OCR
RECOGNISING ACHIEVEMENT

H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE BIOLOGY A

A221/02

Unit 1: Modules B1 B2 B3 (Higher Tier)

OCE/25798

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 13 January 2011
Morning

Duration: 40 minutes

A221102

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. 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 genes and proteins.

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

For each gene a person has

2	
23	
46	

alleles and they are

always the same.	
always different.	
either the same or different.	

It is the combination of maternal and paternal

alleles	
genes	
embryos	

that controls a person's characteristics.

[3]

(b) Genes are instructions for making different proteins.

Explain how the body uses these proteins.

.....

.....

.....

..... **[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]

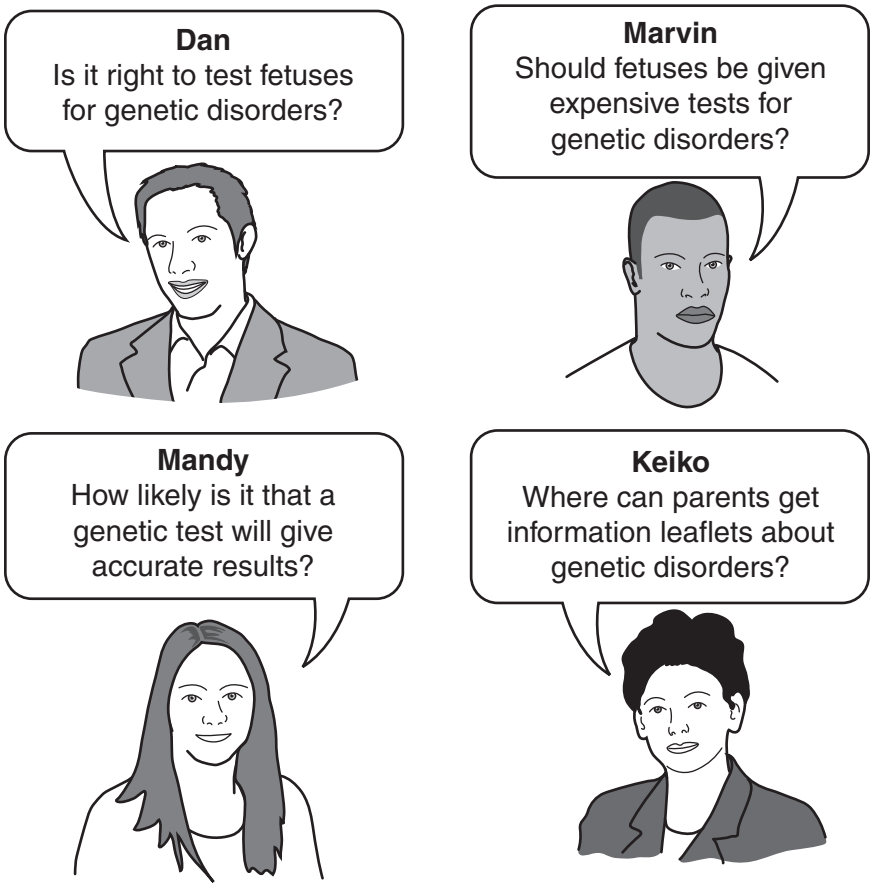
(b) Adults and fetuses can be tested to see if they have the allele for a genetic disorder.

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?

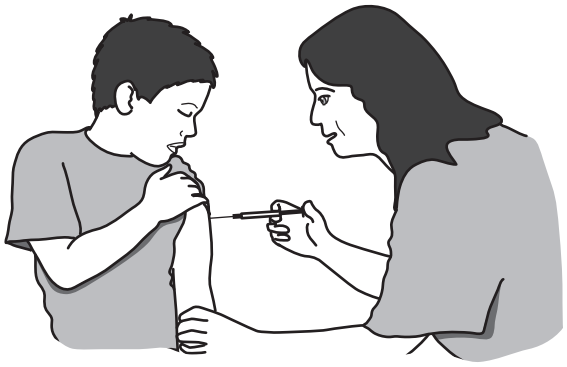
answer ..... **[1]**

(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]

(c) To prevent an epidemic of infectious disease it is necessary to vaccinate a high percentage of the population.

