

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

**A221/01**

Unit 1: Modules B1 B2 B3 (Foundation Tier)

**Thursday 13 January 2011  
Morning**

**Duration: 40 minutes**

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)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

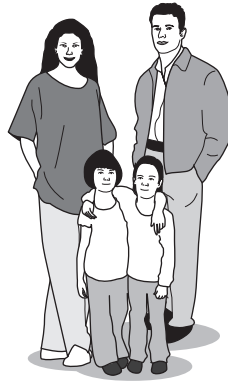
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer 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.

Answer **all** the questions.

1 This question is about why there are similarities and differences in families.



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

Sex cells have	one copy	<input type="checkbox"/>	of each chromosome.
	two copies	<input type="checkbox"/>	
	twenty three copies	<input type="checkbox"/>	

Chromosomes in a pair carry	the same	<input type="checkbox"/>	genes in the same place.
	different	<input type="checkbox"/>	
	alternate	<input type="checkbox"/>	

Different versions of a gene are called	chromatids.	<input type="checkbox"/>
	gametes.	<input type="checkbox"/>
	alleles.	<input type="checkbox"/>

[3]

(b) Explain why different children from the **same parents** often do not look like each other.

.....

.....

.....

..... [2]

[Total: 5]

2 Human characteristics such as eye colour and cystic fibrosis are genetically controlled.

(a) Human eyes can be a wide range of colours.

Cystic fibrosis is different. You either have cystic fibrosis or you do not.

(i) Explain this difference.

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

(ii) Write down two symptoms of cystic fibrosis.

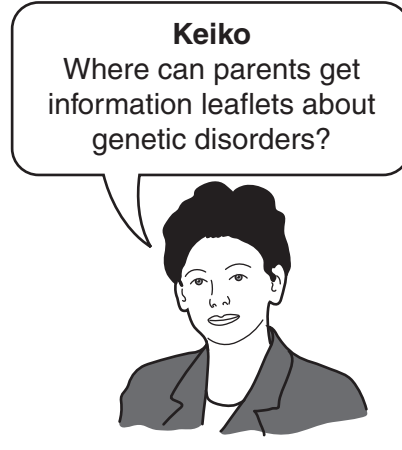
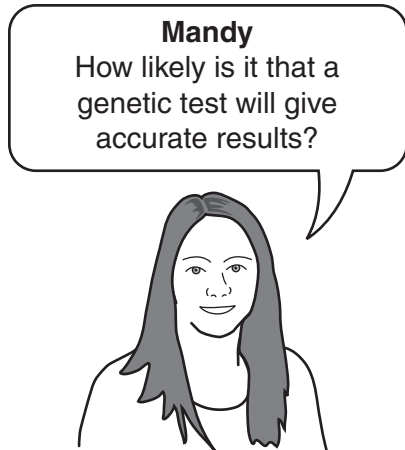
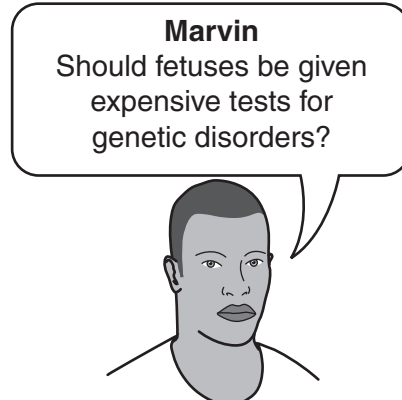
symptom 1 .....  
symptom 2 ..... [2]

(b) Adults and fetuses can be tested to see if they have the allele for a genetic disorder.

State **two** possible implications of testing adults and fetuses for a genetic disorder.

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

(c) Four people ask questions about testing fetuses for genetic disorders.



(i) Which person, **Dan**, **Marvin**, **Mandy** or **Keiko**, is asking a question that could be investigated using a scientific approach?

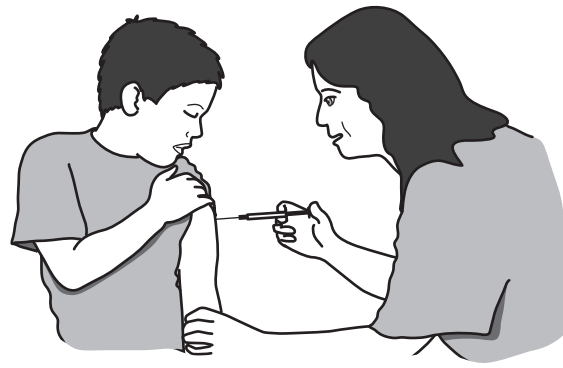
answer ..... [1]

(ii) Which person, **Dan**, **Marvin**, **Mandy** or **Keiko**, is asking a question that could mean certain actions are never justified because they are unnatural or wrong?

answer ..... [1]

[Total: 8]

3 Vaccinations help us to resist infection.



(a) A newspaper printed this article about a new vaccine.

The sentences in the article have been numbered.

Two of the sentences contain mistakes.

**New vaccine for flu**

- 1 Scientists have developed a new vaccine for flu.
- 2 The vaccine consists of a safe form of the virus.
- 3 It encourages the body to make antigens to destroy the virus.
- 4 The flu virus is then destroyed when it enters the body.
- 5 The new vaccine would enable the body to destroy any other type of virus entering the body.
- 6 The new vaccine will be available after testing.

(i) Write down the numbers of the **two** sentences that contain mistakes.

sentences ..... and ..... [1]

(ii) Rewrite each of the incorrect sentences so that it is scientifically correct.

Rewritten correct sentence .....

.....

.....

Rewritten correct sentence.....

.....

.....

[2]

(b) Which of the statements about diseases and vaccines are true?

Put a tick (✓) in the box next to each of the **three** correct statements.

