OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

B3.1 WHAT HAPPENS DURING PHOTOSYNTHESIS? (FOUNDATION)

SCORE	PERCENTAGE
/90	%

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1(a). In some areas of the UK, dogwhelk numbers are decreasing. This reduces biodiversity.

Give **two** benefits of maintaining biodiversity.

1 ---

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2 ---

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[2]

(b). Sea anemones can reproduce asexually.

Give **one** advantage and **one** disadvantage of this method of reproduction.

Advantage ---

Disadvantage ---

---

[2]

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(c).

(i) Sea anemones are mainly found in rock pools.

During the summer the water temperature in a rock pool can increase to a level which can be dangerous for a sea anemone.

Put a tick (✓) in the box that best explains why this temperature increase is a problem.

Enzyme catalysed reactions will speed up.	☐
Enzyme catalysed reactions will slow down.	☐
Enzymes will be killed.	☐
Enzymes will become denatured.	☐

[1]

(ii) When it rains, the concentration of the sea water in a rock pools decreases.

What effect will this change in concentration have on a sea anemone's cells?

Put a tick (✓) in the box next to the correct answer.

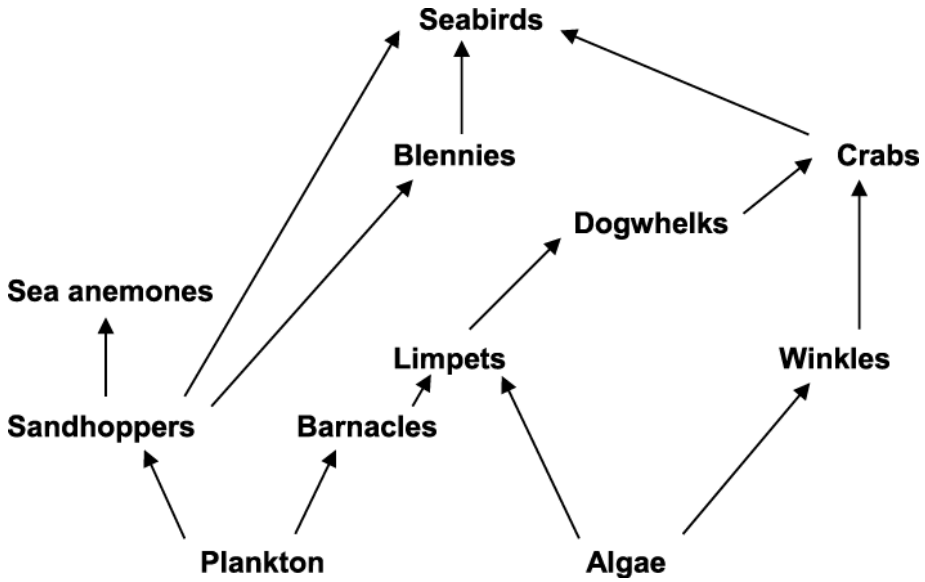
Some cells may burst.	☐
Some cells may shrink.	☐
There will be no change to the cells.	☐
Some cells will burst, others will shrink.	☐

[1]

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(d). This is a food web for the species that can live on a rocky shore.



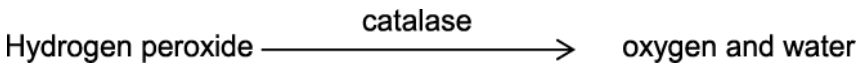
Explain the impact of an increase in the number of dogwhelks on one species in this food web.

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[2]

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2(a). A group of students carry out an enzyme investigation. The equation below shows the reaction.



Name the substrate and the enzyme in the reaction above.

