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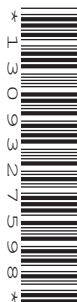
**Friday 6 June 2014 – Afternoon**
**GCSE TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A/ADDITIONAL SCIENCE A**
**A162/01** Modules B4 B5 B6 (Foundation Tier)

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<br>forename |  | Candidate<br>surname |  |
| Centre number         |  | Candidate number     |  |

**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**

- The 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.

2

Answer **all** the questions.

1 Enzymes are found in the human body.

(a) Write down the effect enzymes have on chemical reactions.

..... [1]

(b) 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]

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

Some washing powders contain enzymes.

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

.....

..... [1]

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

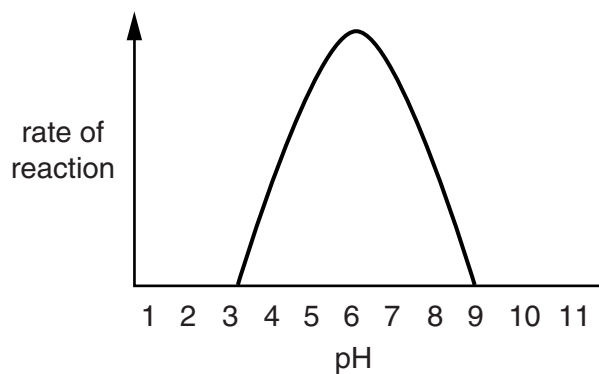
Suggest why.

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..... [2]

3

(d) 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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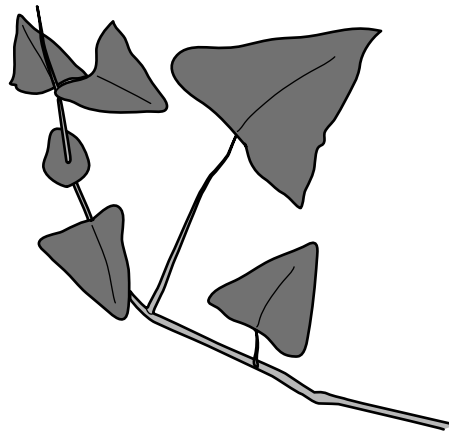
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..... [3]

[Total: 10]

4

- 2 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.*

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..... [6]

[Total: 6]

5

**3** Living organisms obtain energy using respiration.

Look at the equations for the two different types of respiration.

They show the energy released from the same amount of glucose.

**Type A**    glucose + oxygen  $\longrightarrow$  carbon dioxide + water + 2880 kJ

**Type B**    glucose  $\longrightarrow$  lactic acid + 150 kJ

(a) Write down the names of **Type A** and **Type B** respiration.

**Type A** .....

**Type B** ..... [1]

(b) Calculate the ratio:

$$\frac{\text{energy released in Type A}}{\text{energy released in Type B}}$$

Show your working.

ratio = ..... [2]

(c) Jenny is running in a 26 mile marathon race.

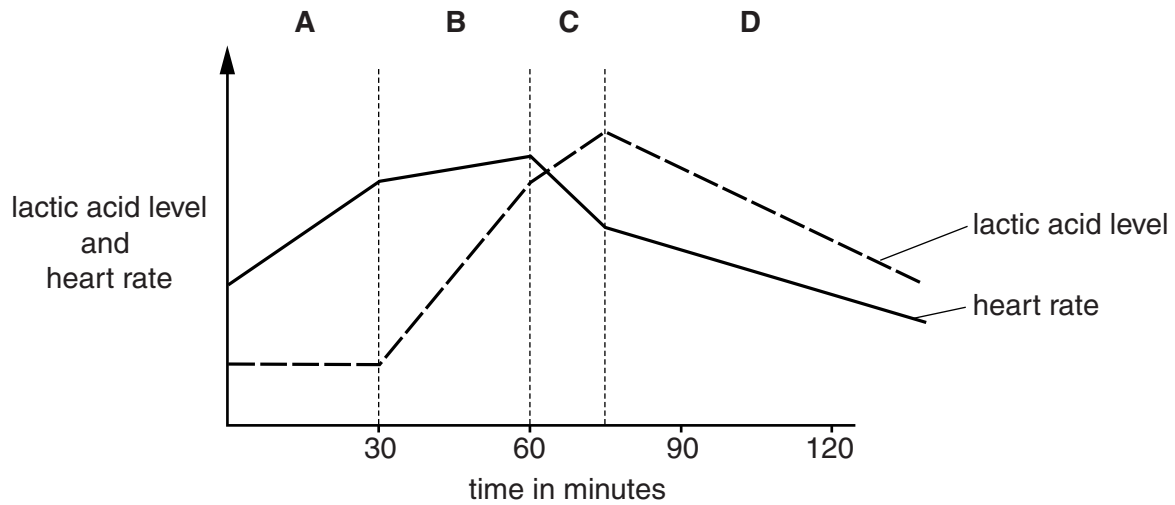
For **most** of the race Jenny respire using **Type A** respiration.

