

**Wednesday 5 June 2013 – Afternoon**

**GCSE TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A162/01** Modules B4 B5 B6 (Foundation Tier)

Candidates answer on the Question Paper.  
A calculator may be used for this paper.

**OCR supplied materials:**  
None

**Other materials required:**

- Pencil
- Ruler (cm/mm)

**Duration:** 1 hour



Candidate forename		Candidate surname	
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Centre number							Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 This question is about chemical reactions taking place in living things.

(a) 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]

(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.

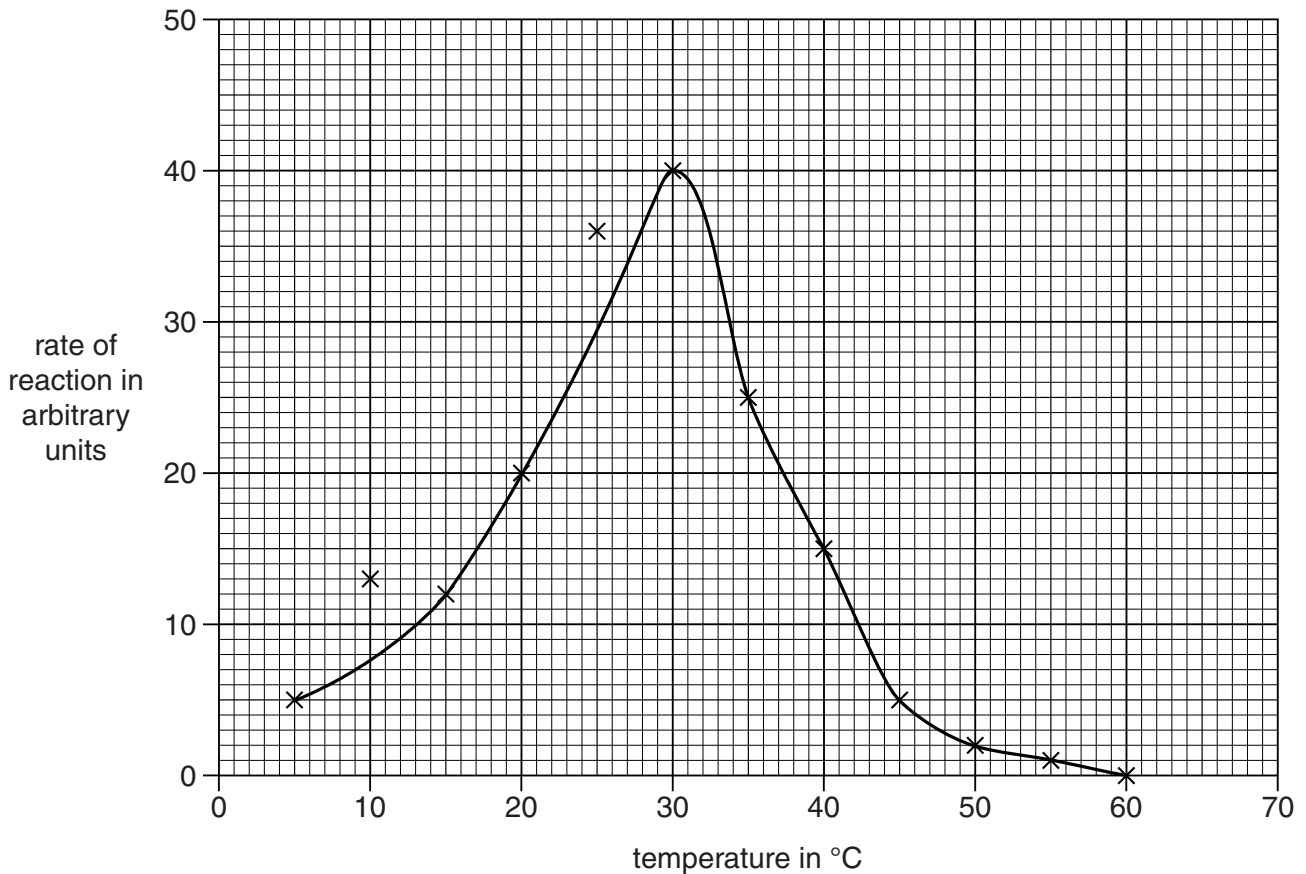
.....

.....

..... [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.

