

**Tuesday 15 May 2012 – 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



Candidate forename		Candidate surname	
Centre number		Candidate number	

**MODIFIED LANGUAGE**

**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 Body cells and sex cells have similarities and differences.

(a) Put ticks (✓) in the boxes next to the **three** correct statements.

A sex cell usually has two alleles of each gene.

☐

Body cells contain pairs of chromosomes.

☐

Sex cells contain alleles that can be dominant or recessive.

☐

Body cells contain half the normal number of chromosomes.

☐

A sex cell usually contains one allele of each gene.

☐

Body cells in males have only Y sex chromosomes.

☐

Sex cells in humans always have both X and Y chromosomes.

☐

[3]

(b) Body cells and sex cells both contain chromosomes.

Put ticks (✓) in the boxes next to the **three** correct statements.

Chromosomes are made from very long DNA molecules.

☐

A person only has one allele for each gene.

☐

Genes are sections of DNA molecules.

☐

Genes are instructions for making fats and carbohydrates.

☐

All DNA is found in the cytoplasm of cells.

☐

Genes determine all of our characteristics.

☐

Genes with a recessive allele always express that allele.

☐

Many characteristics are produced by several different genes working together.

☐

[3]

- (c) Two parents each have a dominant allele (**A**) and a recessive allele (**a**) for the same gene.

Draw a genetic diagram to show how these alleles can be passed on to their children.

Explain your genetic diagram.



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

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..... [6]

- (d) Scientists are learning more about our genes.

This information can be used in many different ways.

Sheila, a student, gives a talk to her class about the use of this genetic information.

Knowledge of genetics means we will be able to predict which diseases we will get and when we will get them. This will allow doctors to produce medicines so that there will be no more disease.



- (i) Identify **one** mistake in Sheila's talk.

Explain your answer.

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..... [2]

- (ii) Sheila continues her talk.

My father runs a business. If he knew all about the DNA of people who apply for a job, he would be able to select who to employ. He would know who would get ill and cost the company sick pay. I think making all the information about our DNA available to everyone can only be a good thing.



Do you agree with Sheila about making our DNA information available to everyone?

Explain your answer.

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..... [2]

[Total: 16]

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**Question 2 begins on page 6**

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2 This question is about stem cells and clones.

(a) There are two types of stem cell: adult stem cells and embryonic stem cells.

Look at the statements about both types of stem cell.

Some of the statements are correct for **adult stem cells only**, some for **embryonic stem cells only**, and some for **both types of stem cell**.

Complete the table by putting a tick (✓) in the correct box in each row.

	Statement applies to ...		
	... adult stem cells only	... embryonic stem cells only	... both types of stem cell
They can develop into all types of cell.			
They have the potential to treat some diseases.			
They are produced by humans.			
They produce specialised cells in the early development of an organism.			

[2]

(b) Identical twins are clones.

Clones have the same alleles as one another.

Many characteristics of identical twins will be the same, but later in life some of their characteristics will be different.

Explain why

- many characteristics of these twins will be the same,
- later in life some of their characteristics will be different.

