

Photosynthesis

Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Biology
Exam Board	AQA
Topic	4.4 Bioenergetics
Sub-Topic	Photosynthesis
Difficulty Level	Bronze Level
Booklet	Question Paper 1

Time Allowed: 60 minutes

Score: /59

Percentage: /100

Grade Boundaries:

Q1. Pathogens cause infectious diseases in animals and plants.

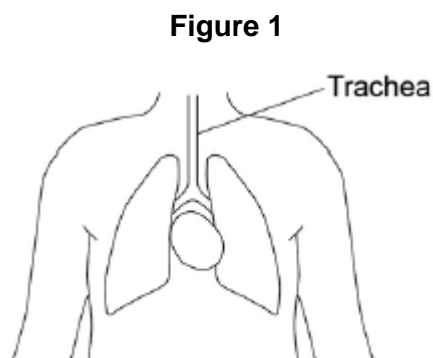
- (a) Draw **one** line from each disease to the type of pathogen that causes the disease.

Disease	Type of pathogen
Gonorrhoea	Bacterium
Malaria	Fungus
Measles	Protist
	Virus

(3)

- (b) Some parts of the human body have adaptations to reduce the entry of live pathogens.

Look at **Figure 1**.



Explain how the trachea is adapted to reduce the entry of live pathogens.

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(4)

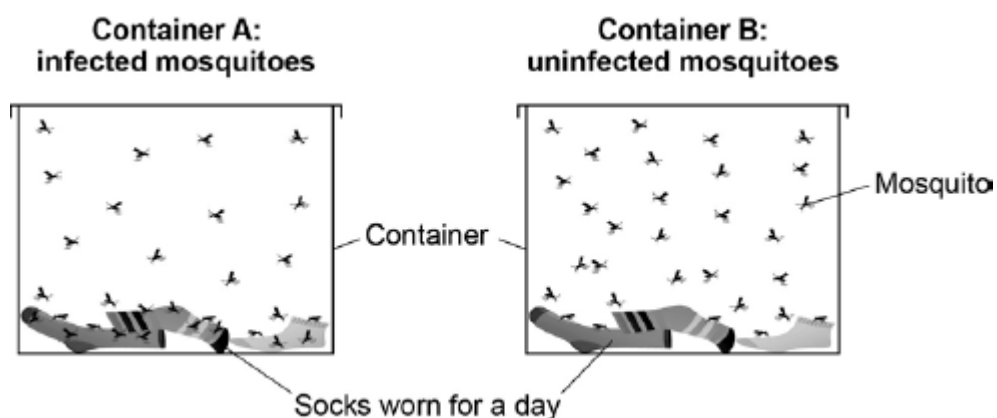
- (c) Malaria is a serious disease that can be fatal.

Malaria is spread to humans by infected mosquitoes.

Scientists investigated the behaviour of mosquitoes to understand how the spread of malaria could be controlled.

Figure 2 shows the equipment the scientists used.

Figure 2



This is the method used.

- 30 mosquitoes **infected with malaria** were placed in Container **A**.
- 30 **uninfected** mosquitoes were placed in Container **B**.
- The total number of times the mosquitoes landed on the socks was recorded.

Name the dependent variable and suggest **one** control variable in this investigation.

Dependent variable

.....

Control variable

.....

(2)

- (d) Infected mosquitoes landed on the socks three times more often than uninfected mosquitoes.

Explain how this information can be used to reduce the spread of malaria.

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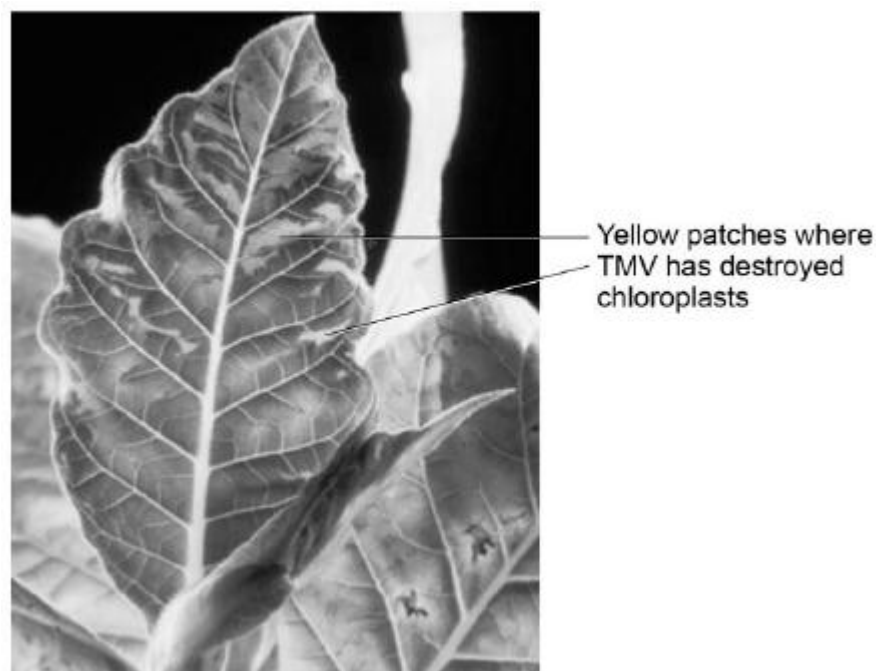
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(2)

