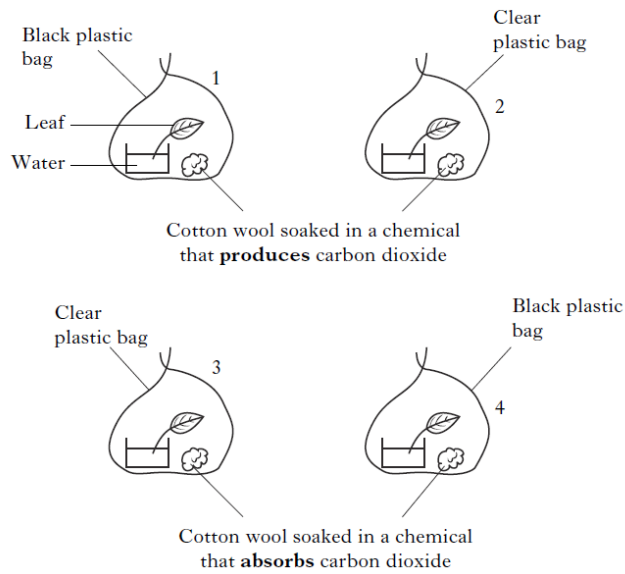


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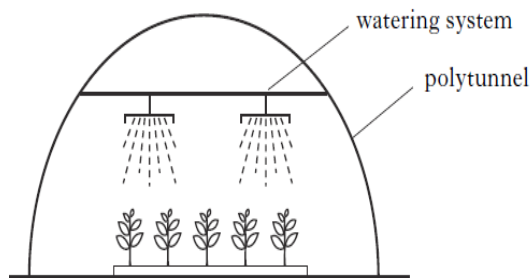
The diagrams below show four experiments used in an investigation into the conditions needed for photosynthesis.



The results from which two experiments should be compared to show that light is needed for photosynthesis?

- A 1 and 2
- B 1 and 4
- C 2 and 3
- D 3 and 4

A crop of tomatoes was grown in a polytunnel.



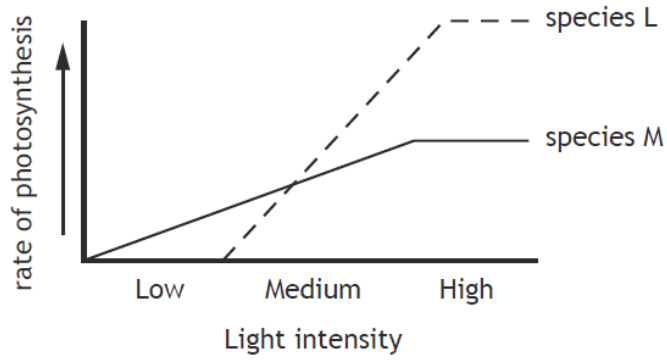
Which of the following changes would **not** produce an earlier crop of tomatoes?

- A Increasing the heating during the day.
- B Increasing the CO₂ concentration at night.
- C Increasing the light intensity at night.
- D Increasing the CO₂ concentration during the day.

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The effect of light intensity on the rate of photosynthesis was measured for two species of plants, L and M.

The results are shown in the graph below.



The rate of photosynthesis of species M is

- A slower than L in low light intensities
- B slower than L in high light intensities
- C faster than L in medium light intensities
- D faster than L in high light intensities.

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Marks

- (a) Two gardeners compared their tomato crops. Both grew 10 plants of the same variety in a greenhouse.

One gardener altered the environmental conditions in his greenhouse to increase the rate of photosynthesis. His plants yielded 720 tomatoes. The other gardener only produced 480 tomatoes.

- (i) What was the percentage increase in the yield of tomatoes when the rate of photosynthesis was increased?