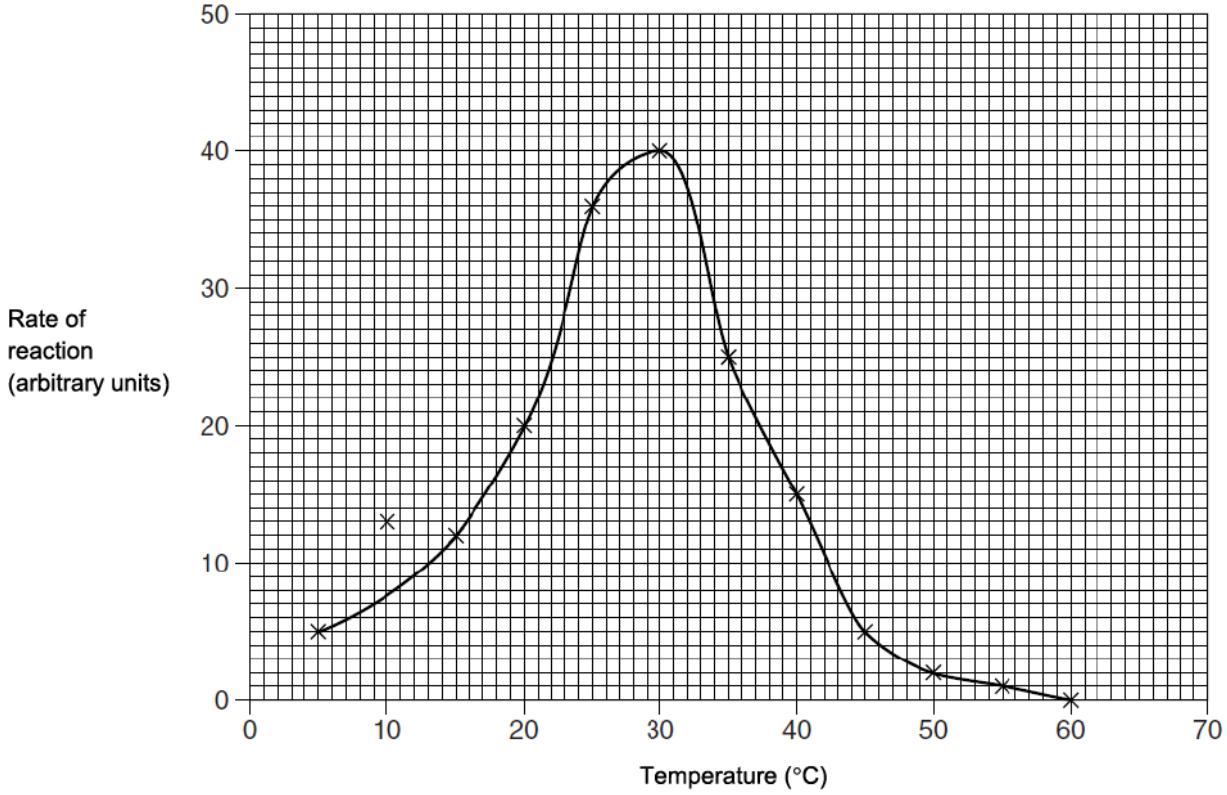
Substrate: _____

Enzyme: _____

[1]

(b). * The students investigated the effect of temperature on the rate of the enzyme controlled reaction.

Their results are shown in the graph below.



Use the graph above to describe and explain the effect of temperature on an enzyme such as this.

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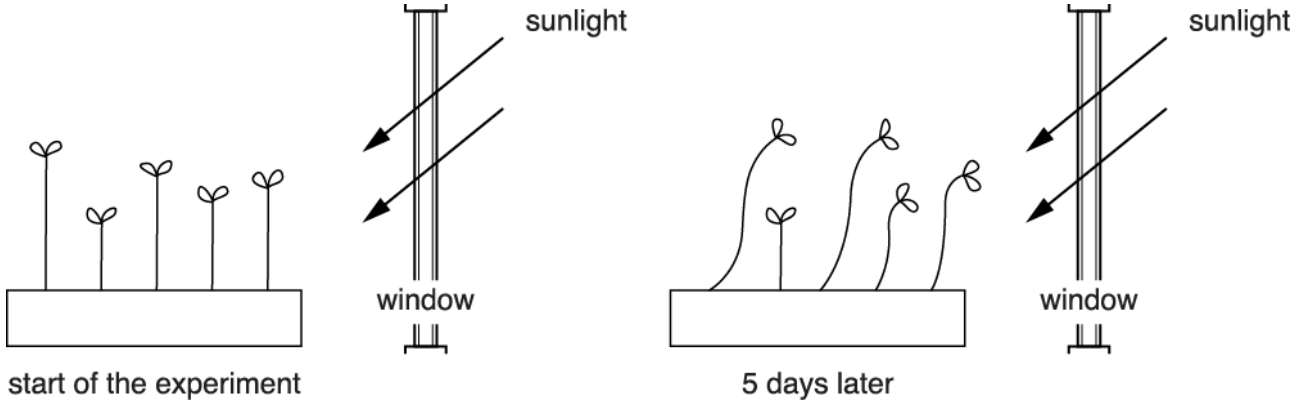
[6]

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3. James investigates the effect of light on shoot growth.

