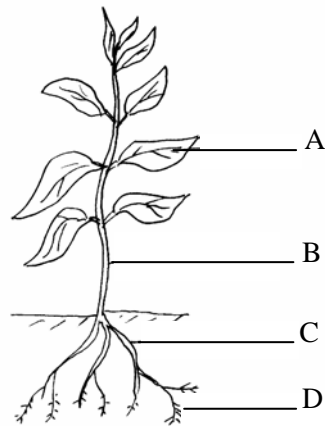


The diagram shows a flowering plant.



(a) Name the parts labelled A, B, C and D.

A B
 C D [4]

(b) The table lists some functions of parts of a plant. Match the part of the plant (A, B, C or D) to its function by writing the letters in the table.

Function of part of plant	Part of plant
Carries water to other plant organs	
Makes food using light energy	
Anchors plant in ground	
Supports the flowers	
Absorbs water and mineral salts	

[5]

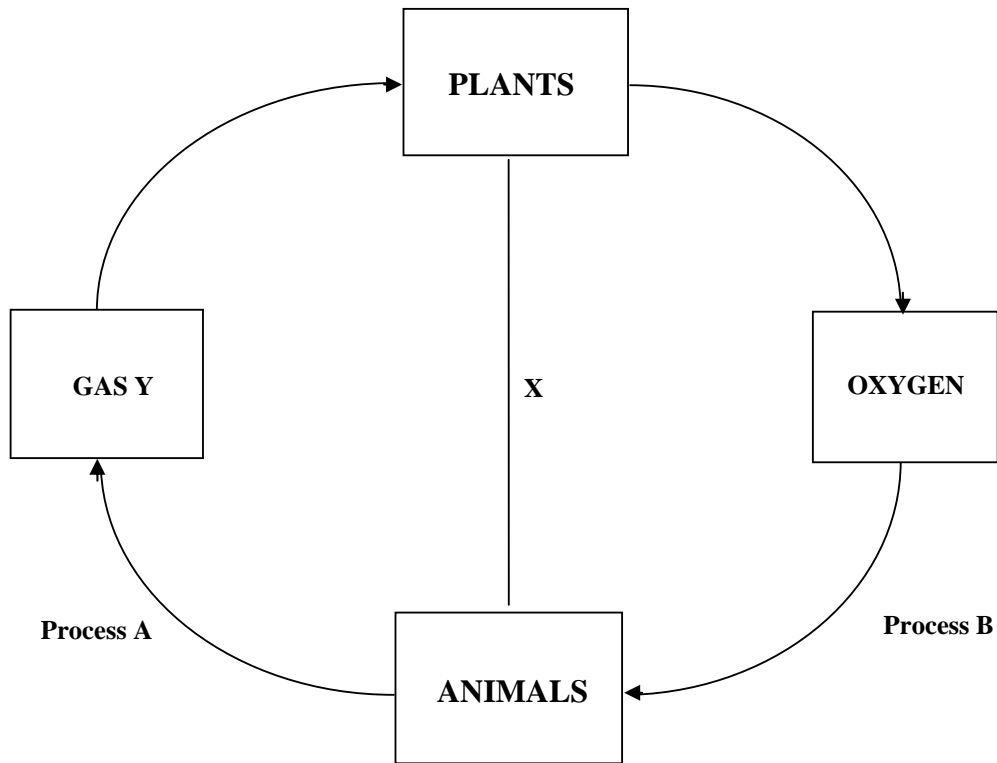
(c) Which part of the plant contains chlorophyll?

..... [1]

(d) What does chlorophyll do?

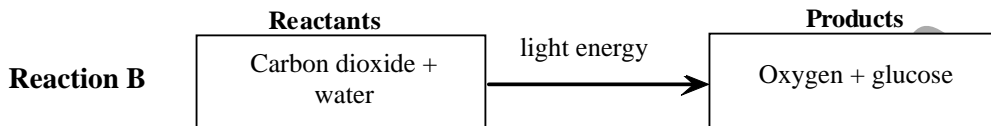
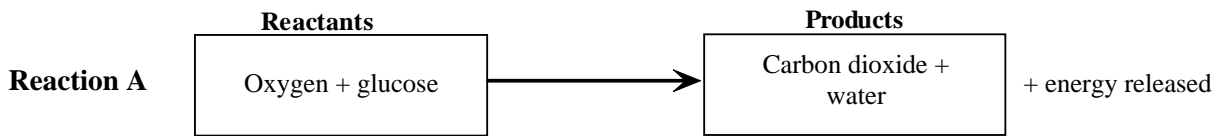
..... [1]

Look at the following diagram.



