HELP WITH
QUESTION
NUMBER **5**



Most leaves have more stomata (small holes) on the lower surface. Some eg Laurel have none on the upper surface at all.

5. Which **one** of the following would occur if the experiment was repeated with the lower surfaces of the leaves covered with vaseline?

- A** - There would be a greater loss of mass.
- B** - There would be the same loss of mass.
- C** - There would be a smaller loss of mass.
- D** - There would be a gain of mass due to the vaseline.

6. The following passage has four missing words.

The leaf is adapted for efficient photosynthesis. It has a large surface area, cells containing ____ arranged in a way to maximise the absorption of ____, and stomata to allow the uptake of ____, and the release of ____ .

Which of the following has the correct missing words in the sequence as they should appear in the passage.

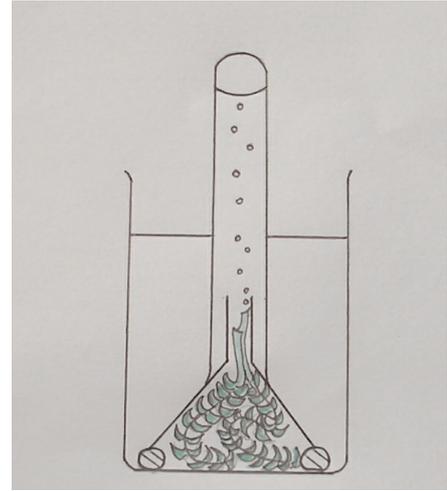
- A** - chloroplasts - carbon dioxide - light - water vapour
- B** - chloroplasts - light - water vapour - carbon dioxide
- C** - chloroplasts - water vapour - light - carbon dioxide
- D** - chloroplasts - light - carbon dioxide - water vapour

Photosynthesis

Practical - The apparatus was set up as shown in the photograph and the drawing. The pondweed had been kept in a container of pond water in bright light at room temperature for a period of 3 hours before being placed in the apparatus. The water in the beaker and tube had been enriched with hydrogen carbonate solution. After a few minutes bubbles of gas were seen coming from the leaves and cut stem of the plant and collecting over the water in the tube above the glass funnel.

HELP BOX

PASS CURSOR OVER
QUESTION MARK
FOR HELP WITH
QUESTION
NUMBER 8



Hydrogen carbonate solution is a source of hydrogen carbonate ions which is the form in which aquatic green plants absorb their carbon dioxide.

7. Which of the following best explains why the pond weed was kept in bright light for a period of 3 hours before being placed in the apparatus?

- A - To make sure photosynthesis was **happening** at a fast rate.
- B - To make sure that the pond weed was pointing to the light.
- C - To stop respiration from interfering with the experiment.
- D - To warm the water to an optimum temperature.

8. Which of the following best explains why the water in the apparatus had hydrogen carbonate solution added?

- A - To make sure the pond weed continued to grow.
- B - To sterilise the apparatus.
- C - To ensure respiration did not interfere with the experiment.
- D - To increase the carbon dioxide for photosynthesis.

9. Which one of the following gases was being collected in the tube?

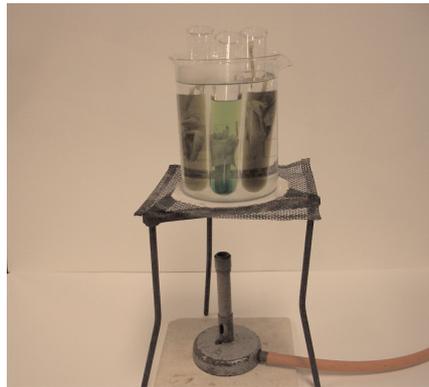
- A - Oxygen
- B - Nitrogen
- C - Carbon dioxide
- D - Carbon monoxide

Photosynthesis

Practical - Glucose, one of the products of photosynthesis, is converted into starch and stored in the cells of the leaf. A leaf can be tested for the presence of starch by the procedure illustrated below.



Leaves boiled in water to break down cell membranes



Leaves boiled in tubes of alcohol in a **hot** waterbath to release chlorophyll from leaves (with Bunsen burner turned off).



Leaves soaked in iodine solution to test for the presence of starch which produces a darker brown/blue-black colour

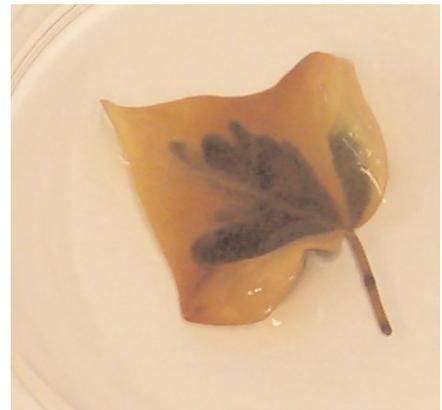
10. In the above procedure which of the following best describes why it is necessary to remove the chlorophyll from the leaves.

- A** - The chlorophyll would colour the starch green.
- B** - The chlorophyll would react with the iodine solution.
- C** - To stop photosynthesis from continuing.
- D** - The chlorophyll would mask the colouration of starch by the iodine solution.



Photosynthesis

Practical - Variegated leaves have a patchy green and white pattern. When a variegated leaf is tested for the presence of starch, the distribution of the starch is the same as that of the green area, as shown in the photographs.