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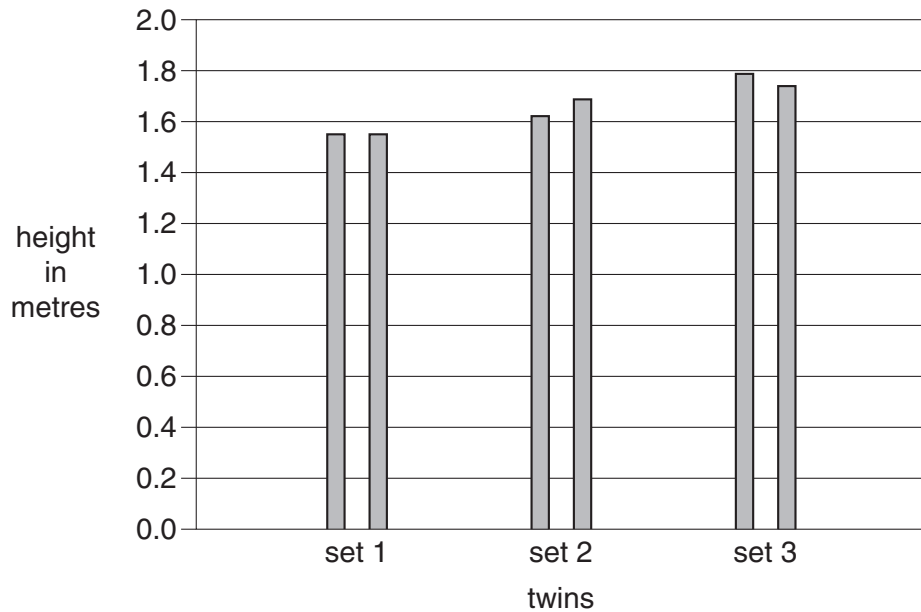
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..... [2]

(c) The bar chart below was drawn by a student.

It shows data about the height of three different sets of identical twin boys.



(i) What can you conclude from the graph about the difference in height between identical twins?

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(ii) Suggest how you could improve this study to make you feel more sure that your conclusions are correct.

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[Total: 9]

3 This question is about disease.

(a) All infectious diseases have symptoms. Different diseases have different symptoms.

What is the cause of these symptoms for most infectious diseases?

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

the medicine taken to cure the disease

☐

other microorganisms that take advantage of the situation

☐

damage done to cells

☐

the length of time that the illness lasts

☐

toxins produced by the microorganism

☐

people eating less food when they feel ill

☐

[1]





(d) Influenza is a serious disease.

Look at the table of data about influenza (flu). The fatality rate is the percentage of people with the disease who die.

Type of flu	Date	Number of deaths in millions	Fatality rate (%)	Severity index
Spanish flu	1918-20	80	2	5
Asian flu	1957-8	1.25	0.13	2
Hong Kong flu	1968-9	0.8	0.1	2
2009 flu	2009-10	0.018	0.03	not available

(i) Use the data in the table to suggest what the 'severity index' might show.

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(ii) Describe the correlation between the number of deaths and the fatality rate.

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 ..... [1]

(iii) Spanish flu killed 80 million people worldwide between 1918 and 1920.

One hundred years earlier, Russian flu killed 1 million people worldwide.

Suggest **two** reasons why Russian flu killed fewer people worldwide than Spanish flu.

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[Total: 13]

- 4 There are automatic control systems in the body that maintain several factors at steady levels.

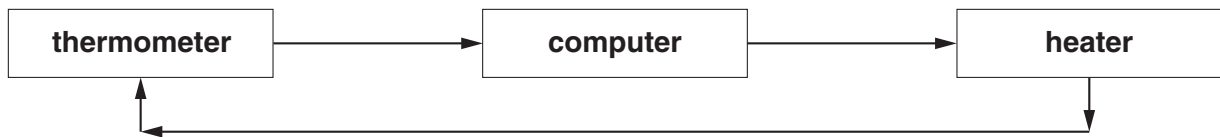
It is important that our bodies maintain a constant internal environment.

- (a) Write down the word that means 'maintaining a constant internal environment'.

..... [1]

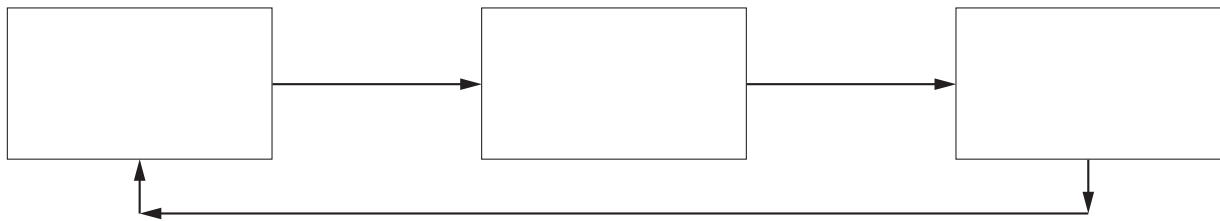
- (b) Like the human body, it is important that the temperature in incubators for premature babies is kept constant.