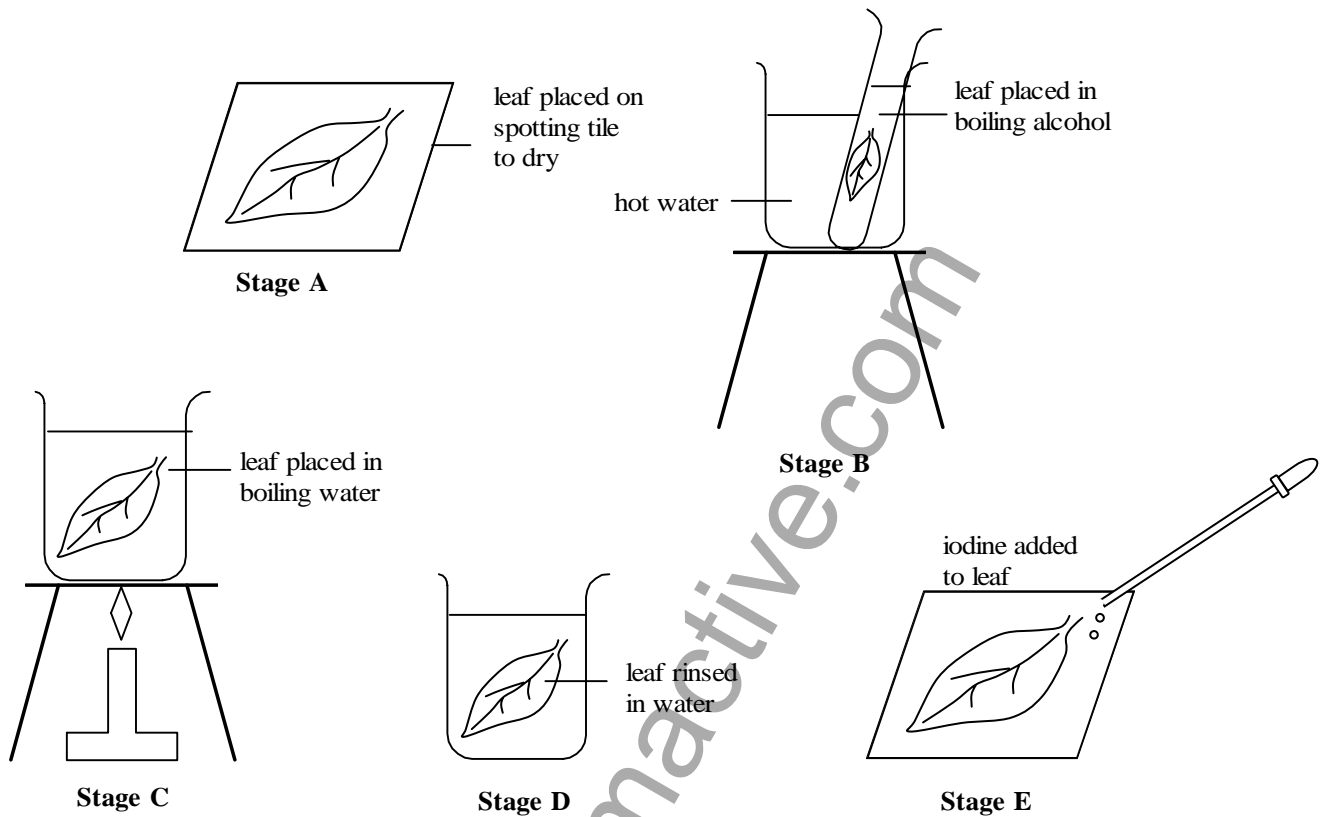
- (a) What is gas Y?
 [1]
- (b) Where does gas Y enter the plant?
 [1]
- (c) What do plants use gas Y for?
 [1]
- (d) In which process do animals use oxygen?
 [1]
- (e) Name process A and B.
 A [1]
 B [1]
- (f) What does the arrow labelled X represent?
 [1]

Look at these two reactions which take place in living organisms.

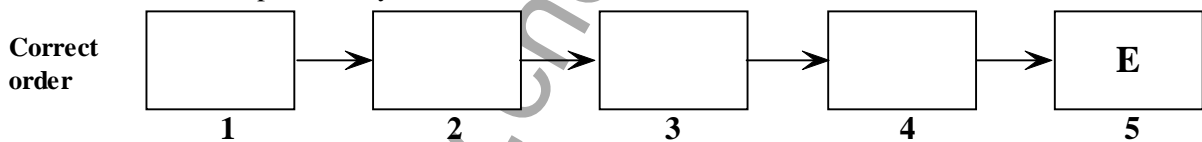


- (a) Which of the two reactions
- (i) takes place in plants and animals?
..... [1]
- (ii) takes place only in plants?
..... [1]
- (b) Which reaction represents photosynthesis?
..... [1]
- (c) Name one substance used up in reaction A?
..... [1]
- (d)(i) Which of the two reactions can only take place in daylight?
..... [1]
- (ii) Give a reason for your answer.
..... [1]
- (e) What is the source of the water in reaction B?
..... [1]
- (f) What is the source of the glucose in reaction A?
..... [1]

The diagram shows the stages in testing a green leaf for starch. The stages are not in the correct order.



(a) Place the letters of the stages in the correct order by writing the letters in the boxes. The last stage has been completed for you.



[4]

(b) Give the reason for each of the following stages:

(i) stage C.

..... [1]

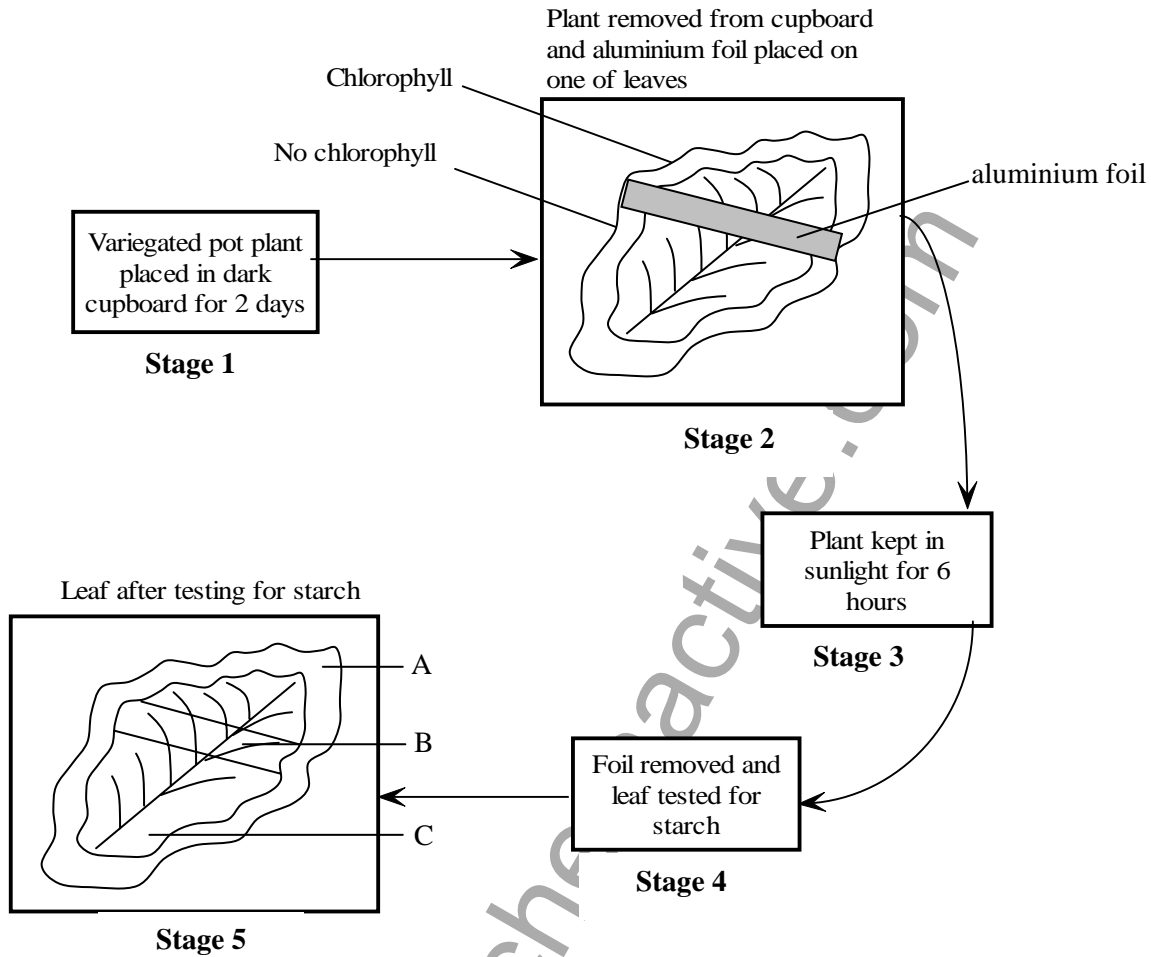
(ii) stage B.

