

**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)

**Friday 21 May 2010
Morning**

Duration: 40 minutes



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

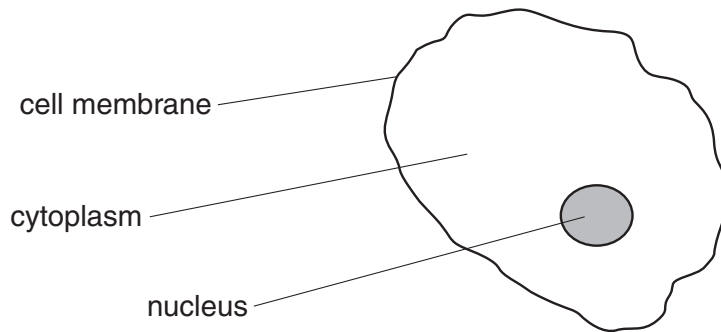
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- 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).

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 Look at the diagram of a cell.



(a) Where are genes found in the cell?

Choose your answer from the labels on the diagram.

answer [1]

(b) What is the job of genes?

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

- to store glucose from digestion
- to describe how to make proteins
- to release energy by respiration
- to transport materials around the cell

[1]

(c) Which statement best describes the structure of genes?

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

Genes are sections of ...

- ... very long DNA molecules that make up chromosomes.
- ... very short DNA molecules that make up chromosomes.
- ... very short chromosomes that make up DNA molecules.
- ... very long chromosomes that make up DNA molecules.

[1]

[Total: 3]

2 Human **body** cells have 46 chromosomes.

Chromosomes can replicate themselves.

(a) How many chromosomes are found in each human **sex** cell?

Put a **ring** around the correct answer.

1 2 23 46 92

[1]

(b) Mary has cystic fibrosis.

Where did Mary get her alleles for cystic fibrosis from?

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

both from her mother

both from her father

neither from her mother nor her father

one from her mother and one from her father

[1]

(c) Neither Mary's mother nor father has cystic fibrosis.

Which statement is the best explanation for this?

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

Cystic fibrosis is caused by ...

... one dominant allele.

... two dominant alleles.

... one recessive allele.

... two recessive alleles.


... one dominant and one recessive allele.


[1]

[Total: 3]

3 Genetic testing can be used to find the chances of a person developing certain conditions in the future.

Read these two people's views about this kind of genetic testing.

Amrit – an employee

I want to have a genetic test to see if I am at risk of getting cancer. Then I can make sure that my family will be prepared if anything happens to me. However, my employer wants to know the results of my tests. I do not want to tell him. If I am at risk of cancer he may sack me and I would lose my job and all my income.

Raj – an employer

I am pleased that Amrit wants to have the genetic test. But I think I have the right to know the result of the test. After all, if he is ill I will have to pay sickness pay and I may have to employ someone else to do his job. That is going to cost me a lot of money that my business cannot afford.

Summarise why Amrit and Raj have different views about the use of the genetic test results.

.....

.....

.....

..... [3]

[Total: 3]

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Question 4 starts on page 6

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4 Our body is sometimes invaded by microorganisms.

(a) White blood cells can destroy invading microorganisms.

Some of the statements about white blood cells are true. Some are not.

Put ticks (✓) in the boxes next to the **three** statements that are true.

White blood cells destroy microorganisms by ...

- | | |
|-----------------------------------|--------------------------|
| ... using high frequency sound. | <input type="checkbox"/> |
| ... engulfing them. | <input type="checkbox"/> |
| ... drowning them. | <input type="checkbox"/> |
| ... digesting them. | <input type="checkbox"/> |
| ... making antibodies. | <input type="checkbox"/> |
| ... using an electrical impulse. | <input type="checkbox"/> |
| ... making antigens. | <input type="checkbox"/> |
| ... using high speed collisions. | <input type="checkbox"/> |
| ... injecting them with hormones. | <input type="checkbox"/> |

[2]

(b) Microorganisms can grow in the human body.

Which conditions inside the body help microorganisms to reproduce rapidly?

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

- | | |
|----------------------------|--------------------------|
| presence of nitrogen gas | <input type="checkbox"/> |
| acidic | <input type="checkbox"/> |
| cold | <input type="checkbox"/> |
| wet | <input type="checkbox"/> |
| presence of food | <input type="checkbox"/> |
| dry | <input type="checkbox"/> |
| warm | <input type="checkbox"/> |
| presence of carbon dioxide | <input type="checkbox"/> |

[3]

(c) Our bodies have natural barriers to prevent microorganisms from entering our blood.

One natural barrier is the skin, which is a physical barrier.

Write down **three** other examples of these natural barriers and describe how they work.

.....

.....

.....

..... [3]

[Total: 8]

5 Steve is concerned about his heart. He wants to stay healthy.

(a) He makes a list of activities that could affect his health.

