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)

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 14 January 2010
Morning

Duration: 40 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

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, however additional paper may be used if necessary.

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 Mary and Steve are sister and brother.

The have both inherited sex chromosomes from their parents.

(a) Complete the labelling of Mary's and Steve's chromosomes. **[1]**

X .....
Mary's chromosomes

X .....
Steve's chromosomes

(b) Which of Steve's sex chromosomes did he inherit from his mother?

Put a (ring) around the correct answer.

X **Y** **both** **neither**

[1]

(c) Steve has an identical twin brother called Dave.

Steve and Dave do not look completely like each other.

Explain why.

.....

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

[Total: 3]

2 A science class has students of many different heights.

Which two factors **best** explain why?

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

The students are all in the same age group.	☐
Height is controlled by several different genes.	☐
Height is affected by environmental factors such as lifestyle.	☐
Height is affected by the number of children in the class.	☐
All children grow at the same rate.	☐
The students are all the same sex.	☐

[2]

[Total: 2]

3 Fetuses can be tested to see if they have the alleles that cause genetic disorders.

(a) Which two decisions may parents have to make after the results of a genetic test on the fetus?

Put ticks (✓) in the boxes next to the **two** most important decisions.

They may have to decide whether or not to …

… have a vaccination. ☐

… have the pregnancy terminated. ☐

… name the baby after a grandparent. ☐

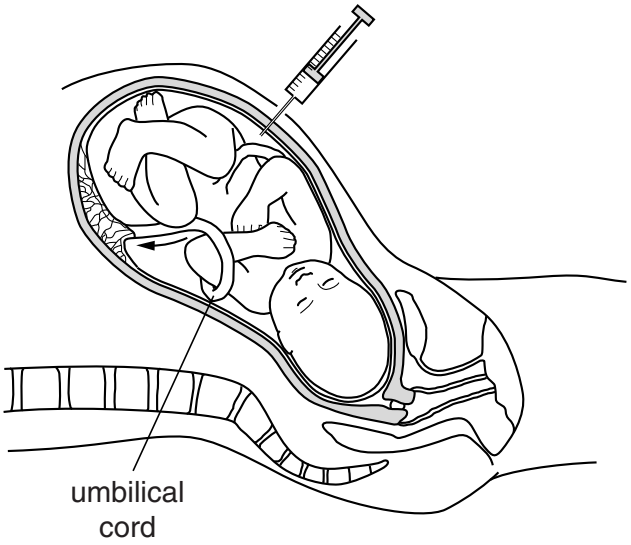
… have an anaesthetic during the baby's birth. ☐

… have any more children. ☐

… tell the grandparents the sex of the fetus before it is born. ☐

[2]

(b) Fetuses are tested by removing a sample of amniotic fluid.



The fluid contains cells from the fetus that can then be tested.

There is a 1% risk that doing the test could result in the mother having a miscarriage.

Using this information, explain clearly **three** things that the parents need to think about **before** they decide whether to have the test.

.....

.....

.....

.....

..... **[3]**

[Total: 5]

4 This question is about producing clones.

(a) Animal clones can be produced artificially.

A nucleus from the body cell of a donor can be put into an egg cell.

Which of these statements about this type of cloning process are true?

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

The clone is genetically different to the donor.	☐
The clone has two nuclei in each cell.	☐
A new nucleus is placed in an empty egg cell.	☐
A nucleus is removed from an adult body cell.	☐
A nucleus is removed from an egg cell.	☐

[2]

(b) Stem cells can also be used to produce clones.

Which of these statements are true?

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

Embryos can be used to make stem cells.	☐
Each clone cell has different DNA.	☐
Half the clone cells are male, the other half are female.	☐
The clone cells never become highly specialised.	☐
The stem cells may be used to treat some diseases.	☐

[2]

[Total: 4]

5 The human body has natural barriers to reduce the risk of harmful microorganisms entering the body.

(a) Complete this table.

Put ticks (✓) in the correct boxes.

	type of barrier to microorganisms		
	chemical only	**physical only**	**both physical and chemical**
skin with sweat glands			
stomach acid			
tears			

[3]

(b) When a person has had a disease they are unlikely to get it again.