He places a tray of 5 cress seedlings on a windowsill and leaves them for 5 days.

He notes the appearance of the seedlings at the start of the experiment and again 5 days later.



all cress seedlings grow upright

only 1 cress seedling is growing upright

James concludes that the seedlings have grown towards the sunlight. James thinks that there are problems with his experimental design.

Evaluate the experimental design. In your answer you should:

- identify some of the problems
- suggest how the experiment could be improved.

The quality of written communication will be assessed in your answer.

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[6]

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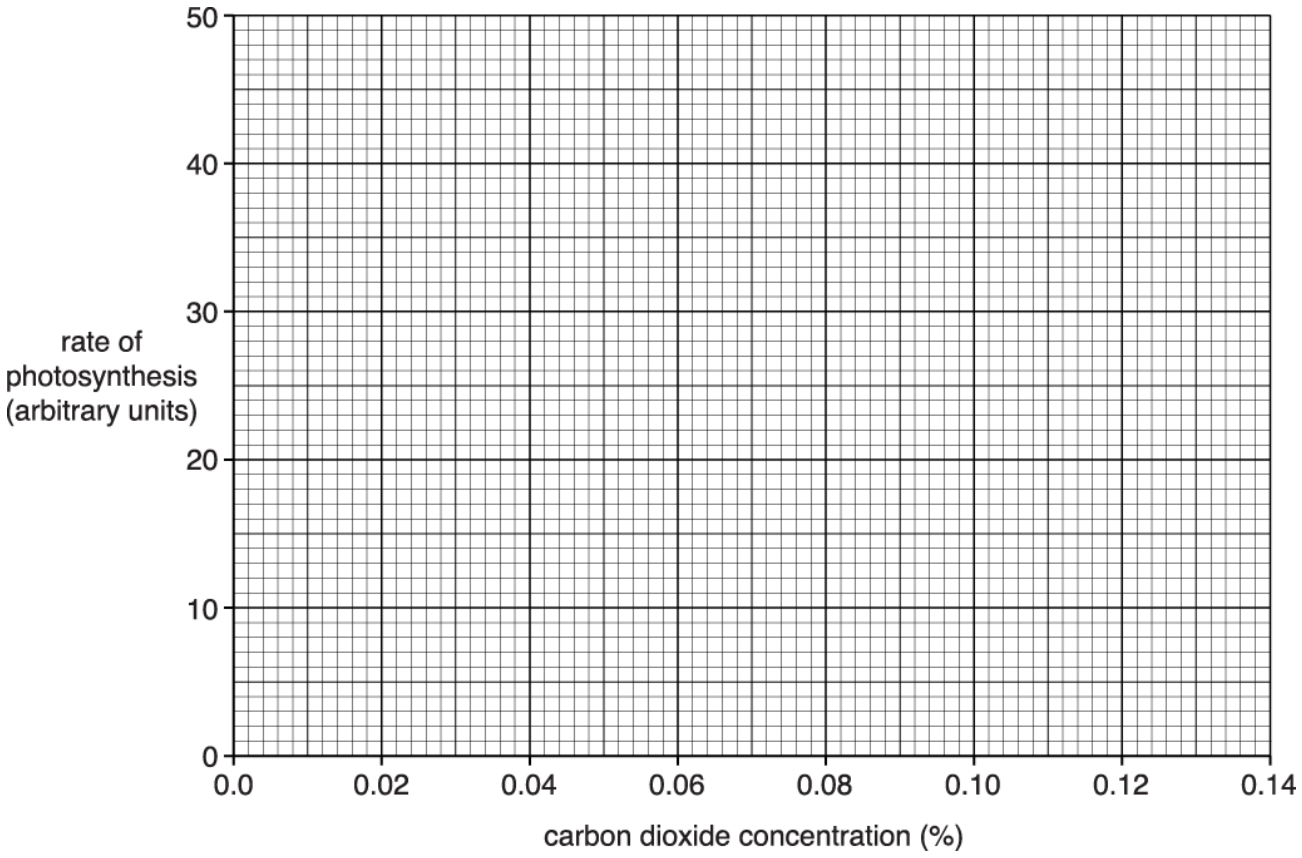
4(a). Paresh does an experiment to investigate the effect of carbon dioxide on the rate of photosynthesis.

