OCR
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
BIOLOGY A
Unit 1 Modules B1 B2 B3
FOUNDATION TIER
WEDNESDAY 20 JUNE 2007

F **A221/01**

Morning
Time: 40 minutes

Calculators may be used.
Additional materials: Pencil
                         Ruler (cm/mm)

Candidate Name

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
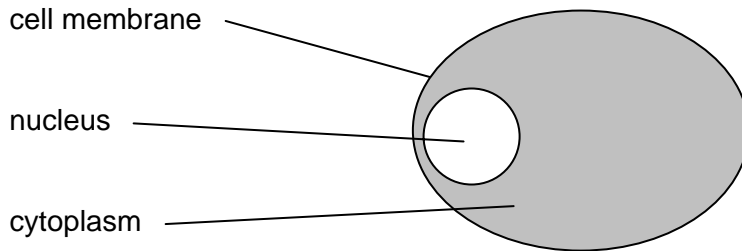
FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	9	
2	6	
3	6	
4	5	
5	8	
6	4	
7	4	
TOTAL	42	

This document consists of **16** printed pages and **4** blank pages.

Answer **all** the questions.

1   Look at this diagram of an animal cell.

Three parts are labelled.

cell membrane

nucleus

cytoplasm

(a)   Which part contains the genetic information?

answer .... [1]

(b)   Complete these sentences that describe how genetic information is stored.

Choose words from this list.
Words should only be used **once**.

alleles   chromosomes   DNA   dominant   fats   proteins
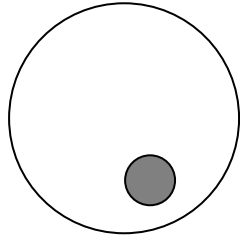
Genes are parts of very long molecules of .... [1]

The two different versions of a gene are called .... [1]

Groups of genes make up .... [1]

Genes are instructions to make .... [1]

(c) Look at these diagrams of sex cells.

egg cell   sperm cell

(i) What do sex cells contain?

Put a tick (✔) in the correct box.

no chromosomes   ☐

one chromosome from each pair   ☐

three chromosomes from each pair   ☐

[1]

(ii) A child has similar characteristics to its parents.

Look at these possible explanations.

Put ticks (✔) in the boxes next to the **three** correct explanations.

The sperm and egg **nuclei** carry characteristics from the parents.

The sperm and egg **cytoplasm** carry characteristics from the parents.

In a fertilized egg, the genetic information **is** combined.

In a fertilized egg, the genetic information is **not** combined.

The genetic information in the child comes from the egg **and** the sperm.

The genetic information in the child comes **only** from the sperm.

[3]

[Total: 9]

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Question 2 starts on page 6

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[Turn over

2 Cystic fibrosis is an inherited disorder.

It can affect the respiratory system and the digestive system.

(a) Put ticks (✓) in the **two** boxes that show the symptoms of cystic fibrosis.

food is not digested properly

low body temperature

headache

frequent chest infections

nose bleeds

[2]

(b) A child is born with cystic fibrosis.

The allele for cystic fibrosis is recessive.

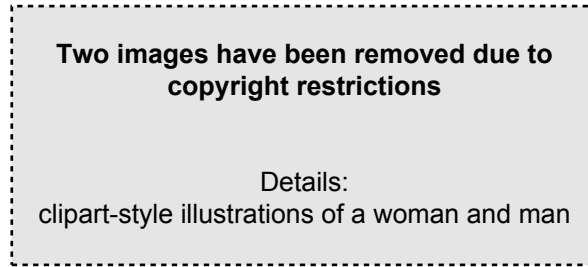How has the child inherited it?

Put a ring around the correct answer.

from the mother

from the father

from both parents

[1]

(c) Samantha and Jamal are married.
They have a son who has cystic fibrosis.
They want to have another child.

> **Two images have been removed due to copyright restrictions**
>
> Details:
> clipart-style illustrations of a woman and man

There is a 25% chance that the child will have the disorder.

(i) Complete the genetic diagram below to show this.