Which statements, when taken together, explain why?

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

Antibodies are made by our bodies to destroy microorganisms. ☐

Cells in the body can still make antigens to destroy the microorganism's antibodies. ☐

Red blood cells retain the memory of the invading microorganism. ☐

Once made, antibodies can be made again very quickly by our bodies. ☐

Antibiotics from the first infection remain in our blood stream. ☐

The brain unconsciously remembers how to fight the infection. ☐

[2]

[Total: 5]

6 Some diseases can be prevented by vaccination.

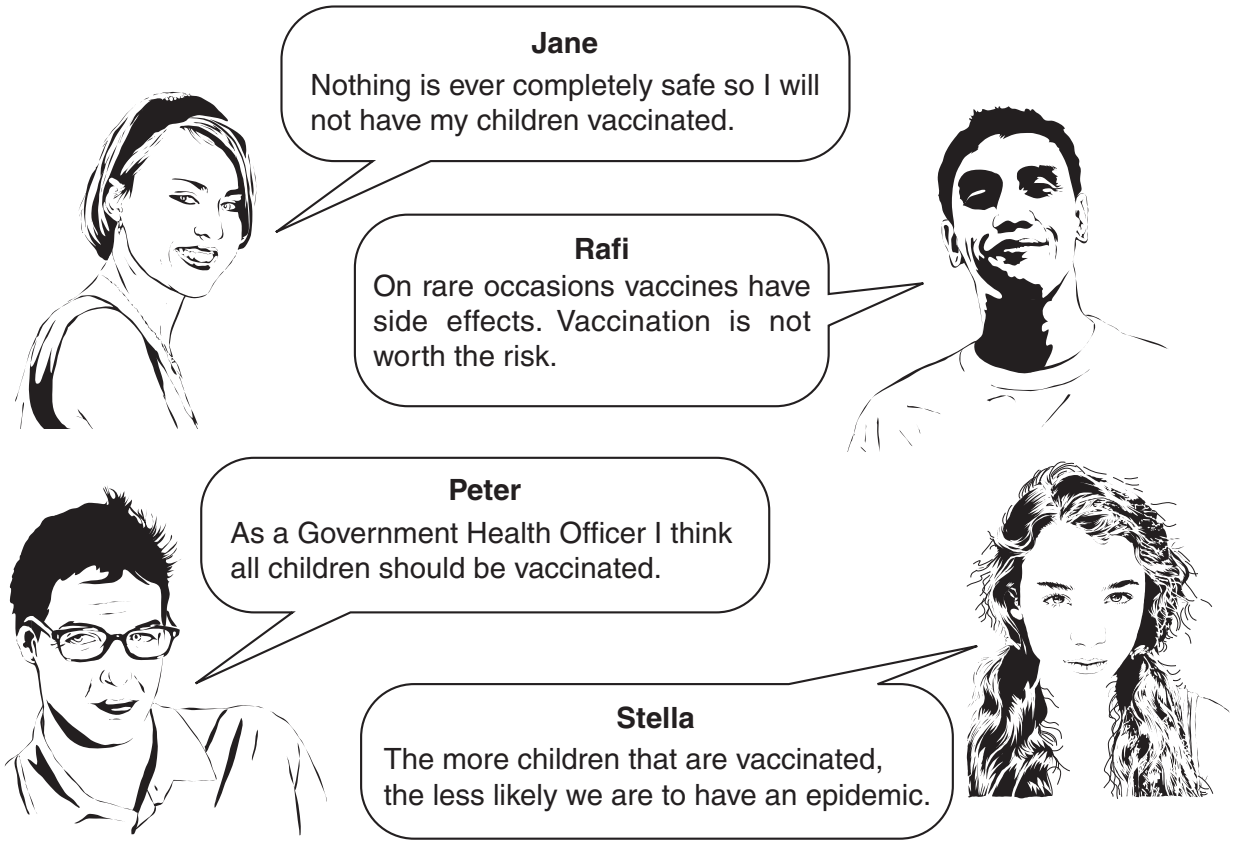
(a) Complete the sentence about vaccines.