- (e) Tobacco mosaic virus (TMV) affects many species of plant.

Figure 3 shows a leaf infected with TMV.

Figure 3



© Nigel Cattlin/Getty Images

TMV destroys chloroplasts in the leaf.

Explain how this could affect the growth of the plant.

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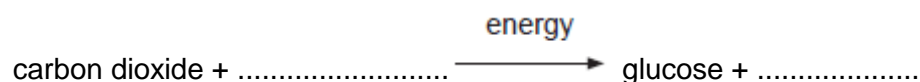
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(3)
(Total 14 marks)

Q2.Photosynthesis uses carbon dioxide to make glucose.

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



(2)

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

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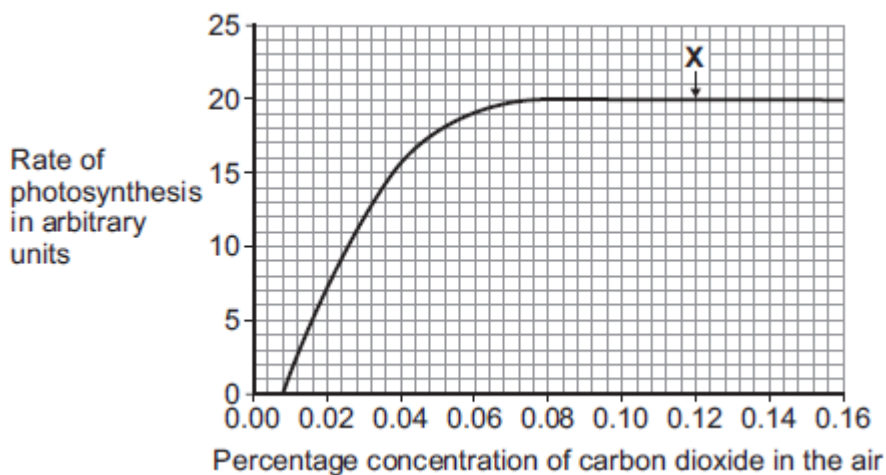
(1)

- (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)

Q3.(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.

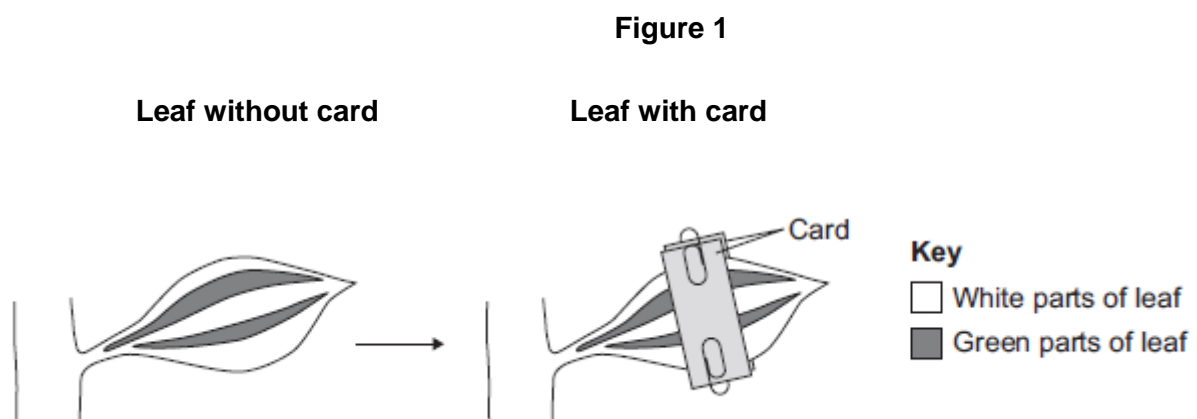
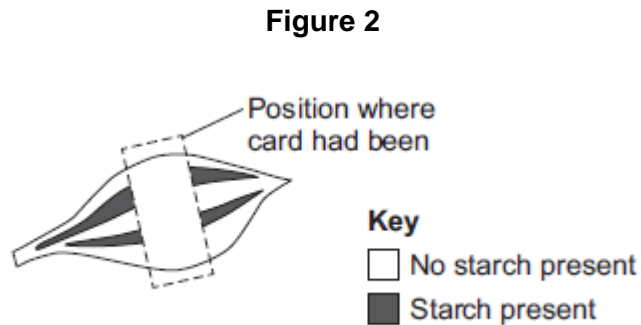


Figure 2 shows the same leaf after 2 days in the light.
The leaf has been tested for starch.



