AQA

General Certificate of Secondary Education
Higher Tier
January 2013

Science A
Unit Biology B1

Biology
Unit Biology B1

BL1HP

H

Wednesday 9 January 2013   9.00 am to 10.00 am

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

Time allowed
● 1 hour

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. Do not write outside the box around each page or on blank pages.
● 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 60.
● You are expected to use a calculator where appropriate.
● You are reminded of the need for good English and clear presentation in your answers.
● Question 3(a) should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

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

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

1 Peas grow in pods on pea plants.
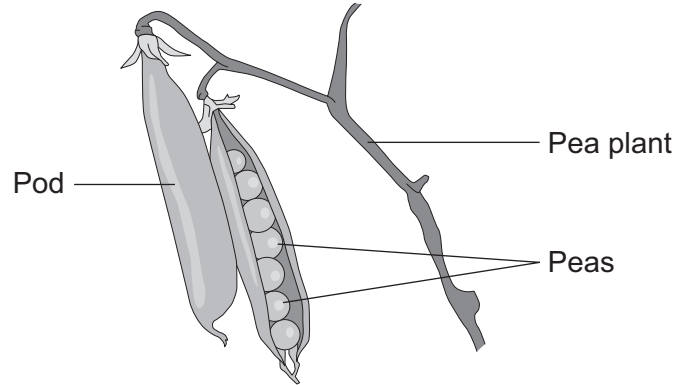
A gardener grew four varieties of pea plants, **A**, **B**, **C** and **D**, in his garden.
The gardener counted the number of peas in each pod growing on each plant.

The table shows his results.

Variety	Range of number of peas in each pod	Mean number of peas in each pod
A	2−6	4
B	3−7	5
C	3−8	6
D	6−8	7

1 (a) Give **one** environmental factor and **one other** factor that might affect the number of peas in a pod.

Environmental factor ....

Other factor ....

(2 marks)

1 (b) The gardener thinks that he will get the largest mass of peas from his garden if he grows variety **D**.

Why is the gardener **not** correct?

Suggest **one** reason.

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(1 mark)

1 (c) It is important that carbon is cycled through living things.

After he has picked the peas, the gardener puts the dead pea plants onto a compost heap.

Over the next few months, the carbon in the carbon compounds from the pea plants is returned to the air.

Describe how.

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(4 marks)

7

Turn over for the next question

Turn over ▶

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2 The diagram shows the position of two glands, **A** and **B**, in a woman.

Brain

A

B

Uterus (womb)
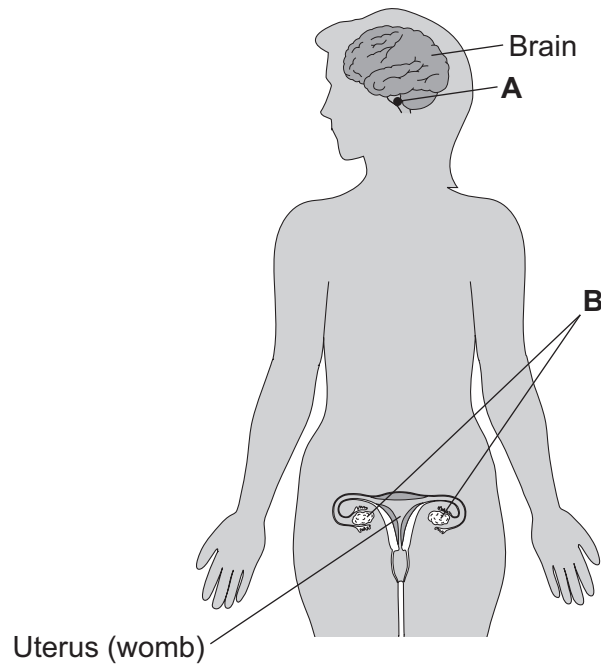
2 (a) (i) Name glands **A** and **B**.

A ....

B ....

(2 marks)

2 (a) (ii) Gland **A** produces the hormone Follicle Stimulating Hormone (FSH).

FSH controls changes in gland **B**.

How does FSH move from gland **A** to gland **B**?

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(1 mark)

Question 2 continues on the next page

Turn over ▶

2 (b) (i) A woman is not able to become pregnant. The woman does not produce mature eggs. The woman decides to have In Vitro Fertilisation (IVF) treatment.

Which **two** hormones will help the woman produce and release mature eggs?

