

**Wednesday 9 January 2013 – Morning**

**GCSE TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A161/01** Modules B1 B2 B3 (Foundation Tier)

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

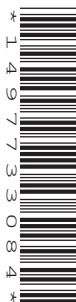
**OCR supplied materials:**  
None

**Other materials required:**

- Pencil
- Ruler (cm/mm)

**Duration:** 1 hour

**MODIFIED LANGUAGE**



|                       |  |                      |  |
|-----------------------|--|----------------------|--|
| 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**

- 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** Steve and Jane are expecting a baby.

**(a)** Jane's sex chromosomes are XX.

Complete the Punnet square to show the possible combinations of sex chromosomes in their baby.

|       |  | Jane |   |
|-------|--|------|---|
|       |  | X    | X |
| Steve |  |      |   |
|       |  |      |   |

[2]

**(b)** Steve and Jane already have two baby boys.

Steve says there is a higher chance that the new baby will be a girl.

Explain why Steve is wrong.

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..... [2]

- (c) Steve and Jane's baby is born.  
Some features of the baby are like Steve and some are like Jane.  
However some features look different to both Steve and Jane.

Use ideas about genes, alleles and the environment to explain these observations.



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

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..... [6]

**[Total: 10]**

- 2 Ali and Mary do not have cystic fibrosis, but their baby does have cystic fibrosis.

(a) What does this tell us about Ali and Mary's genes for this disorder?

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

- (b) Ali and Mary talk about whether or not to have another child.  
 These are some of the questions that they could think about before making their decision.

|          |  |
|----------|--|
| <b>A</b> | How much will it cost to have another child with cystic fibrosis?            |
| <b>B</b> | What is the chance that we will have another child with cystic fibrosis?     |
| <b>C</b> | If we find that the foetus has cystic fibrosis should we have a termination? |
| <b>D</b> | Do we want to have a boy or a girl?  |
| <b>E</b> | What will other people think?  |
| <b>F</b> | Should we discuss this with the grandparents?                                |

(i) Which question, **A**, **B**, **C**, **D**, **E** or **F**, is an **ethical** issue?

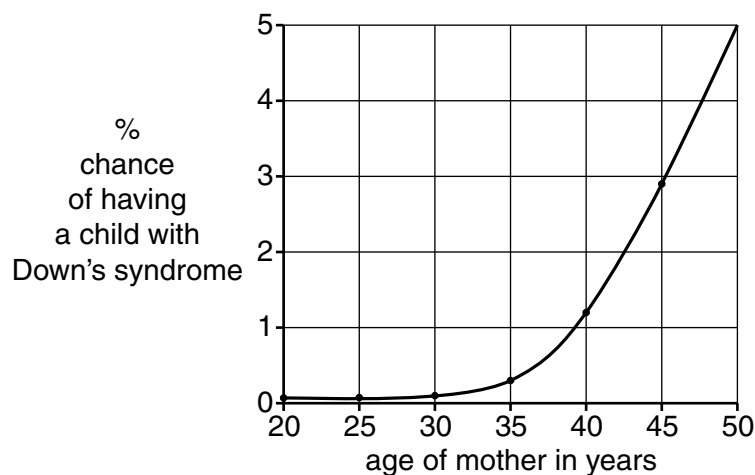
question = ..... [1]

(ii) Which question, **A**, **B**, **C**, **D**, **E** or **F**, can be answered by **science**?

question = ..... [1]

- (c) Another couple, Rajesh and Sangeeta, are thinking of having a baby. They talk to a genetic counsellor. They are told that because of Sangeeta's age they have a 1% chance of having a child with Down's syndrome. A child with Down's syndrome might have some physical and learning difficulties.

Look at the graph.



- (i) What is Sangeeta's age?

..... years [1]

- (ii) Describe the **trend** shown by the graph.

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

- (iii) It is possible to increase confidence in the trend shown by the graph. Put ticks (✓) in the boxes next to the **two** best methods.

|   |                          |
|---|--------------------------|
| ask patients how they feel                | <input type="checkbox"/> |
| use a larger sample size                  | <input type="checkbox"/> |
| collect data for other genetic conditions | <input type="checkbox"/> |
| collect data for other ages               | <input type="checkbox"/> |
| use smaller graph paper                   | <input type="checkbox"/> |
| collect data from just one hospital       | <input type="checkbox"/> |

[2]

- (iv) Rajesh and Sangeeta want to decide if they will have a baby or not. Explain how the information in the graph and the information from the genetic counsellor can affect their decision to have a baby.

.....

.....

.....

..... [2]

- (d) Rajesh and Sangeeta decide to have a baby.  
They decide that if Sangeeta becomes pregnant, the foetus will be tested for genetic disorders.

Describe the implications that Rajesh and Sangeeta need to think about if they decide to have the foetus tested for genetic disorders.



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

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..... [6]

**[Total: 16]**

**3** An incubator for a premature baby has three parts to monitor and control temperature.

- A** a thermometer to detect changes in air temperature
- B** a computer to receive and coordinate data about temperature changes
- C** a heater to warm up the incubator if it gets too cold

**(a)** Which part of the incubator, **A**, **B** or **C**, is ...

... a processing centre? .....

... an effector? .....

... a receptor? .....

