Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use

General Certificate of Secondary Education
June 2007

SCIENCE B
Unit Biology B1

BLY1H

H

BIOLOGY
Unit Biology B1

Higher Tier

Wednesday 20 June 2007 9.00 am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed: 45 minutes

Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- 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.

For Examiner's Use			
Question	Mark	Question	Mark
1		3	
2		4	
		5	
		6	
		7	
		8	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

1 Read the article about sustainable cod fishing.

> Every December the European Commission makes proposals for cod fishing quotas in European Union (EU) waters. These quotas take into account data obtained by scientists.
>
> Scientists calculate what proportion of the cod stock is being caught each year. They do this by working out the numbers in each age-group of cod.
>
> Every year the fishermen say the scientists are exaggerating the danger to the stocks in the North Sea. The scientists say the fishermen are threatening their own long-term livelihoods by ignoring their warnings of a collapse of cod populations.
>
> The scientists say that fishermen go only to parts of the sea where there are a lot of cod, so they get the wrong idea of the number of cod in the whole area.

(a) The scientists and the fishermen have different opinions about the size of the cod population.

Explain why.

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(2 marks)

(b) The final decision on how many cod the fishermen are allowed to catch may not depend entirely on the data produced by the scientists.

Suggest **two** reasons for this.

1 .....

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2 .....

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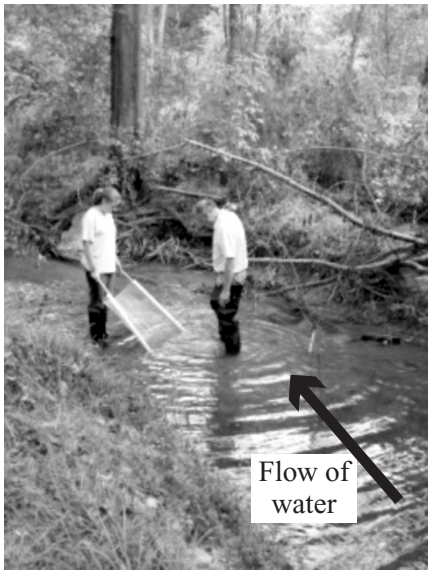
(2 marks)

4

2 Invertebrate animals are used to monitor pollution in streams. The photograph shows scientists collecting a sample of invertebrates from a stream.



This is the method that they use.

- A 1 m^2 area of the bed of the stream is marked out.
- A net 1 m wide is held by one person on the downstream side of the marked-out area.
- The other person uses their boots to gently move stones in this area of the stream bed. They do this for three minutes. This dislodges invertebrates which are then caught in the net.
- The invertebrates are then identified and counted.

(a) Name **two** control variables (variables which must be kept the same) in this investigation.

1 .....

2 .....

(2 marks)

Question 2 continues on the next page

(b) Suggest **two** reasons why the results from a sample might not be accurate.

1 .....

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2 .....