Jamal

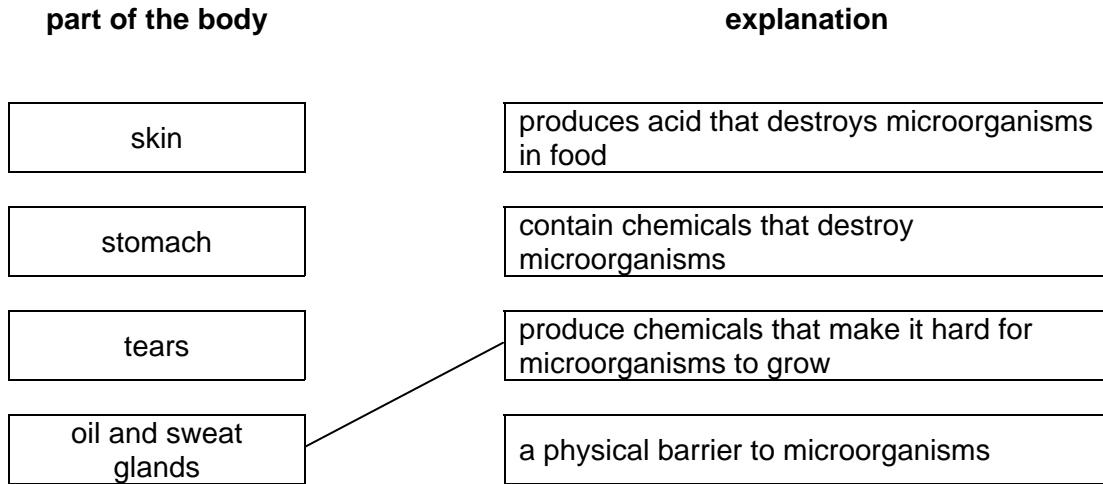|	Jamal: Ff

Key		
F	=	normal allele
f	=	cystic fibrosis allele

Samantha

Samantha: Ff

	F	
F		
	Ff	

[2]
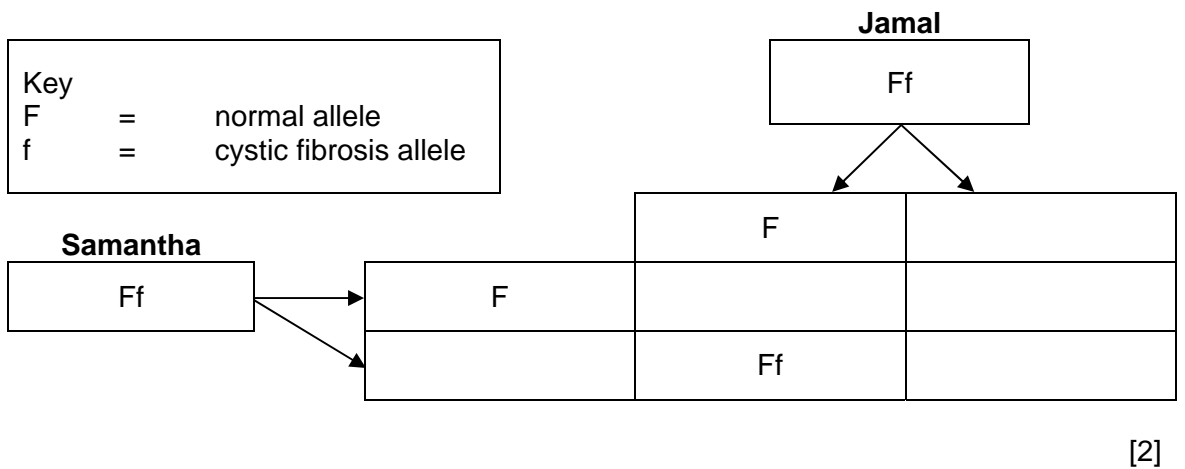
(ii) Put a (ring) around the combination that will produce cystic fibrosis. [1]

[Total: 6]

[Turn over

3 Our bodies have defences to keep infections out.

(a) Draw a straight line from each **part of the body** to the correct **explanation** to show how these defences work.

One has been done for you.

part of the body   **explanation**

| skin | produces acid that destroys microorganisms in food |

| stomach | contain chemicals that destroy microorganisms |

| tears | produce chemicals that make it hard for microorganisms to grow |

| oil and sweat glands | a physical barrier to microorganisms |

[2]

(b) There are **two** main ways that cells destroy microorganisms.

Choose the correct words to complete the sentences.

antibodies   antibiotics   digest   pathogens   filter   reproduce

Some cells engulf and ………………………… microorganisms.

Other cells produce ………………………… to destroy microorganisms.   [2]

(c) Miriam is a young mother. She has a three month old daughter called Natasha. Miriam takes Natasha to have a vaccination.

> **An image has been removed due to copyright restrictions**
>
> Details:
> a clipart-style illustration of a baby receiving a vaccination

The sentences below describe how vaccination works against a disease-causing microorganism.

