

**H****A221/02**

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
BIOLOGY A

Unit 1 Modules B1 B2 B3 (Higher Tier)

TUESDAY 15 JANUARY 2008

Afternoon
 Time: 40 minutes

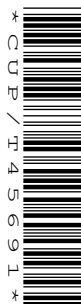
Candidates answer on the question paper.

Additional materials (enclosed):

None

Calculators may be used.

Additional materials: Pencil
 Ruler (cm/mm)



Candidate
Forename

Candidate
Surname

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 42.

FOR EXAMINER'S USE

Qu.	Max.	Mark
1	10	
2	4	
3	9	
4	5	
5	9	
6	5	
TOTAL	42	

This document consists of **12** printed pages.

Answer **all** the questions.

- 1 Saleema has a three month old daughter called Nadia.

Nadia is due for a vaccination to protect her from certain diseases.

Saleema is worried that there may be side effects.

She asks some of her friends what they think.



- (a) (i) Which friend can see a benefit to **Nadia** in having the vaccination?

answer [1]

- (ii) Which **two** friends can see a benefit for **society** if Nadia has the vaccination?

answer and [2]

3

(b) Mary says that not all scientists agree that there is a risk.

What reasons might these scientists have for coming to different conclusions?

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

All scientists share data with each other.

☐

Different studies produce different results.

☐

Not enough evidence may have been collected.

☐

Scientists like to argue with each other.

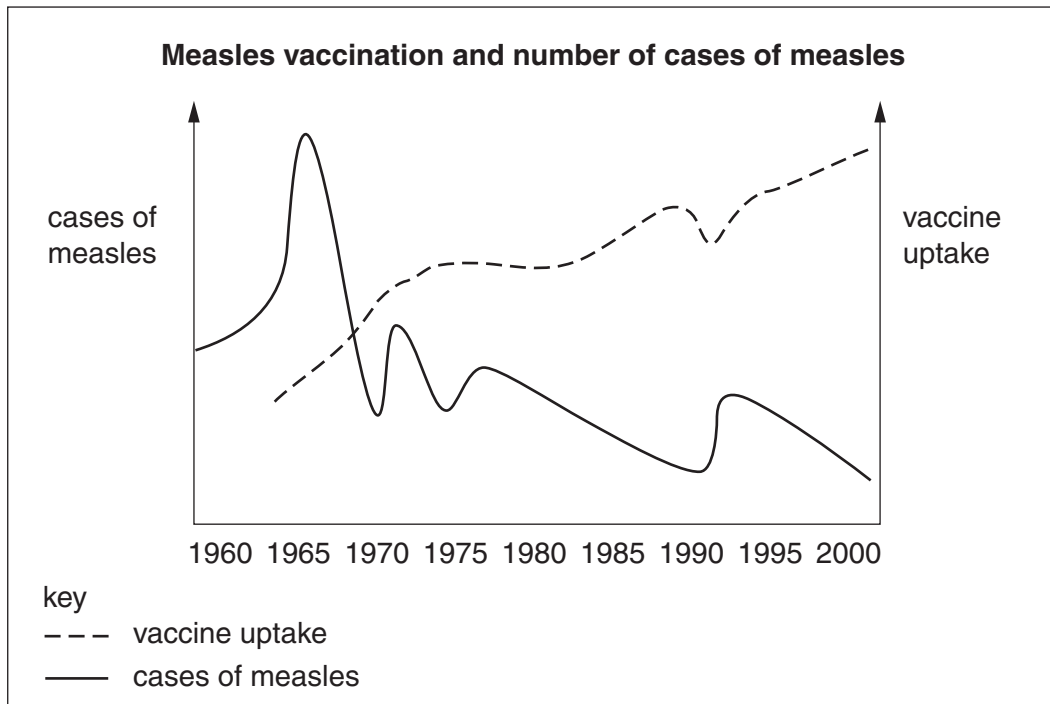
☐

[2]

4

(c) Saleema tells her doctor she is worried.

He shows her this information.



Use the information to answer these questions.

(i) What general trends are shown?

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

There is a positive correlation between vaccine uptake and the number of cases of measles.

☐

As vaccine uptake increases, the number of cases of measles falls.

☐

There is a negative correlation between vaccine uptake and the number of cases of measles.

☐

There is no correlation between vaccine uptake and the number of cases of measles.

☐

As vaccine uptake falls, the number of cases of measles falls.

☐

[2]

5

- (ii) In 1994, there was an increase in the number of cases of measles.

Use the graph to suggest a reason why.