His results are shown below.

Carbon dioxide concentration in the air (%)	Rate of photosynthesis (arbitrary units)
0.00	0
0.02	20
0.04	28
0.06	35
0.08	40
0.10	
0.12	43
0.14	43

[2]

(i) Plot the data on the grid below.



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[1]

(ii) Use the points to draw an appropriate line of best fit.

(iii) The table does not show the rate of photosynthesis when the concentration of carbon dioxide was 0.10%.

Use the graph to find the rate of photosynthesis when the carbon dioxide concentration was 0.10%.

rate of photosynthesis _____ [1]

(iv) What conclusions can be made about the effect of carbon dioxide concentration on the rate of photosynthesis?

_____

_____

_____

_____ [2]

(v) Paresh measures the rate of photosynthesis at 0.13%.

The rate of photosynthesis was 22 (arbitrary units).

He decides **not** to include this in the data set.

Suggest why.

_____

_____

_____ [2]

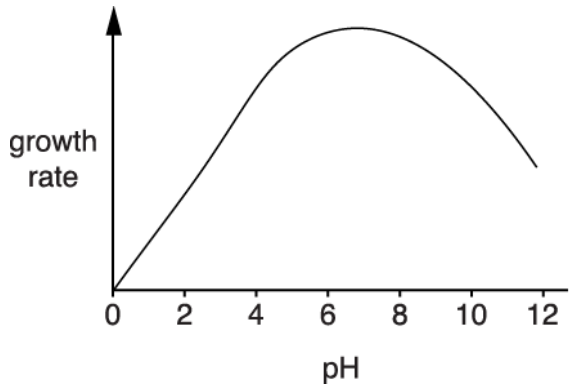
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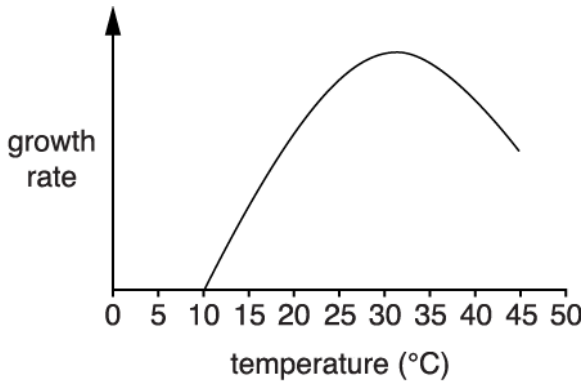
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(b). Paresh is a keen gardener. He wants to improve the growth rate of his tomatoes.

To do this he needs to provide the optimum conditions for growth.

Paresh read the information below in a gardening magazine. It shows the effects of pH and temperature on the growth rate of tomatoes.





Describe what conditions he should provide to grow his tomatoes. Use the information above and your biological knowledge in your answer.

The quality of written communication will be assessed in your answer.

[6]

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5. Explain how phototropism increases a plant's chance of survival.

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[2]

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6(a). This question is about chemical reactions taking place in living things.

Both photosynthesis and respiration are a series of chemical reactions.

Complete the sentences.

Use words from the list.

The words can be used once, more than once or not at all.

break down

build up

digest

electricity

energy

oxygen

sunlight

water

Photosynthesis uses carbon dioxide and water.

It needs energy from _____ .

It involves a series of reactions that _____ large food molecules.

Respiration releases carbon dioxide and water.

It also releases _____ from food.

It involves a series of reactions that _____ large food molecules.

[4]

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(b). The processes of photosynthesis and respiration are made up of a series of reactions.

Each reaction needs a specific enzyme.

This means that each enzyme only works for one reaction.