Explain why.

.....

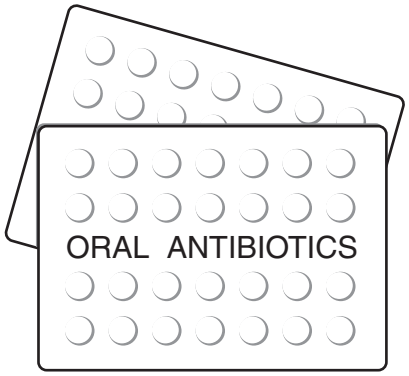
.....

.....

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

[Total: 8]

4 This question is about antibiotics.



(a) Bacteria can become resistant to antibiotics.

These statements are about antibiotic resistance in bacteria.

Some are correct and some are not.

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

Antibiotic resistance begins with mutations in the genes of bacteria.	☐
The process is helped because bacteria reproduce so quickly.	☐
Only bacteria that do not develop antibiotic resistance can survive a course of antibiotic treatment.	☐
Natural selection ensures resistant bacteria survive.	☐
Sexual reproduction is required to produce variation so that some bacteria are resistant.	☐
It is the antibiotic that causes the genes to mutate.	☐
Mutations are not random and that is why bacterial resistance appears.	☐

[1]

(b) New antibiotics are tested using double blind trials.

When taking some drugs the patient cannot exert a placebo effect.

These drugs are tested without using blind or double blind trials.

These tests are called open label trials.

Put a tick (✓) in the box next to any of the following drugs that could be tested using an open label trial.

a new cold cure	☐
a headache tablet	☐
a cream that restores hair in bald men	☐
a drug that shortens the duration of flu symptoms	☐
a drug that increases production of red blood cells	☐
a new contraceptive pill for men	☐
a rub-on cream for back pain	☐

[2]

(c) Placebos are **not** commonly used in human trials.

The statements give reasons why.

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

The doctor would not know if the drug was effective.	☐
It is not morally correct to deceive patients into thinking they are taking an active drug when they are not.	☐
The patient would not know if the drug was effective.	☐
Patients with life threatening illnesses have the right to choose to have the active drug.	☐
It is right that a few patients should suffer so that many patients can benefit.	☐
Neither the patient nor the doctor would know if the drug was effective.	☐
Doctors do not want to give patients a treatment that is not expected to work.	☐
Both the patient and the doctor would know if the drug was effective.	☐

[2]

[Total: 5]

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

(a) Fatty deposits in the blood vessels supplying the heart muscle can produce a heart attack.

Which of these statements about fatty deposits and a heart attack are correct?

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

The fatty deposits are poisonous and kill heart muscle.	☐
The blood supply to the heart muscle is reduced.	☐
Fatty deposits reduce the build up of lactic acid in the heart muscle causing pain.	☐
The heart muscle does not get enough oxygen and glucose.	☐
The body stores the fat in blood vessels to act as an emergency supply of energy for the heart.	☐

[2]

(b) Some factors can increase the risk of heart disease.

When epidemiologists study a factor they look for a correlation between the factor and the outcome.

Explain why a correlation between a factor and an outcome does not necessarily mean that one causes the other.

Give an example to illustrate your answer.

.....

.....

.....

.....

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

[Total: 4]

6 Different parts of our body communicate with each other using the nervous system.

(a) The nervous system is used to respond to a stimulus.
A stimulus received by a person's hand is detected.
The brain produces a response.

Use the letters to complete the pathway for this response in the empty boxes.

A sensory neuron

B spinal cord

C receptor

D motor neuron

E effector

F brain

Each letter can be used **once**, **more than once**, or **not at all**.
One has been done for you.

			F			

[3]

(b) Which of these activities are associated with **both** the nervous system and the hormonal system?

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

rapid responses ☐

communication ☐

supplying the brain with information about external stimuli ☐

homeostasis ☐

long-lasting responses ☐

[2]

[Total: 5]

7 This question is about evolution.

(a) Natural selection and selective breeding both produce changes within a species.