Space for calculation

_____ %

1

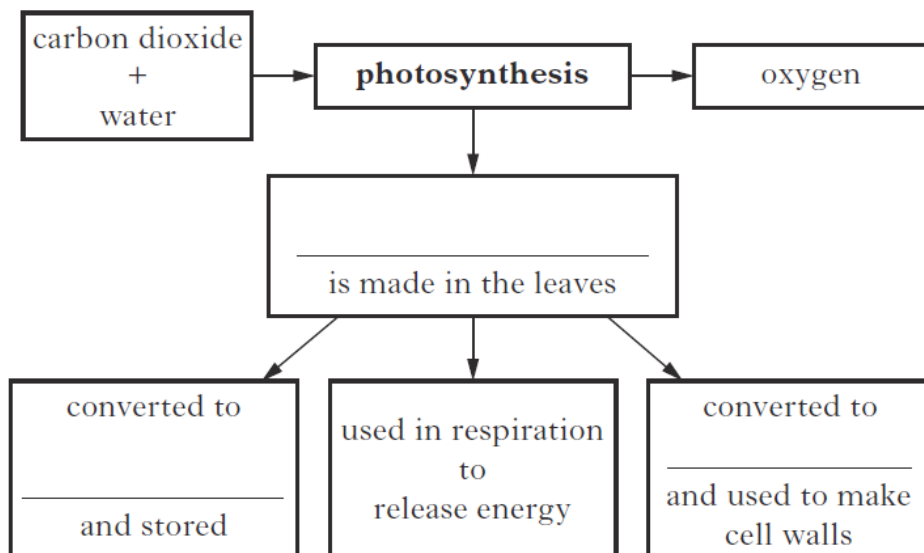
- (ii) Describe **two** changes to the environmental conditions in the greenhouse which could have increased the rate of photosynthesis.

1 _____

2 _____

1

- (b) (i) Complete the diagram below to show how the carbohydrate product of photosynthesis is used in a plant.



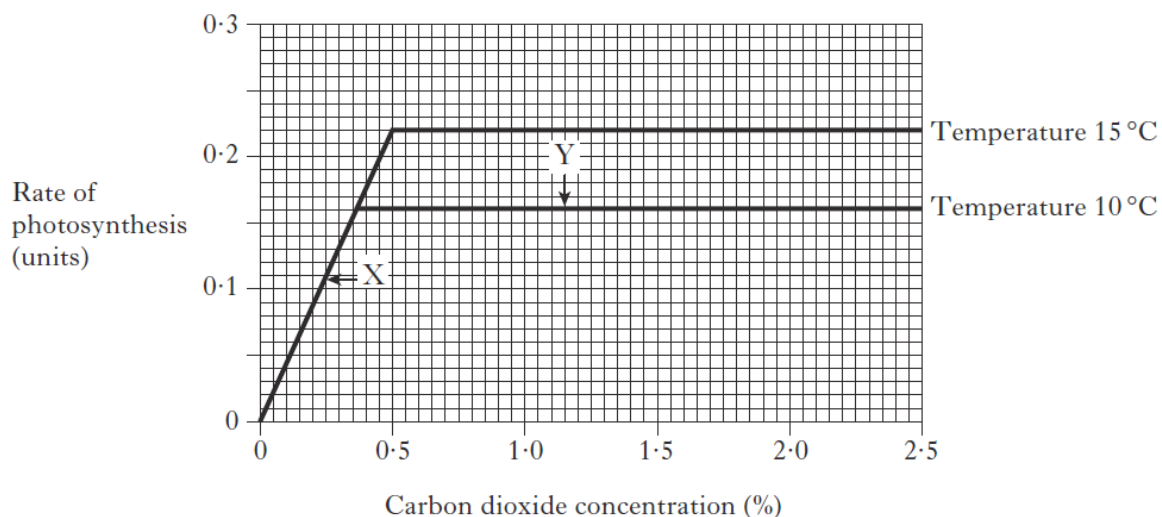
2

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5. (continued)

Marks

(c) The following graph shows the effect of increasing carbon dioxide concentration on the rate of photosynthesis at two different temperatures. All other factors were kept constant.



From the evidence in the graph, what are the limiting factors at points X and Y?

X _____

Y _____

1

(d) Some carbon compounds found in plants are shown in the list below.

- List**
- carbon dioxide
 - cellulose
 - glucose
 - starch

Complete the following table with the correct carbon compound for each of the functions.