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

[2]

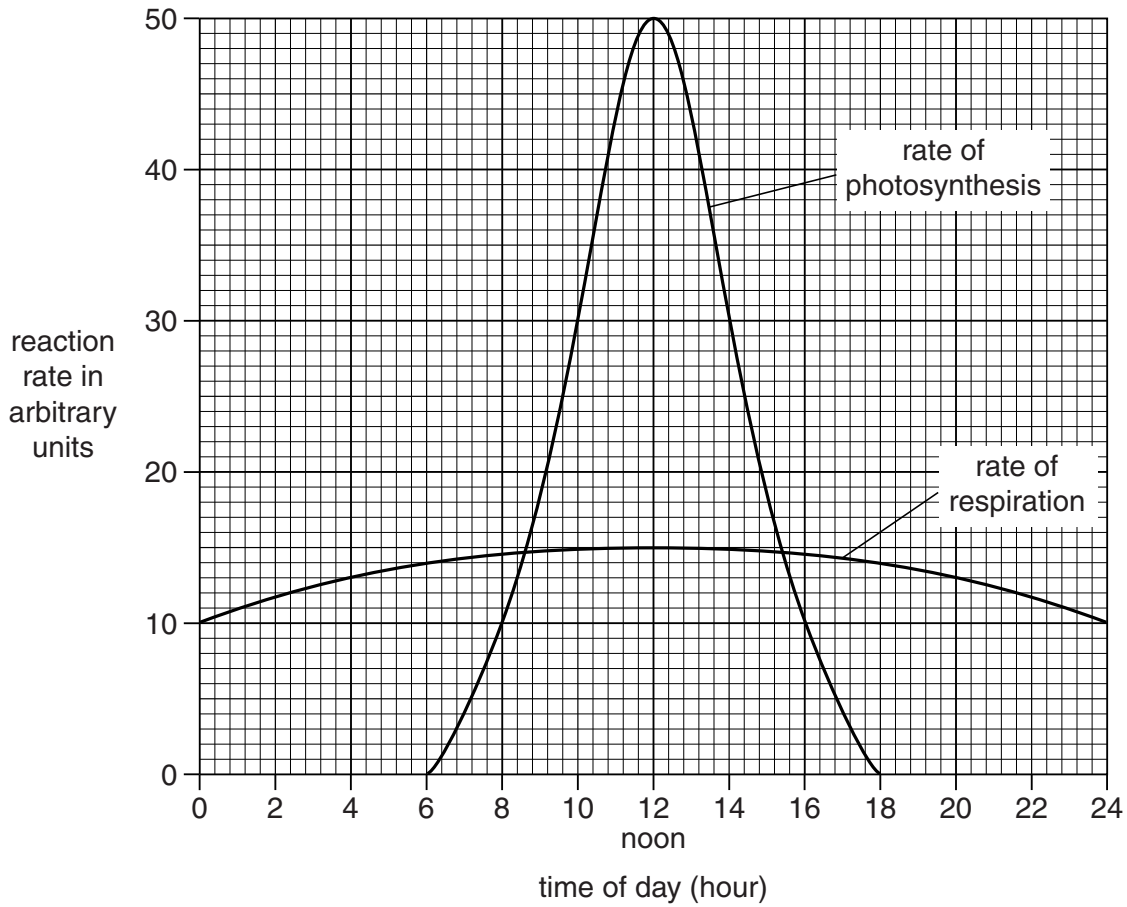
(ii) Describe the change in the rate of reaction between the two temperatures in the table and explain this difference.

.....  
 .....  
 ..... [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.



- (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.

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.

.....  
.....  
..... [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]

[Total: 16]

2 Plants need chemicals to survive.

(a) One essential chemical is glucose.

What can happen to glucose in plants?

Put ticks (✓) in the boxes next to the **two** correct answers.

Glucose can be ...

... used in respiration.

... taken up from the soil.

... produced as a waste product.

... converted into starch for storage.

... lost from the underside of plant leaves.

... absorbed by the green chemical chlorophyll.

[2]

(b) Nitrates enter plant roots from the soil.

Plants use the nitrogen in nitrates to make some chemicals.

Which nitrogen-containing chemicals do plants make?

Put rings around the **two** correct answers.

**amino acids**

**cellulose**

**enzymes**

**oxygen**

**starch**

**water**

[2]

(c) Water enters and leaves plant tissues by osmosis.

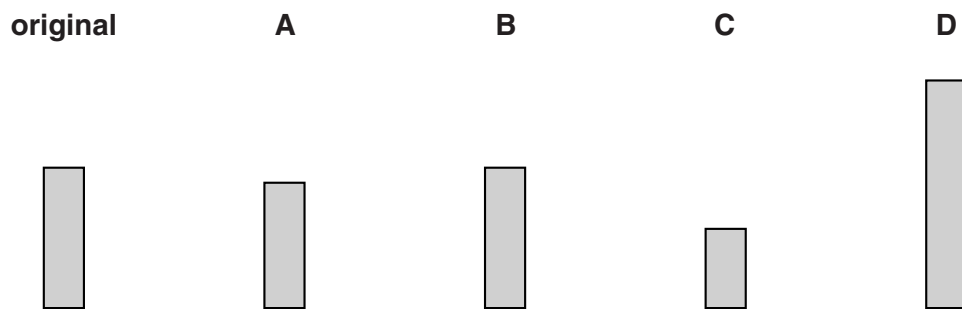
Kaye is investigating how plant tissue takes up water.