The block diagram shows how this process is carried out in an incubator.



Complete the block diagram below to show how the same process is maintained in the human body.

Use the words **effector**, **receptor** and **processing centre** in your answer.

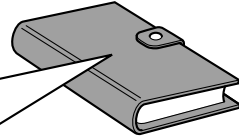


[2]

(c) It is also important to control our water levels.

(i) Read the extract from Shane's diary. Shane is a marathon runner.

It was the race today. I made sure that I had a good breakfast. Later in the morning I had plenty of orange juice. I went to the toilet before I started the race. The race started. It was a hot day and I was sweating a lot. It's amazing how much your heart rate increases when you start running. My trainer says that this is because my rate of respiration increases. I did not win, but came second. Not a bad result.



Complete the table by selecting words from the extract which show where water was gained and lost from Shane's body.

**You must only use words from Shane's diary.**

Water gained	Water lost

[3]

(ii) Shane wants to avoid getting dehydrated during and after the race.

He measures the concentration of his urine on the morning of the race. He thinks this will tell him how much he needs to drink before the race.

Shane's idea will not work.

Explain why.

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- (iii) By keeping fit, Shane reduces his chances of getting heart disease.

The list below shows risk factors for heart disease.

Put a tick (✓) in the box next to the risk factor that Shane **cannot** control.

poor diet	<input type="checkbox"/>
stress	<input type="checkbox"/>
faulty genes	<input type="checkbox"/>
cigarette smoking	<input type="checkbox"/>
misuse of drugs	<input type="checkbox"/>

[1]

- (iv) Shane knows that he can reduce some of his risk factors for heart disease.

He also knows that nothing in life is certain.

His grandfather was a heavy drinker and smoker but lived to be 93 years old with no heart disease.

Which of the following statements best fit the case of Shane's grandfather?

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

It proves that there is no correlation between smoking, drinking and heart disease.	<input type="checkbox"/>
The effects on the body of smoking and drinking cannot be measured using scientific methods.	<input type="checkbox"/>
A factor might increase the chance of a particular outcome but does not always lead to it.	<input type="checkbox"/>
Individual cases do not provide good evidence for or against a correlation.	<input type="checkbox"/>
The right decision is the one that leads to the best outcome for the greatest number of people.	<input type="checkbox"/>
There is no plausible mechanism that links smoking and drinking to heart disease.	<input type="checkbox"/>

[2]

[Total: 11]

- 5 A scientist studies peppered moths.

Peppered moths breed together to produce fertile offspring.

- (a) Write down the word that describes a group of organisms that can breed together to produce fertile offspring.

answer ..... [1]

- (b) The normal appearance of the peppered moth is speckled grey.



This makes the peppered moth camouflaged when resting on the bark of trees.

In areas of heavy pollution most of the moths are black.

This makes them better camouflaged against the black soot on the trees.



- (i) Explain the process that could lead to the majority of the moths in unpolluted areas being grey and the majority of moths in polluted areas being black.



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

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- (ii) An unpolluted area becomes quickly covered in soot when a new factory opens.

The soot does not harm the peppered moths.

However the population of peppered moths quickly falls. It then slowly returns to its normal levels.

The area remains covered in soot throughout this time.

Suggest why the population of peppered moths falls quickly and then returns to normal levels.

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- (iii) Describe **two** ways that energy can be lost from the food chain when birds prey on the moths.

1. ....

2. .... [2]

[Total: 11]

**END OF QUESTION PAPER**

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