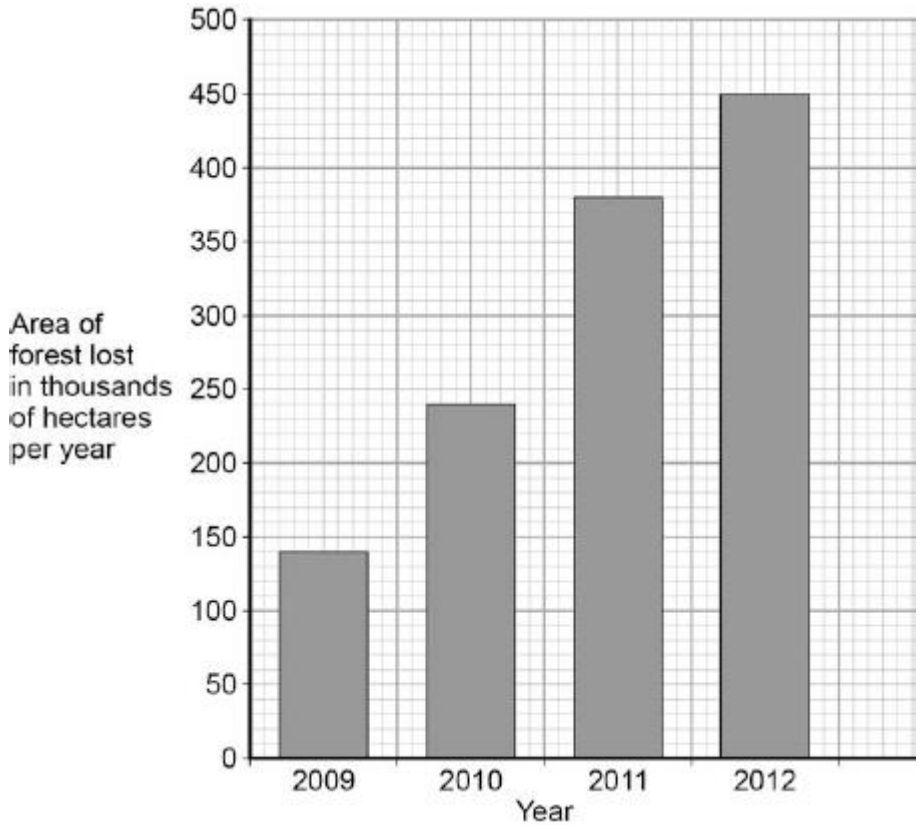
Q1. The graph below shows the area of forest lost in Madagascar from 2009 to 2012.



(a) The area of forest lost each year in Madagascar increased between 2009 and 2012.

Determine the total area of forest lost from the start of 2009 to the end of 2012.

.....

.....

Total area of forest lost = ... thousand hectares

(1)

(b) What are the possible reasons for the change in the area of forest lost per year between 2009 and 2012?

Tick **two** boxes.

The local people stop growing rice ☐

Fewer new houses are needed for the population ☐

The local people decided to farm cattle	☐
More trees have been planted	☐
A company starts growing plants for biofuels	☐

(2)

(c) More forest was lost in 2012 than in 2009.

Use words from the box to complete the sentences.

carbon dioxide	**excretion**	**nitrogen**
oxygen	**photosynthesis**	**respiration**

The increase in the area of forest lost has caused an increase in the gas .....

The increase of this gas has been caused because less of the gas is being absorbed by plants for the process of ..... .

(2)

(d) Deforestation can have negative effects on our ecosystems.

What are the negative effects of deforestation?

Tick **two** boxes.

Animals and birds migrate because there is less food	☐
More habitats are destroyed	☐
There is less acid rain	☐
There is more biodiversity	☐
The global temperature decreases	☐

(2)

(e) Scientists try to reduce the negative effects of human activity on our ecosystems.

One way is to protect rare habitats.

Give **one other** way of reducing the negative effects of human activity on our ecosystems.

.....

.....