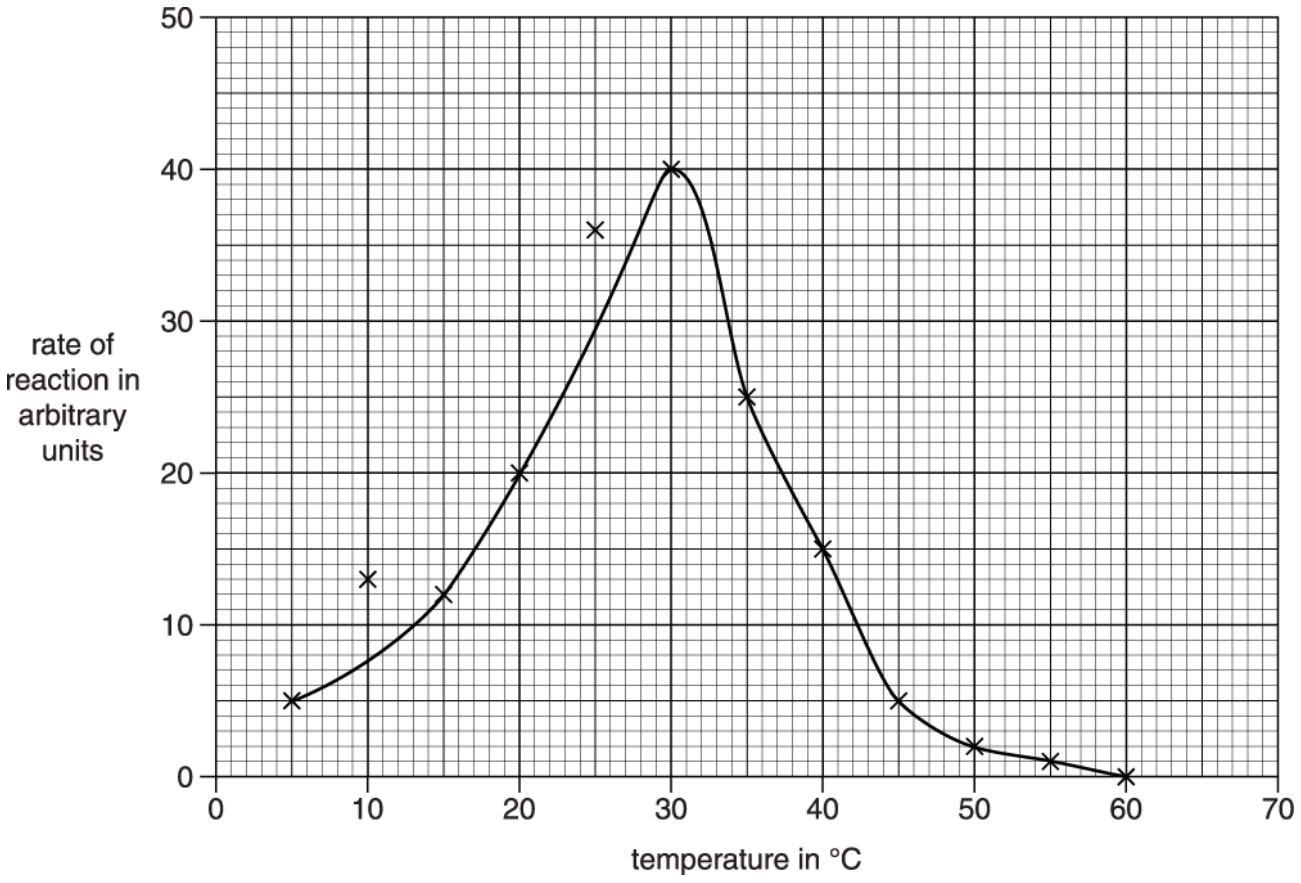
Explain why.

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[2]

(c). A group of students carry out an investigation using enzymes.

They record the rate of an enzyme reaction across a range of temperatures.



(i) Use information in the graph to complete the table.

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Temperature in °C	Rate of reaction in arbitrary units
_____	40
45	_____

[2]

(ii) Describe the change in the rate of reaction between the two temperatures in the table and explain this difference.

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[2]

(iii) The students have drawn a line of best fit on the graph.