Tick (✓) **one** box.

FSH and Luteinising Hormone (LH)

FSH and oestrogen

Luteinising Hormone (LH) and oestrogen

(1 mark)

2 (b) (ii) Giving these hormones to the woman helps her to produce several mature eggs. Doctors collect the mature eggs from the woman in an operation.

Describe how the mature eggs are used in IVF treatment so that the woman may become pregnant.

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(3 marks)

2 (b) (iii) IVF clinics have been set a target to reduce multiple births.

At least 76% of IVF treatments should result in single babies and a maximum of 24% of treatments should result in multiple births.

Suggest **one** reason why the clinics have been set this target to reduce multiple births.

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(1 mark)

2 (c) Two clinics, **R** and **S**, used IVF treatment on women in 2007. Doctors at each clinic used the results of the treatments to predict the success rate of treatments in 2008.

The table shows the information.

	Total number of IVF treatments in 2007	Number of IVF treatments resulting in pregnancy in 2007	Predicted percentage success rate in 2008
Clinic **R**	1004	200	18 – 23
Clinic **S**	98	20	3 – 56

2 (c) (i) Compare the success rates of the two clinics in 2007.

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(1 mark)

2 (c) (ii) The range of the predicted success rate in 2008 for clinic **R** is much smaller than the range of the predicted success rate for clinic **S**.

Suggest why.

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(2 marks)

11

Turn over for the next question

3 A student is given a tube containing a liquid nutrient medium. The medium contains one type of bacterium.

3 (a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

The student is told to grow some of the bacteria on agar jelly in a Petri dish.

Describe how the student should prepare an uncontaminated culture of the bacterium in the Petri dish.

You should explain the reasons for each of the steps you describe.

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(6 marks)

3 (b) After the culture had been prepared, the student added one drop of each of five disinfectants, **A**, **B**, **C**, **D** and **E**, onto the culture.

The diagram shows the appearance of the Petri dish 3 days later.

3 (b) (i) There are areas on the agar jelly where **no** bacteria are growing.

Why?

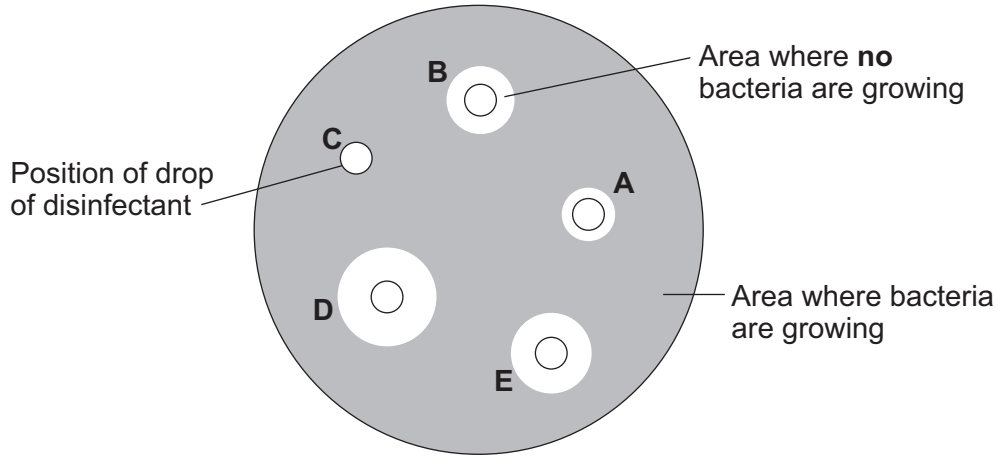...

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(1 mark)

3 (b) (ii) The student concluded that disinfectant **D** would be the best for using around the home.

Give **one** reason why the student might be correct.

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Give **one** reason why the student might **not** be correct.

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(2 marks)

Turn over ▶

9

4 LDL is one form of cholesterol found in the blood.

People with a high concentration of LDL in their blood may be treated with drugs called statins.

A high concentration of LDL cholesterol in the blood may result in an increased risk of heart and circulatory diseases.

The graph shows the effects of the treatment of one person with four different statins, **A**, **B**, **C** and **D**, over a period of 8 years. The arrows show when each new treatment was started.

