

Photosynthesis 2

Q:1 Green plants are able to make their own food.

Complete each sentence by drawing a ring around the correct answer in the box.

(a) Green plants make their own food during the process of

diffusion
photosynthesis .
respiration

(1 mark)

(b) This process can be summarised by the equation:

carbon dioxide + water → glucose +

mineral salts
light .
oxygen

(1 mark)

(c) The energy needed for this process is trapped for the plant by

chlorophyll
glucose .
light

(1 mark)

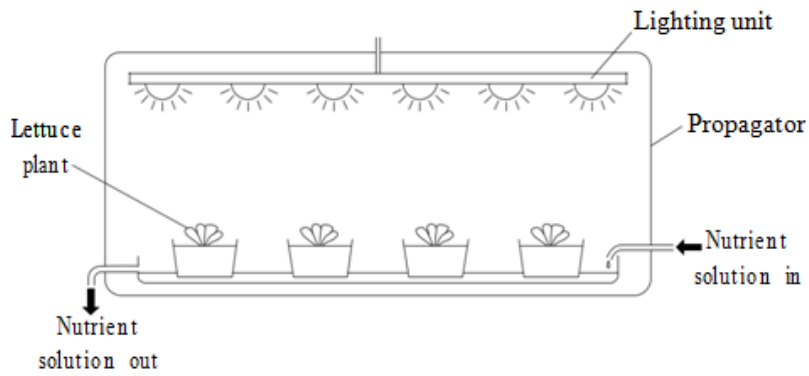
(d) Some of the food made by plants is stored as insoluble

chlorophyll
glucose .
starch

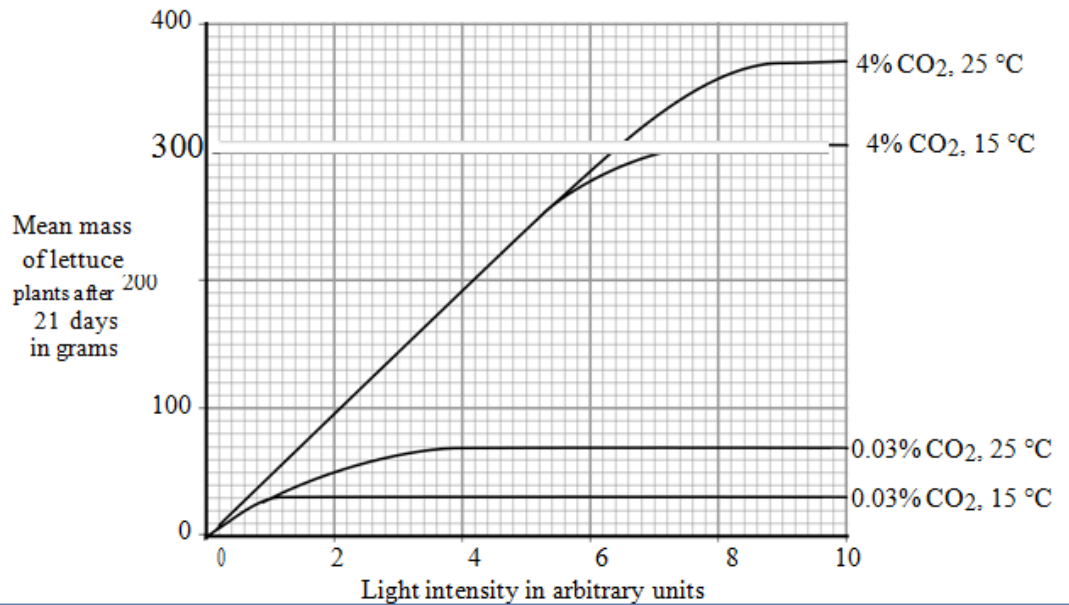
(1 mark)

Q:2 Changing the conditions in which plants grow affects how fast they grow.

The diagram shows a propagator in which scientists can control temperature, light intensity and carbon dioxide concentration.



The graph shows the effects of changing the temperature, light intensity and carbon dioxide concentration on the growth of lettuce plants.



(a) Describe and explain the effect of increasing light intensity on the mean mass of lettuce plants at 4 % carbon dioxide and 15 °C.

(3 marks)

(b) Growers wish to make maximum profits from their lettuces.

What do they need to consider before making decisions about the growing conditions for their lettuces?

(2 marks)

(c) The nutrient solution contains nitrate ions and magnesium ions.

Complete the table to show the functions of these ions in plants and their deficiency symptoms.

Ion	Function in plants	Deficiency symptoms
Nitrate
Magnesium

(4 marks)

Q:3(a)(i) Complete the word equation for photosynthesis.

carbon dioxide + (+ light energy) → glucose +

(2 marks)

(a)(ii) Most of the carbon dioxide that a plant uses during photosynthesis is absorbed from the air.

Give one other source of carbon dioxide for a plant.

Draw a ring around your answer.

the soil respiration in the plant osmosis in the plant water

(1 mark)

A student investigated the conditions that plants need for photosynthesis.

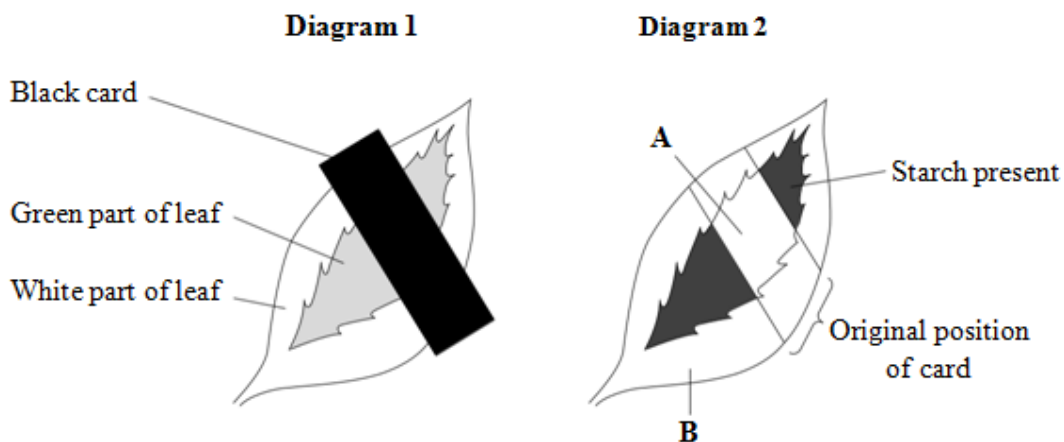
The leaves of the plant he used had green and white parts.

Diagram 1 shows how part of one leaf was covered in black (opaque) card.

The plant was placed in a warm, sunny area and was watered well.

Eight hours later the leaf was removed from the plant and was tested for starch.

The results of the test are shown in Diagram 2, the shaded parts show where starch was present.



(b) Name the two independent variables in this investigation.

1. _____

2. _____

(2 marks)

(c) Why was no starch found in:

(c)(i) the part of the leaf labelled A

(1 mark)

(c)(ii) the part of the leaf labelled B?

(1 mark)

Q:4 This question is about photosynthesis.

(a) Plants make glucose during photosynthesis. Some of the glucose is changed into insoluble starch.

What happens to this starch?

Tick (☑) one box.

The starch is converted into oxygen.

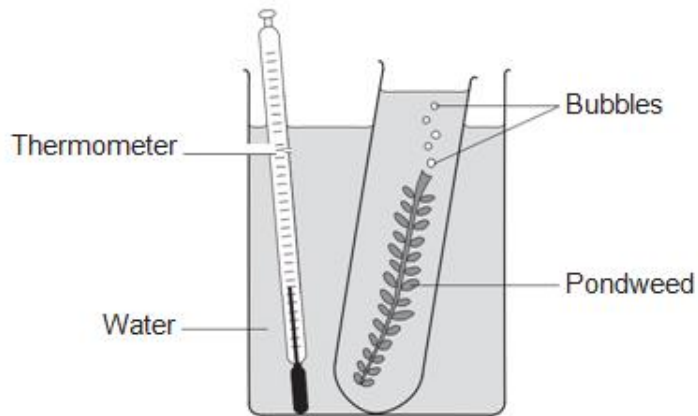
The starch is stored for later use.

The starch is used to make the leaf green.

(1 mark)

(b) A student investigated the effect of temperature on the rate of photosynthesis in pondweed.

The diagram shows the way the experiment was set up.



(b) (i) The student needed to control some variables to make the investigation fair.

State two of these variables.

1 _____

2 _____

(2 marks)

(b) (ii) The bubbles of gas are produced only while photosynthesis is taking place.

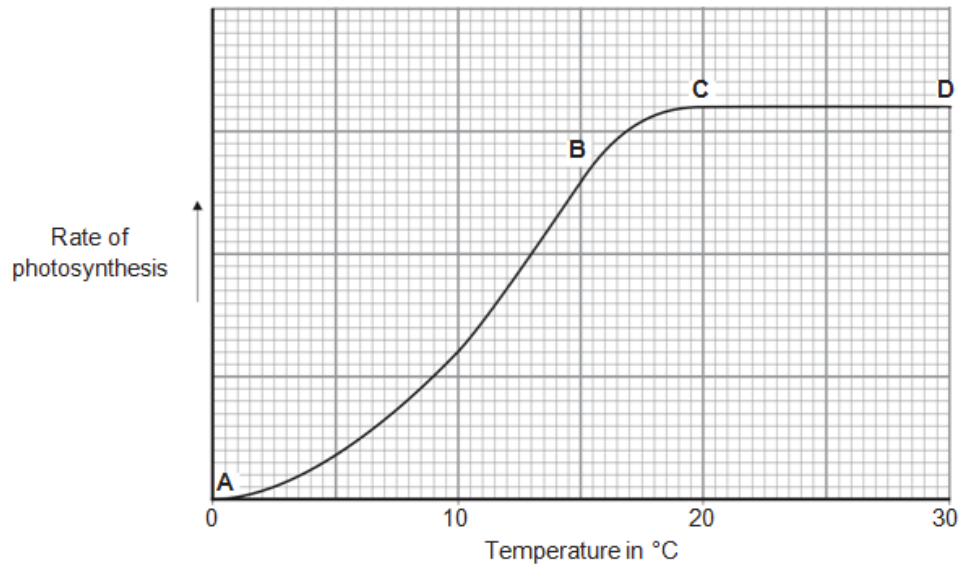
What two measurements would the student make to calculate the rate of photosynthesis?

1 _____

2 _____

(2 marks)

(c) The graph shows the effect of temperature on the rate of photosynthesis.



(c) (i) Name the factor that limits the rate of photosynthesis between the points labelled A and B on the graph.

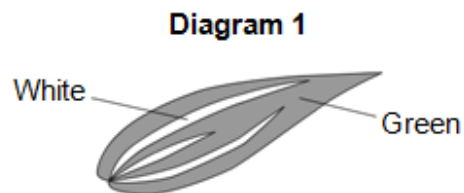
(1 mark)

(c) (ii) Suggest which factor, carbon dioxide, oxygen or water, might limit the rate of photosynthesis between the points labelled C and D on the graph.

(1 mark)

Q:5 Students investigated the effect of changing the carbon dioxide concentration on the rate of photosynthesis in pieces of leaf.

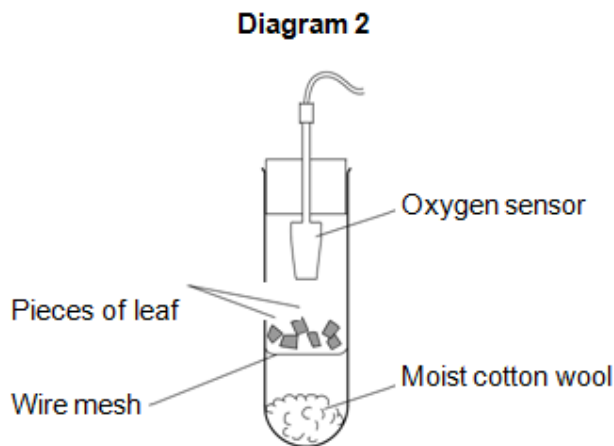
Diagram 1 shows the type of leaf used by the students.



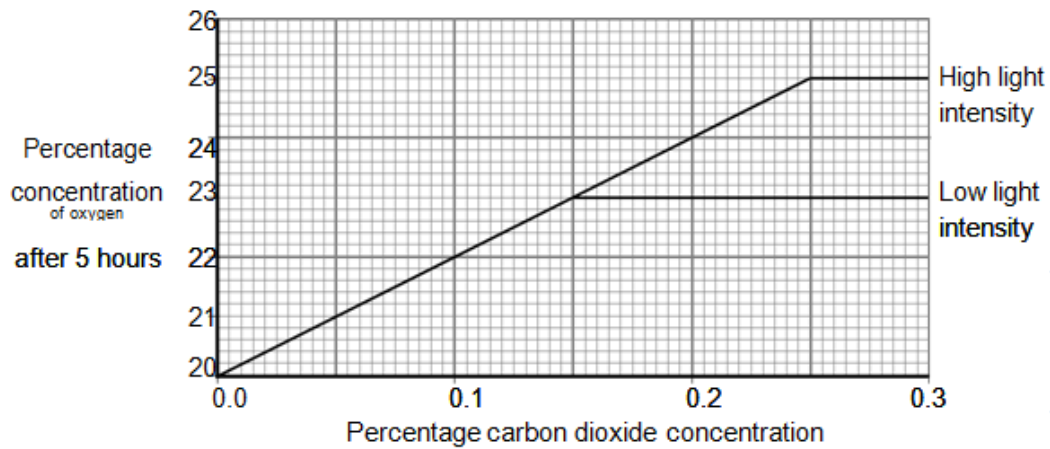
The students:

- ② cut pieces of leaf from the green region
- ② put the pieces into tubes
- ② added different concentrations of carbon dioxide to each tube
- ② shone lights on the tubes with either high or low light intensity
- ② recorded the concentration of oxygen in the tubes after 5 hours.

Diagram 2 shows how each experiment was set up.



The graph shows the results of the investigation.



(a) (i) Describe the effect of increasing carbon dioxide concentration on the rate of photosynthesis at low light intensity.

(1 mark)

(a) (ii) Explain the effect that you have described.

In your answer you should refer to limiting factors.

(2 marks)

(b) What would have been the effect on oxygen concentration over the five-hour period if a white region of the leaf had been used, instead of a green region?

Effect _____

Explain your answer.

Explanation _____

(2 marks)

(c) Some people keep indoor plants which have variegated leaves (leaves with green and white regions).

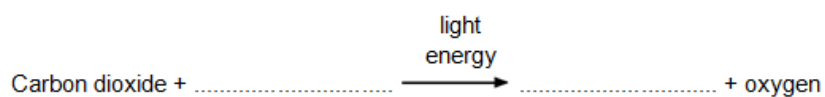
If plants with variegated leaves are kept in dim light conditions the white areas of the leaves start to turn green.

This is an advantage to the plant.

Suggest why.

(2 marks)

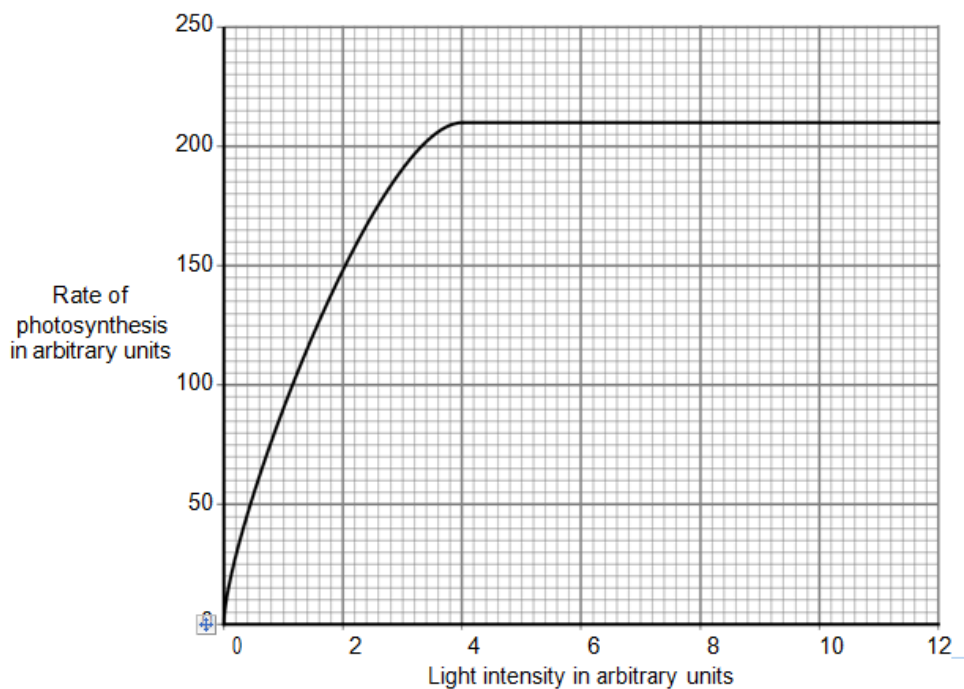
Q:6 (a) Complete the equation for photosynthesis.



(2 marks)

(b) A farmer grew tomato plants in a greenhouse.

The graph shows the effect of light intensity on the rate of photosynthesis in the tomato plants growing in the greenhouse.



(b) (i) At which light intensity was light a limiting factor for photosynthesis?

Tick (☑) one box.

1 arbitrary unit

4 arbitrary units

10 arbitrary units

(1 mark)

(b) (ii) What was the highest rate of photosynthesis?

_____ arbitrary units

(1 mark)

(b) (iii) The farmer wants to increase the rate of photosynthesis in his tomato plants.

Apart from light intensity, name one factor that the farmer could change to increase the rate of photosynthesis in his tomato plants.

(1 mark)

TOTAL MARKS=39