Put ticks (✓) in the boxes next to the **two** activities Steve should continue to do.

smoke cigarettes

exercise regularly

drink a lot of alcohol

have a poor diet

reduce his stress level

[2]

(b) Fatty deposits could build up in Steve's blood vessels. This could produce a heart attack.

Read the sentences.

Put a **ring** around the correct choice in each sentence.

Blood is supplied to Steve's heart muscle cells through the coronary **artery** / **vein**.

Fat deposits in the blood vessels **increase** / **decrease** the blood supply to Steve's heart.

This means the muscle cells in Steve's heart get less **oxygen** / **carbon dioxide**.

This can cause cells in Steve's **lungs** / **heart** to die.

[2]

(c) Steve wants to know if any other factors are a major cause of heart disease.

He makes a list of factors that he thinks might affect his chances of developing heart disease.

- A** I get lots of colds.
- B** I enjoy playing football.
- C** My father and grandfather both had heart attacks in their early forties.
- D** I only get about six hours sleep most nights.

Which of these are high risk or low risk factors in causing heart disease?

Write the letters **A**, **B**, **C** and **D** in the correct columns.

high risk	low risk

[2]

[Total: 6]

6 Eating a diet containing a lot of fatty food can increase the risk of getting heart disease.

Different people have different views about this.

Jane
I read on the internet that eating fatty foods for 20 years will cause heart disease. But I believe scientists who say it will just increase my risk of developing heart disease.



Ranjit
My grandad ate fatty food all his life. He lived until he was 83 and died of influenza. It's a good job scientists examine lots of data before they conclude that a high fat diet increases the risk of heart disease.



Peter
We only know that fatty foods can cause heart disease because lots of different scientists have collected data. If the tests had not been repeated they would not have been reliable.



Stella
I am a food scientist. My findings are always checked by other scientists before they are published.



To answer these questions you may use each person once, more than once, or not at all.

(a) Which person says that the absence of replication is a reason for questioning a scientific claim?

answer [1]

(b) Which person is suggesting that individual cases do not provide convincing evidence for or against a **correlation**?

answer [1]

(c) Which person is describing the process of peer review?

answer [1]

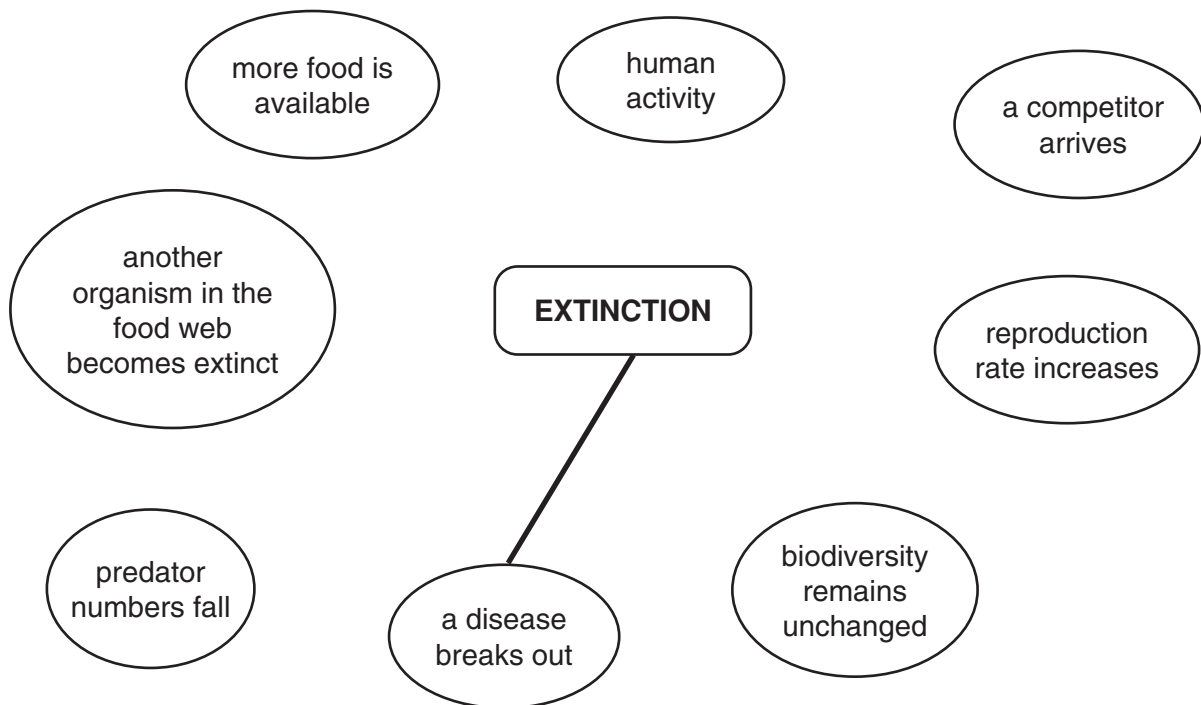
(d) Which **two** people are suggesting that factors might increase the chance of an outcome but not always lead to it?

answer and [1]

[Total: 4]

7 Wendy is revising for her exams.

She produces a mind map to help her revise about extinction.