Suggest reasons why this is important.

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

6

- (d) The graph shows Jenny's heart rate and the lactic acid level in her blood during a training session.



- (i) Jenny makes this conclusion.

There is always the same correlation between my heart rate and my lactic acid level, however long or fast I run.



Discuss how well her conclusion fits the data in the graph.

Use information from sections **A**, **B**, **C** and **D** in your answer.

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..... [4]

7

- (ii) Jenny thinks that some of her data is incorrect.

What should she do to become more confident in her conclusion?

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

Repeat the same training a number of times.

☐

Repeat her training but only run for 60 minutes.

☐

Run more slowly so that her heart rate does not rise too much.

☐

Repeat the same experiment on other runners.

☐

[1]

[Total: 10]

8

4 During sexual reproduction a sperm cell fertilises an egg cell.

(a) What is this fertilised egg cell called?

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

|        |                          |
|--------|--------------------------|
| embryo | <input type="checkbox"/> |
| zygote | <input type="checkbox"/> |
| fetus  | <input type="checkbox"/> |
| gamete | <input type="checkbox"/> |

[1]

(b) The fertilised egg divides to form 2 cells.

These 2 cells divide to form 4 cells.

These 4 cells divide to form 8 cells.

How many divisions are needed to form a group of 128 cells from one fertilised egg?

Show your working.

answer = ..... divisions. [2]

(c) After how many divisions will the cells start to become specialised?

answer = ..... [1]

(d) Some cells remain unspecialised.

Write down the name of these cells and what may happen to them at a later time.

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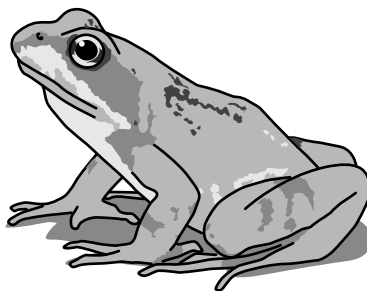
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..... [2]

[Total: 6]

- 5 Frogs grow by producing new body cells.

Adult frogs reproduce sexually by making sex cells (gametes).



Describe how body cells and sex cells are made.



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

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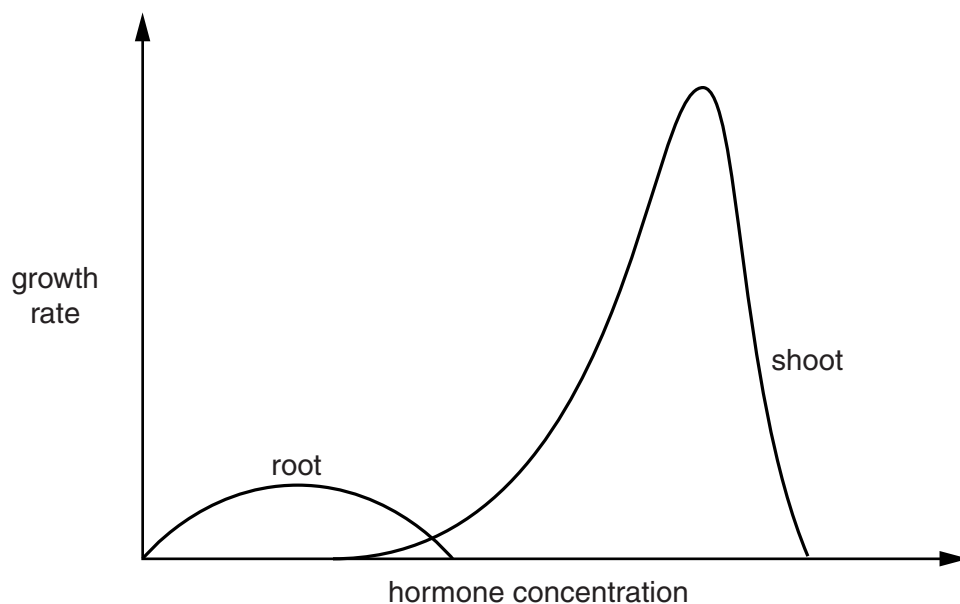
[Total: 6]

10

- 6 A plant hormone affects the growth of shoots and roots.

Look at the graph.

It shows the effect of different concentrations of this hormone on shoot growth and root growth.



- (a) Two of these are correct conclusions from the data.

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

Root growth requires lower concentration of hormone than shoot growth.

☐

Increasing the hormone concentration has no effect on shoot growth.

☐

Roots and shoots both grow at very high hormone concentrations.

☐

All hormone concentrations increase the growth rate of shoots.

☐

The hormone causes a greater rate of shoot growth than root growth.

☐

[2]

- (b) Shoot growth is also affected by light.

Write down the name of a shoot's growth response to light.

..... [1]

- (c) This growth response increases the plant's chance of survival.

Explain why.

.....

