

Wednesday 5 June 2013 – Afternoon

**GCSE TWENTY FIRST CENTURY SCIENCE
BIOLOGY A**

A162/02 Modules B4 B5 B6 (Higher Tier)

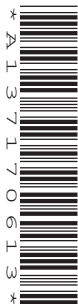
Candidates answer on the Question Paper.
A calculator may be used for this paper.

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) Photosynthesis and respiration are both a series of reactions.

Make two sentences by drawing lines to join the **beginning** of each sentence to its correct **middle** and **ending**.

You should **only** draw four lines.

beginning

middle

ending

Photosynthesis ...

... does not need energy ...

... by breaking down large food molecules.

... releases energy ...

... to build large food molecules.

Respiration ...

... needs energy ...

... to take in large food molecules.

[2]

(b) Some microorganisms can photosynthesise.

Write down a type of microorganism that photosynthesises.

..... [1]

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

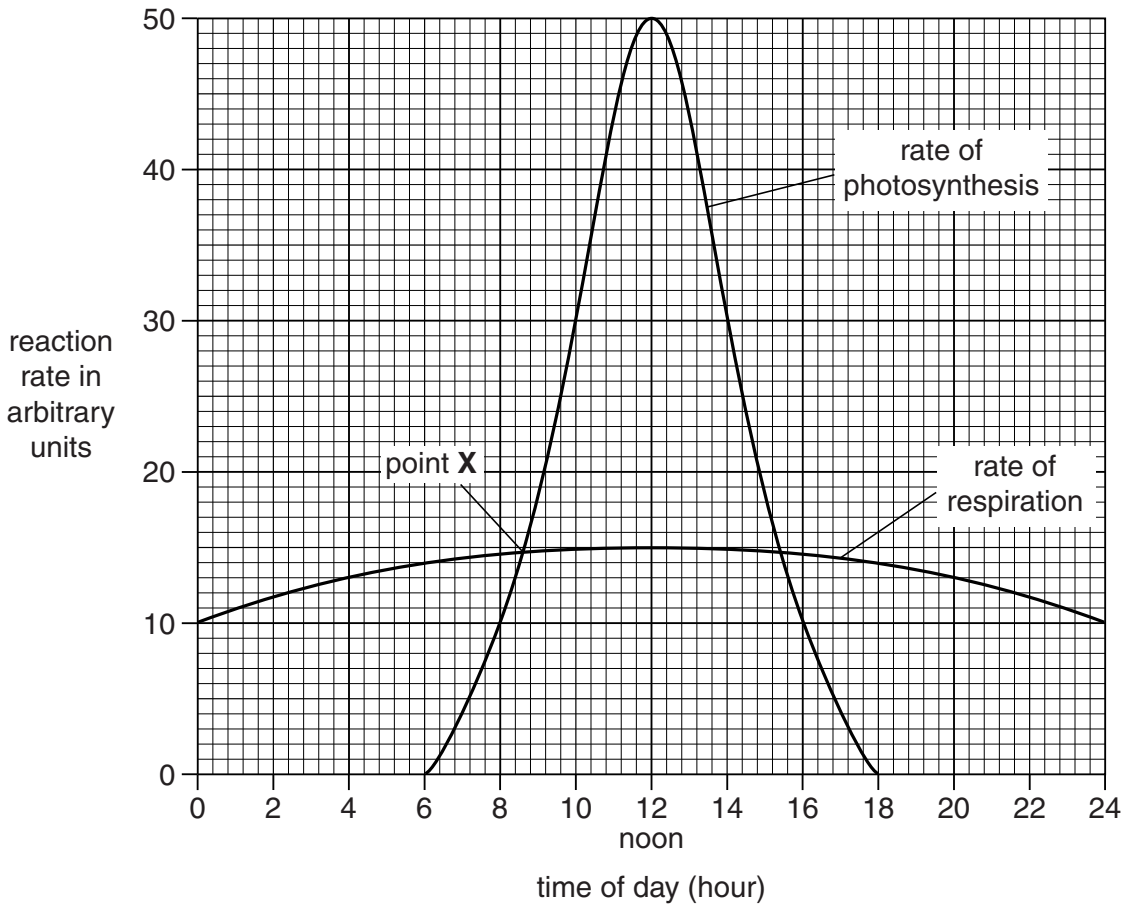
Each reaction needs a specific enzyme.