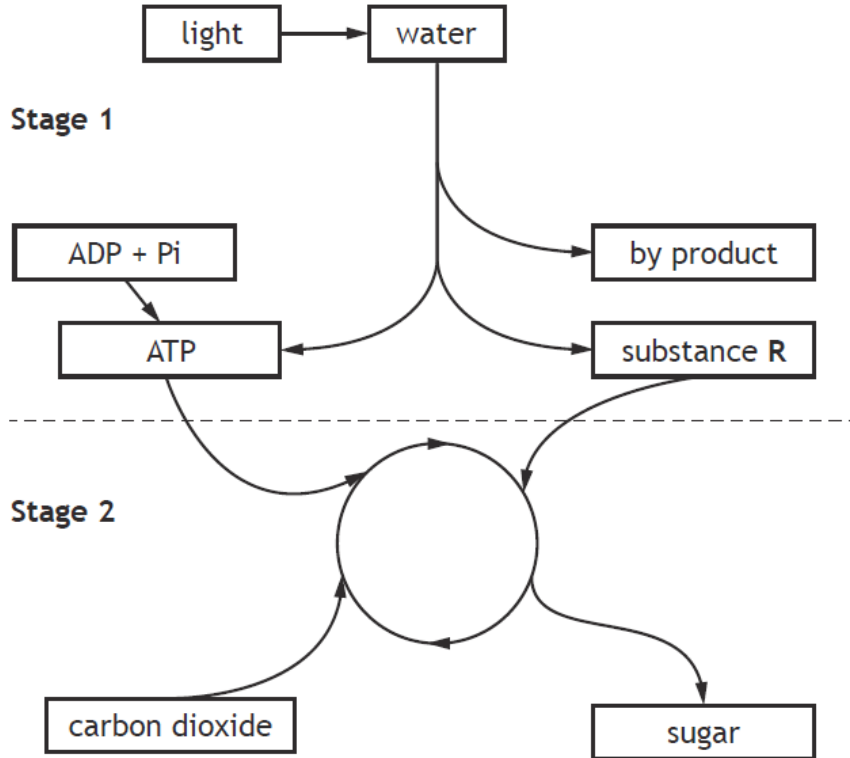
<i>Carbon compound</i>	<i>Function</i>
	raw material for photosynthesis
	respiratory substrate
	storage carbohydrate

2

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MARKS

- (a) Photosynthesis is the process by which plants produce sugar using light. The flow diagram represents stages of photosynthesis in a leaf.



- (i) Identify substance R.

1

- (ii) Describe the transfer of energy from light arriving at the leaf to the formation of sugar.

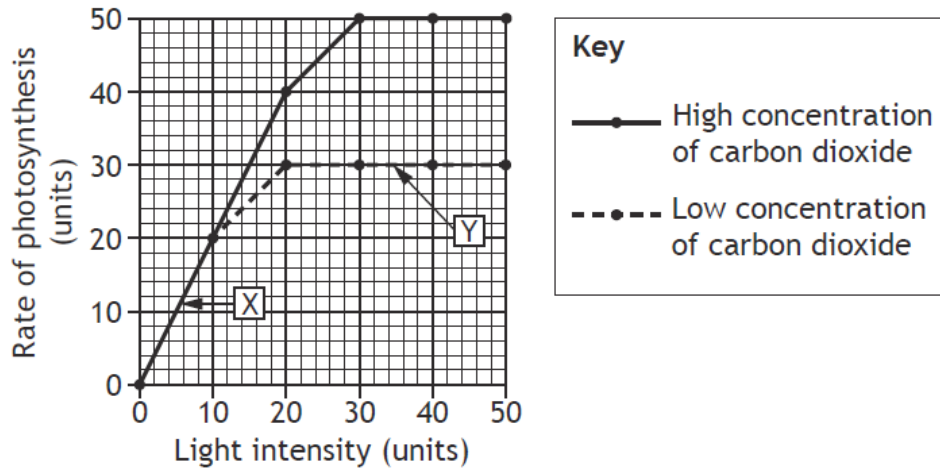
3

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MAKKS

(continued)

(b) The graph shows the effect of light intensity and carbon dioxide concentration on the rate of photosynthesis.



Identify the limiting factor at each of the points X and Y.

1

X _____

Y _____

Total marks 5

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MARKS

Photosynthesis is a two stage process.

Stage 1 — Light reactions

Stage 2 — Carbon fixation

(a) The table below shows some statements about photosynthesis.