..... [1]

(iii) stage E.

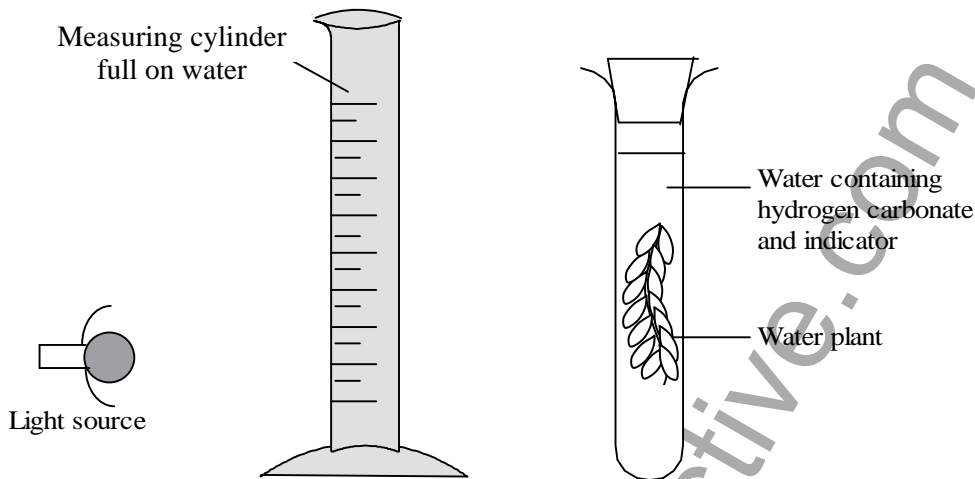
..... [1]

A student carried out an experiment to find out if plants need light to make starch. The diagram shows what the student did.



- (a) Why was the potted plant kept in a dark cupboard for 48 hours?
 [1]
- (b) Why did the student cover part of one of the leaves with aluminium foil?
 [1]
- (c) Stage 5 shows three areas on the leaf: A, B and C.
 Write down the colours these areas would be stained after testing for starch.
 A B C [3]

An investigation was set up to find out if the concentration of carbon dioxide affected the rate of photosynthesis. A water plant was placed in each of 6 test tubes containing water and different concentrations of hydrogen carbonate. The hydrogen carbonate releases carbon dioxide into the water. An indicator was added to each test tube. The indicator changes from yellow to green when oxygen is released. Each test tube was illuminated by a lamp placed behind a measuring cylinder full of water.



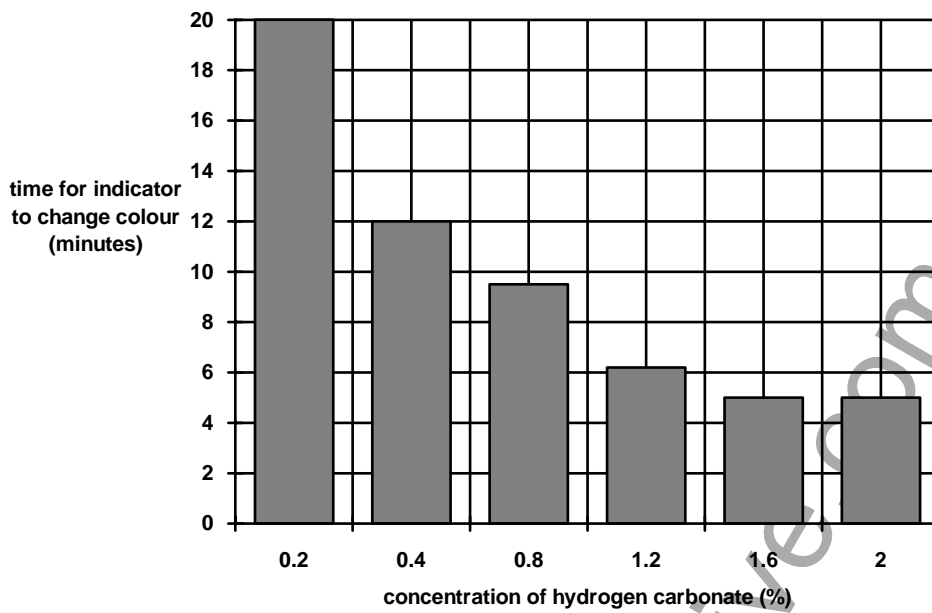
The time for the indicator to change from yellow to green was recorded and plotted on a chart.

- (a) What was the purpose of the measuring cylinder full of water?
 [1]
- (b) What causes the indicator to change colour?

 [2]

QUESTIONSHEET 6 CONTINUED

The bar chart shows the results of this investigation.



(c) What was the effect of increasing the hydrogen carbonate concentration from 0.2 to 0.4%?

.....
 [2]

(d)(i) At what concentration of hydrogen carbonate was the rate of photosynthesis highest?

..... [1]

(ii) Give an explanation for your answer.