This means that each enzyme only works for one reaction.

Explain why.

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

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



(i) The rate of photosynthesis changes between 10.00 hours and 12.00 noon.

Work out the percentage change in the rate.

Show your working.

..... % change [2]

(ii) Explain the reason for the change you have calculated.

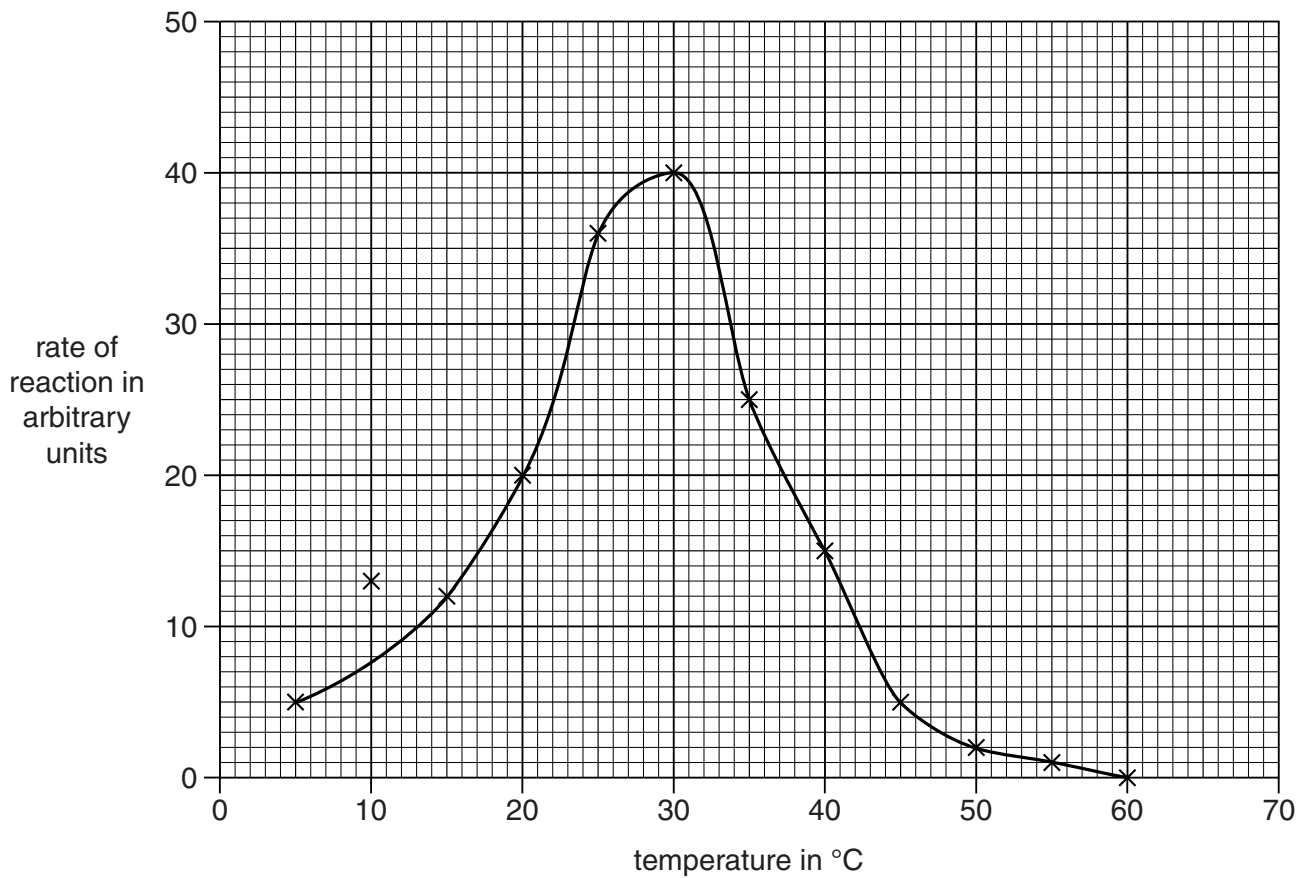
.....
 [2]

(iii) Describe and explain what is happening to the amount of **carbon dioxide** used and the amount produced within the plant at point X on the graph.

