

**Thursday 12 January 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	
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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 All people are different.

Some of our characteristics are inherited from our parents.

Some are caused by our environment.

Some are a combination of both.

(a) Complete the table by writing down one example of each type of characteristic.

inherited from our parents	caused by our environment	a combination of inheritance and environment

[3]

(b) Genetic characteristics are determined by our genes.

These statements are about genes.

Some of the statements are correct and some are not.

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

Genes are instructions for making proteins.

Some genes are instructions for making enzymes.

Genes are made up of chromosomes.

Some characteristics are controlled by several genes working together.

Genes are instructions for making carbohydrates.

Some genes are instructions for making fats.

[2]

3

(c) Sex is determined by the X and Y chromosomes.

Complete the Punnett square to show how sex is inherited in humans.

You should write something in each of the empty boxes.

		X	
	X		
	X		

[3]

[Total: 8]

2 Some disorders are inherited.

One of these disorders is Huntington’s disease.

(a) Complete the sentences to show how Huntington’s disease is inherited.

Put a **ring** around the correct word to complete each sentence.

Huntington’s disease is caused by a change in **one / two / multiple** gene(s).

Only one faulty allele is required to cause the disease, because the allele is **dominant / recessive / powerful / weak**. [2]

(b) Cystic fibrosis is another inherited condition.

Explain how the inheritance of cystic fibrosis is different from the inheritance of Huntington’s disease.

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

(c) Genetic testing can be used for screening adults, children and embryos.

Describe uses of genetic testing and the implications of these tests for these people.



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

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [6]

(d) Genetic testing is viewed differently by different people.

Write down **one** argument for and **one** argument against genetic testing.

.....

.....

.....

..... [2]

[Total: 12]

3 Microorganisms can cause disease.

(a) What actions of microorganisms produce the symptoms of infectious disease?

Write down **two** of these actions.

- 1 .....
- 2 ..... [2]

(b) In warm conditions, a bacterium can divide into two new bacteria every twenty minutes.

(i) A chef puts a cooked meal on a warm work surface.

A single bacterium is present on the food.

The meal was left for **two hours**.

Calculate how many bacteria would be present after this time.

Show your working.

answer = ..... [2]

(ii) The results of this type of calculation have important implications for chefs.

Use your answer to (b)(i) to explain why.

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

(c) Robert Koch was a scientist who proved that bacteria can cause disease.

Read the article about Robert Koch and then answer the questions.

In 1890 Koch published his research into bacteria and disease.

He wanted to show that a particular type of bacteria was responsible for causing the disease tuberculosis.

These were his findings.

- 1 He found the bacteria in all the organisms with the disease but not in healthy organisms.
- 2 He isolated the bacteria from an animal with the disease and grew the bacteria in a Petri dish.
- 3 He then introduced the bacteria into a healthy animal.
- 4 The healthy animal started to show symptoms of the disease.
- 5 He isolated the bacteria from the new diseased animal and checked to make sure it was the same as the bacteria he had found in diseased animals at the start of his investigation.

Answer the questions by using the information provided.

(i) Which statement, 1, 2, 3, 4 or 5, describes a correlation?

statement ..... [1]

(ii) Do statements 1, 2, 3, and 4, when taken together, prove that the bacteria caused tuberculosis?

Explain your answer.

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

(iii) For Koch's ideas to have been accepted by the scientific community, what should other scientists have done?

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

[Total: 11]

- 4 Blood pressure readings have two measurements, called systolic and diastolic.

A group of men have their blood pressure checked.

Here are the results.

	<b>systolic pressure in mm/Hg</b>	<b>diastolic pressure in mm/Hg</b>
Paul	87	58
Dave	88	78
Ranjit	101	58
Peter	145	95
Mike	110	70

- (a) The systolic pressure is different from the diastolic pressure.