Choose the best words from this list.

a different **an infectious** **a large** **a safe** **a toxic**

Vaccines are usually made from ..... form of the disease-causing microorganism. **[1]**

(b) People argue about vaccination.



(i) Which person is using a correlation in their argument?

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

(ii) Summarise in not more than 15 words both sides of the argument about vaccination.

.....

.....

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

[Total: 3]

7 Trials are carried out to test new drugs.

Drugs can be tested using **blind**, **double-blind**, or **non-blind** trials.

Complete the table to show which type of trial is being used in each example.

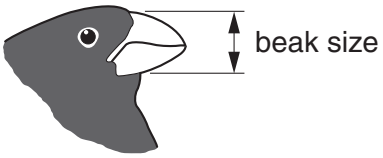
Put ticks (✓) in the correct boxes.

	blind	**double-blind**	**non-blind**
The patient does not know if they are taking the drug or a placebo but the doctor does.			
Both the patient and the doctor know if the patient is taking the drug.			
Neither the patient nor the doctor know if they are taking the drug or a placebo.			

[2]

[Total: 2]

8 The graphs show data collected from one of the Galapagos Islands about the size of finch beaks measured vertically.



The graphs show the numbers of finches with different beak sizes before and after 1977.

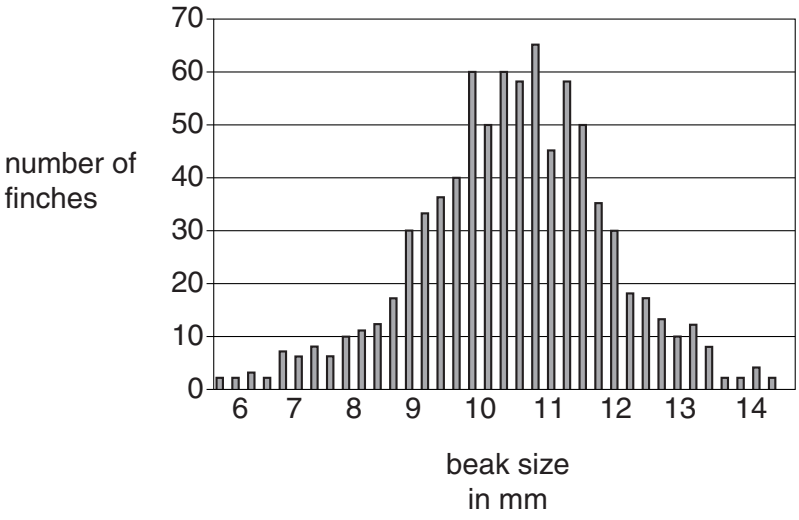
Finches feed on seeds. In 1977 there was a severe drought.

The vegetation died and the small seeds were soon eaten.

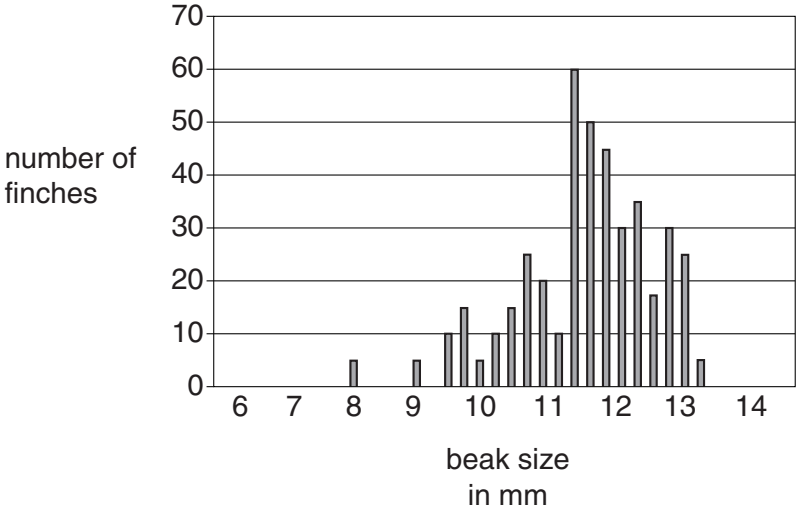
Only larger, tougher seeds that the birds usually ignore were left.

