1 Photosynthesis is the process by which plants obtain nutrition.

(a) Write a balanced chemical symbol equation for photosynthesis.

(2)

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(b) Leaves can be tested for starch to show that photosynthesis has taken place.

This is the method given in a biology textbook.

1. Remove the leaf you want to test from the plant.
2. Half fill a 250 cm^3 beaker with water and boil the water using a Bunsen burner.
3. Using a pair of forceps, hold the leaf in the boiling water for 20 seconds.
4. Turn the Bunsen burner off.
5. Using the forceps, push the leaf to the bottom of a boiling tube and cover it with ethanol.
6. Place the boiling tube in the beaker of very hot water. The ethanol will boil.
7. When the leaf is colourless, remove it from the boiling tube and wash it in cold water for a few seconds.
8. Place the leaf flat on a white tile.
9. Add dilute iodine solution with a pipette, making sure the whole leaf is covered.
10. Any starch present will react with the iodine solution.

(i) Explain a safety precaution that should be taken when carrying out this test.

(2)

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(ii) State the purpose of step 3.

(1)

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(iii) State the purpose of step 6.

(1)

(c) Experiments can be done to demonstrate that light, chlorophyll and carbon dioxide are needed for photosynthesis.

Testing leaves for starch is the final step in these experiments.

Explain what other steps need to be taken to demonstrate that each of these factors is needed for photosynthesis.

(i) light

(2)

(ii) chlorophyll

(2)

(iii) carbon dioxide

(2)

(Total for Question = 12 marks)

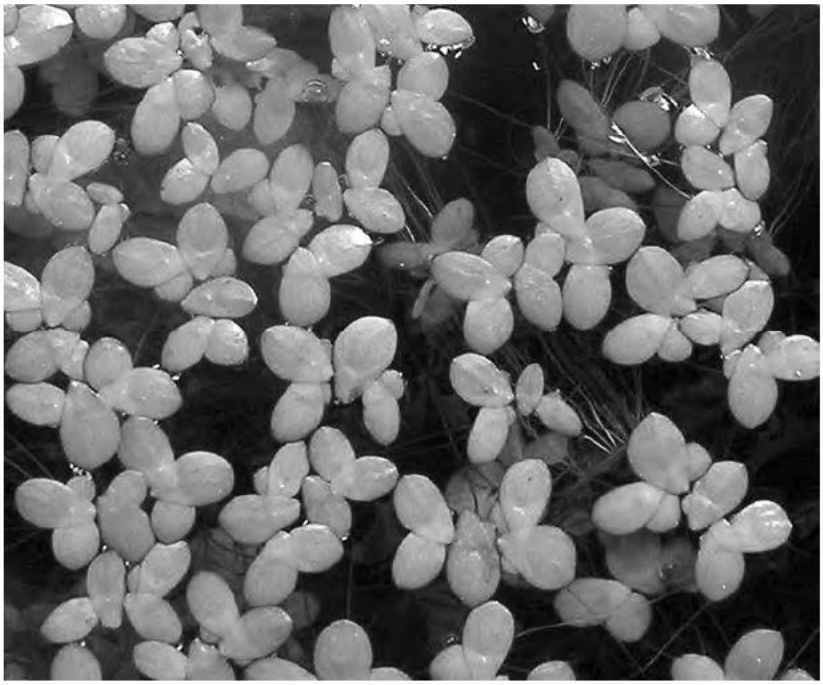
2 Plants obtain their food by the process of photosynthesis.

Explain how the structure of the leaf is adapted for its role as the organ of photosynthesis.

(6)

(Total for Question = 6 marks)

3 The photograph shows a water plant growing on the surface of a lake.



This water plant grows by increasing the number of its leaves. Many mineral ions help plants to grow.

(a) Describe how **one** named mineral ion helps plants to grow.

(2)

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(b) Copper ions inhibit the growth of this water plant.

