

**Wednesday 9 January 2013 – Morning**

**GCSE TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A161/02** Modules B1 B2 B3 (Higher Tier)

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

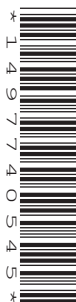
**OCR supplied materials:**  
None

**Other materials required:**

- Pencil
- Ruler (cm/mm)

**Duration:** 1 hour

**MODIFIED LANGUAGE**



Candidate forename		Candidate 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 This question is about reproduction.

- (a) Bacteria, plants and some animals can reproduce **asexually**.  
Which of the statements about asexual reproduction are true?  
Put ticks (✓) in the boxes next to the correct statements.

Only female offspring are produced.

☐

The offspring produced are clones.

☐

Mutation is always involved.

☐

The offspring are produced from a sperm and an egg.

☐

Most of the offspring produced are infertile.

☐

All the offspring produced have the same genes.

☐

Two parents are always involved.

☐

[2]

- (b) It is possible to produce clones of animals.  
Explain how animal clones are made naturally and how animal clones are made artificially.

.....

.....

.....

..... [2]

- (c) Stem cells are found in the human body.  
Describe the different types of stem cells and explain how they might be used to treat some diseases.



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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [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]

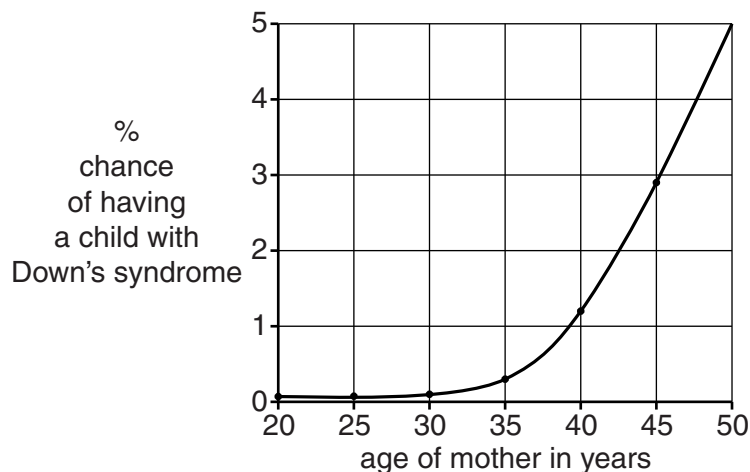
- (c) Another couple, Rajesh and Sangeeta, are thinking of having a baby.

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) Describe the **trend** shown by the graph.

.....

.....

..... [2]

- (ii) 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

☐

use a larger sample size

☐

collect data for other genetic conditions

☐

collect data for other ages

☐

use smaller graph paper

☐

collect data from just one hospital

☐

[2]

- (iii) 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.*

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

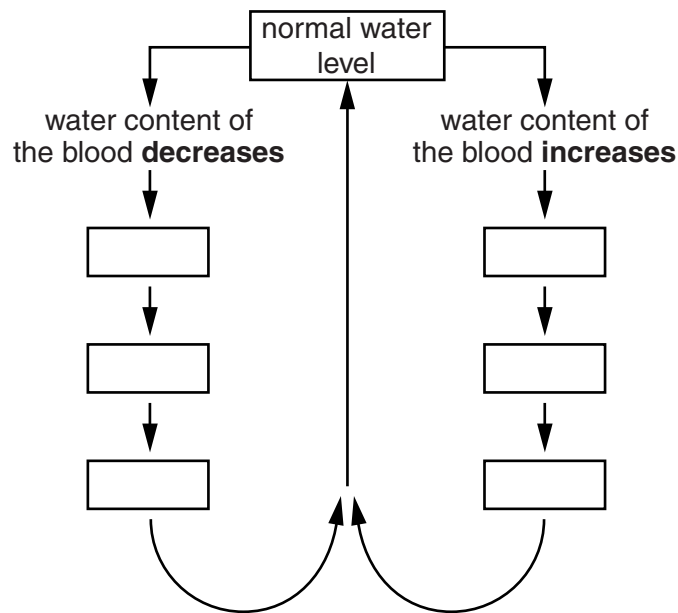
**[Total: 15]**

3 This question is about regulating water content in animals.

(a) Negative feedback is used to control the water content of the human body. These statements show stages in this process.

- A The kidney produces more urine.
- B More ADH is released from the pituitary gland.
- C The kidney reabsorbs less water from the urine.
- D The kidney reabsorbs more water from the urine.
- E Less ADH is released from the pituitary gland.
- F The kidney produces less urine.

Write the letters, **A, B, C, D, E** and **F**, in the correct boxes.



[3]

(b) Urine production is also affected by drugs such as alcohol and Ecstasy.

Draw a straight line linking each **drug** with its **effect on ADH**.

Then draw another straight line linking the **effect on ADH** to the **effect on urine production**.

drug	effect on ADH	effect on urine production
	more ADH	larger volume of dilute urine
alcohol	no change	larger volume of concentrated urine
Ecstasy	delayed ADH production	smaller volume of dilute urine
	less ADH	smaller volume of concentrated urine
		no change in the volume or concentration of urine

[2]

- (c) The gerbil is an animal adapted to living in deserts.  
It feeds on plants.  
The gerbil can go for very long periods of time without drinking water.  
Suggest how the gerbil manages to survive on so little water.