They are in the wrong order.

A   The immune system destroys the safe microorganism in the vaccine.

B   A safe form of the microorganism is injected into the body.

C   The disease-causing microorganism cannot now make you ill.

D   The immune system remembers how to destroy the microorganism.

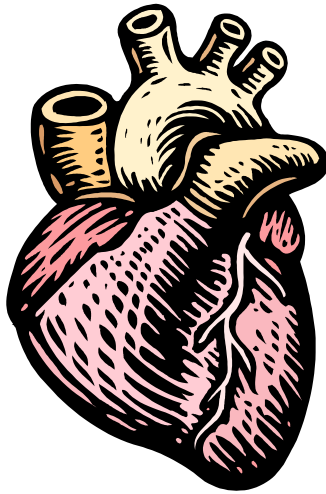Write the letters **A**, **B**, **C** or **D** in the boxes to show the correct order.

The first one has been done for you.

| **B** | | | |

[2]

[Total: 6]

[Turn over

4 David has high levels of cholesterol in his blood.
The doctor warns him that he could develop coronary heart disease (CHD).

(a) Which of the following should David do to reduce his risk of developing CHD?

Put ticks (✔) in the boxes next to the **three** best answers.

rest as much as possible

eat plenty of carbohydrates

eat a diet low in salt

eat plenty of meat and dairy products

have a regular exercise programme

stop smoking

[3]

(b) David has been asked to take part in a clinical trial of a new drug.
Doctors hope it will reduce cholesterol levels in blood.

Why must new drugs be tested in humans before they are approved for use?

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

The drugs must not be too expensive.

The drugs must not have any side effects.

The drugs must not have serious side effects.

The drugs must be effective against the disease.

The drugs must be in a form that is easy for people to take.

The manufacturer must be able to make a lot of the drug.

[2]

[Total: 5]

[Turn over

5 Read the following article.

> # SCIENTISTS FIND NEW SPECIES OF 'HOBBIT' HUMANS.
>
> The remains of a human have been discovered on an Indonesian island. The skeleton was only 1 metre tall and is 18 000 years old.
>
> The pelvis showed that the skeleton was a woman. Her teeth were worn and her skull bones fused together suggesting an adult of around 30 years old.
>
> Nearby were found remains of stone tools, charred wood and roasted animals. These suggest that the woman was intelligent, cooked food and might even have built rafts and used language.
>
> The little humans may be descendants of a *Homo erectus* population that became isolated.
>
> 'Various factors such as isolation, poor resources and few predators have led to a small body size by natural selection', said one leading scientist.

(a) The table contains some statements from the article.

Which are examples of data? Which are possible explanations? Which are neither?

Tick (✓) the correct box for each statement.

statement	data	explanation	neither
'The skeleton was only 1 metre tall'			
'her skull bones were fused together'			
'Various factors such as isolation, poor resources and few predators have led to a small body size by natural selection'			
'These suggest that the woman was intelligent and cooked her food.'			
'The little humans may be descendants of a *Homo erectus* population'			

[5]

(b) **(i)** The scientist believed the small size was due to natural selection.

Which of the following factors could have led to the evolution of small size?

Put a tick (✓) in the box next to the most likely factor.

limited food on the island ☐

living in caves ☐

eating small mammals ☐

[1]