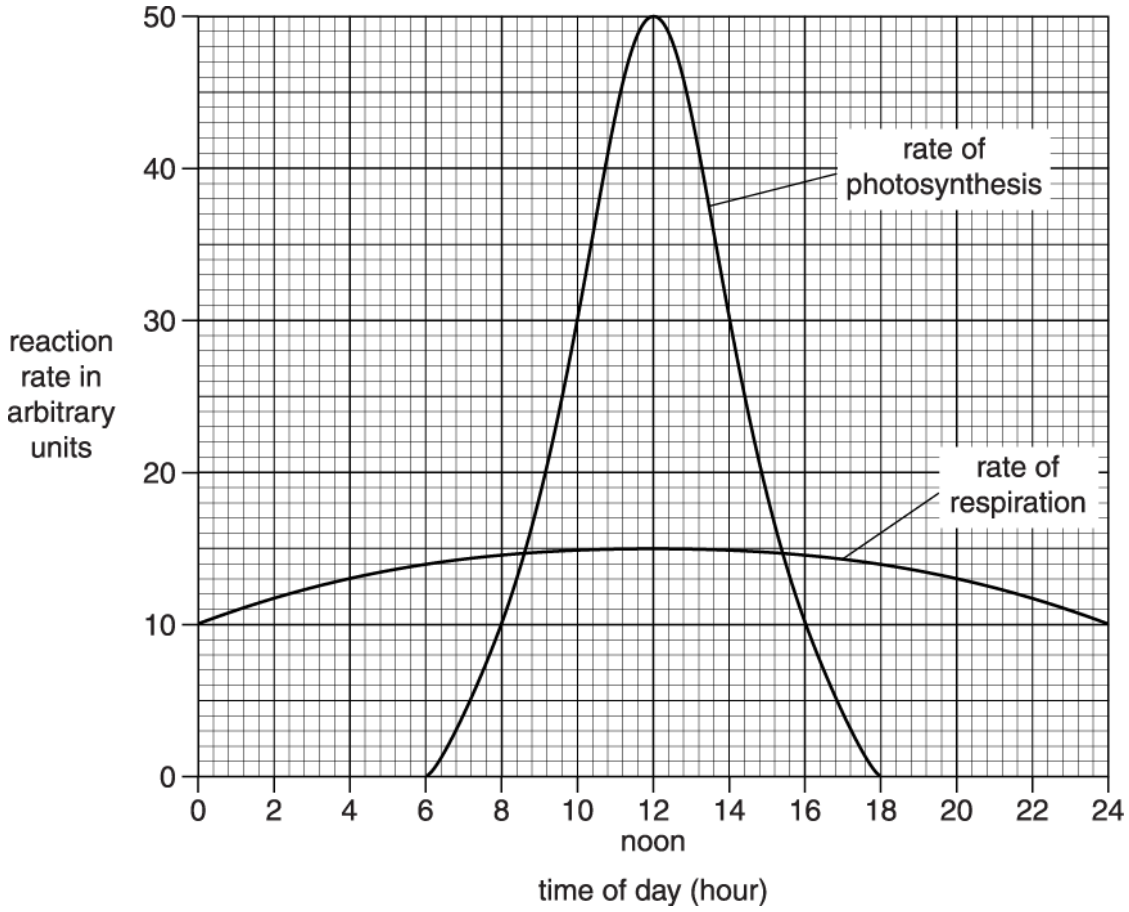
On the graph, put a ring around each of the **two** points that the students think are outliers.

[1]

(d). The reaction rates for photosynthesis and respiration in a plant on a sunny day are plotted over a 24-hour period.

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(i) The maximum rate of photosynthesis is at 12.00 noon.

What is the most likely explanation for this?

Put a tick (✓) in the box next to the **best** answer.

More water is available. ☐

The light intensity is at its highest. ☐

The temperature of the soil is at its highest. ☐

[1]

(ii) At 12.00 noon, the rate of respiration is also at its maximum.

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Calculate the difference between the maximum rate of photosynthesis and the maximum rate of respiration.

difference = _____ arbitrary units **[1]**

(iii) Suggest how the value you calculated in part **(ii)** would change if the experiment was done on a **cloudy** day.

Explain your answer.

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[2]

(iv) Look at the graph.

During which of the following times of day are plants using up more carbon dioxide for photosynthesis than they produce by respiration?

Draw a ring around the correct answer.