**[2]**

**(b)** A similar process takes place in the human body for monitoring and maintaining water levels.

**(i)** Name the process that maintains a constant internal environment in the human body.

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

**(ii)** Write down the names of the two coordination systems used in the human body.

..... and ..... **[2]**

**(iii)** The organs that control water balance in the human body are the two kidneys.

Ranjit donated one of his kidneys to save the life of his brother.

Suggest how this will affect the activity of Ranjit's one remaining kidney.

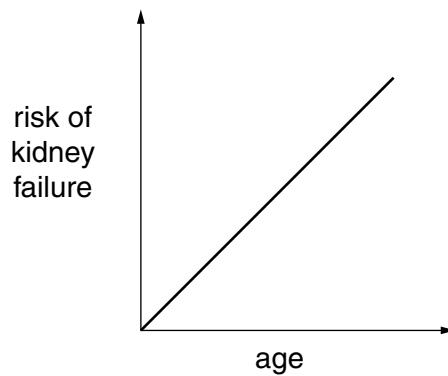
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..... **[2]**

- (c) Look at the graph of the age of a person and the risk of kidney failure.



- (i) Draw **one** straight line to join the two correct statements that, when taken together, describe the correlation between the **factor** and the **outcome**.

**factor**

**outcome**

As age increases ...

... the risk decreases at a faster rate.

At a certain age ...

... the risk stays the same.

The younger you are ...

... the risk increases.

[1]

- (ii) Ranjit's brother was 55 years of age when he had kidney failure.  
Explain why this does not provide good evidence for or against a correlation.

.....

..... [1]

[Total: 9]



- 4 A recent study has shown that there is a correlation between the amount of television watched and the risk of developing heart disease.

A student concluded that ...

|   |
|---|
| Watching television causes heart disease. |
|---|

- (a) Explain whether this is a valid conclusion.

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

- (b) Suggest **two** factors, other than watching television, that could increase the chance of developing heart disease.

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

[Total: 4]

- 5 Tony has pneumonia.  
His doctor prescribes antibiotics.

(a) Suggest the type of microorganism that causes pneumonia.

..... [1]

(b) The microorganism reproduces rapidly.

It divides into 2 every 20 minutes.

Starting with 1 microorganism, what is the maximum number that could be present in Tony's body after 2 hours?

You **must** show your working.

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

32

☐

64

☐

128

☐

256

☐

[2]

(c) Suggest why it is important that Tony starts his course of treatment as soon as possible.

.....

..... [1]

(d) The doctor tells Tony to complete the course of antibiotics.

Explain why this is important.

.....

.....

..... [2]

(e) Tony recovers.

Several years later, Tony's friend, Gordon, also catches pneumonia.

This time the antibiotic does not work.

The doctor decides to give Gordon two other antibiotics at the same time.

Gordon gets better.

Suggest why:

- the first antibiotic did not work
- using two other antibiotics did work.

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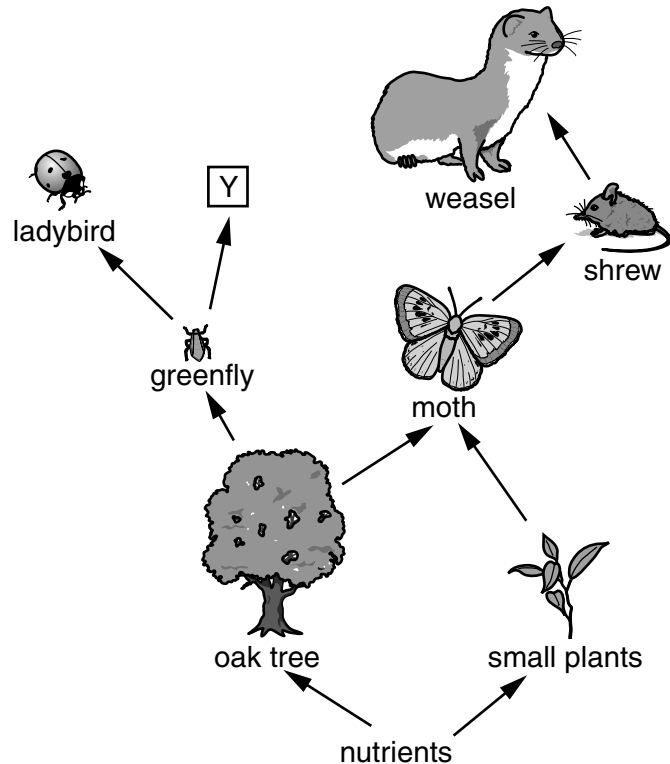
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..... [3]

[Total: 9]

6 The diagram shows a food web.



(a) A new organism that eats greenflies enters the food web at Y.

(i) Suggest what effect the introduction of the new organism will have on the oak trees.  
Put a tick (✓) in the box next to the correct statement.

The tree will be in a better condition.

☐

The tree will be unaffected.

☐

The tree will be in a worse condition.

☐

[1]

(ii) Which of these statements about the new organism are true?  
Put ticks (✓) in the boxes next to the **two** correct answers.

The new organism is ...

... a disease-causing organism.

☐

... a decomposer.

☐

... a competitor.

☐

... a microorganism.

☐

... a predator.

☐

[2]

- (b) Not all the energy is kept within the food web.  
Suggest reasons why.

.....

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..... [3]

[Total: 6]

Question 7 begins on page 14

- 7 Carbon is recycled through the environment.  
Explain how this process takes place.  
You may draw a diagram to help explain your answer.



*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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