To investigate this effect, a student put four plants with a total of 10 leaves into a beaker containing 400 cm^3 of mineral ion solution together with a copper coin. She repeated this with 400 cm^3 of the mineral ion solution without a copper coin.

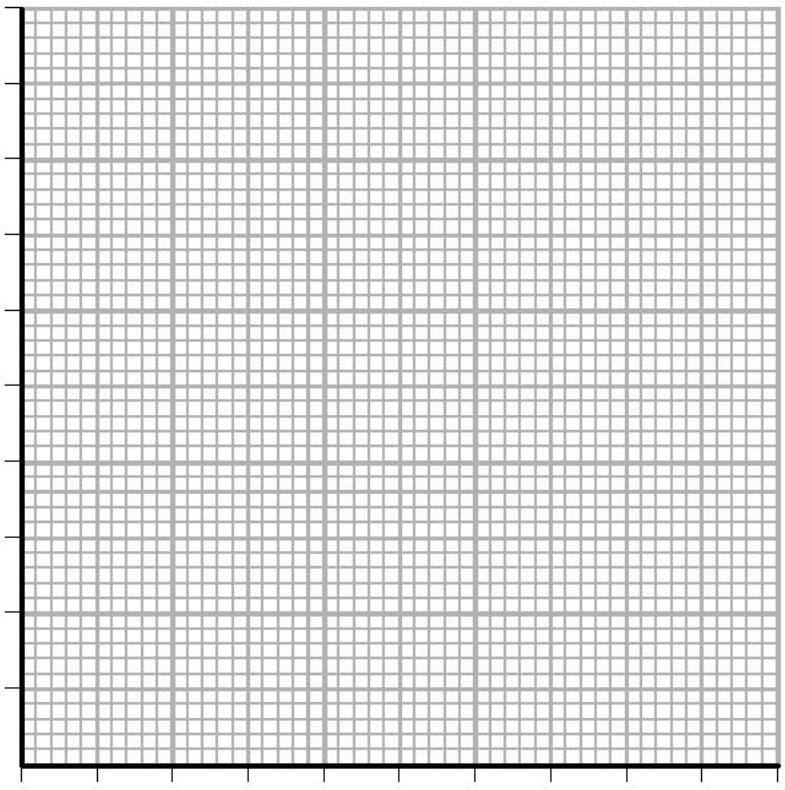
She counted the number of living leaves each day for the next eight days.

The table shows her results.

Day	Number of living leaves	
	Mineral ion solution with a copper coin	**Mineral ion solution without a copper coin**
1	10	10
2	10	10
3	11	12
4	12	16
5	12	18
6	7	23
7	2	33
8	0	42

(i) Plot a line graph on the grid below to show the results of her investigation. Use a ruler to join the points with straight lines.

(6)



(ii) In this investigation, the concentrations and volumes of the mineral ion solution and the species of water plant were kept the same.

Name **three other** variables that need to be kept the same for the results of this investigation to be valid.

(3)

1 .....

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2 .....

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3 .....

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(Total for Question = 11 marks)

4 Plants obtain their nutrition by photosynthesis.

(a) Write the balanced chemical symbol equation for photosynthesis.

(2)

(b) (i) Explain how the rate of photosynthesis is affected by changes to abiotic (non-living) factors throughout the day.

(4)

(ii) Explain how very high temperatures might reduce the growth of plants.

(4)