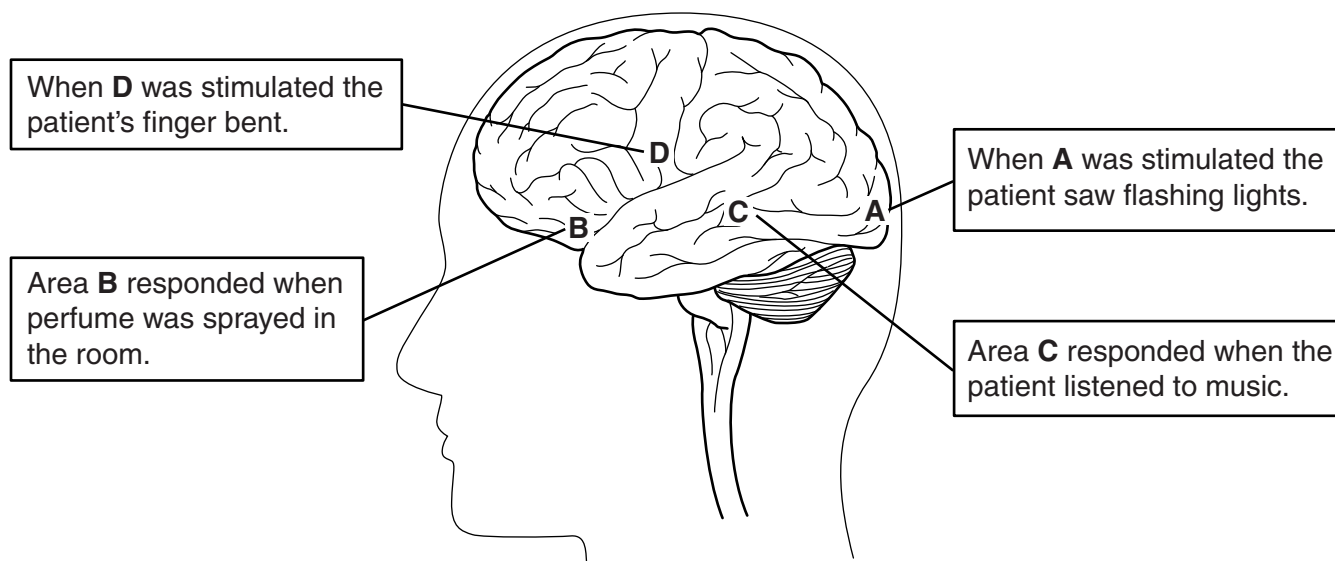
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..... [2]

[Total: 5]

7 Scientists studied four different areas of the brain, **A**, **B**, **C** and **D**.

They discovered this information.



(a) Use this information to draw four straight lines linking each **area of the brain** to its **function**.

| area of brain | function |
|---------------|----------|
| <b>A</b>      | smell    |
| <b>B</b>      | movement |
| <b>C</b>      | sight    |
| <b>D</b>      | hearing  |

[3]

(b) Which part of the brain, **A**, **B**, **C** or **D**, is involved with motor responses?

Explain your answer.

.....

.....

..... [2]

(c) Scientists discover a lot about the brain by studying patients with brain damage.

(i) Two of these statements are **ethical** issues involved in this kind of scientific research.

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

The patient's brain contains millions of neurons.

☐

The patient's CNS consists of both motor and sensory neurons.

☐

Some brain damaged patients are paralysed.

☐

The patient may not benefit from the research.

☐

The patient needs to give informed permission for the research.

☐

[2]

(ii) Scientists sometimes ask patients to take part in low risk studies.

Two of these statements describe why patients may be willing to take part in low risk studies.

Put ticks (✓) in the boxes next to the **two** best statements.

People are more willing to accept risk when it is something that they choose to do.

☐

A correlation is a link between a factor and an outcome.

☐

Scientists do not believe claims that cannot be repeated by any other scientists.

☐

People are happy to take risks if this leads to the best outcome for most people.

☐

Certain actions are wrong whatever the consequences.

☐

[2]

13

(d) Synapses are small gaps between the ends of neurons.

Chemicals allow impulses to cross the gap.

Some poisons stop these chemicals from working.

What effect would these poisons have on your fingers?

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

Your fingers would be painful.

☐

Your fingers would feel numb.

☐

There would be no effect on your fingers.

☐

The muscles in your fingers would contract.

☐

Your fingers would not move.

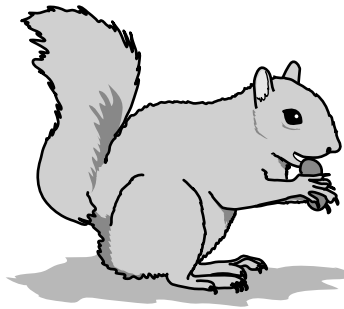
☐

Your fingers would turn white.

☐

[2]

[Total: 11]

**8** Animals respond to changes in their environment.

A predator appears and causes a rapid response in a squirrel.

Suggest what this response might be.

Describe the processes that occur in the squirrel to cause this rapid response.



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

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..... [6]

[Total: 6]

**END OF QUESTION PAPER**

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