She uses four potato chips, **A**, **B**, **C** and **D**.

The chips are all cut to the **same length**.

Kaye puts the four chips into four different concentrations of sugar solution.

The diagram shows the original length of the chips and the length of each chip **after** soaking for 60 minutes in the sugar solutions.



(i) Write letters **A**, **B**, **C** and **D** in the table to show which chip was in each solution.

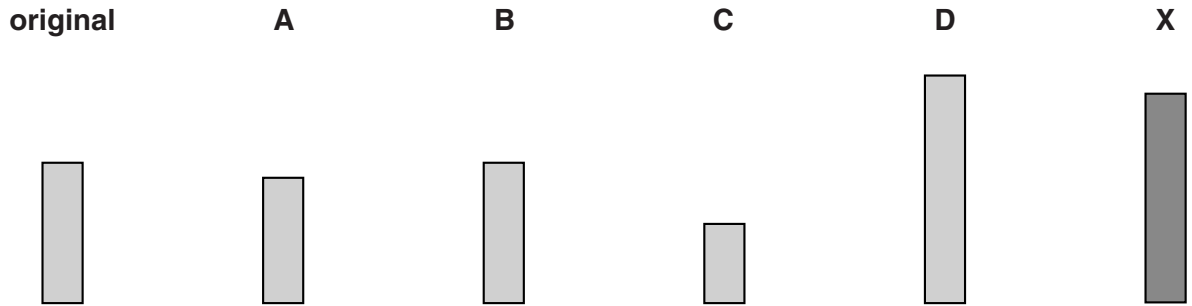
Concentration of solution in arbitrary units	Potato chip
0.0	
0.3	
0.6	
0.9	

[2]

(ii) Kaye has another potato chip, **X**, which has been in a different concentration of sugar solution.

Potato chip **X** was originally cut to the same length as the other chips.

The diagram shows potato chip **X** **after** soaking for 60 minutes in the sugar solution.



The label on the test tube containing chip **X** has rubbed off.

Use the results of Kaye's experiment to estimate the concentration of sugar solution (in arbitrary units) in the test tube containing chip **X**.

.....  
..... [2]

[Total: 8]





4 Emily and Carmel are identical twins.



The twin girls are formed from the division of a zygote (fertilised egg).

(a) This zygote divides into two cells, which then separate.

Name the type of cell division involved when the zygote divides into two cells.

..... [1]

(b) These cells complete the cell cycle many times to form separate embryos.

Describe the main processes of the **cell cycle**.

.....  
.....  
.....  
.....  
..... [3]

- (c) An educational scientist is investigating how the environment changes the behaviour of identical twins.

One pair of identical twin girls are separated and sent to two different nursery schools.

They both return to the family home at the end of each nursery school session.

The investigation lasts for two years.

The twins' development and behaviour is monitored and compared.

- (i) Suggest **one** ethical issue involved with this investigation.

.....  
.....  
..... [1]

- (ii) Describe **three** ways of changing the investigation to make any conclusion more valid.

.....  
.....  
.....  
..... [3]

[Total: 8]



6 Simple animals rely on **reflex actions** for most of their behaviour.

(a) Simple reflexes are made up of three main processes.

Each process is carried out by a specific structure.

Which structures perform these processes?

Write the name of the structure in the box next to each process.

Choose words from the list.

**effector**

**fatty sheath**

**processing centre**

**receptor**

**synapse**

Process in a simple reflex	Structure
detection of stimuli	
receiving information and coordinating responses	
producing a response	

[3]

(b) Electrical impulses travel along neurons in a simple reflex.

Jimmy tests three different types of neuron, **A**, **B** and **C**.

He records the speed of electrical impulses along each neuron.

Jimmy repeats his experiment five times.

Neuron	Speed of electrical impulse in m/s					
	1st	2nd	3rd	4th	5th	mean
<b>A</b>	85	60	70	75	80	74
<b>B</b>	45	50	40	35	55	45
<b>C</b>	120	95	100	105	90	

(i) Calculate the **mean** speed of electrical impulse for neuron **C**.

Write your answer in the box in the table.

[1]

(ii) One of these neurons is surrounded by a fatty sheath.

Which neuron, **A**, **B** or **C**, is surrounded by a fatty sheath?

Use information in the table to justify your choice.

.....  
 ..... [2]

(iii) Jimmy noticed that the five results obtained for neuron **A** were all different.

Suggest **two** reasons why the measurements recorded may not be the 'true value' of the speed of the electrical impulses for neuron **A**.

.....  
 ..... [2]



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