Put a tick (✓) in the correct box.

More children became susceptible to measles.

☐

The measles virus became more infectious.

☐

Fewer children were vaccinated.

☐

[1]

- (d) Look at these statements. Some support vaccination, and some do not.

- A** There is a 1:500 risk of death from measles. There is a 1:5000 risk of serious side effects from the vaccination.
- B** There is a 1:20 risk of deafness from measles. There is a 1:20 risk of temporary soreness at the injection site.
- C** Epidemics can start if a high percentage of the population is vaccinated.
- D** It is impossible to eliminate all side effects from vaccination.
- E** There is a 1:100 risk of increased temperature from vaccination. There is a 1:20 risk of a swelling appearing at the injection site.

Which **two** statements support vaccination?

answer and [2]

[Total: 10]

6

- 2 Alex works for a pharmaceutical company trying to make new antibiotics.

Antibiotics are used to treat infections caused by some microorganisms.

- (a) Why do scientists need to find new types of antibiotics?

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

Antibiotics can be killed.

☐

Not all microorganisms can be controlled with antibiotics.

☐

Microorganisms can become resistant to antibiotics.

☐

[1]

- (b) The statements **A**, **B**, **C**, **D** and **E** explain how bacteria become resistant to an antibiotic.

They are in the wrong order.

A The bacteria without the mutation are killed by the antibiotic.

B Most of the bacteria are now resistant to the antibiotic.

C Next time the same antibiotic is used, the bacteria are not affected.

D The resistant bacteria have reduced competition for resources and multiply rapidly.

E A mutation in a gene makes some bacteria more resistant to the antibiotic.

Put the statements in the correct order by writing **A**, **B**, **C**, **D** or **E** in each box.

--	--	--	--	--

[3]

[Total: 4]

7

- 3 Theresa and Matthew have identical twin boys.

Identical twins are clones.

- (a) Put ticks (✓) in the boxes next to the statements that **best** describe clones.

Clones cannot be produced by natural means.

☐

Clones cannot be produced by asexual reproduction.

☐

Differences between clones are due to genetic factors.

☐

Differences between clones are due to environmental factors.

☐

Clones can be produced by transferring a nucleus from a cell into an empty egg cell.

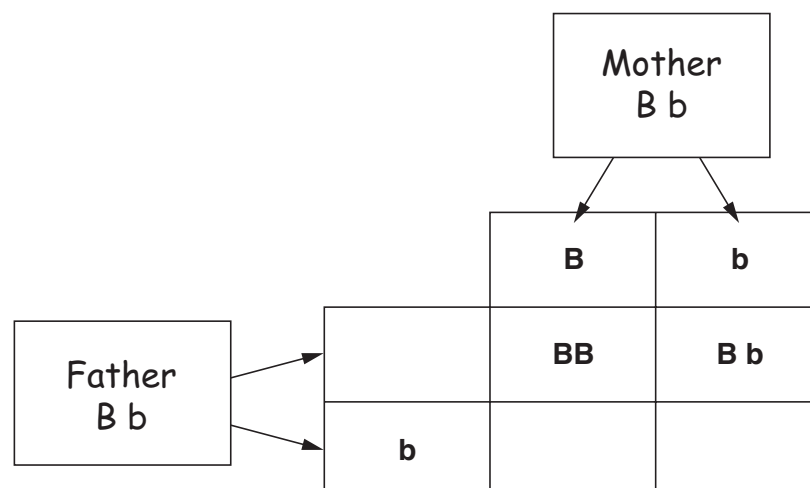
☐

[2]

- (b) The twins have an older brother called Steven. There are differences between him and the twins.

Steven has blue eyes. The twins and both of their parents have brown eyes.

- (i) Complete the genetic diagram below to show how Steven inherited blue eyes. **B** is the allele for brown eyes, and **b** is the allele for blue eyes.



[2]

- (ii) Put a ring around the combination that Steven inherited.

[1]

8

(c) Theresa and Matthew want another son.

(i) Which chromosome has the gene for producing a male child?

answer [1]

(ii) It is possible to select the sex of an embryo before it is implanted.

Some people think that embryo selection should not be done.

Sort the following statements into arguments **for** embryo selection and arguments **against** embryo selection.

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

statement	argument for	argument against
We can make a more balanced family by selecting the sex of a child.		
Embryo selection could result in an imbalance of males and females in the population.		
Scientists should not be allowed to play God.		
Embryo selection could reduce the number of children with genetic disorders.		
Many embryos would be discarded if embryo selection were allowed.		