.....
 [2]

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

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



(i) There is a correlation between temperature and the rate of reaction between 15°C and 25°C.

Describe the correlation.

.....
 [1]

(ii) State **two** ways in which the students can increase their confidence in their results.

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

(iii) The reaction rate changes between 30 °C and 70 °C.

Complete the sentences to show what is happening between these temperatures.

The collision rate between the molecules and enzymes is

Higher temperatures change the shape of the of the enzyme.

This change in shape is

The enzyme becomes

[2]

(iv) What is the name of the **model** used to describe how enzymes work?

..... model [1]

[Total: 17]

2 Plants need chemicals to survive.

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

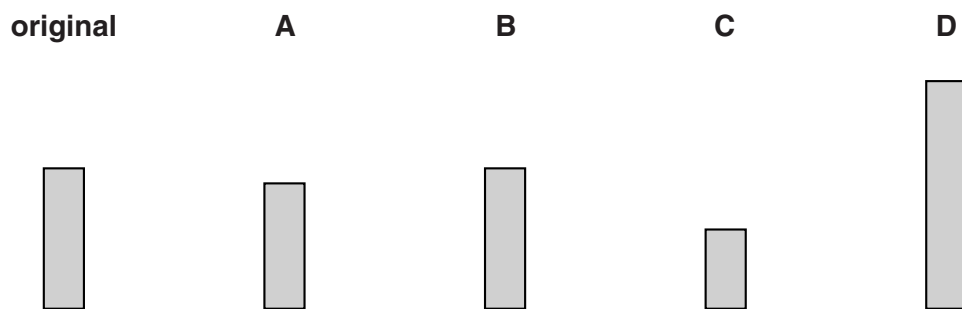
Kaye is investigating how plant tissue takes up water.

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.

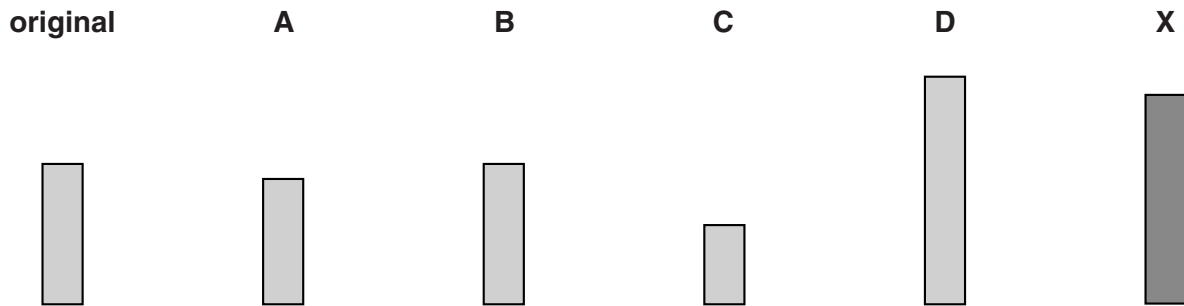
Concentration of solution in arbitrary units	Potato chip
0.0	
0.3	
0.6	
0.9	

[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]

- (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 a ring around the **two** correct answers.

- amino acids** **cellulose** **enzymes** **oxygen** **starch** **water**

[2]

(c) Active transport is used in the absorption of nitrates by plant roots.

What is **active transport**?

Complete the sentences.

Active transport is the movement of chemicals from low concentration to high concentration across a

This requires from the process of respiration.

[1]

(d) Suggest why plants growing in water-logged soil may not take up enough nitrates.