Put a tick (✓) in one box in each row to show whether the description applies only to **natural selection**, or only to **selective breeding**, or to **both natural selection and selective breeding**.

description	natural selection	selective breeding	both natural selection and selective breeding
performed by humans			
has only ever produced new varieties, not species			
evolution happens due to this process			
takes place over successive generations			
sometimes called “survival of the fittest”			
involves the inheritance of alleles			
usually requires the use of sexual reproduction			

[3]

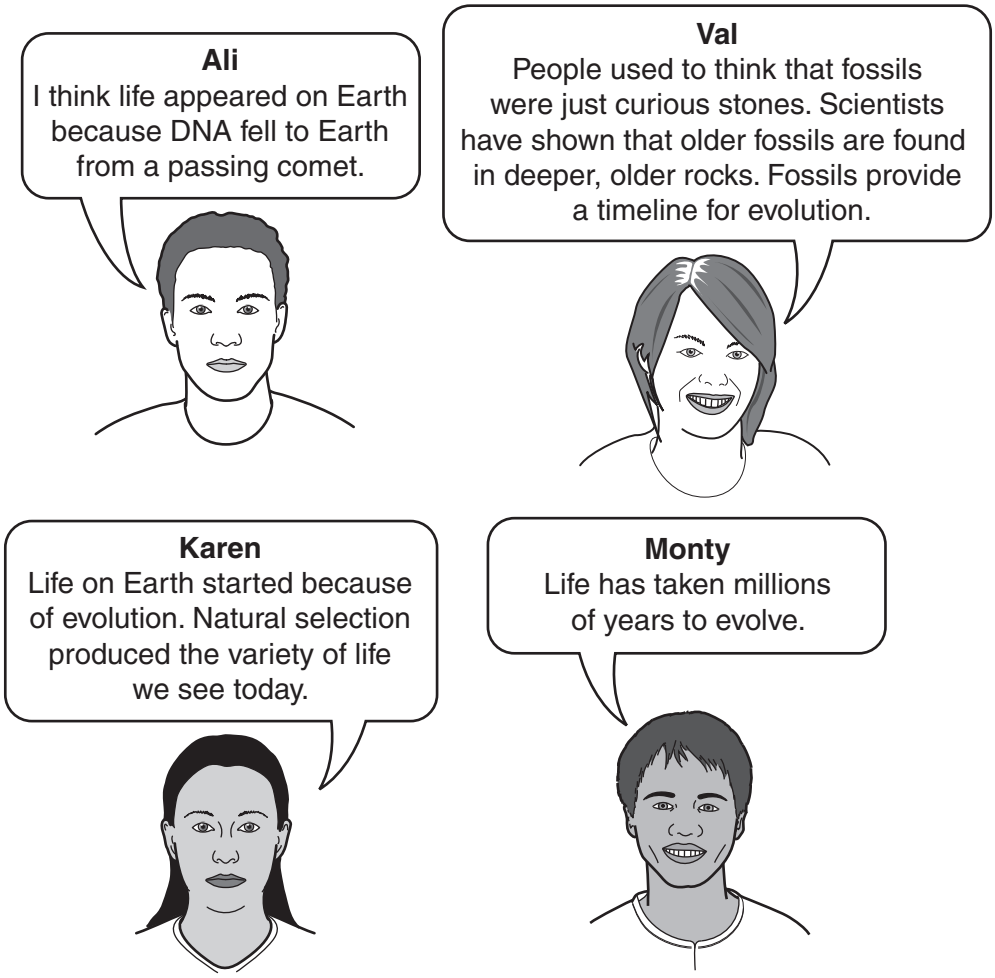
(b) Which of these factors could cause a species to become extinct?

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

the introduction of a new predator species into the environment	☐
the seasons of the year	☐
a long period of time	☐
climate change	☐
another species in the food web dies out	☐
a hunting ban	☐
an increase in the number of offspring the species produces	☐

[2]

(c) Four people discuss evolution and the origin of life on Earth.



(i) Which person, **Ali**, **Val**, **Karen** or **Monty**, is providing an explanation that links things that were previously thought to be unrelated?

answer ..... **[1]**

(ii) Which person, **Ali**, **Val**, **Karen** or **Monty**, is using imagination and creativity in the development of an explanation?

answer ..... **[1]**

[Total: 7]

END OF QUESTION PAPER

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