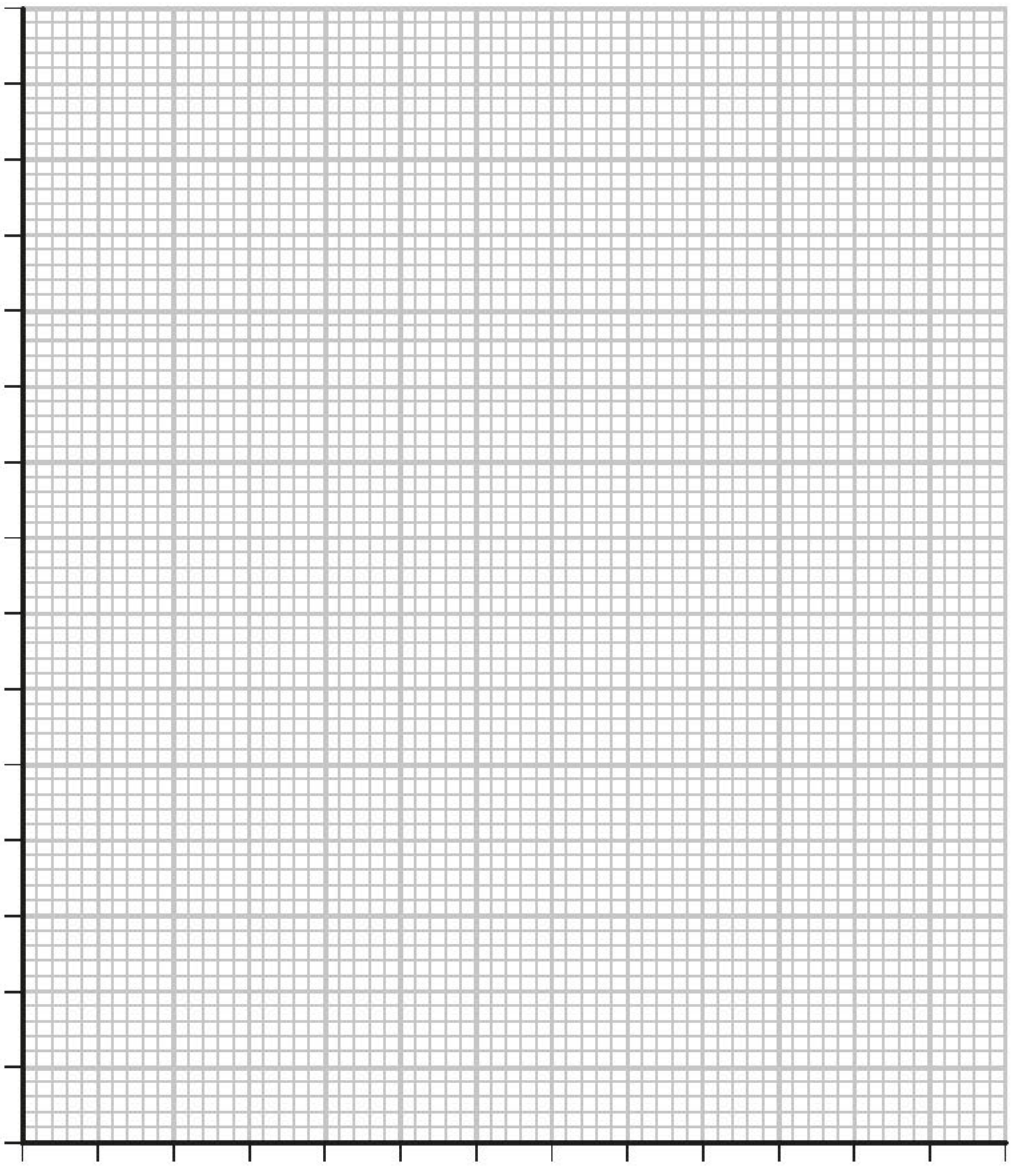
(Total for Question = 10 marks)

5 The data shows the number of heart attacks in men and women of different ages from 1969 to 1998 in one area in England.

Year	Number of heart attacks per 100 000 people	
	Men aged 40–44	Women aged 40–44
1969–73	125	13
1974–78	135	15
1979–83	116	11
1984–88	86	6
1989–93	68	9
1994–98	48	9

(a) Plot a bar graph to show the data in the table.

(6)



(b) Describe how the data differs for men and women.

(2)

(c) Give an explanation for the change in the number of heart attacks from 1969 to 1998.

(1)

(d) Explain why reducing the blood supply to the heart muscle cells can cause a heart attack.

(3)

(Total for Question = 12 marks)