(1)

(Total 8 marks)

Q2. (a) Complete the word equation for photosynthesis.

Use words from the box.

chlorophyll	**minerals**	**oxygen**	**water**

carbon dioxide + ... → glucose + ...

(2)

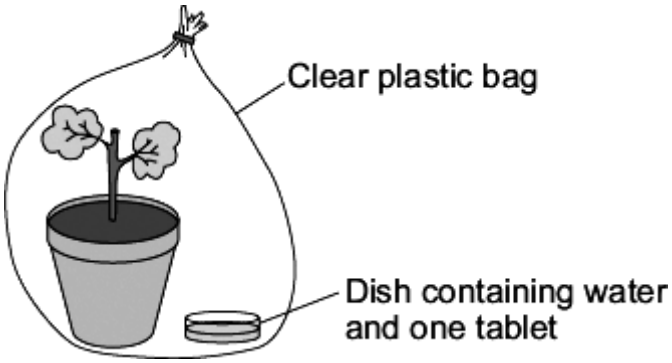
(b) Plants may grow faster if they have more carbon dioxide.

Indigestion tablets dissolve in water to form a solution.
This solution slowly gives off carbon dioxide.

A student set up an investigation to see what concentration of carbon dioxide is best for increasing the growth of geranium plants.

The student:

- put a geranium plant in a clear plastic bag
- put a dish containing water and one tablet in the bag
- sealed the top of the bag.



The student:

- set up 5 more experiments each with water and a different number of tablets
- left all the plants in a well-lit place for four weeks.

The student used a clear plastic bag, not a black plastic bag.

Explain why.

.....

.....

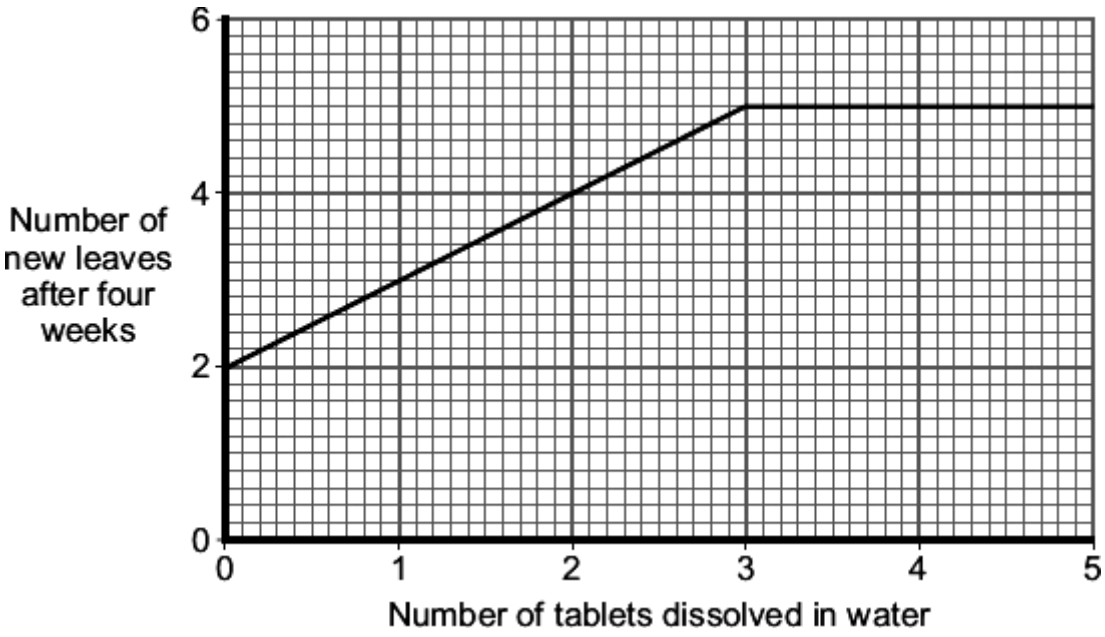
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(2)

(c) After four weeks, the student counted the number of new leaves on each plant.

