

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A221/01**

Unit 1: 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)

**Thursday 19 May 2011  
Afternoon**

**Duration: 40 minutes**



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**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. Pencil may be used for graphs and diagrams only.
- 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).
- Answer **all** the questions.
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

- 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 **42**.
- This document consists of **16** pages. Any blank pages are indicated.

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Answer **all** the questions.

1 This question is about chromosomes, genes and alleles.

(a) Complete each sentence by putting ticks (✓) in the boxes next to the correct words.

Human females have

no copies	<input type="checkbox"/>
one copy	<input type="checkbox"/>
two copies	<input type="checkbox"/>

of a **Y** chromosome in each body cell.

Human females have

no copies	<input type="checkbox"/>
one copy	<input type="checkbox"/>
two copies	<input type="checkbox"/>

of all other chromosomes in each body cell.

Human females have

no alleles	<input type="checkbox"/>
two alleles	<input type="checkbox"/>
three alleles	<input type="checkbox"/>

for each gene in each body cell.

[3]

(b) Children may be similar to both of their parents.

Explain why.

.....

.....

.....

..... [2]

[Total: 5]

2 Huntington's disorder is a genetic disorder.

(a) State two symptoms of Huntington's disorder.

symptom 1 .....

symptom 2 .....

[1]

(b) Height is also inherited through our genes.

Height and Huntington's disorder are inherited in different ways.

Explain the difference.

.....

.....

..... [2]

(c) People can be tested to see if they have the allele for a genetic disorder.

(i) A couple are thinking about having children.

They are told that they are both carriers of a genetic disorder.

What decision will they have to make?

.....

..... [1]

(ii) Another couple are told that their fetus has a genetic disorder.

What decision will they have to make?

.....

..... [1]

(d) Four friends are having a discussion.

**Peter**  
My wife and I are thinking about whether to have a genetic test on our unborn child.

**Rafi**  
I do not agree with genetic testing as it is too risky to the unborn child.

**Jane**  
There is a 2% chance of losing the baby by having the test.

**Stella**  
I agree with genetic testing. It helps identify children who may be born with serious genetic conditions.

(i) What **issue** is being discussed by the four people?

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

(ii) Who is making a statement that could be tested scientifically?

..... [1]

[Total: 7]

3 Our bodies have natural barriers to reduce the risk of harmful microorganisms entering the body.

(a) Which of the following are natural barriers to harmful microorganisms?

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

hair	<input type="checkbox"/>
fingernails	<input type="checkbox"/>
sweat	<input type="checkbox"/>
skin	<input type="checkbox"/>
urine	<input type="checkbox"/>
breath	<input type="checkbox"/>
tears	<input type="checkbox"/>
stomach acid	<input type="checkbox"/>

[2]

(b) When microorganisms enter the body they can cause diseases.

Symptoms of these diseases then develop.

Complete each sentence by putting a tick (✓) in the box next to each correct choice.

Symptoms are caused by microorganisms producing

antibiotics.	<input type="checkbox"/>
antibodies.	<input type="checkbox"/>
toxins.	<input type="checkbox"/>

Our body responds by

platelets	<input type="checkbox"/>
red blood cells	<input type="checkbox"/>
white blood cells	<input type="checkbox"/>

producing

antibodies.	<input type="checkbox"/>
antigens.	<input type="checkbox"/>
toxins.	<input type="checkbox"/>

These cells

engulf	<input type="checkbox"/>
increase the reproduction of	<input type="checkbox"/>
protect	<input type="checkbox"/>

the invading microorganisms.

[3]

(c) Bacteria can reproduce very quickly.

A single bacterium divides into two, every twenty minutes.

How long will it take for a single bacterium to produce a colony of 256 bacteria?

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

1 hour and 20 minutes

2 hours

2 hours and 40 minutes

85 hours and 20 minutes

256 hours

[1]

[Total: 6]

4 This question is about our blood system and health.

(a) The heart is full of blood but it still needs its own blood supply from the coronary artery.

Explain why.

.....

.....

.....

.....

..... [3]

(b) The heart pumps blood through blood vessels.

Draw **two** straight lines to link the vein with its correct **features**.

Then draw **two** straight lines to link each of the vein's **features** with their correct **function**.

	<b>feature</b>	<b>function</b>
vein	thick walled	allow blood to flow more easily
	large lumen	stop backflow of blood
	valves	allow diffusion

[2]



(c) Four people discuss some ideas about science.

**John**  
Individual cases do not provide convincing evidence for or against a correlation.

**Robin**  
There are examples from everyday life of correlations between a factor and an outcome.

**Mary**  
A factor might increase the chance of an outcome for a number of people but not always lead to it.

**Angela**  
The absence of replication is a reason for questioning a scientific claim.

Write the name of the person whose idea about science **best** matches each example in the table.

You may use each person once, more than once, or not at all.

Eating a high fat diet increases the risk of heart disease but not everyone eating a high fat diet will get heart disease.	
The more cigarettes you smoke the greater the risk of getting lung cancer.	
My grandad drank four pints of beer a day. His liver was fine and he died of old age at 93.	
A new report says that eating 'super-foods' will reduce my risk of getting cancer. I am going to wait to see what other scientists think about this before spending money on 'super-foods'.	

[4]

[Total: 9]

5 There is variation in all species on Earth.

(a) Complete the table to show how variation is **caused** and how it is **passed on**.

Put a tick (✓) in the correct box for each row.

	only the environment	only genes	both environment and genes	neither environment nor genes
variation is <b>caused</b> by				
variation is <b>passed on</b> by				

[2]

(b) Variation is important in natural selection.

Explain how the process of natural selection works.

In your answer use ideas about

- competition
- chances of survival
- reproduction.

.....

.....

.....

.....

.....

.....

[3]

(c) Look at the statements about changes to organisms.

Put a tick (✓) in the correct box for each row to show whether these changes were produced by **natural selection** or **selective breeding**.

	<b>natural selection</b>	<b>selective breeding</b>
development of bacterial resistance to antibiotics		
production of rose bushes without thorns		
production of new types of pedigree dogs		

[2]

[Total: 7]

6 This question is about communication systems.

(a) Humans have evolved both a **nervous** communication system and a **hormonal** communication system.

Write down **two** situations when the hormonal communication system is used.

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

(b) Humans have evolved a larger brain than most other animals.

Complete the sentence.

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

A larger brain gave humans ...

- ... a shorter life expectancy.
- ... an ability to see greater distances.
- ... fewer opportunities for breeding.
- ... a better chance of survival.
- ... the ability to evolve faster.

[1]

(c) The nervous communication system responds to changes in our environment.

It includes the following structures.

- A central nervous system
- B nerve cells to spinal cord
- C receptors
- D effectors
- E nerve cells from spinal cord

When our body responds to a stimulus from the external environment all these structures are used.

Write the letters in the boxes to show the correct order in which they are used.

--	--	--	--	--

[3]

[Total: 6]

7 Darwin published his Theory of Evolution in 1859.

At that time little was known of the fossil record.

A prediction was made that birds had evolved from dinosaurs.

Two years later a fossil of Archaeopteryx was found.

This was a link between the dinosaurs and birds.



Which of these statements are true?

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

The fossil proved the theory of evolution was correct.

The fossil was an observation that agreed with a prediction.

The fossil increased the confidence in the explanation.

The fossil made no difference to Darwin's Theory.

The fossil provided strong evidence against Darwin's Theory.

[2]

[Total: 2]

**END OF QUESTION PAPER**

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