Draw lines to connect the **four circles** containing correct reasons why extinction may happen, to the **EXTINCTION** box.

One of the four lines has been done for you.

[2]

[Total: 2]

8 Scientists have gathered evidence to show that life on Earth evolved.

(a) Which statements provide evidence for evolution?

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

- ancient manuscripts like the Dead Sea Scrolls
- stories passed down from one generation to the next
- the fossil record
- looking at how life evolved on other planets
- similarities and differences in DNA
- using the internet to research our ancestry

[2]

(b) Read the sentences about evolution.

Put a **ring** around the correct choice in each sentence.

Evolution has happened over millions of years.

The first living things developed from molecules that **could** / **could not** copy themselves.

Most scientists think that evolution happens by **natural** / **unnatural** selection. [1]

(c) Many scientists think that the Earth may warm up in the future.

This is called climate change.

Suggest and **explain** how climate change could have an effect on evolution.

.....

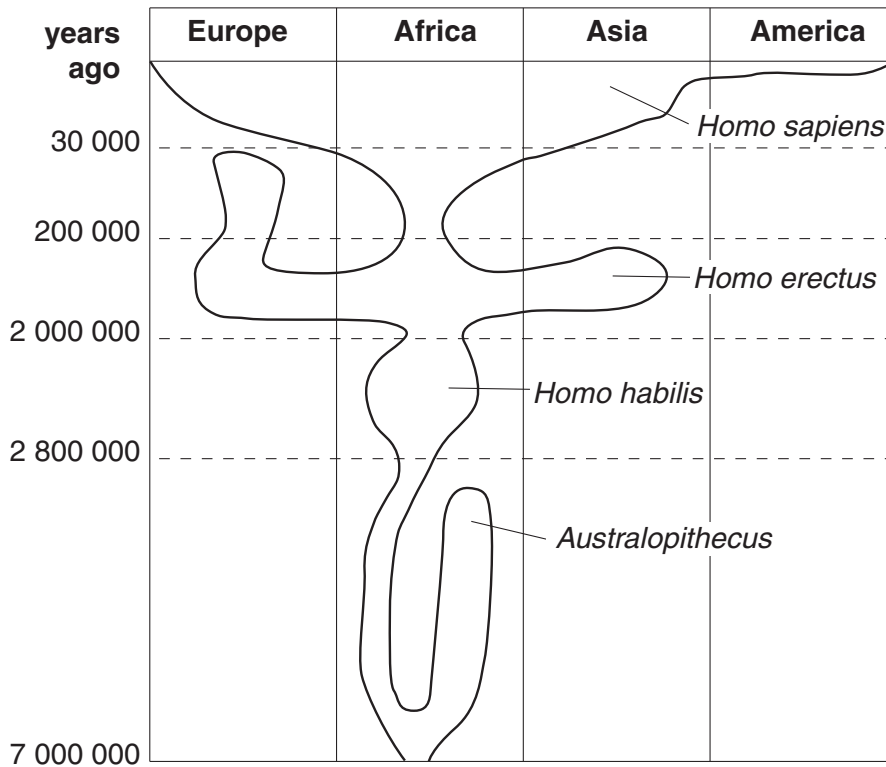
.....

.....

..... [2]

[Total: 5]

9 The chart shows the evolution of humans (*Homo sapiens*) over the last 7 million years.



(a) Neanderthals are another extinct relative of humans.

They did not evolve into *Homo sapiens*.

Neanderthals became extinct just over 30 000 years ago.

Shade in the part of the chart that represents the Neanderthals.

[1]

(b) Use the chart to answer the questions.

(i) Which of these statements is true?

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

All the species named on the chart evolved from a common ancestor.

Only one of the species evolved from a common ancestor.

Australopithecus evolved from *Homo habilis*.

None of the species evolved from a common ancestor.

Homo erectus was mainly found in America.

[1]

(ii) Which process is shown by the chart?

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

The chart shows ...

... central evolution.

... convergent evolution.

... divergent evolution.

... negative evolution.

[1]

(iii) Name one species shown on the chart that is not yet extinct.

answer [1]

(c) Explain how changes to the brain influenced human evolution.

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

(d) Ideas about evolution have changed with time.

Darwin produced data to back up his theory of evolution by natural selection.

This data conflicted with the old explanations that many scientists believed.

Even so, scientists were still reluctant to give up these old explanations.

Suggest **two** reasons why scientists involved in a scientific issue may disagree.

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

[Total: 8]

END OF QUESTION PAPER

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