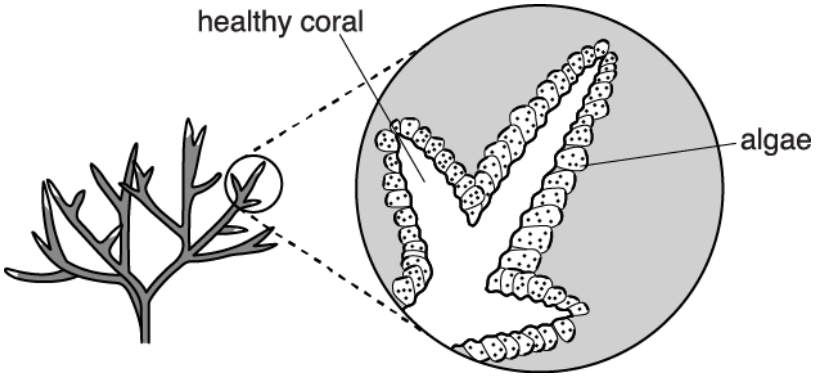
6.00–8.00 **10.00–12.00** **16.00–18.00**

[1]

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7(a). Scientists have found that some algae in the coral are dying.

This is thought to be caused by increases or decreases in sea temperature.



Photosynthesis is controlled by enzymes.

Explain how changes in the sea temperature can result in the algae dying.

The quality of written communication will be assessed in your answer.

[6]

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(b). Some scientists think that temperature changes are killing the algae.

Other scientists think that increased UV light could be the cause.

How would scientists show whether UV light or temperature change is the cause of the algae dying in their natural habitat?

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[3]

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(c). Coral reefs are found in tropical seas.

They are made by living organisms called reef-building corals.

Reef-building corals have a symbiotic relationship with microscopic algae. Algae are single-celled plants.

In a symbiotic relationship both organisms **benefit** from each other.

(i) Using your knowledge of photosynthesis, what are the benefits for the organisms in this symbiotic relationship?

Put a tick (✓) in the **three** correct boxes.

Algae give carbon dioxide to the coral. ☐

Algae give chlorophyll to the coral. ☐

Algae give glucose to the coral. ☐

Algae give oxygen to the coral. ☐

Coral gives carbon dioxide to the algae. ☐

Coral gives chlorophyll to the algae. ☐

Coral gives glucose to the algae. ☐

Coral gives oxygen to the algae. ☐

[3]

(ii) Algae can convert glucose into other substances.

Put a ring around **two** substances that the algae can make from glucose.

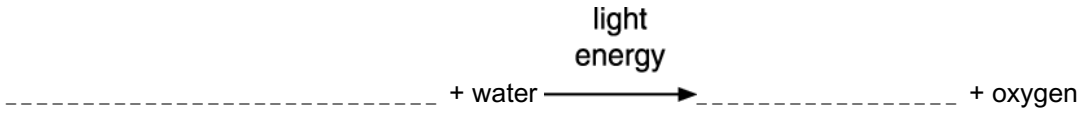
calcium **carbon** **cellulose** **nitrogen** **starch**

[2]

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8(a). Photosynthesis takes place in plants.

Complete the word equation for photosynthesis.

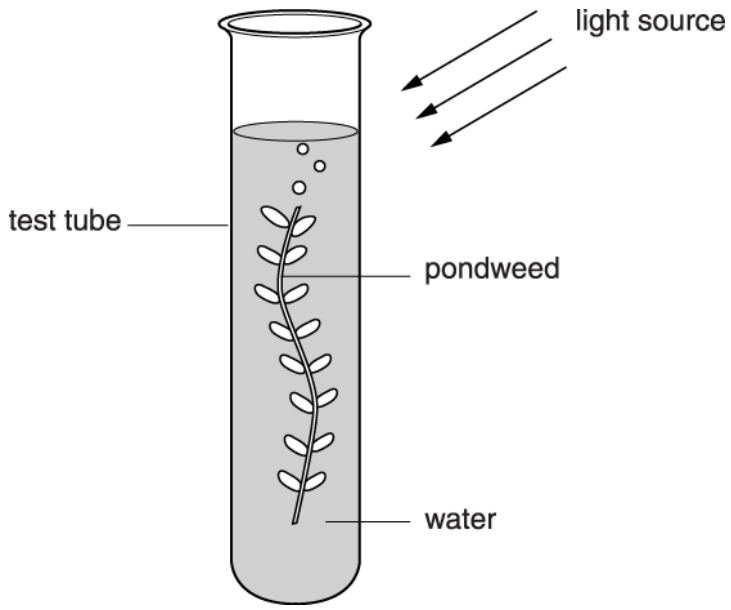


[2]

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(b). Jason is studying the rate of photosynthesis for pondweed under **low** and **high** light intensities.