.....

.....

.....

.....

..... [4]

[Total: 9]



4 Jake often goes running.

- (a) He thinks running is very safe.  
He is going to enter a marathon for the first time.  
Jake does some research into the risks of marathon running.

He reads a study that says that 1 in several thousand runners die when they run a marathon.

Use the above example to show the difference between **perceived** and **calculated** risk.

.....

.....

.....

..... [2]

- (b) Suggest why Jake is willing to accept the risk of running a marathon.

.....

.....

..... [2]

- (c) In the last 32 years, 11 people have died running the London marathon.  
An average of 36 000 people run the marathon each year.

Calculate the chances of any person dying whilst running the marathon.  
Show your working.

chances of any individual dying during the marathon ..... [3]

- (d) Discuss the risk to Jake in terms of probability and the consequences of running a marathon.

.....

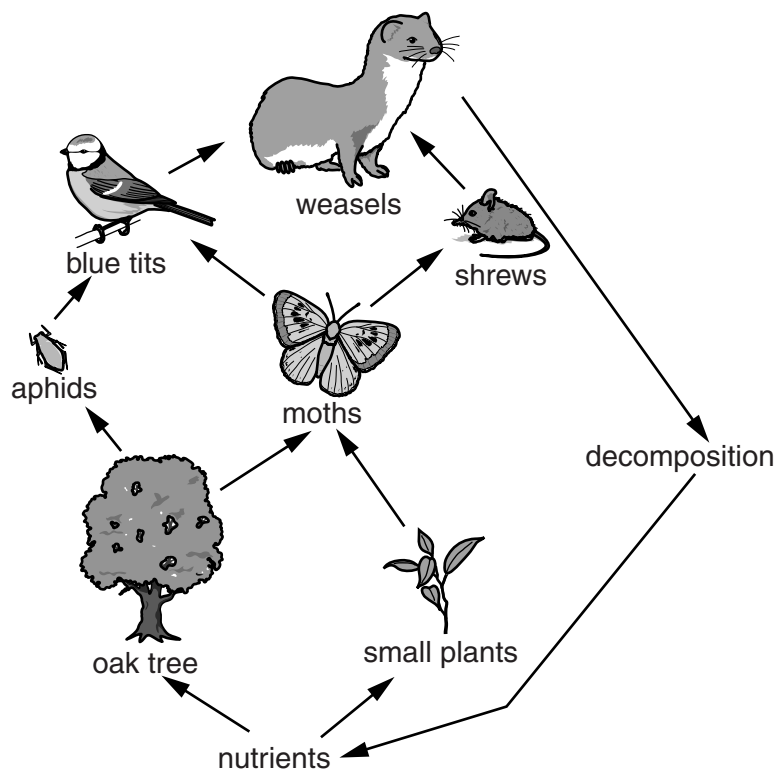
.....

.....

..... [2]

[Total: 9]

5 The diagram shows the flow of nutrients through a food web.



- (a) Which of the following are shown by the diagram?  
Put ticks (✓) in the boxes next to the correct answers.

The diagram shows ...

... competition.

☐

... evolution.

☐

... natural selection.

☐

... part of an ecosystem.

☐

... transfer of nutrients.

☐

... selective breeding.

☐

... interdependence.

☐

[3]

- (b) A closed loop system is one where waste materials are not lost, but are recycled within the system.

Suggest **two** reasons why the system shown by the diagram is not likely to be a closed loop system.

1 .....

.....

2 .....

.....

[2]

- (c) Microorganisms are part of an ecosystem.

Microorganisms can reproduce very quickly.

- (i) If a single microorganism divides into two every 20 minutes, how many microorganisms will there be after 3 hours?

Show your working.

number of microorganisms = ..... [2]

- (ii) Some microorganisms are decomposers.

Suggest why this ability to reproduce so quickly is important.

.....

..... [1]

- (iii) There are many different species of microorganisms in an ecosystem.

Write down **two** processes that are involved in the production of a new species.

1 .....

2 .....

[1]

[Total: 9]

- 

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

..... [6]

- (b) A climate change scientist investigates the movement of a glacier on the Greenland ice cap.

This is her data.

Flow rate in metres per day							
2004	2005	2006	2007	2008	2009	2010	2011
6	5	7	6	9	8	9	11

She thinks this data shows clear evidence for a **trend**.

Other scientists disagree.

Suggest why monitoring climate change in this way requires measurements to be taken over more years than shown in this data.

.....

.....

.....

..... [2]

[Total: 8]

**END OF QUESTION PAPER**

**14**  
**BLANK PAGE**

**PLEASE DO NOT WRITE ON THIS PAGE**

**15**  
**BLANK PAGE**

**PLEASE DO NOT WRITE ON THIS PAGE**

**PLEASE DO NOT WRITE ON THIS PAGE**



**Copyright Information**

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website ([www.ocr.org.uk](http://www.ocr.org.uk)) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.