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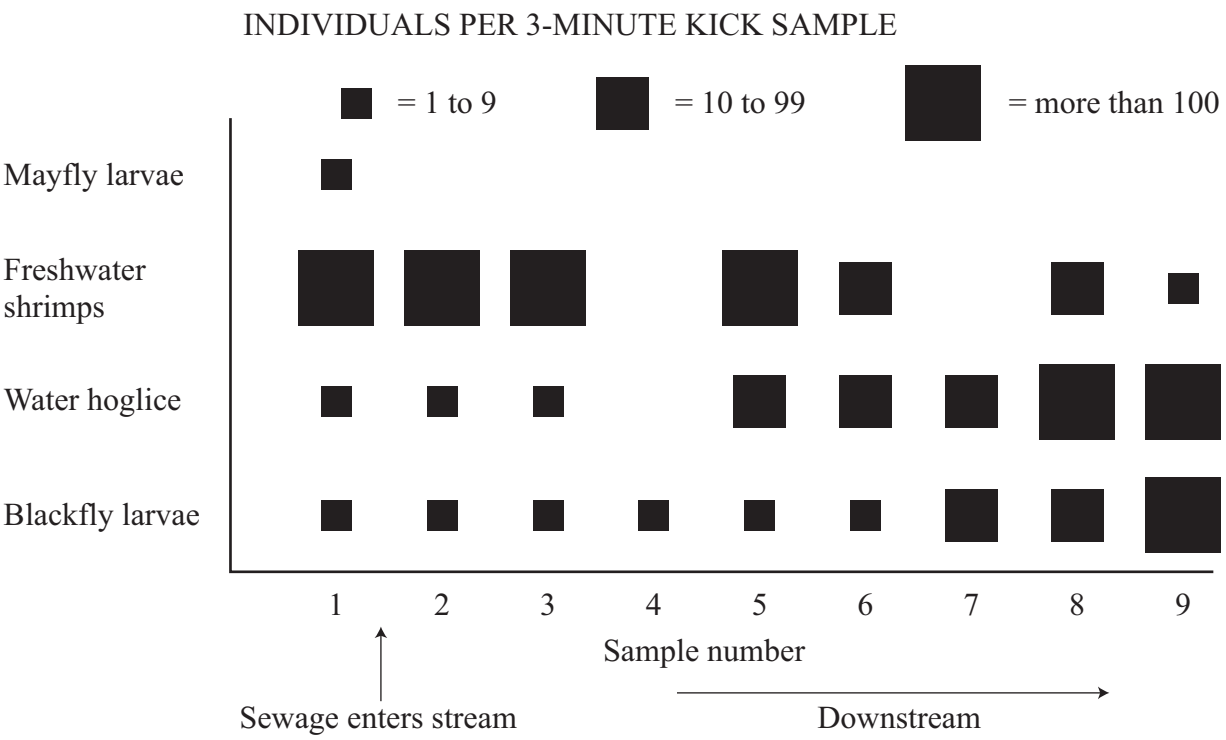
(2 marks)

The technique described on the previous page was used to investigate the effect of sewage on stream invertebrates.

- Sample 1 was taken upstream of the point where the sewage entered the stream.
- Samples 2–9 were taken at regular intervals downstream of the sewage inflow.

The graph shows the results.



(c) What was the range of the number of blackfly larvae that could be found in sample 7?

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(1 mark)

(d) Describe, as fully as you can, how the number of water hoglice changed downstream from where sewage entered the stream.

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(2 marks)

(e) Which of the four invertebrates is the best indicator species for water which is **not** polluted by sewage?

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Give the reason for your answer.

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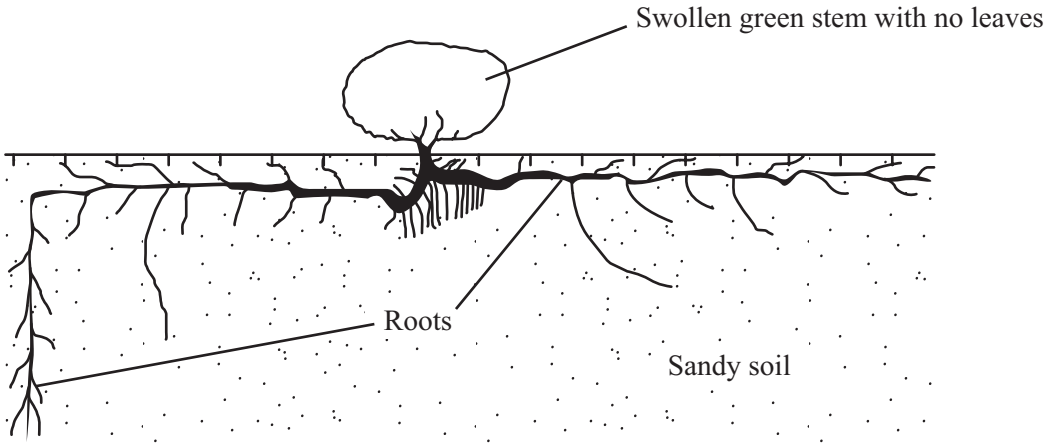
(2 marks)

9

Turn over for the next question

3 The drawing shows a bean caper plant.



The bean caper plant lives in hot desert conditions.

Explain **two** ways in which the bean caper is adapted for life in a hot desert.

Adaptation 1 .....

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How this adaptation helps the bean caper to survive

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.....

Adaptation 2 .....

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How this adaptation helps the bean caper to survive

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(4 marks)

4

4 Some diseases can be tackled by using antibiotics and vaccination.

(a) (i) Explain fully why antibiotics cannot be used to cure viral diseases.

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(2 marks)

(ii) A recent study found that babies in 90 % of hospitals are infected with the MRSA bacterium.

Explain how the MRSA bacterium has developed resistance to antibiotics.

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(2 marks)

(b) A person can be immunised against a disease by injecting them with an inactive form of a pathogen.

Explain how this makes the person immune to the disease.

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(3 marks)

7

5 A woman's fertility can be controlled by using hormones.

(a) Some contraceptive pills contain oestrogen.

Name the gland which produces oestrogen.

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(1 mark)

Women are being encouraged to use longer-term methods of contraception to reduce their chances of having an unwanted pregnancy.

The table summarises four long-term methods of contraception.

Method	**What it is**	**How it works**	**How long does it last?**	**Chances of getting pregnant**	**Side effects**
Hormone implant	Rod containing slow-release hormone inserted under the skin	Stops ovaries releasing eggs	3 years	Less than 1 in 1000	Acne in some women
Hormone injection	Injection that slowly releases hormone	Stops ovaries releasing eggs	12 weeks	Less than 4 in 1000	Weight gain in some women
IUD	Small plastic and copper coil placed in womb	Stops fertilised eggs developing in womb	5 – 10 years	Less than 20 in 1000	Heavier or more painful periods in some women
IUS	Plastic device containing slow-release hormone placed in womb	Stops fertilised eggs developing in womb	5 years	Less than 10 in 1000	Irregular periods in some women

(b) Which of the methods in the table is the most reliable?

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(1 mark)

(c) What is the advantage of using long-term contraception methods instead of taking a contraceptive pill every day?

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(1 mark)

(d) The IUD is the least reliable of the contraceptive methods shown in the table.

Use information from the table to suggest a reason for this.

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(1 mark)

(e) Some people have ethical objections to the use of an IUD or an IUS.

Suggest **one** reason why people might object to their use.

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(1 mark)

(f) (i) Explain how the hormone in the implants prevents the ovary releasing eggs.

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(2 marks)

(ii) Hormones can also be used as 'fertility drugs'.

Explain how a fertility drug helps a woman to become pregnant.

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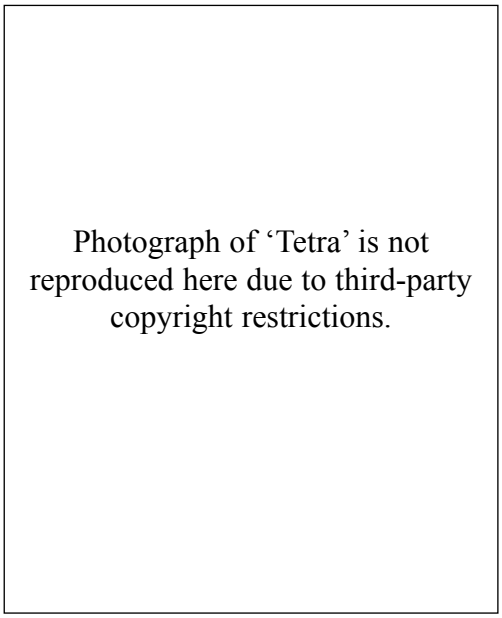
(2 marks)

9

6 Tetra is the first monkey to be cloned.



The method is described below.

- A sperm and an egg were combined and the resulting embryo was allowed to split into two cells, then four, then eight cells.
- At the eight-cell stage, the embryo itself was split by scientists to produce four two-cell embryos.
- The four embryos were then implanted into surrogate mothers. Three of the embryos did not survive. The fourth, Tetra, was born 157 days later. Her name means 'one of four'.

(a) Explain why this method could produce several identical monkeys.

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(2 marks)

(b) Suggest **two** reasons why these monkeys would be valuable in trials of new treatments for human diseases.

1 .....

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2 .....

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(2 marks)

4

Turn over for the next question

7 (a) Describe the relationship between the types of lipoprotein in the blood and heart disease.