11. Which of the following is the best explanation of why the two patterns are so similar?

- A** - The white area is producing sugars not starch.
- B** - The green area is the only area with living cells.
- C** - The green area is the only one where photosynthesis was occurring.
- D** - The white area is using up starch in respiration.



Photosynthesis

Practical - A plant was kept in the dark for 48 hours so that it used up all its stores of starch (de-starched). A silver foil stencil was attached to one of the leaves, which was then exposed to a bright light (PHOTO 1) for some hours. The leaf was then removed from the plant (PHOTO 2) and tested for the presence of starch, as described for a previous question. When the leaf was placed in iodine solution the result was as shown in PHOTO 3.



PHOTO 1



PHOTO 2

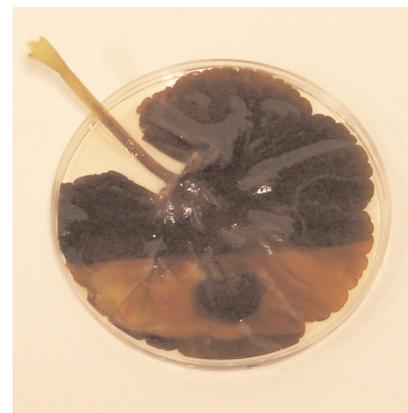


PHOTO 3

12. Which of the following statements best explains why the pattern of the stencil shown in photo 3 was the same as that of the starch in the leaf?

- A** - The stencil marked the leaf.
- B** - Starch was only produced where the light could reach the leaf.
- C** - The leaf used up less starch in the light.
- D** - The leaf only carried out respiration in the dark areas.

13. Which of the following statements is the best explanation of why the plant had to be de-starched at the start of the experiment?

- A** - Photosynthesis would not take place if starch was present.
- B** - To stop respiration taking place.
- C** - So that only starch newly produced during the experiment could be detected.
- D** - So it did not stop light reaching the chlorophyll.

Photosynthesis

HELP BOX

PASS CURSOR OVER
QUESTION MARK
FOR HELP WITH
QUESTION
NUMBER **14**



Photosynthesis produces simple sugars, of which glucose is an example. Many molecules of glucose combine chemically to produce starch.

14. The following passage has four missing words.

Photosynthesis is a process by which light energy trapped by ___ in the leaves of a plant, water and ___, are involved in a series of enzyme controlled reactions to produce ___ and ___. The simple sugar is then converted into insoluble starch and stored in the leaf cells.

Which of the following has the correct missing words in the sequence as they should appear in the passage.

- A** - chlorophyll - nitrogen - carbon dioxide - oxygen
- B** - chlorophyll - carbon dioxide - glucose - oxygen
- C** - haemoglobin - air - glucose - oxygen
- D** - cells - chlorophyll - oxygen - carbon dioxide



Tropisms

Practical - The shoots of green plants, if they do not receive light evenly from all around, grow towards the direction from which the light is coming. This response is known as phototropism, and a similar response of roots to gravity is known as geotropism.

Two dishes of cress seeds were sown on damp cotton wool. One dish was placed in a box with a black lining and a hole at one end, at which a bright light was shone. The other dish of seeds was grown surrounded by light. The results, after the seeds had germinated, are shown in the photographs.



15. Why was the lining of the box painted black?

- A** - To stop the internal reflection of light entering via the hole in the box.
- B** - To mimic the conditions of night time.
- C** - To stop the leaves growing on one side.
- D** - To make sure the plant knew which end the hole was.

16. What is the advantage to the plant of its shoots growing towards light?

- A** - To avoid leaf eating pests that prefer the dark.
- B** - To increase the uptake of carbon dioxide for photosynthesis.
- C** - To increase the release of oxygen produced by photosynthesis from the leaves.
- D** - To increase the absorption of light for photosynthesis.

17. How do plant shoots manage to grow towards light coming from one direction only?

- A** - The stem grows more on the dark side.
- B** - The stem grows less on the dark side.
- C** - The stem contracts on the light side.
- D** - The light destroys cells on the light side making it shorter.

Tropisms

HELP BOX

PASS CURSOR OVER
QUESTION MARK
FOR HELP WITH
QUESTION
NUMBER **18**



A stimulus is something in the environment to which a living organism responds, typically by growing towards or away from it.

Practical - A Broad Bean seed was germinated and pinned with its young shoot and root positioned horizontally and then placed in the dark. After several days the result was as shown in the photograph.



18. What is the stimulus to which the shoot and the root of the seedling are responding?

- A** - Light.
- B** - Gravity.
- C** - Water.
- D** - Air.

19. The following passage has four missing words.

The advantages to the plant of these responses by the root and the shoot are that they make sure that the ____ grows ____ into the soil for anchorage, water and nutrients; and that the ____ grows ____ to reach the light for photosynthesis.

Which of the following has the correct missing words in the sequence as they should appear in the passage.

- A** - root - down - leaves - up
- B** - embryo - down - shoot - up
- C** - root - down - shoot - up
- D** - seed - down - shoot - up

- Leaf Structure and Function
- Photosynthesis
- Tropisms

SECTION TOTAL

SECTION PERCENTAGE