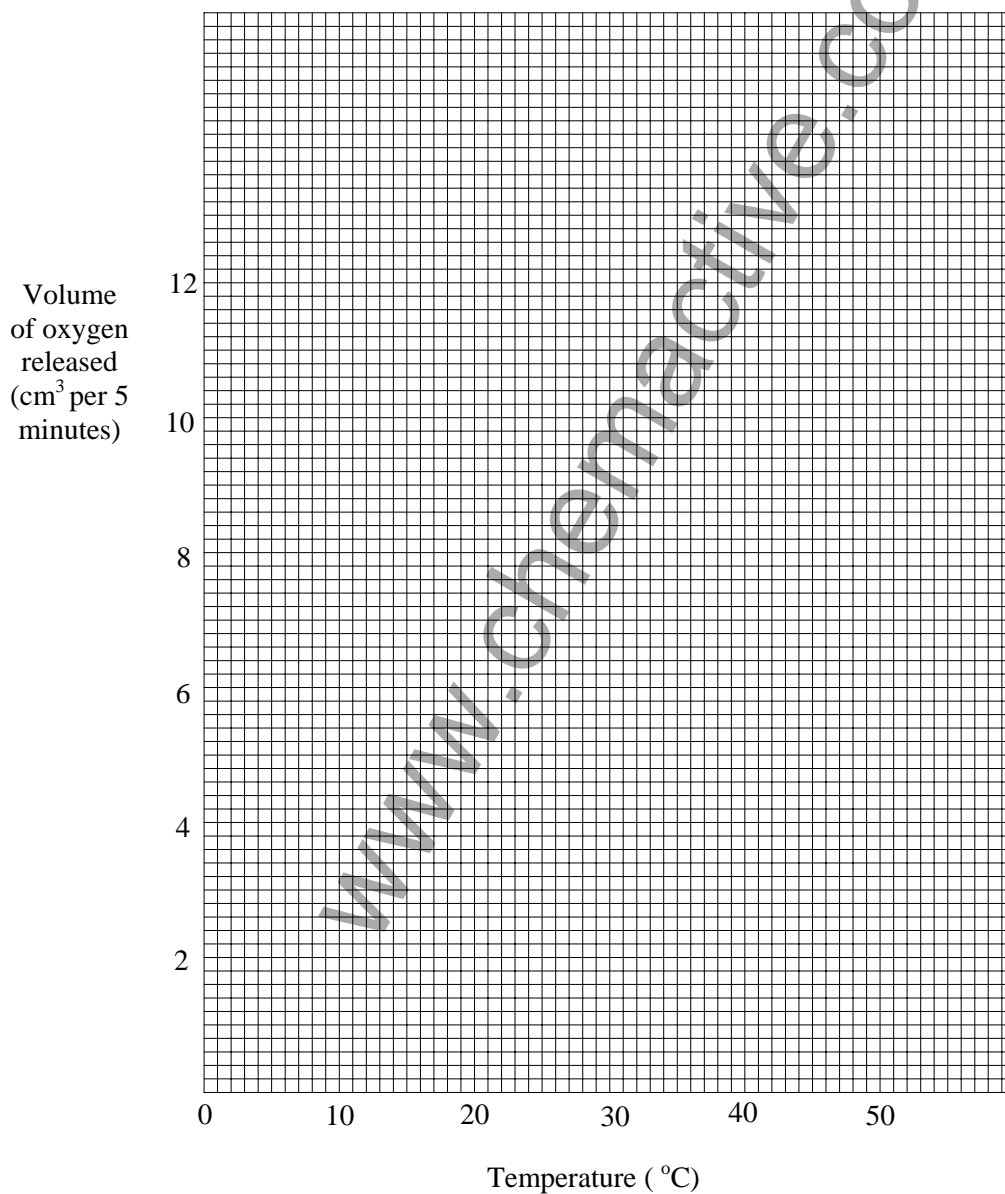
.....
 [2]

A student investigated the effect of temperature on the rate of photosynthesis in a water plant. The results are shown in the following table.

Temperature/ °C	Volume of oxygen released/ cm ³ per 5 minutes
5	2
15	4
25	7
35	10
45	12

(a) plot these results on the graph paper below.

[4]



(Continued...)

QUESTIONSHEET 7 CONTINUED

(b)(i) Describe the effect of temperature on the volume produced.

..... [1]

(ii) Suggest an explanation for this effect.

..... [1]

(c) What would have been the result if the experiment had been repeated at 70°C? Explain your answer.

Result: [1]

Explanation: [1]

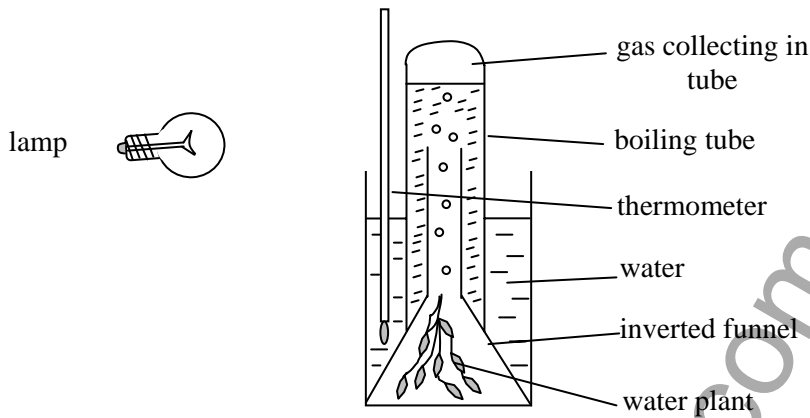
(d) Name two other factors which influence the rate of photosynthesis.

1. [1]

2. [1]

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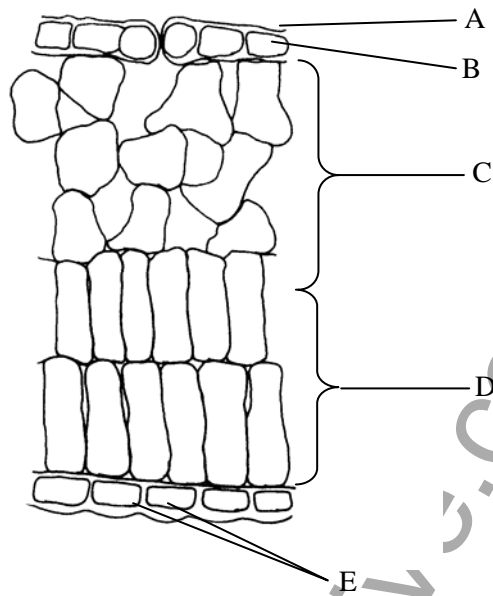
An experiment was carried out to investigate the effect of light intensity on the rate of photosynthesis of a water plant. The diagram below shows the apparatus used.