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.

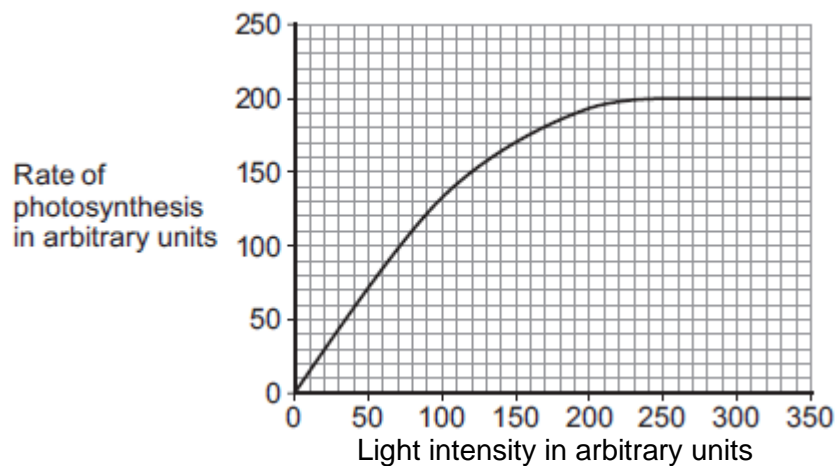
☐

(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.

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(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**?

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(1)

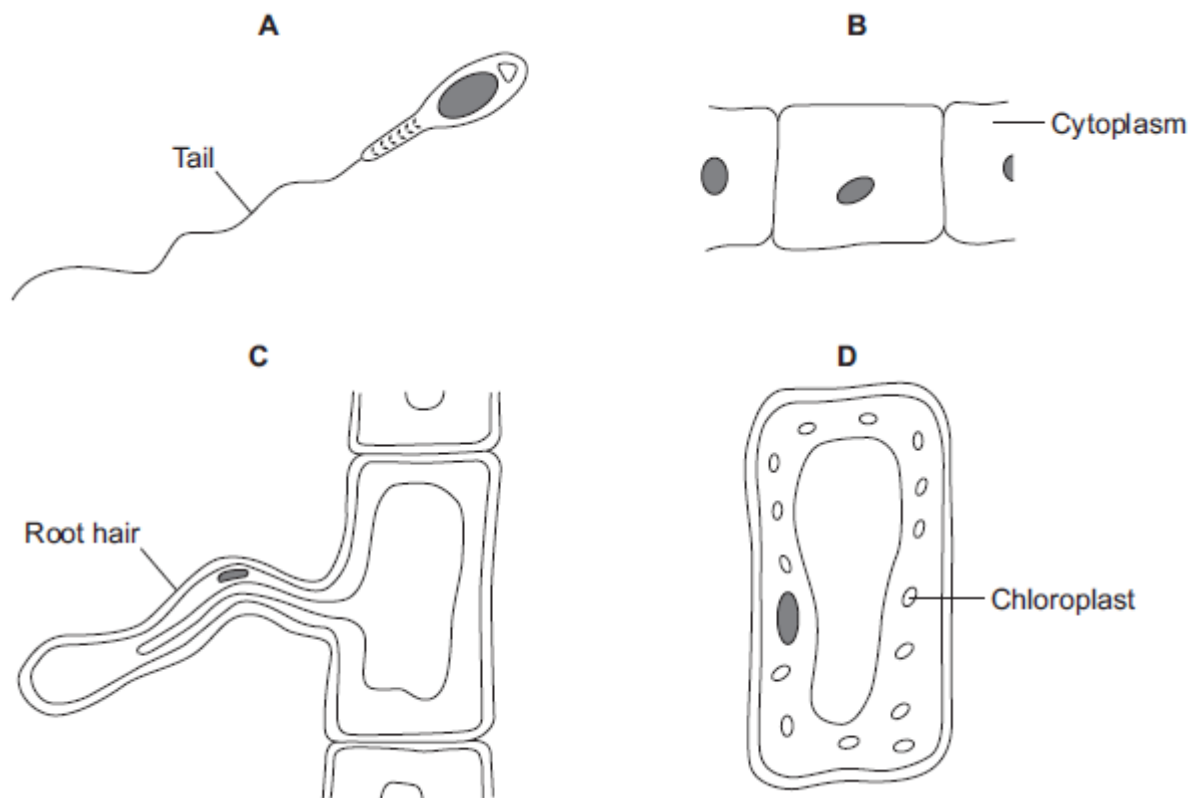
- (ii) Give **two** factors that could be limiting the rate of photosynthesis at a light intensity of 250 arbitrary units.