The graph shows his results.



Describe the effect of increasing the number of tablets dissolved in water on the number of new leaves that grew in four weeks.

.....

.....

.....

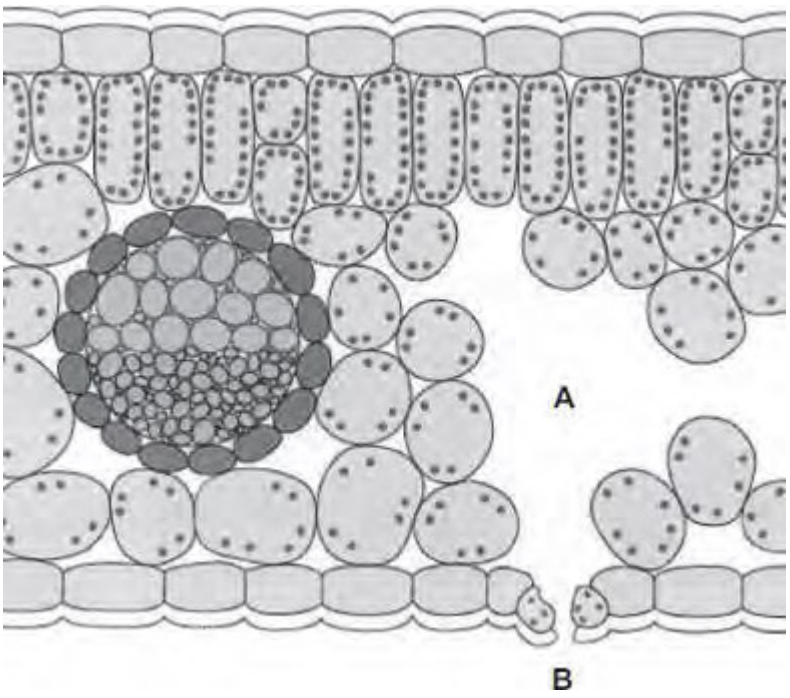
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.....

.....

(3)
(Total 7 marks)

Q3. The diagram shows a section through a plant leaf.



(a) Use words from the box to name **two** tissues in the leaf that transport substances around the plant.

epidermis	**mesophyll**	**phloem**	**xylem**

..... and
.....

(1)

(b) Gases *diffuse* between the leaf and the surrounding air.

(i) What is *diffusion*?

.....

.....

.....

.....

(2)

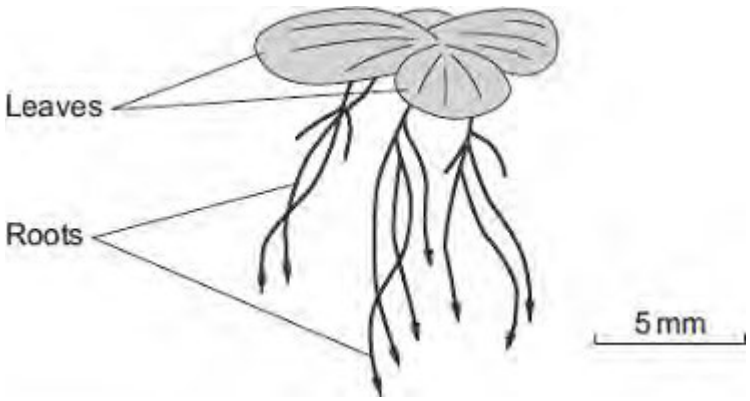
(ii) Name **one** gas that will diffuse from point **A** to point **B** on the diagram on a sunny day.

.....

(1)
(Total 4 marks)

Q4. Duckweed is a plant. Duckweed grows in ponds. The leaves of duckweed float on the surface of the water and its roots hang down in the water.

The drawing shows a duckweed plant.



(a) Duckweed roots absorb nitrate ions from the water.
The nitrate ions help the duckweed to grow.

Draw a ring around the correct answer to complete the sentence.