- (a) Suggest how you ensure that the plant had a good supply of carbon dioxide?
 [1]
- (b)(i) Which gas is given off by the plant?
 [1]
- (ii) How could you test for this gas?
 [1]
- (c) How could you prevent the heat from the lamp affecting the experiment?
 [1]
- (d) How would you use this apparatus to investigate the effect of increasing light intensity on the rate of photosynthesis?

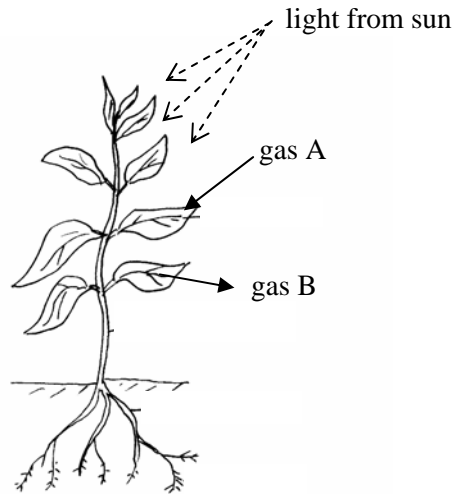
 [4]

The diagram shows a section through a small part of a leaf.



- (a) Which of the structures labelled on the diagram
- (i) is where most photosynthesis takes place?
..... [1]
 - (ii) forms a waterproof layer to the leaf?
..... [1]
 - (iii) controls the entry of carbon dioxide into the leaf?
..... [1]
- (b) Water is needed for photosynthesis in the leaf.
Describe how water is carried from the soil to the leaf.
.....
.....
..... [3]
- (c) One of the products of photosynthesis is sugar.
In which tissue is sugar transported?
..... [1]

Look at the diagram below.



(a)(i) Name gas A.

..... [1]

(ii) Where does this gas enter the leaves?

..... [1]

(b) Name gas B.

..... [1]

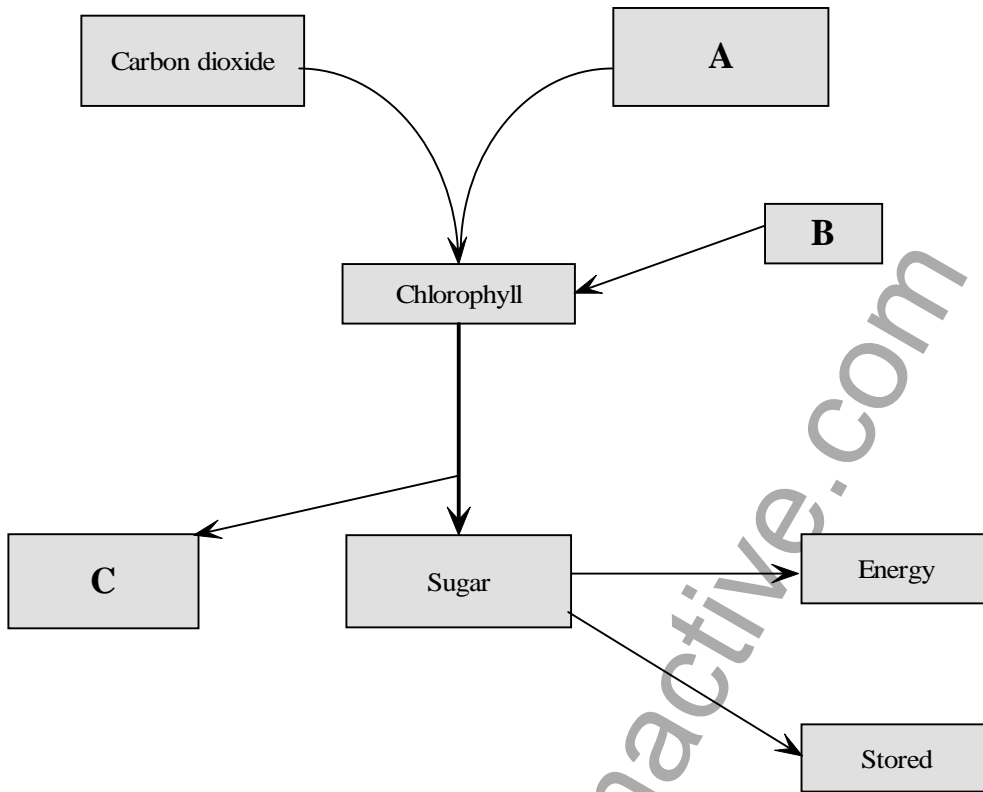
(c) How do leaves capture light energy from the sun?

..... [2]

(d) During the night the levels of gas A around the plant increase.
Give your reasons for this.

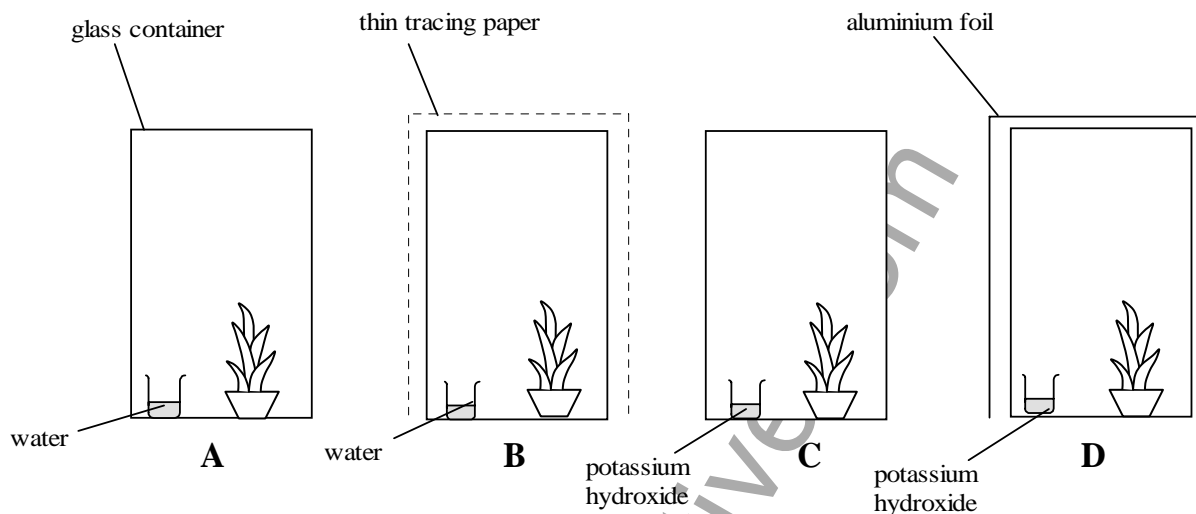
..... [4]