1

2

(2)
(Total 8 marks)

Q4. 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)

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)

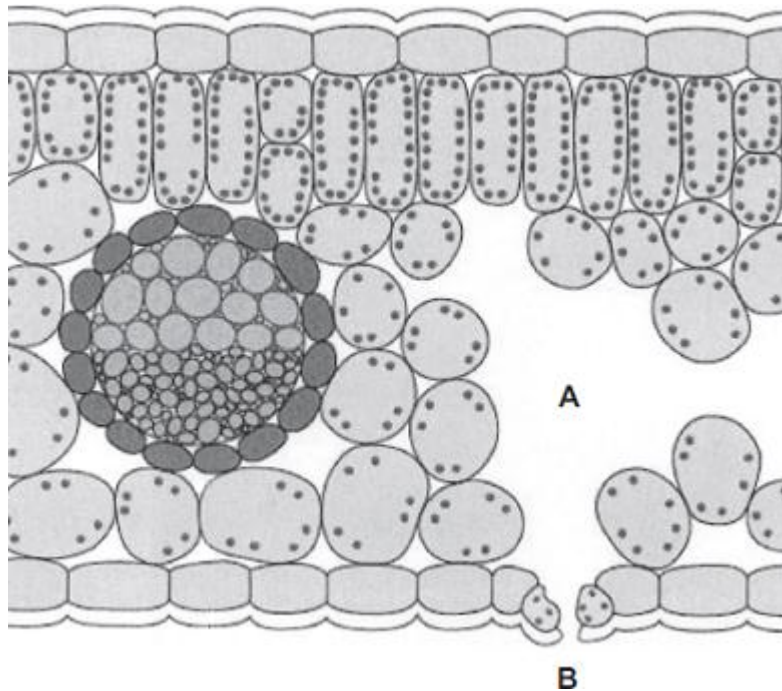
(c) Give **three** ways in which plants use the glucose made in photosynthesis.

- 1
-
- 2
-
- 3
-

(3)

(Total 7 marks)

Q6. 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
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..... 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)

- Q7.** (a) Complete the word equation for photosynthesis.

Use words from the box.

chlorophyll	minerals	oxygen	water
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carbon dioxide + → glucose +

(2)

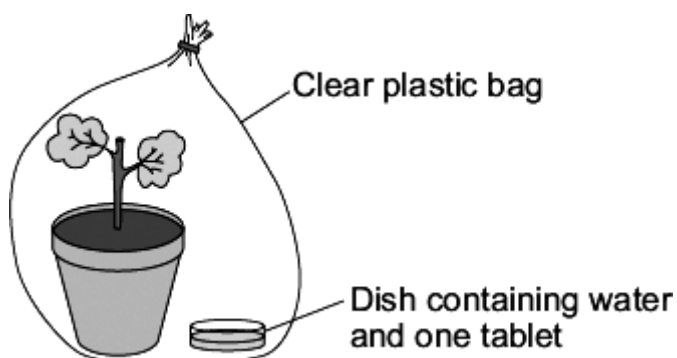
- (b) Plants may grow faster if they have more carbon dioxide.