Duckweed needs nitrate ions to make

carbohydrate.

fat.

protein.

(1)

(b) Some students grew duckweed plants in three different solutions of mineral ions, **A**, **B** and **C**, and in distilled water (**D**).

Table 1 shows the concentrations of mineral ions in each of **A**, **B**, **C** and **D** at the start of the investigation.

Table 1

Mineral ion	Concentration of mineral ions

	in mg per dm ^{3} at the start of the investigation			
	A	**B**	**C**	**D**
Nitrate	1000	4	4	0
Phosphate	300	0	0	0
Magnesium	200	84	24	0

The students counted the number of duckweed leaves in **A**, **B**, **C** and **D** at the start of the investigation and after 28 days.

Table 2 shows their results.

Table 2

	A	**B**	**C**	**D**
Number of leaves at start	4	4	4	4
Number of leaves after 28 days	50	27	14	6

(i) Using **Table 1** and **Table 2**, describe the effect of magnesium ions on the growth of duckweed.

.....

.....

(1)

(ii) Solution **A** contained the highest concentration of nitrate ions.

One student said, 'The results show that nitrate ions are needed for the growth of duckweed.'

What evidence in **Table 2** supports what the student said?

.....

.....

(1)

(c) The students measured the growth of the duckweed by counting the number of leaves.

(i) Suggest a better method of measuring the growth of the duckweed.

.....

.....

(1)

(ii) Suggest why your method is better than the students' method.

.....

.....

(1)
(Total 5 marks)

Q5.(a) Complete the word equation for photosynthesis.

carbon dioxide + water $\xrightarrow{\text{energy}}$ glucose + ...

(1)

(b) Draw a ring around the correct answer to complete each sentence.

(i) The energy needed for photosynthesis comes from

light.
osmosis.
respiration.

(1)

(ii) Energy is absorbed by a green pigment called

chloride.
chloroplast.

chlorophyll.

(1)

(iii) If the temperature is decreased the rate of photosynthesis will

decrease.

increase.

stay the same.

(1)

(c) Give **three** ways in which plants use the glucose made in photosynthesis.

1 .....

.....

2 .....

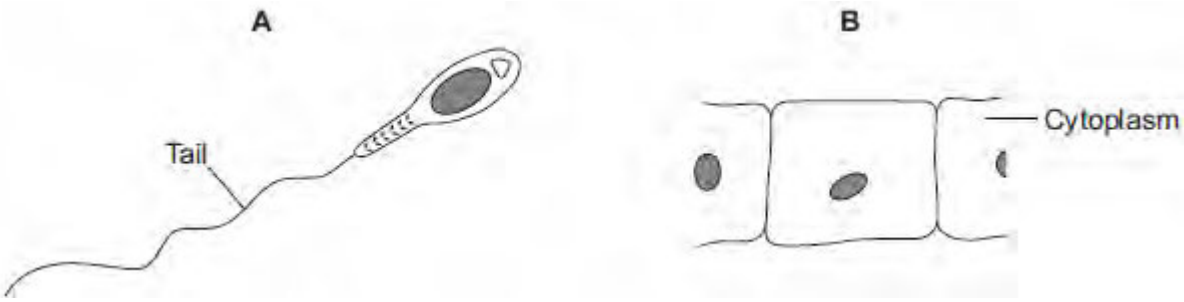
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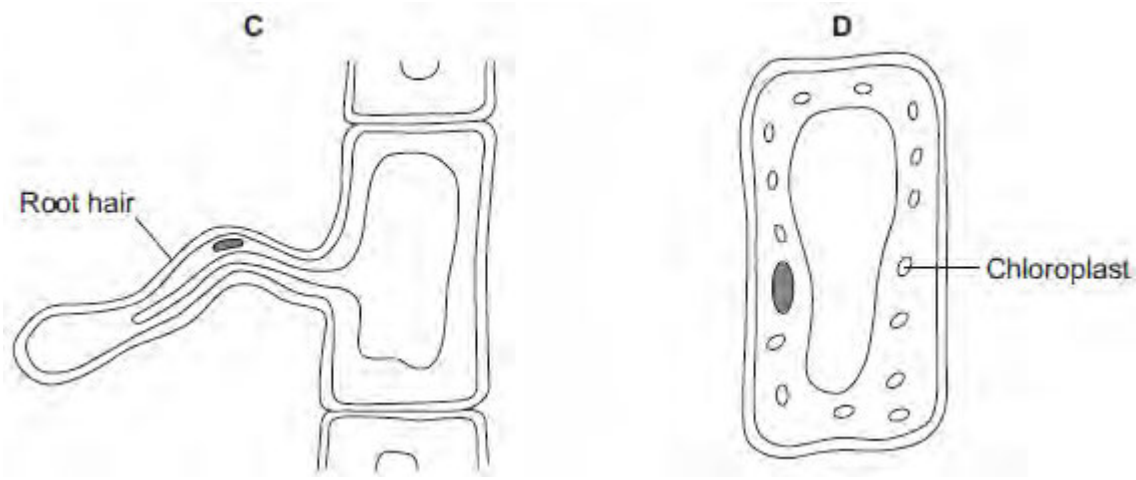
3 .....

.....

(3)
(Total 7 marks)

Q6. The diagrams show four types of cell, **A**, **B**, **C** and **D**.
Two of the cells are plant cells and two are animal cells.





(a) (i) Which **two** of the cells are plant cells?

Tick (✓) **one** box.

A and **B** ☐

A and **D** ☐

C and **D** ☐

(1)

(ii) Give **one** reason for your answer.

.....

.....

(1)

(b) (i) Which cell, **A**, **B**, **C** or **D**, is adapted for swimming? ☐

(1)

(ii) Which cell, **A**, **B**, **C** or **D**, can produce glucose by photosynthesis? ☐

(1)

(c) Cells **A**, **B**, **C** and **D** all use oxygen.

For what process do cells use oxygen?

Draw a ring around **one** answer.

osmosis **photosynthesis** **respiration**

(1)
(Total 5 marks)

Q7.(a) A student carried out the following investigation using a plant with variegated leaves.
A variegated leaf has green and white stripes.

The student:

- left the plant in the dark for 3 days to remove the starch
- fixed two pieces of card to a leaf on the plant
- left the plant in the light for 2 days
- removed the leaf from the plant
- tested the leaf for starch.

Figure 1 shows how the two pieces of card were attached to the leaf.

Figure 1

Leaf without card **Leaf with card**

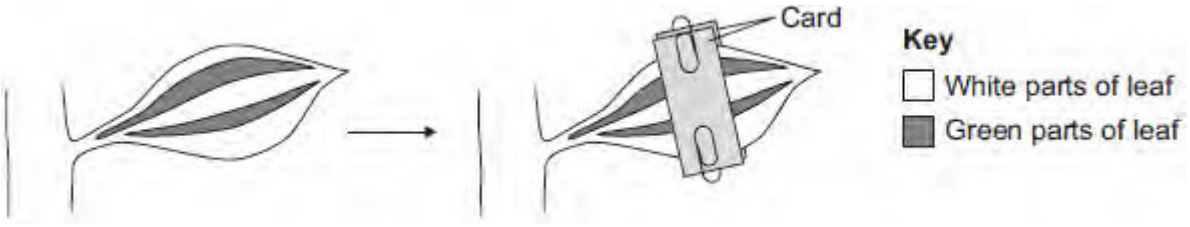
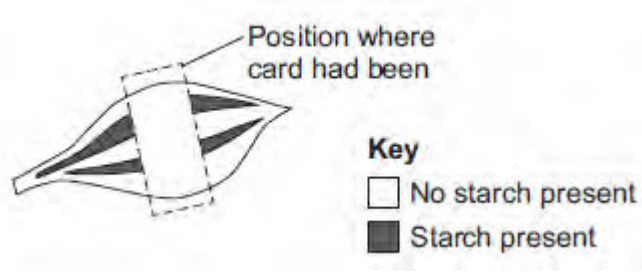


Figure 2 shows the same leaf after 2 days in the light.
The leaf has been tested for starch.

Figure 2



Give **two** conclusions from this investigation.

Tick (✓) **two** boxes.

Carbon dioxide is needed for photosynthesis. ☐

Chlorophyll is needed for photosynthesis. ☐

Light is needed for photosynthesis. ☐

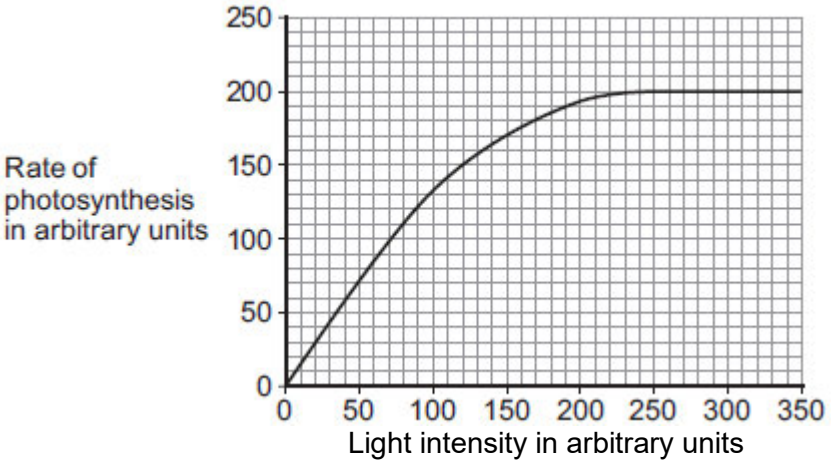
Water is needed for photosynthesis. ☐

(2)

(b) Scientists investigated the effect of light intensity on the rate of photosynthesis.

Figure 3 shows the scientists' results.

Figure 3



Describe the effect of increasing light intensity on the rate of photosynthesis. You should include numbers from **Figure 3** in your description.

.....

.....

.....

.....

.....

.....

(3)

(c) At a light intensity of 250 arbitrary units, light is **not** a limiting factor of photosynthesis.

(i) What is the evidence for this in **Figure 3**?

.....

.....

(1)

(ii) Give **two** factors that could be limiting the rate of photosynthesis at a light intensity of 250 arbitrary units.

1 .....

2 .....

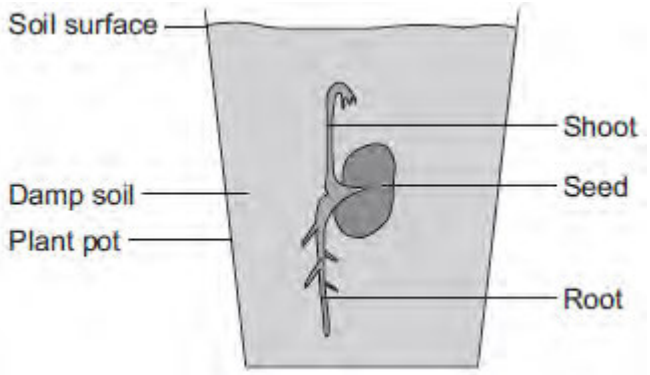
(2)
(Total 8 marks)

Q8. A student investigated growth in plants.

The student:

- planted a seed in damp soil in a plant pot
- put the plant pot in a dark cupboard.

The image below shows the result after 5 days.



(a) Draw a ring around the correct answer to complete each sentence.

(i) After the 5 days, the root had grown

away from water.
in the direction of the force of gravity.
towards light.

(1)

(ii) After the 5 days, the shoot had grown

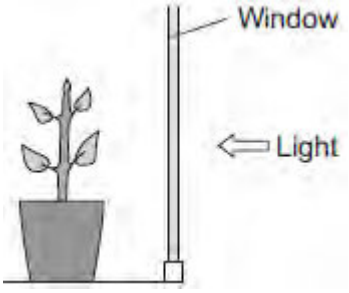
against the force of gravity.

away from light.
towards water.

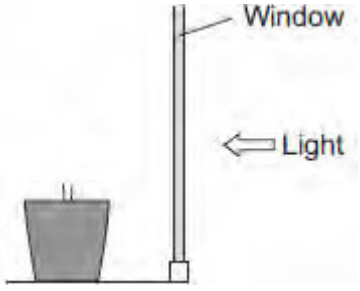
(1)

(b) After the plant had grown, the student put the plant pot by a window with lots of light.

The illustration below shows this.



(i) Complete the diagram below to show the appearance of the student's plant after 20 days by the window.



(1)

(ii) Explain the advantage to the plant of growing in the way that you have drawn in part **(b)(i)**.

.....

.....

.....

.....

(2)
(Total 5 marks)

Q9. Photosynthesis uses carbon dioxide to make glucose.

(a) (i) Complete the equation for photosynthesis.

carbon dioxide + ... $\xrightarrow{\text{energy}}$ glucose + ...

(2)

(ii) What type of energy does a plant use in photosynthesis?

.....

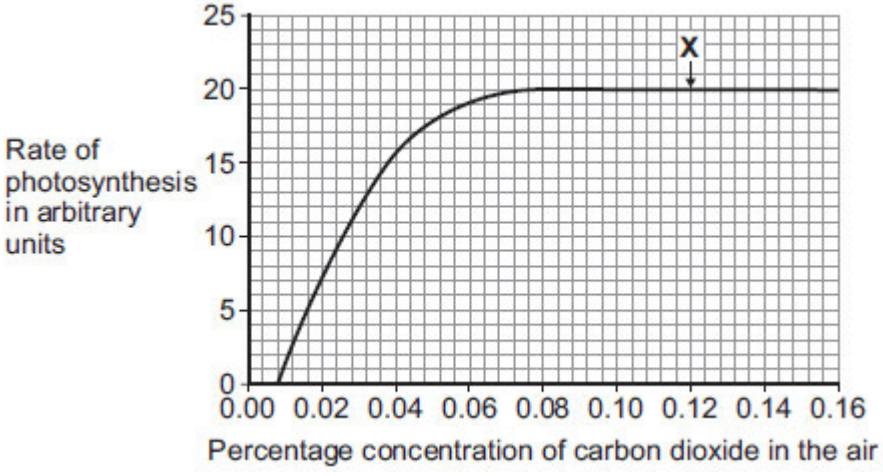
(1)

(iii) Which part of a plant cell absorbs the energy needed for photosynthesis?

.....

(1)

(b) The graph shows the effect of the concentration of carbon dioxide on the rate of photosynthesis in tomato plants at 20 °C.



(i) What is the maximum rate of photosynthesis of the tomato plants shown in the graph?

..... arbitrary units

(1)

(ii) At point **X**, carbon dioxide is **not** a limiting factor of photosynthesis.

Suggest **one** factor that is limiting the rate of photosynthesis at point **X**.

.....

(1)

(c) A farmer plans to grow tomatoes in a large greenhouse.

The concentration of carbon dioxide in the atmosphere is 0.04%.
The farmer adds carbon dioxide to the greenhouse so that its concentration is 0.08%.

(i) Why does the farmer use 0.08% carbon dioxide?

Tick (✓) **one** box.

To increase the rate of growth of the tomato plants ☐

To increase the rate of respiration of the tomato plants ☐

To increase water uptake by the tomato plants ☐

(1)

(ii) Why does the farmer **not** use a concentration of carbon dioxide higher than 0.08%?

Tick (✓) **two** boxes.

Because it would cost more money than using 0.08% ☐

Because it would decrease the temperature of the greenhouse ☐

Because it would not increase the rate of photosynthesis of the tomato plants any further ☐

Because it would increase water loss from the tomato plants ☐

(2)
(Total 9 marks)