Look at the graphs.

before 1977



after 1977



(a) Describe two effects on finches shown by the graphs.

1 .....

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

(b) Darwin described this effect as “evolution in action”.

He used a theory to explain how evolution occurs.

What is the name of his theory?

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

(c) Breaking open large, tough seeds needs a bigger beak.

Suggest why finches with a large beak size of 14 mm or more were **not** found on the island after 1977.

.....

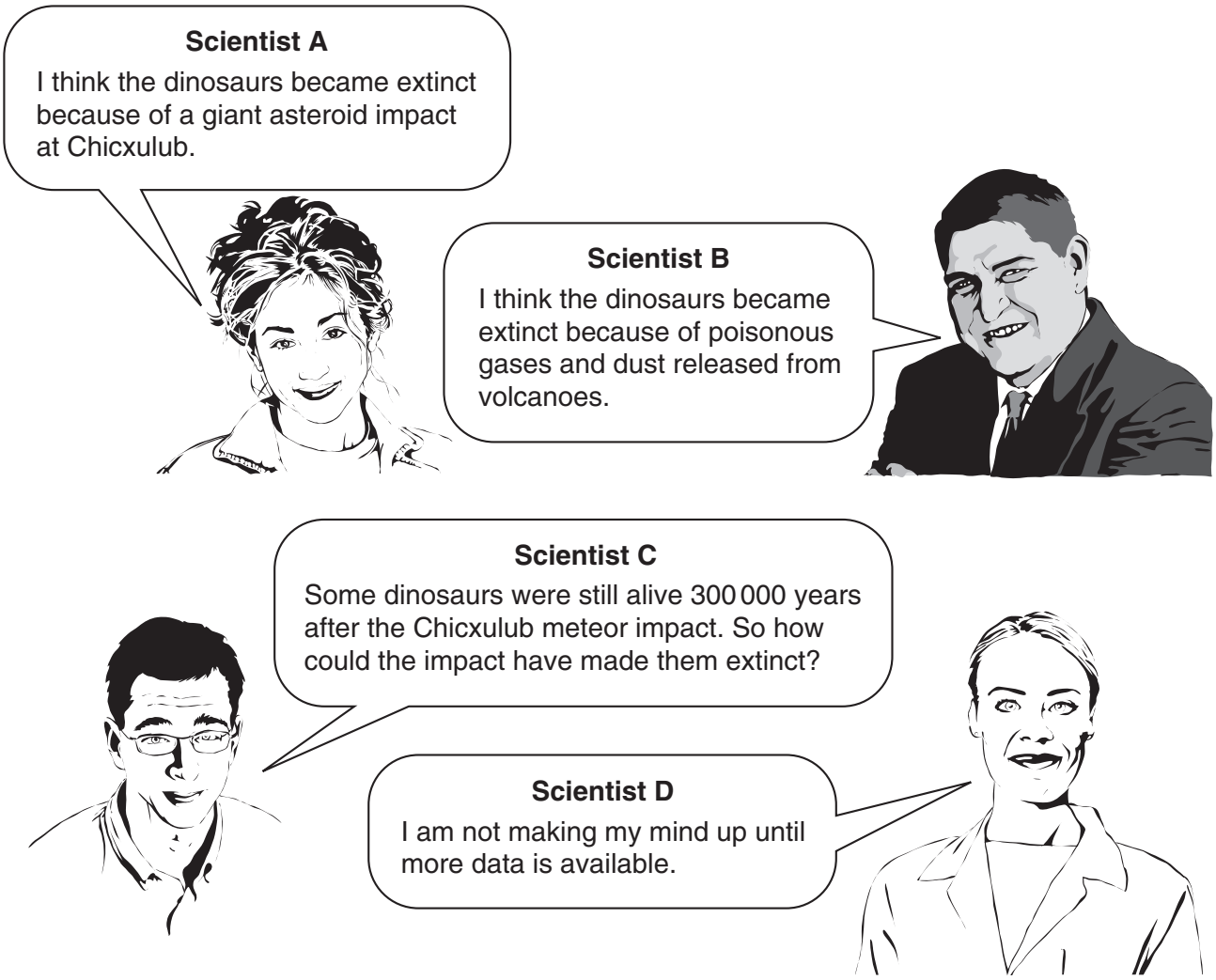
.....