(ii) Which of the following characteristics could be inherited by the 'Hobbits'?
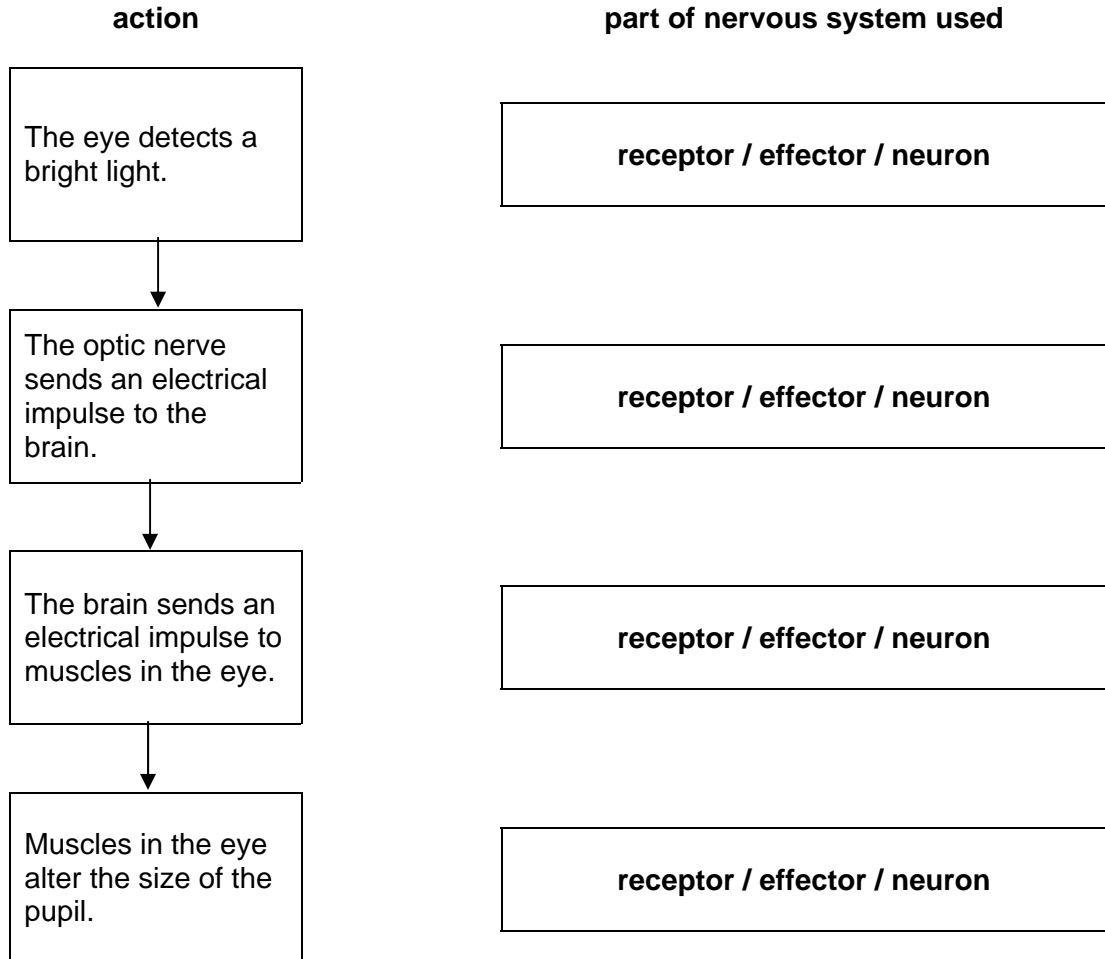
Underline each of the **two** correct answers.

A small brain size

B how to use stone tools

C small body size

D how to build a raft

E how to cook

[2]

[Total: 8]

[Turn over

6 Our nervous system allows us to respond to stimuli.
It does this using **receptors**, **effectors** and **neurons**.

Put a (ring) around the correct part of the nervous system used in each action.

action	**part of nervous system used**

The eye detects a bright light.

receptor / effector / neuron

The optic nerve sends an electrical impulse to the brain.

receptor / effector / neuron

The brain sends an electrical impulse to muscles in the eye.

receptor / effector / neuron

Muscles in the eye alter the size of the pupil.

receptor / effector / neuron

[4]

[Total: 4]

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Question 7 starts on page 16

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7 Before 1977, otters were in danger of becoming extinct.

The table below shows numbers of otters from 1978 to 1993.

National Otter Surveys: 1978, 1985 and 1993

country	number of places surveyed	number of places where otters were found		
		1978	1985	1993
England	2940	170	284	687
Wales	1008	207	393	529
Scotland	2650	1511	1717	2211
Great Britain total	**6598**	**1888**	**2394**	**3427**

Source: *Former NCC and Vincent Wildlife Trust National Otter Surveys, Environment Agency*

(a) **(i)** How has the number of places where otters were found changed between 1978 and 1993?

Put a ring around the correct answer.

decreased   **increased**   **stayed the same**

[1]

(ii) In 1985, which country had the fewest places where otters were found?

Put a ring around the correct answer.

England   **Scotland**   **Wales**

[1]

(b) Otters are no longer in danger of becoming extinct.

Put ticks (✔) in the boxes next to the **two most important** reasons to protect animal species.

They will affect the numbers of other animals and plants in the habitat. ☐

They release oxygen into the air. ☐

They may provide us with valuable resources in the future. ☐

They eat the food that humans want to use for themselves. ☐

[2]

[Total: 4]

END OF QUESTION PAPER

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