- Jason cuts 20 pieces of pondweed and puts each piece in a separate test tube in water.
- He puts 10 test tubes under **low** light intensity and 10 under **high** light intensity.
- He records the number of oxygen bubbles produced by each of the pieces of pondweed during a 1 minute period.
- Jason records the data in **Table 1**.

Table 1

Light intensity	Number of bubbles produced per minute										Mean
low	8	7	5	9	6	10	7	8	6	6	7.2
high	10	11	9	13	15	8	11	10	9	12	

(i) Calculate the mean number of bubbles produced under **high** light intensity.

Write your answer in the empty box in **Table 1**.

[1]

(ii) Another student repeats the experiment using five species of pondweed, **A, B, C, D** and **E**.

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The mean number of bubbles produced per minute for each species of pondweed is shown in **Table 2**.

Table 2

Light intensity	Mean number of bubbles produced per minute				
	Pondweed species				
	A	B	C	D	E
low	7	5	7	6	8
high	15	10	11	17	13

Use the results in **Table 1** and **Table 2** to identify which species, **A, B, C, D** or **E**, was the one also used by Jason.

species used by Jason = _____ **[1]**

(iii) How confident can you be about your conclusion?

Explain why

---**[2]**

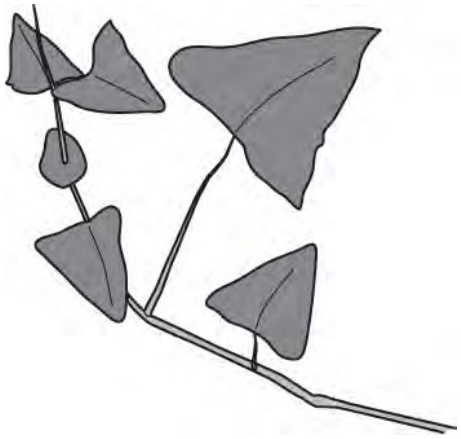
(iv) Suggest **two** improvements for Jason's experiment.

---**[2]**

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9. The mile-a-minute vine is a plant. It grows very quickly.



The vine makes its food using a process called photosynthesis.

Describe the process of photosynthesis.

Suggest why the rate of photosynthesis in this plant is very fast.

The quality of written communication will be assessed in your answer.

[6]

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10(a) Put ticks (?) in the boxes next to the **three** statements that describe enzymes.

.

Enzymes are made from starch.	☐
Enzymes are sections of DNA.	☐
Enzymes have an active site.	☐
Enzymes are made from instructions in genes.	☐
The four types of enzymes are A, T, C and G.	☐
Enzymes are proteins.	☐
Enzymes are waste products.	☐

[3]

(b). Washing powders are used to remove food stains from clothes.

Some washing powders contain enzymes.

(i) Suggest what enzymes do to the food stains.

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[1]

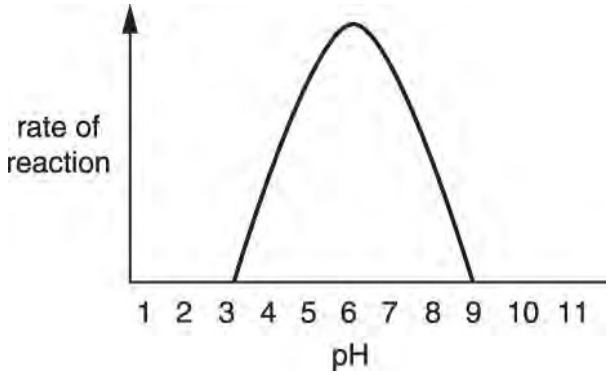
(ii) Manufacturers recommend a wash temperature of 30°C rather than 90°C for washing powders containing enzymes.
Suggest why.

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[2]

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(c). The graph shows how pH affects the rate of reaction of an enzyme.



A student concludes that the enzyme only works at pH 6.

Is the student correct?

Explain your answer.

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[3]

END OF QUESTION PAPER

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