[3]

[Total: 9]

- 4 Andrew's employer asks him to attend a health screening session.

The nurse doing the screening asks him if there are any inherited disorders in his family history and offers him a genetic test.

- (a) Andrew may **not** wish his employer to be given the results of this test.

Put ticks (✓) in the boxes next to the **two** most likely reasons why.

The test may give a false positive result for a disorder.

☐

His employer could provide him with counselling.

☐

His employer may not promote him.

☐

His job at work will be protected by the disability discrimination act.

☐

He does not want his doctor to be given the results of the test.

☐

[2]

- (b) Andrew's father and grandfather died of a form of cancer that can be inherited. This cancer is caused by a faulty gene. Andrew has not been tested for the faulty gene but does attend the hospital for regular check ups.

Andrew is trying to decide if he should have genetic screening for the faulty gene.

Put a ring around each of the letters **A**, **B**, **C**, **D** or **E** which **support** Andrew being screened for the faulty gene.

A If he does not have the gene then he will not need regular check ups.

B If he does have the gene then he may not be able to get life insurance.

C If he does not have the gene then he cannot pass it on to his children.

D If he does have the gene then he may become depressed.

E If he does have the gene then the cancer can be detected at an early stage.

[3]

[Total: 5]

5 Read this passage about a discovery made by a conservation group.

New rodent is 'living fossil'

1. A squirrel-like rodent discovered in Laos is the sole survivor of a group that otherwise died out 11 million years ago, according to fossil data.
2. The animal made headlines in 2005 when it was hailed as the only new family of living mammals to be found in 30 years.
3. But scientists now believe it is a 'living fossil', a relic of a group of prehistoric rodents once widespread in South East Asia and Japan.
4. They went back through the fossil evidence and found that the rodent's skull, teeth, lower jaw-bone and other skeletal characteristics looked the same as those in rodent fossils found in rocks thought to be 11 million years old.
5. Dr Dawson said efforts to conserve this animal should be given the highest priority.
6. 'We don't know what its status is – whether there are a lot of them around or just a few,' she said.

Extract from BBC News at <http://news.bbc.co.uk>, 09 March 2006

(a) Which three statements, **1**, **2**, **3**, **4**, **5** or **6**, contain data?

answer [2]

(b) Which statement **best** explains why scientists had thought that this rodent was extinct?

Put a tick (✓) in the correct box.

The rodent had never been observed in the wild.

☐

Fossils of this rodent are only found in 11 million year old rock.

☐

New species of animals are always being discovered.

☐

[1]

(c) New species of animals evolve over time.

Choose the **three** statements, **A, B, C, D, E, F** or **G**, that **best** explain why this happens.

- A** because the environment changes
- B** because most mutations in genes do not benefit the individual animal
- C** because mutations in genes cause changes in characteristics
- D** because animals can live together if they eat different foods
- E** because better adapted individual animals survive to breed
- F** because animal species do not show variation
- G** because some individual animals may develop characteristics during their lifetimes that make them better at finding food than others

answer [3]

(d) Conservationists are now studying the rodent and its habitat.

They want to make sure it does not become extinct.

Which changes could cause the rodent to become extinct?

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

- | | |
|--|--------------------------|
| More trees grow giving new shelter. | <input type="checkbox"/> |
| The rodent faces increased competition for its prey. | <input type="checkbox"/> |
| The environmental conditions begin to change. | <input type="checkbox"/> |
| The rodent is susceptible to a new disease. | <input type="checkbox"/> |
| The number of humans living in the area decreases. | <input type="checkbox"/> |
| An asteroid passes close by the Earth. | <input type="checkbox"/> |

[3]

[Total: 9]

- 6 Our bodies need communication systems to respond to changes in our surroundings.

Some of these responses are controlled by nerves.

Some are controlled by hormones.

(a) Here is a list of responses.

- A knee jerk reaction when the knee cap is tapped
- B controlling the glucose level in the blood after a meal
- C keeping the water level in the body correct
- D touching a hot surface and pulling away
- E jumping out of the way of a moving car
- F blinking when a bright light is shone in our eyes

Choose **two** responses that:

(i) are controlled by nerves.

answer and [2]

(ii) are controlled by hormones.

answer and [2]

(b) The internal environment of our bodies must be maintained.

What is the name of this process?

answer [1]

[Total: 5]

END OF QUESTION PAPER

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Q.5 text Helen Briggs, *New Rodent is 'living fossil'*, 09 March 2006 © BBC News, <http://news.bbc.co.uk> Reproduced by kind permission of BBC News Online.

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