Complete the table to show which stage each statement refers to by placing a tick (✓) in the Stage 1 or Stage 2 box.

The first two statements have been completed for you.

2

<i>Statement</i>	<i>Stage 1</i>	<i>Stage 2</i>
Carbon dioxide required		✓
Light energy required	✓	
Water required		
Sugar produced		
ATP + Hydrogen required		
Oxygen produced		

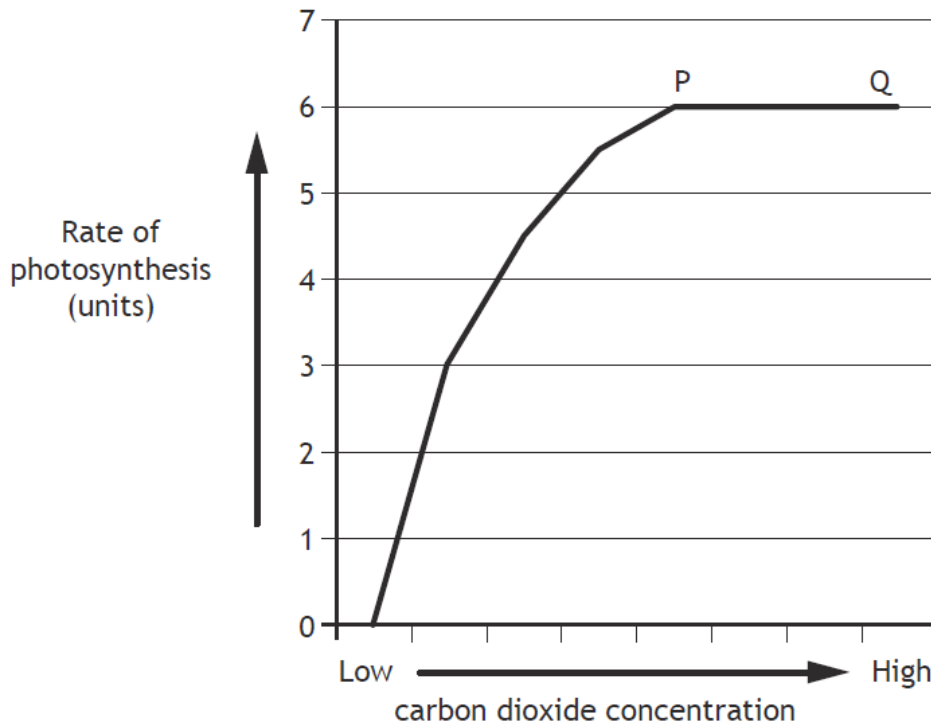
(b) Explain why high temperatures (above 50°C) would prevent the photosynthesis reactions from taking place.

2

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(continued)

(c) The graph below shows how the rate of photosynthesis is affected by the concentration of carbon dioxide.



State two environmental factors which could limit the rate of photosynthesis between points P and Q.

1

1 _____

2 _____

Total marks 5

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MARKS

4. Photosynthesis is a two stage process used by green plants to produce food.

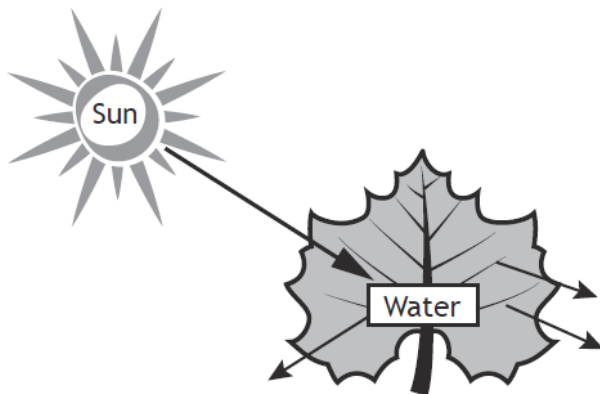
(a) The diagram below represents a summary of the first stage of photosynthesis.

Complete the diagram by filling in the three boxes, selecting terms from the list in the box below.

3

ATP	carbon dioxide	carbon fixation	
sugar	hydrogen	oxygen	light reactions

Name of the first stage



Two products used in second stage.
1. _____
2. _____

Diffuses out of the leaf

(b) Describe the second stage of photosynthesis.

2