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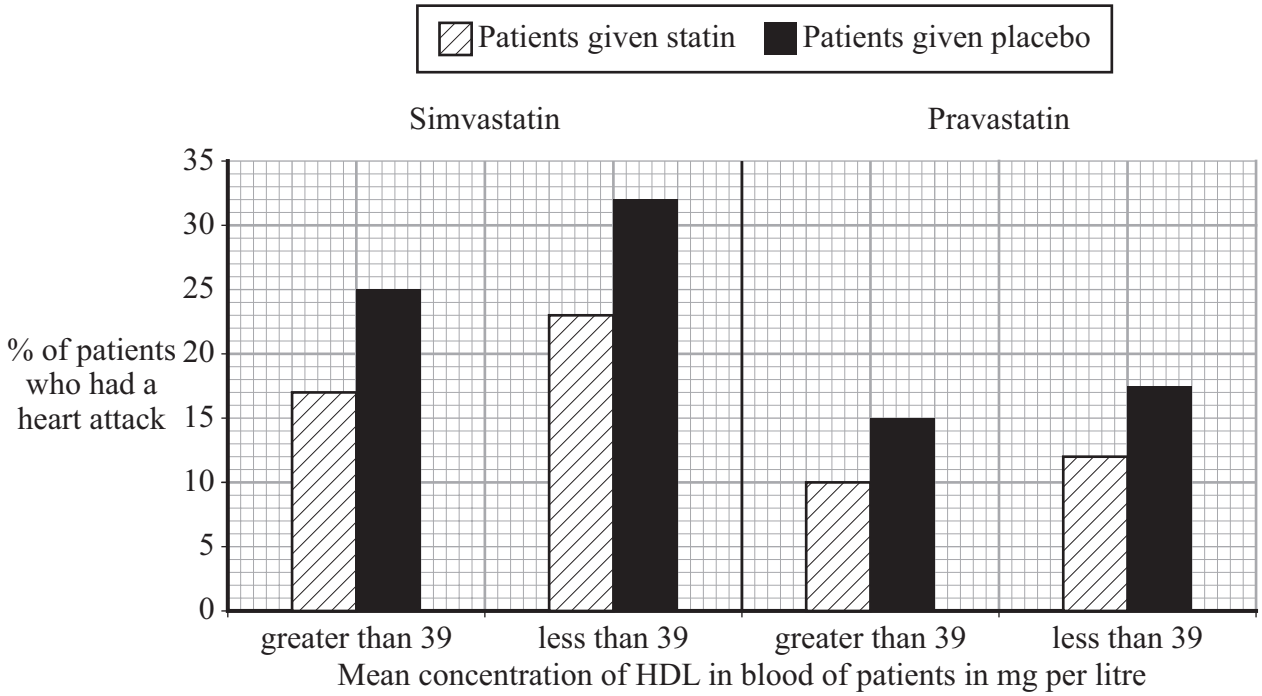
(2 marks)

(b) Statins are drugs used to reduce the risk of heart disease.

The graph shows the results of trials into the effectiveness of two different statins: simvastatin and pravastatin.

Different groups of patients were used in the trials of the two statins. The groups of patients had different initial concentrations of HDL in their blood.

In each trial, half of the patients were given pills containing statins and the other half were given placebos (pills containing no statins). The patients did not know whether or not their pills contained statins.



State **two** conclusions that can be drawn from the results of the trials.

1 .....

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2 .....

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(2 marks)

4

Turn over for the next question

8 (a) What does the theory of evolution state?

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(2 marks)

(b) *Daphnia* are microscopic water fleas. Midge larvae prey on *Daphnia*. The midge larvae release a hormone into the water. *Daphnia* respond to these hormones by growing larger protective 'helmet'-like structures.

Scientists were surprised to observe that the offspring of *Daphnia* females who had been exposed to these hormones always had larger helmets than offspring whose mothers had never been exposed to the hormones. The offspring with the large helmets went on to produce offspring with large helmets.

Explain why the scientists' observations seem to contradict the theory of natural selection.

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(2 marks)

4

END OF QUESTIONS

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There are no questions printed on this page

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Question 2 Photo of kick-sampling, *www.columbiacountyga.gov*, 22.5.06

Question 6 Tetra the cloned monkey, *www.empics.com*, 12.4.06