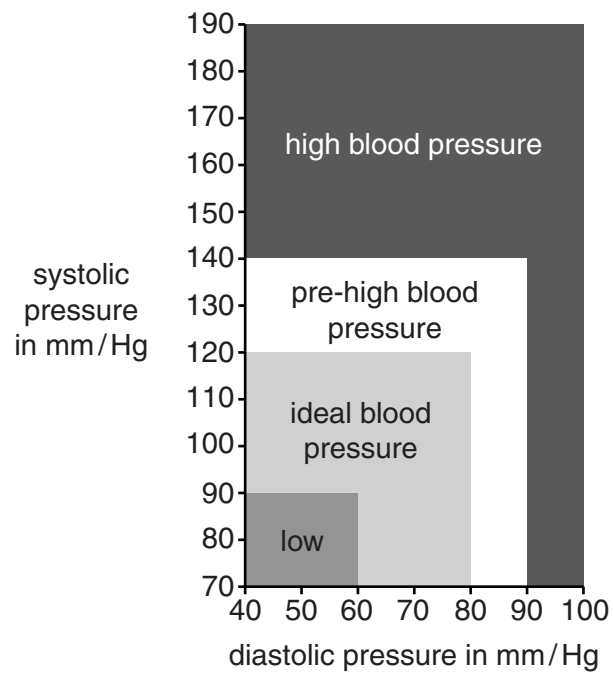
Suggest why.

.....

.....

..... [2]

- (b) Look at the blood pressure chart.







5 This question is about the use of indicators to measure environmental change.

(a) Environmental change in rivers can be measured using living indicators.

The number and types of different species can be used to determine water quality.

The numbers in the table are scores that describe water quality.

A score of 10 or higher indicates clean, unpolluted water.

total number of indicator species		species									
		0–1	2–5	6–10	11–15	16–20	21–25	26–30	31–35	36–40	41–45
stonefly nymph present	more than 1 species	–	7	8	9	10	11	12	13	14	15
	1 species only	–	6	7	8	9	10	11	12	13	14
mayfly nymph present	more than 1 species	–	6	7	8	9	10	11	12	13	14
	1 species only	–	5	6	7	8	9	10	11	12	13
caddis fly larva present	more than 1 species	–	5	6	7	8	9	10	11	12	13
	1 species only	4	4	5	6	7	8	9	10	11	12

Andy collected some insects from a stream near his school.

Here are his notes.

<p><b>10<sup>th</sup> January 2011</b> <b>9.00 a.m.</b></p> <p>I sampled the river water near the school and found these organisms:</p> <ul style="list-style-type: none"> <li>• 1 species of mayfly nymph.</li> <li>• A total of 37 different species.</li> </ul> <p>This gives a water quality score of 12.</p>	<p><b>15<sup>th</sup> March 2011</b> <b>9.00 a.m.</b></p> <p>I sampled the same stretch of river as last time.</p> <p>This time I found:</p> <ul style="list-style-type: none"> <li>• ..... species of stonefly nymph.</li> <li>• A total of 34 different species.</li> </ul> <p>This gives a water quality score of 12.</p>	<p><b>28<sup>th</sup> May 2011</b> <b>9.00 a.m.</b></p> <p>I sampled the same stretch of river as last time.</p> <p>This time I found:</p> <ul style="list-style-type: none"> <li>• 1 species of caddis fly larvae.</li> <li>• A total of 9 different species.</li> </ul> <p>This gives a water quality score of 5.</p>
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Use the water quality table and Andy's notes to answer the following questions.



(b) Write down the name of one **living indicator** that could be used to measure environmental change in each of these environments.

(i) the oceans

..... [1]

(ii) the air

..... [1]

(c) Write down two **non-living indicators** that are used to measure environmental change.

Choose from this list.

**levels of nitrate**

**levels of carbon dioxide**

**levels of nitrogen**

**air pressure**

**tree rings**

**phases of the Moon**

1 .....

2 ..... [2]

[Total: 11]

6 Biodiversity is important to life on Earth.

(a) Which of the following would help to prevent a decrease in biodiversity?

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

Protecting the rain forests.

Increasing the population of a common species.

Reducing large scale monoculture.

Decreasing the genetic variation within species.

Using wood rather than oil for fuel.

[2]

(b) Maintaining biodiversity is important for sustainability.

Which statement best describes sustainability?

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

Sustaining demand by growing more crops.

Preventing any change happening to the environment.

Exploring new environments such as outer space and the depths of the oceans.

Meeting the needs of people today without damaging the Earth for future generations.

Supplying crops all the year round from different parts of the world.

[1]

(c) Many of the foods we buy are packaged.

(i) Explain how sustainability could be improved by reducing packaging.

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

(ii) Some packaging is biodegradable.

Explain why this only helps a little to improve sustainability.

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

[Total: 8]

**END OF QUESTION PAPER**

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