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

[Total: 5]

9 Scientists sometimes have different views.

Read the views of the different scientists discussing how the dinosaurs became extinct.



(a) Which **two** scientists are providing an explanation?

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

(b) Suggest **two** reasons why Scientist A is reluctant to change her opinion, even when data appears to conflict with it.

.....

.....

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

[Total: 3]

10 One way the human body is coordinated is by the nervous system.

(a) Which of these statements about the nervous system are true?

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

The nervous system uses …

… effectors that detect stimuli. ☐

… short-lived electrical impulses. ☐

… receptors to link nerve cells with effectors. ☐

… effectors to link receptors with nerve cells. ☐

… nerve cells to link receptors with effectors. ☐

… long-lived impulses. ☐

… slow electrical impulses. ☐

[2]

(b) The body is also coordinated by the hormonal system.

The hormonal system is **different** from the nervous system.

Write down **three** ways that the hormonal system is different.

1 .....

.....

2 .....

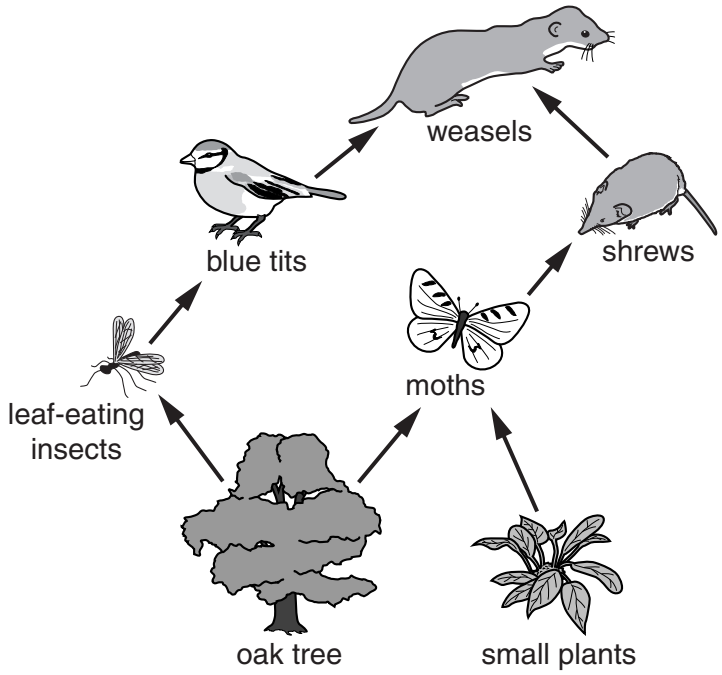
.....

3 .....

..... **[3]**

[Total: 5]

11 Look at the food web.



(a) Which **two** organisms are directly competing with each other for food in the web?

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

(b) A farmer sprays a pesticide and kills off most of the leaf-eating insects.

This could produce several changes in the food web.

Put ticks (✓) in the boxes to show the effect of each of the following changes on shrew numbers.

change to food web	produces increase in shrew numbers	produces decrease in shrew numbers	could produce increase or decrease in shrew numbers
blue tit numbers decrease			
more predators of shrews			
more food for moths			
more food for shrews			

[2]

(c) Which of these changes could cause one of the species to become extinct?

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

a rapid change in environmental conditions	☐
the introduction of a new competitor species	☐
the normal cycle of the seasons	☐
a different species in the food web becoming extinct	☐
the introduction of a disease-causing organism	☐
an increase in food supply	☐

[2]

[Total: 5]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE