Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

General Certificate of Secondary Education
Higher Tier
January 2010

Science B
Unit Biology B1

BLY1H

H

Biology
Unit Biology B1

Written Paper

Thursday 14 January 2010 9.00 am to 9.45 am

For this paper you must have:
You may use a calculator.

Time allowed
- 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

Answer **all** questions in the spaces provided.

1 The photograph shows a musk ox.

The musk ox lives in the Arctic. An adult musk ox is 2.5m long and 1.4m high at the shoulder. Adults usually have a mass of about 400kg.

Use this information and information from the photograph to explain **two** ways in which a musk ox is adapted for survival in the Arctic.

1 (a) (i) Adaptation 1 .....

(1 mark)

1 (a) (ii) How this adaptation helps the musk ox to survive in the Arctic.

.....

.....

(1 mark)

1 (b) (i) Adaptation 2 .....

(1 mark)

1 (b) (ii) How this adaptation helps the musk ox to survive in the Arctic.

.....

.....

(1 mark)

4

Turn over ▶

2 Charles Darwin proposed the theory of natural selection.

2 (a) What is meant by natural selection?

.....

.....

.....

.....

(2 marks)

2 (b) The drawings show stages in the evolution of the human skeleton.

All the drawings are to the same scale.

Ape-like ancestor ⟶ Modern human

Use information from the drawings to describe **two** trends in the evolution of the human skeleton.

1 .....

.....

2 .....

.....

(2 marks)

2 (c) Darwin said that humans had evolved from ape-like ancestors.
Many people disagreed with him at the time.

Give **two** reasons why.

1 .....

.....

2 .....

.....

(2 marks)

2 (d) Lamarck's theory of evolution stated that useful changes which occur in an organism during its lifetime will be inherited by its offspring.

Give **one** way in which Darwin's theory differs from Lamarck's.

.....

.....

(1 mark)

7

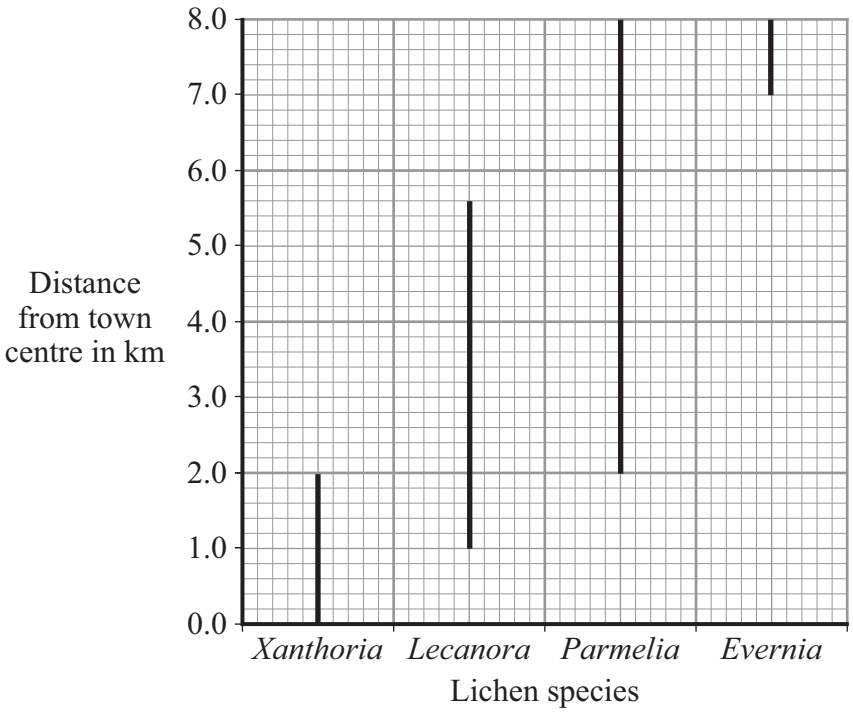
Turn over for the next question

3 Lichens are sensitive to the amount of sulfur dioxide in the atmosphere. They are used as indicator species for the amount of air pollution. Air pollution is generally higher in town centres than in the countryside.

Students investigated the relationship between lichen species and distance from a town centre.

- On a map, they drew a transect (line) from the centre of the town to the countryside.
- They examined sites every 200 metres along the transect (line).
- At each site, they recorded the lichen species growing on trees and walls up to a height of 2 metres.

The graph shows their results.
The lines on the graph indicate the range of each lichen species.



3 (a) Give **one** way in which the students could have obtained more accurate results.

.....

.....

(1 mark)

3 (b) (i) Which lichen species was found over the greatest range?

.....

(1 mark)

3 (b) (ii) Which lichen species grows only in the least polluted air?

.....

(1 mark)

3 (c) One student concluded 'You can tell how much sulfur dioxide there is in the air by the amount of *Lecanora* growing'.

Give **two** reasons why this is **not** a valid conclusion.

1 .....

.....

2 .....

.....

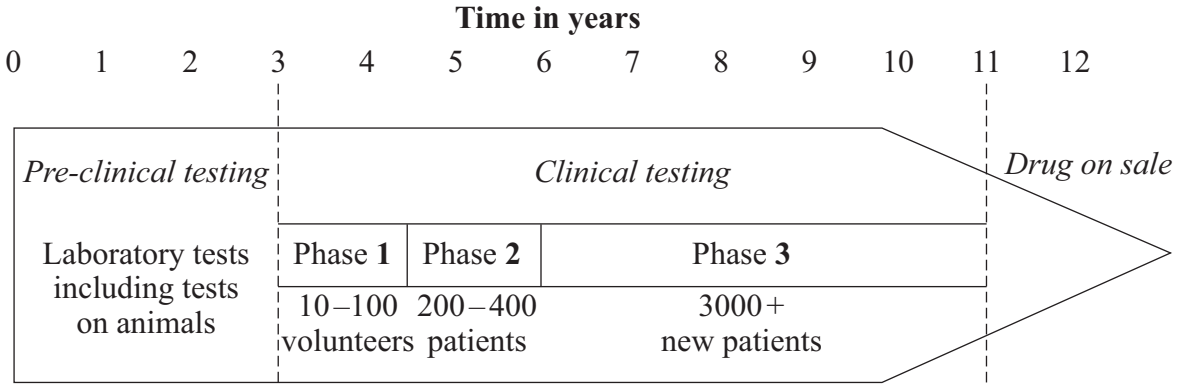
(2 marks)

5

Turn over for the next question

4 New drugs have to be thoroughly tested before they are sold.

The diagram shows a time line for the testing of a new drug.



4 (a) What is the main purpose of *pre-clinical testing*?

.....

.....

(1 mark)

4 (b) In Phase **1** of the *clinical testing*, very low doses of the new drug are used on a small number of volunteers.

4 (b) (i) What is the main purpose of Phase **1** testing?

.....

.....

(1 mark)

4 (b) (ii) In Phase **1** testing, healthy volunteers are used rather than patients.

Suggest **one** reason for this.

.....

.....

(1 mark)

4 (c) What is the main purpose of the Phase **2** and Phase **3** testing?

.....

.....

(1 mark)

4 (d) During Phase **3** testing, many of the patients are given a *placebo*.

4 (d) (i) What is meant by a *placebo*?

.....

.....

(1 mark)

4 (d) (ii) During the testing, who knows which patients are receiving the placebo?

Tick (✓) **one** box.

Only the patients ☐

Only the doctors ☐

Both patients and doctors ☐

Neither patients nor doctors ☐

(1 mark)

6

Turn over for the next question

5 A European Union report estimates that by 2011, one million children in the Union will be obese and have raised blood cholesterol levels.

5 (a) Body mass is dependent on the *metabolic rate* of the body.

What is meant by *metabolic rate*?

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(2 marks)

5 (b) Cholesterol is carried around the body by the two types of lipoprotein: low-density lipoproteins (LDLs) and high-density lipoproteins (HDLs).

Describe the relationship between the two types of lipoproteins and heart health.

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(3 marks)

5

6 Influenza is caused by a virus.

6 (a) How do viruses cause illness?

.....

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(1 mark)

6 (b) A British company making a reality television show in the Peruvian Amazon has been accused of starting an influenza epidemic. This epidemic allegedly killed four members of a remote Indian tribe and left others seriously ill.

The members of the television crew did not show symptoms of influenza, but members of the Indian tribe died from the disease.

Suggest an explanation for this.

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(3 marks)

4

Turn over for the next question

7 The human menstrual cycle is controlled by hormones.

7 (a) Name the gland which produces:

7 (a) (i) FSH

.....

(1 mark)

7 (a) (ii) oestrogen.

.....

(1 mark)

7 (b) The diagram shows part of an advertisement for a fertility monitor. It measures the concentrations of oestrogen and LH in a woman's urine.

The fertility diagram is not reproduced here due to third-party copyright constraints.

7 (b) (i) What proportion of a 28 day menstrual cycle is the fertile period?

.....

.....

(1 mark)

7 (b) (ii) A woman does not usually become pregnant after intercourse on day 9 of the cycle. However, she may become pregnant after intercourse on day 17 of the cycle.

Suggest an explanation for this.

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(2 marks)

7 (b) (iii) Most types of fertility monitor measure LH concentrations.
The fertility monitor shown in the diagram measures both oestrogen and LH concentrations.
The manufacturer states that women have more chance of becoming pregnant if they use the fertility monitor described above instead of an LH monitor.

Use information from the graph to suggest an explanation for this claim.

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(2 marks)

7 (c) What evidence from the graph indicates a causal relationship between oestrogen and LH production?

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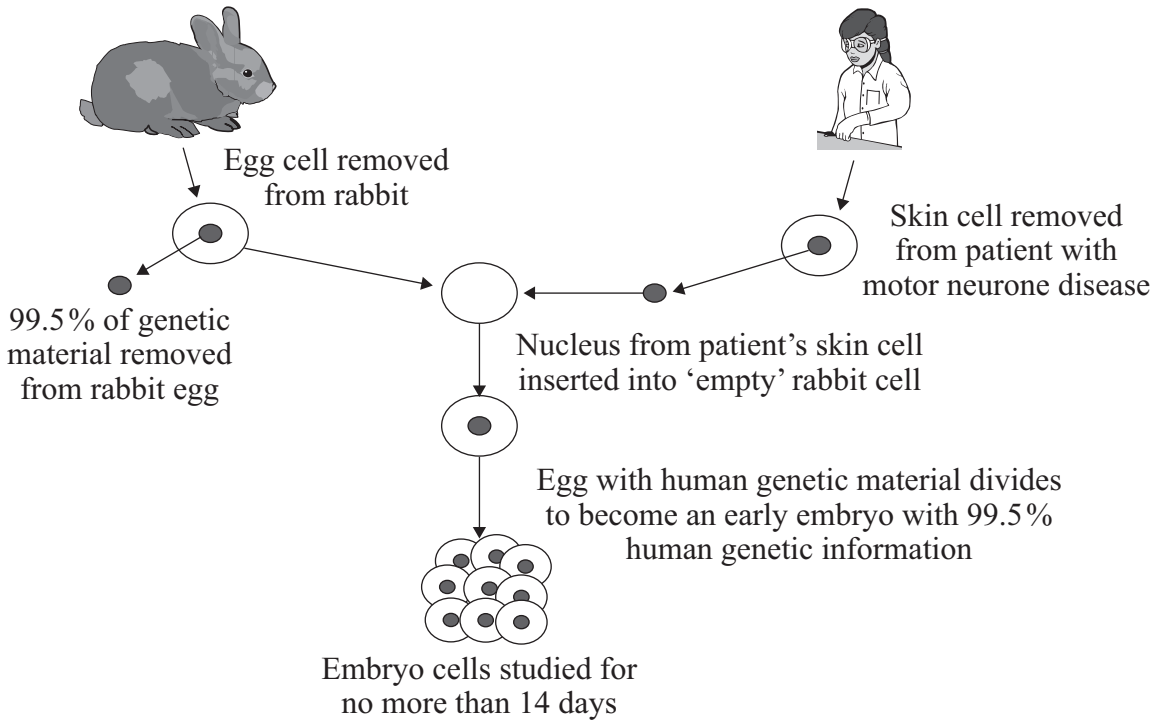
(2 marks)

9

8 Scientists in Korea have discovered a method of producing rabbit–human embryos. Rabbit–human embryos could provide cells for research into human diseases such as motor neurone disease. Rabbits produce large numbers of eggs. Rabbit–human embryos could overcome a shortage of human embryo cells for research.

The diagram shows how rabbit–human embryos are produced.



8 (a) Which structures in the nucleus contain 99.5 % of a cell's genetic information?

.....

(1 mark)

8 (b) Use the above information and your own knowledge and understanding to evaluate how the production of rabbit–human embryos may help research into human diseases.

Remember to give a conclusion as part of your evaluation.

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(4 marks)

5

END OF QUESTIONS

There are no questions printed on this page

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