The diagram shows some of the processes which take place in a green plant.



- (a) Name A, B and C.
 A..... B..... C..... [3]
- (b) What is the function of the chlorophyll?
 [1]
- (c) In what form do plants such as potatoes store sugar?
 [1]
- (d) Which process releases energy in a plant?
 [1]

An investigation was carried out to find the best conditions for photosynthesis. Four similar sized plants of the same species were placed in a dark cupboard for 24 hours. A leaf from each plant was removed and tested for starch. The plants were then watered and placed in the apparatus shown below. Each glass vessel was illuminated for 24 hours.



Potassium hydroxide absorbs carbon dioxide from the air.

- (a) When the leaves from the plants were tested for starch at the start of the investigation all gave a yellow-brown colour with iodine. Explain why.

.....
 [2]

- (b) What conditions for photosynthesis were lacking in

- (i) vessel C?

..... [1]

- (ii) vessel D?

.....
 [2]

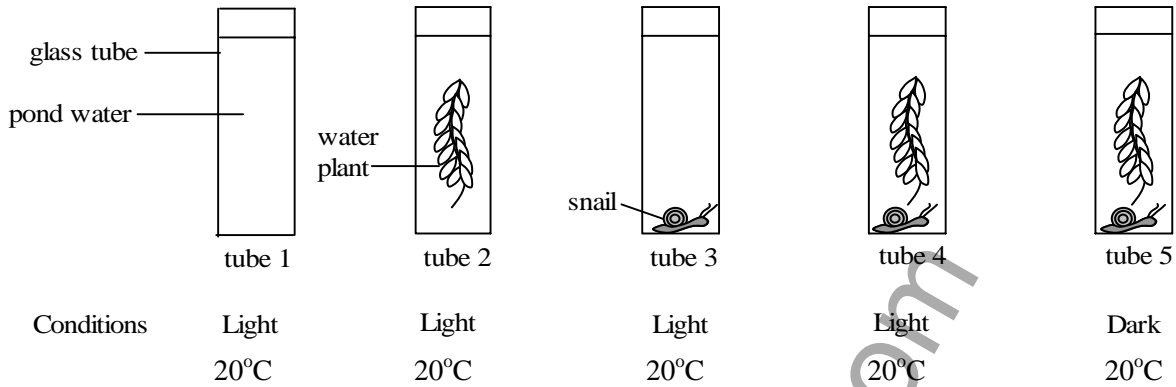
- (c) What would be the effect of the tracing paper covering vessel B?

..... [1]

- (d) After 24 hours leaves were removed from plant C and tested for starch with iodine solution. What would be the expected result of this test?

.....
 [2]

The diagram shows the apparatus used in an investigation.



An equal amount of a harmless blue indicator was added to each tube. The indicator changes from blue in alkaline conditions to green in acid conditions. The pH of the pond water and the colour of the indicator were recorded at the start and again after 6 hours.

(a) The table shows some of the results.

Number of tube	Colour at start	pH at start	Colour after 6 hours	pH after 6 hours
1	blue	alkaline	blue	alkaline
2	blue	alkaline	blue	alkaline
3	blue	alkaline	green	
4	blue	alkaline	blue	alkaline
5	blue	alkaline		

Carbon dioxide dissolves in water to form a weak acid.

(i) State the colour of the pond water in tube 2 after 6 hours.

..... [1]

(ii) Give a reason for your answer.

..... [1]

(iii) What was the pH of tube 3 after 6 hours?

..... [1]

QUESTIONSHEET 13 CONTINUED

(iv) State the colour and pH of the pond water in tube 5 after 6 hours.

Give a reason for each answer.

Colour of tube 5

..... [1]

Reason

.....
.....
.....
..... [4]

pH of tube 5

..... [1]

Reason

.....
..... [2]

(b) (i) In which of the tubes was photosynthesis taking place?

..... [1]

(ii) In which of the tubes was respiration taking place?

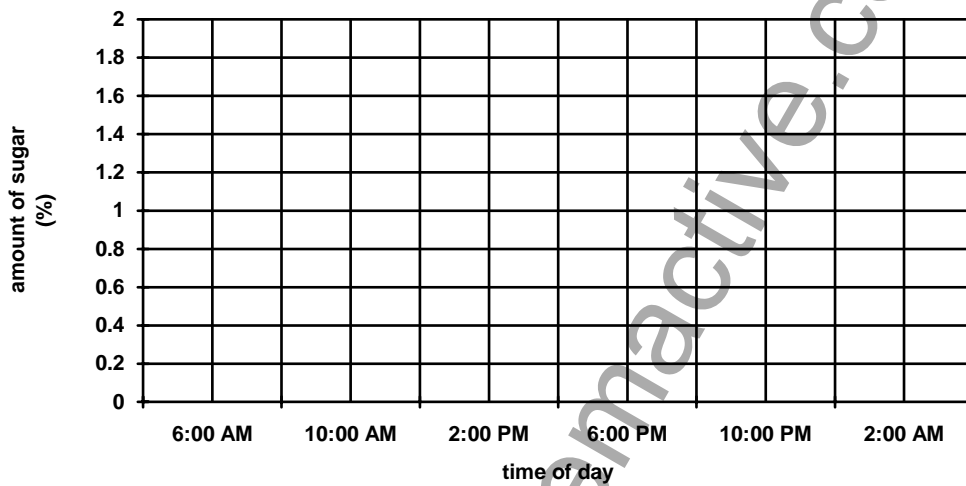
..... [1]

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The table shows the changes in the amount of sugar in the leaves of the same plant over a period of 1 day.

Time of day	Amount of sugar in leaves (%)
6 am	0.3
10 am	no data
2 pm	1.9
6 pm	1.3
10 pm	0.8
2 am	0.4

(a) On the grid below plot a line graph of these figures.



(b) (i) At what time of day was the amount of sugar at a maximum?

..... [1]

(ii) Give a reason for this.

.....

 [3]

(c) Why does the sugar level fall between 6 pm and 6 am?

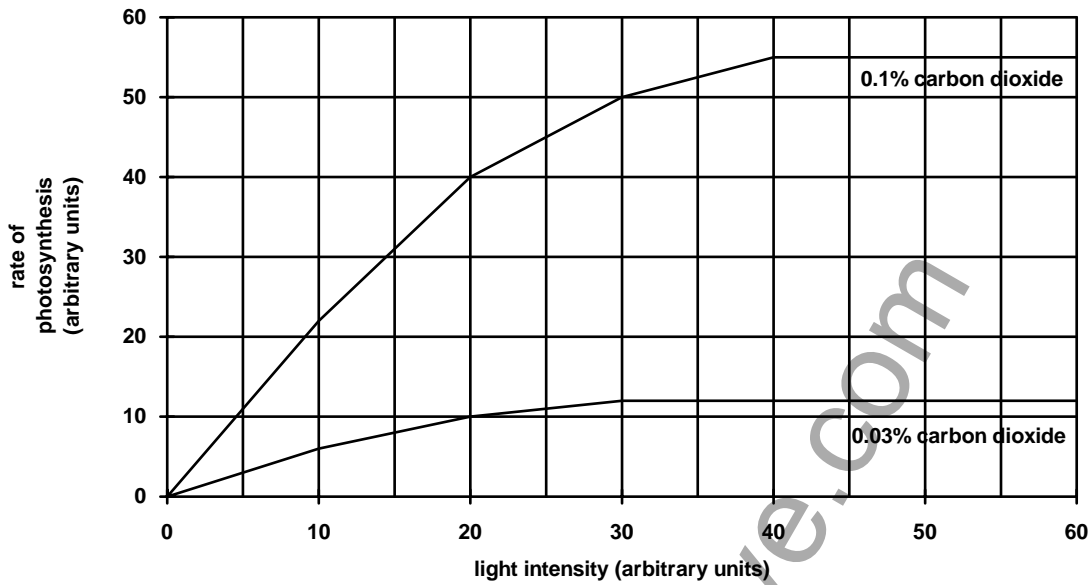
.....

 [4]

(d) No data was collected for 10 am.
 Use the graph to estimate the amount of sugar in the leaves at that time.

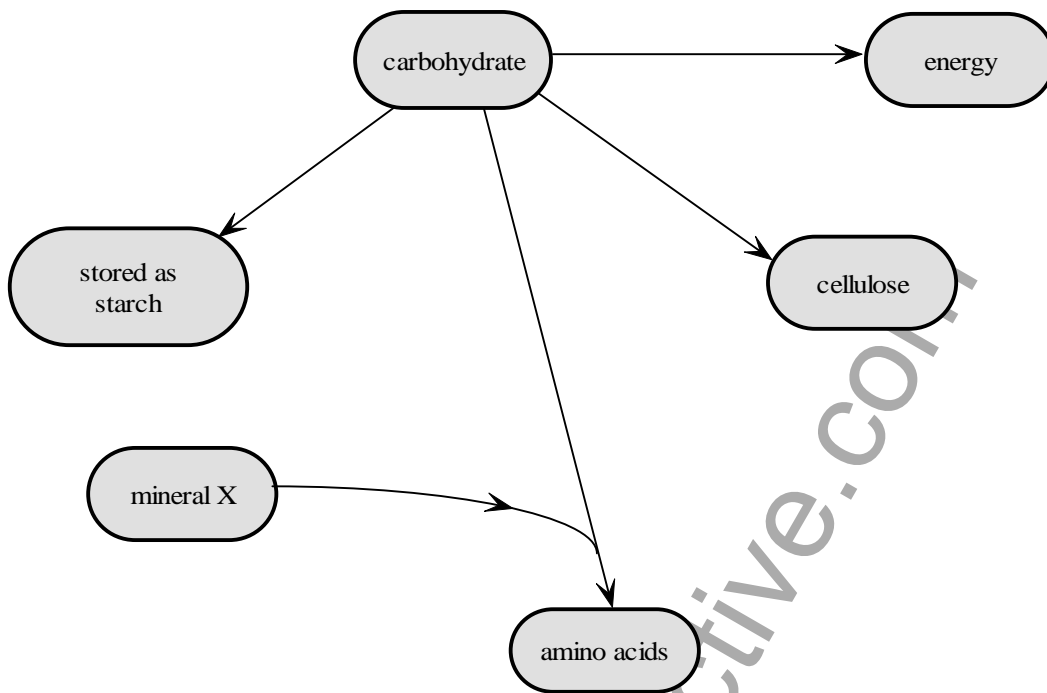
..... [1]

The graph shows the rate of photosynthesis in a plant.



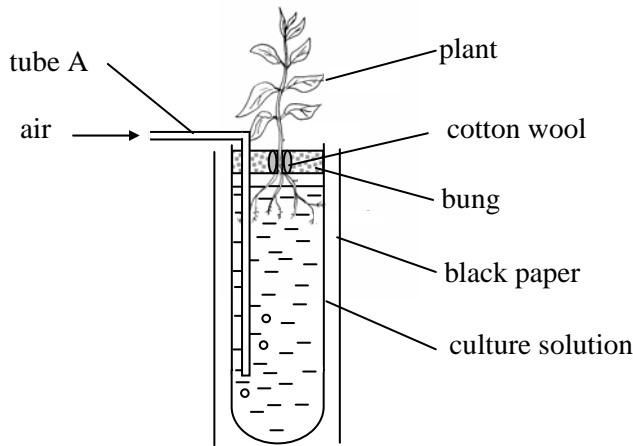
- (a) What was the rate of photosynthesis with a light intensity of 30 and a carbon dioxide level of 0.1%?
 [1]
- (b) By how much does the rate of photosynthesis increase at a light intensity of 20 arbitrary units when the level of carbon dioxide increases from 0.03% to 0.1%?
 [1]
- (c) Describe the relationship between the rate of photosynthesis and light intensity at a carbon dioxide level of 0.03%.
 [2]
- (d) Name one factor, not shown on the graph, which could affect the rate of photosynthesis.
 [1]
- (e)(i) Commercial tomato growers often grow their crops in large greenhouses. The light intensity is kept at a high level and the carbon dioxide level is increased. Why is the carbon dioxide level increased?
 [2]
- (f)(ii) Explain why increasing the light intensity above 40 arbitrary units at a carbon dioxide level of 0.1% would be of little value to a tomato grower.
 [2]

The diagram shows some of the ways in which plants use carbohydrates.



- (a) What is cellulose used for in a plant?
..... [1]
- (b) Why do plants need to produce amino acids?
.....
..... [2]
- (c)(i) To produce amino acids, plants require a mineral. This is labelled X on the diagram.
Name mineral X.
..... [1]
- (ii) How does mineral X enter the plant?
.....
..... [2]
- (d) Plants store carbohydrates as starch rather than sugar.
Explain the reason for this.
.....
.....
..... [3]

A student investigated the effect of mineral ions on the growth of plants.
The diagram shows the apparatus used.



Four tubes were set up identical to the one shown.
 Tube 1 contained all mineral ions.
 Tube 2 contained all mineral ions except nitrate.
 Tube 3 contained all mineral ions except potassium.
 Tube 4 contained all mineral ions except phosphate.

(a) Tube A allowed air to be bubbled at intervals through the culture solution.
What was the purpose of this?

.....
 [2]

(b) Suggest a reason why was the glass tube covered with black paper.

.....
 [2]

(c) Suggest one way of measuring the growth of the plant.

..... [1]

(d) After 4 weeks, the plants were removed and examined.
 The plant from tube 1 showed normal healthy growth. The plants in the other tubes showed symptoms of mineral deficiencies.
 Describe the appearance of the plant in

(i) tube 2.

 [2]

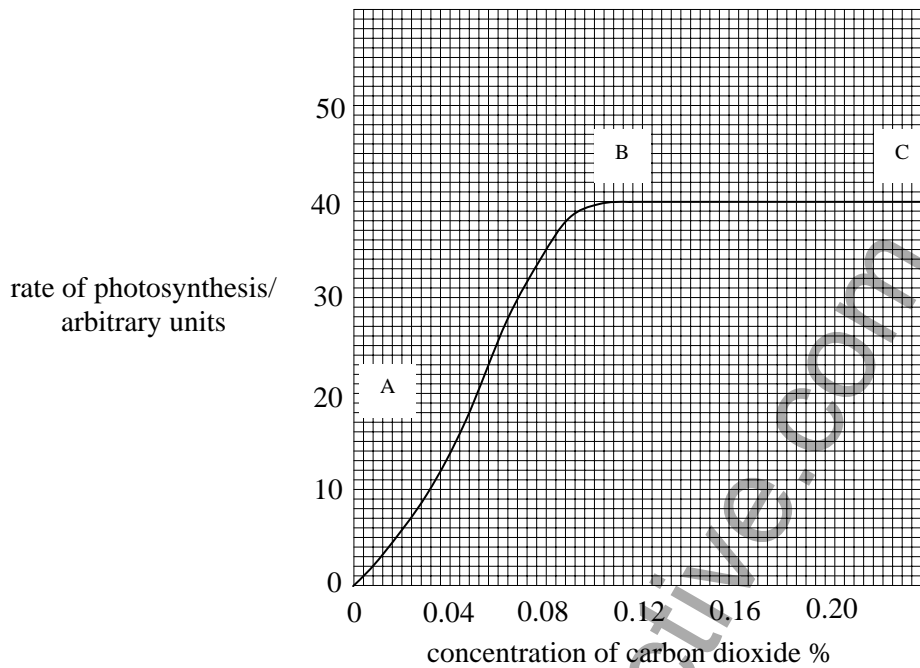
(ii) tube 3.

 [2]

(iii) tube 4.

 [2]

The graph below shows the effect of increasing carbon dioxide concentration on the rate of photosynthesis in an aquatic plant.



(a) Explain why the rate of photosynthesis increases from point A to B on the graph.

.....

.....

..... [4]

(b) Explain why the rate of photosynthesis remains the same between points B and C on the graph.

.....

..... [2]

(c) As a result of burning fossil fuels, atmospheric concentrations of carbon dioxide have increased in this country.
Suggest how this might lead to,

(i) increased food production

.....

..... [2]

(ii) decreased food production in some areas.

.....

..... [2]

Scientists have attempted to increase food production by genetic engineering. However concern about these genetically modified foods has resulted in some shops withdrawing them from sale.

(a) Suggest how food production could be increased if scientists succeeded in inserting,

(i) genes which control nitrogen fixation into cereal crops.

.....
.....
..... [2]

(ii) genes which make plants drought resistant into cereal crops.

.....
.....
..... [3]

(b) Suggest a reason why there is concern about genetically modified plants.

.....
..... [1]

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Canadian pondweed is a common aquatic plant. A student investigated the production of starch in Canadian pondweed using lengths of leafy stem which had previously been destarched. The pieces of plant were placed in four flasks labelled A to D and treated as shown in the table below. The flasks were kept at room temperature, and after 36 hours the pieces of plant were tested for starch.

Flask	Fluid in which pondweed was bathed	Conditions in which flasks were placed	results of testing for starch
A	Water enriched with carbon dioxide	Light	Present
B		Dark	Absent
C	Glucose solution enriched with carbon dioxide	Light	Present
D		Dark	Absent

(a) How and why was the Canadian pondweed destarched?

.....

 [3]

(b) Why were the water and glucose solutions enriched with carbon dioxide?

.....
 [2]

(c) Suggest reasons for the results seen in each of the flasks A to D.

A:
 [2]

B:
 [2]

C:
 [2]

D:
 [2]