Vaccines can never be completely safe.

Side effects of vaccines are the same in all individuals.

Flu vaccines protect against flu for a long time because the virus changes very slowly.

Vaccines cause red blood cells to produce chemicals that destroy the invading microorganism.

Vaccines are always given after infection by a disease-causing microorganism.

Once the body has made the chemical to kill invading microorganisms it can make it again very quickly.

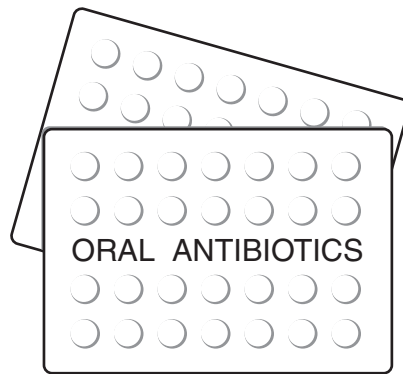
A vaccine contains a dangerous form of the disease-causing microorganism.

Symptoms of the disease are caused by damage done to cells and by toxins produced by the microorganism.

[3]

[Total: 6]

4 This question is about antibiotics.



(a) Steve has a sore throat. He goes to his doctor.

The doctor tells Steve that antibiotics will not cure his sore throat.

Which of these statements could explain the doctor's decision not to give Steve antibiotics?

Put a tick (✓) in the box next to each of the **two** correct statements.

Antibiotics never cure sore throats.

Antibiotics are much too expensive to use on a sore throat.

Antibiotics do not work against viruses.

The antibiotic could make the infection last longer.

Steve's sore throat is not caused by a bacterial or fungal infection.

The antibiotic is a placebo.

[2]

(b) Dave has a blood infection.

His doctor gives him antibiotics.

The doctor tells Dave to complete the course of treatment.

Which statement best explains why Dave should complete the course of treatment?

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

Dave should complete the course of treatment ...

... so that dangerous drugs are not left lying around in Dave's house.

... because antibiotics only work after a long time.

... to stop the bacteria becoming resistant to the antibiotic.

... to make sure the antibiotic does not go past its 'use by' date.

[1]

(c) These statements are steps in testing and producing a new antibiotic.

Some of the statements are correct and some are not.

- A** It is tested on healthy volunteers for safety.
- B** Colour is added to make people think it is more effective.
- C** A potential new antibiotic is discovered.
- D** It is tested on people with the illness for effectiveness and safety.
- E** It is tested on human cells to see if it is effective and safe.
- F** Antibodies are produced to make a vaccine.
- G** It is passed for public use.

Put the correct statements in the correct order by writing letters in the boxes.

Two have been done for you.

			<b>D</b>	<b>G</b>
--	--	--	----------	----------

[2]



- (d) A scientist claims to have discovered a new cure for infections. It is not an antibiotic. He has tested it on human cells and animals.

His claims have not yet been evaluated by the scientific community.

Some scientists do not believe his claims.

Which two statements best explain why?

Put a tick (✓) in the box next to each of the **two** correct statements.

It takes a lot of money to produce a new drug.

The work has not been peer reviewed.

The new drug has been extracted from a rare plant.

The drug has not been tested on any living organisms.

The drug is only 95% effective.

The tests have not been repeated by other scientists.

[2]

[Total: 7]

5 This question is about the blood system and the heart.

(a) The structure of arteries and veins is related to their function.

Draw straight lines to connect each **blood vessel** to any correct **feature**.  
Then draw straight lines to connect each **feature** to its correct **function**.

blood vessel	feature	function
artery	valves along its length	allow blood to flow easily
vein	muscular wall	maintain blood pressure
	large lumen	stop blood flowing backwards

[2]

(b) Which of the statements about the heart muscle is correct?

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

- The heart muscle does not need its own blood supply because the heart is already full of blood.
- The heart muscle does not need its own blood supply because it has lots of rests between beats.
- The heart muscle needs its own blood supply because it needs lots of oxygen and glucose.
- The heart muscle needs its own blood supply to supply it with carbon dioxide.

[1]

(c) Cigarette smoking can increase the risk of developing heart disease but does not necessarily lead to it.

(i) State **two other** factors that can increase the risk of heart disease.

1 .....

2 .....

[2]

(ii) Joe smoked 60 cigarettes a day, lived to be 95 years old and died of old age.

Explain why this does not provide convincing evidence for or against a correlation.

.....

.....

..... [2]

[Total: 7]

6 This question is about how life evolved on Earth.

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

Life on Earth began around	1500		million years ago.
	2500		
	3500		

The first living things developed from	molecules that could copy themselves.	
	green plants.	
	DNA that had been frozen in ice.	

Living species originally evolved from very	large		organisms.
	simple		
	complex		

[3]

(b) Which of these statements about variation and evolution are true?

Put a tick (✓) in the box next to each of the **three** correct statements.

- Natural selection happens due to evolution.
- Variation is caused by both the environment and genes.
- If conditions on Earth had at any stage been different, evolution would have produced different results.
- Variation caused by the environment can be passed onto the next generation.
- Selective breeding by humans is the main reason for evolution.
- The fossil record provides some evidence for evolution.
- Natural selection works by selecting all living organisms.

[3]

[Total: 6]

7 The body uses nerves and hormones.

Read the statements in the table.

Put a tick (✓) in one box in each row to show whether the statement applies to **only nerves**, to **only hormones** or to **both nerves and hormones**.

statements	applies to		
	only nerves	only hormones	both nerves and hormones
made up of neurons			
use electrical impulses			
produce a short-lived response			
used for communication			
travel in the blood			
produce a long-lasting response			
produce a slow response			

[3]

[Total: 3]

**END OF QUESTION PAPER**

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