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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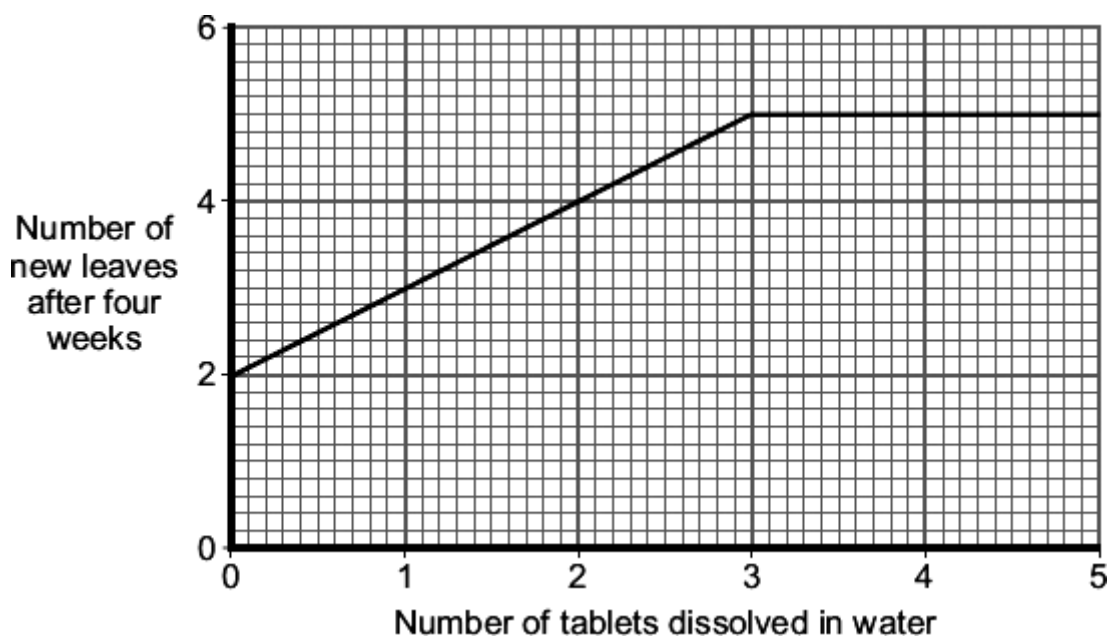
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(2)

- (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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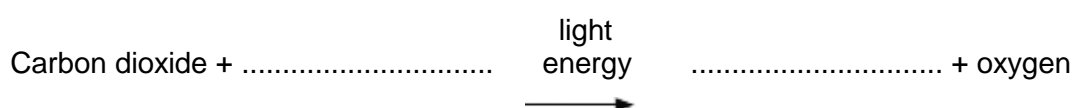
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(3)
(Total 7 marks)

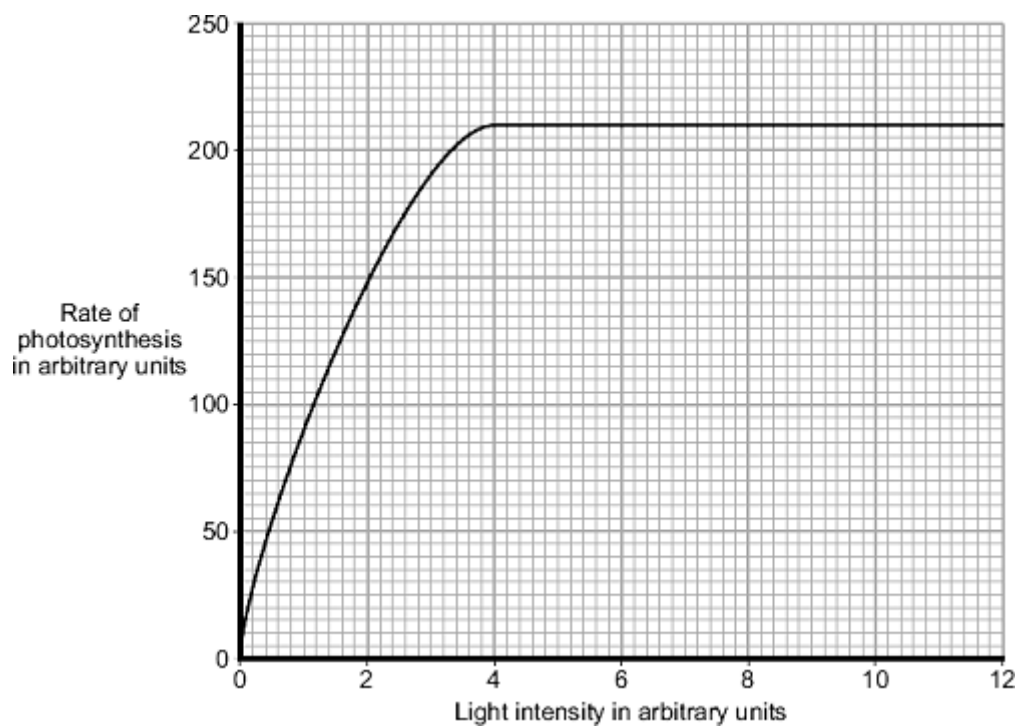
Q8. (a) Complete the equation for photosynthesis.



(2)

(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.



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

Tick (✓) **one** box.

1 arbitrary unit

☐

4 arbitrary

units

arbitrary

10

units

☐
☐

10 arbitrary

units

☐
☐

(1)

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

..... arbitrary units

(1)

- (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)

(Total 5 marks)