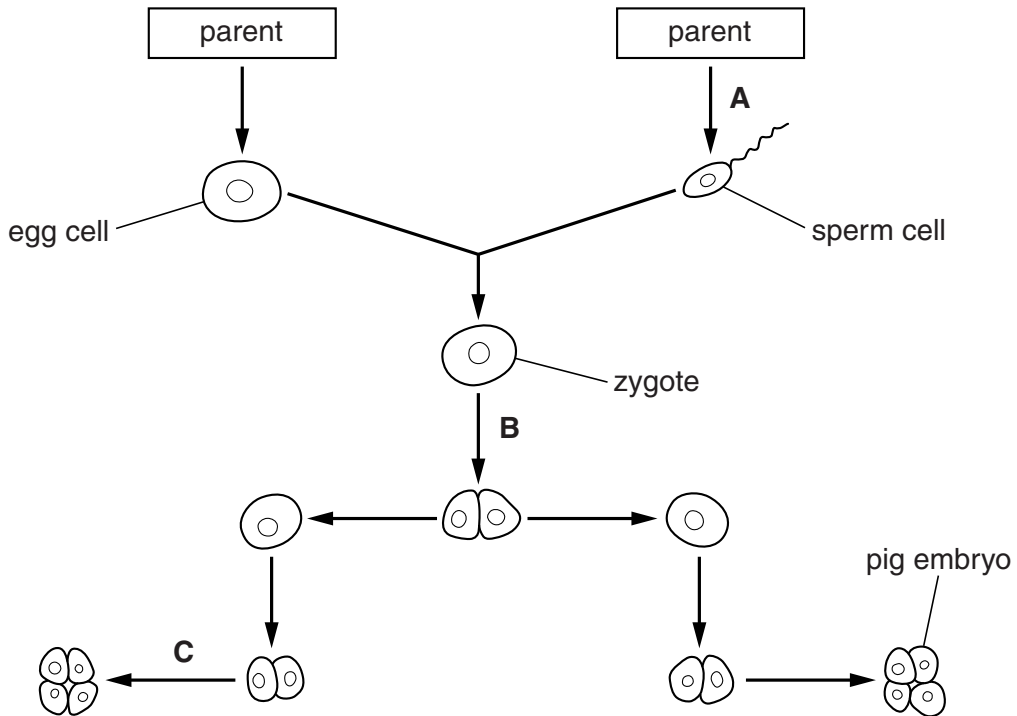
.....
.....
..... [2]

[Total: 9]

4 A scientist is studying growth and development in identical twin piglets.

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

The diagram shows the stages involved in the formation of the piglets.



(i) Name the types of **cell division** at stages **A**, **B** and **C**.

Write the correct answer in the box next to each letter.

A	
B	
C	

[1]

- (ii) The scientist observes that the piglets are **different** from their parents, but are **identical** to each other.

Explain why.

Use information from the diagram in your answer.

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

- (b) Muscle cells and skin cells are sampled from one of the piglets.

The muscle cells contain the protein actin, whereas skin cells contain the protein keratin.

- (i) How can cells in the same piglet produce different proteins?

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

- All of the genes are switched on.
- Different cell types contain different genes.
- Cells only produce the specific proteins they need.
- Only the genes needed for the cell are switched on.
- Some of the genes are lost from cells during their development.

[2]

- (ii) A cell is taken from a pig embryo just after stage **C** in the diagram.

Explain why this cell can be used to make both skin cells and muscle cells.

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

- (iii) Cells can also be taken from **human** embryos for experiments.

Suggest **one** ethical reason **against** this work.

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

[Total: 9]

13
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Question 6 begins on page 14
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6 Simple animals rely on **reflex actions** for most of their behaviour.

(a) Simple reflexes involve three types of structure.

Complete the table to show the process carried out by each structure.

Structure	Process
effector	
processing centre	
receptor	

[2]

(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
A	84	86	83	81	78	82
B	70	80	75	104	91	84
C	50	55	55	60	49	54

(i) Jimmy knows that a fatty sheath speeds up the electrical impulses along neurons.

Only one neuron, **A**, **B** or **C** has a fatty sheath.

He concludes that this is neuron **B**.

Use the information in the table to evaluate his conclusion.

.....

.....

.....

..... [3]

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