Each treatment was continued until the next treatment was started.
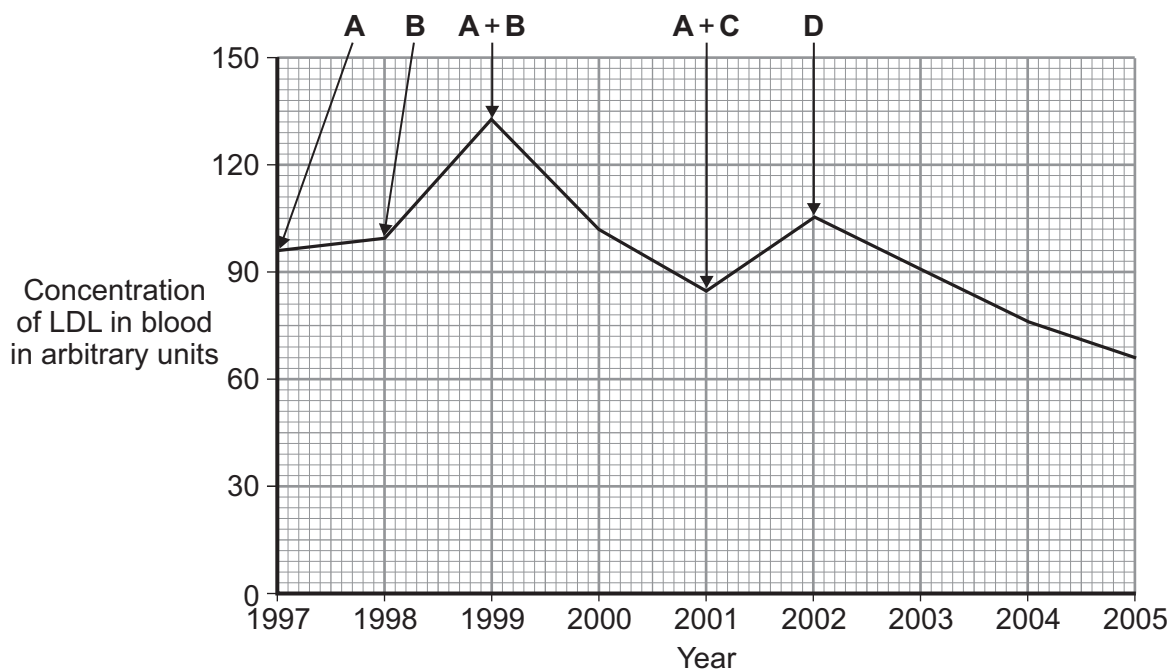
Compare the effectiveness of the five treatments in reducing the risk of heart and circulatory diseases for this person.

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(4 marks)

4

Turn over for the next question

Turn over ▶

5 On a rocky shore, when the tide goes in and out, organisms are exposed to the air for different amounts of time.

5 (a) On hot, windy days when the tide is out the concentration of the salt solution in rock pools may become very high.

What term is used to describe organisms that can survive in severe conditions such as very high concentrations of salt solution?

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(1 mark)

5 (b) Periwinkles are types of snail.
Students surveyed the different types of periwinkle living on a rocky shore.

The diagram shows the results of the students' survey.
The highest position that the sea water reaches on the shore is called the high tide level.
Each bar represents the range of habitats for each type of periwinkle.

Position on shore	Small periwinkle	Rough periwinkle	Common periwinkle	Flat periwinkle
High tide level ↓ Low tide level				

5 (b) (i) Which **two** types of periwinkle are likely to compete with each other to the greatest extent?

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(1 mark)

5 (b) (ii) Explain your answer to part **(b)(i)**.

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(1 mark)

5 (b) (iii) The small periwinkle can survive much nearer to the high tide level than the flat periwinkle.

Suggest **two** reasons why the flat periwinkle cannot survive near to the high tide level.

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(2 marks)

Turn over for the next question

Turn over ▶

6 White blood cells protect the body against pathogens such as bacteria and viruses.

6 (a) (i) Pathogens make us feel ill.

Give **one** reason why.

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(1 mark)

6 (a) (ii) White blood cells produce antibodies. This is one way white blood cells protect us against pathogens.

Give **two** other ways that white blood cells protect us against pathogens.

1 ....

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2 ....

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(2 marks)

6 (b) Vaccination can protect us from the diseases pathogens cause.

6 (b) (i) One type of virus causes measles.

A doctor vaccinates a child against measles.

What does the doctor inject into the child to make the child immune to measles?
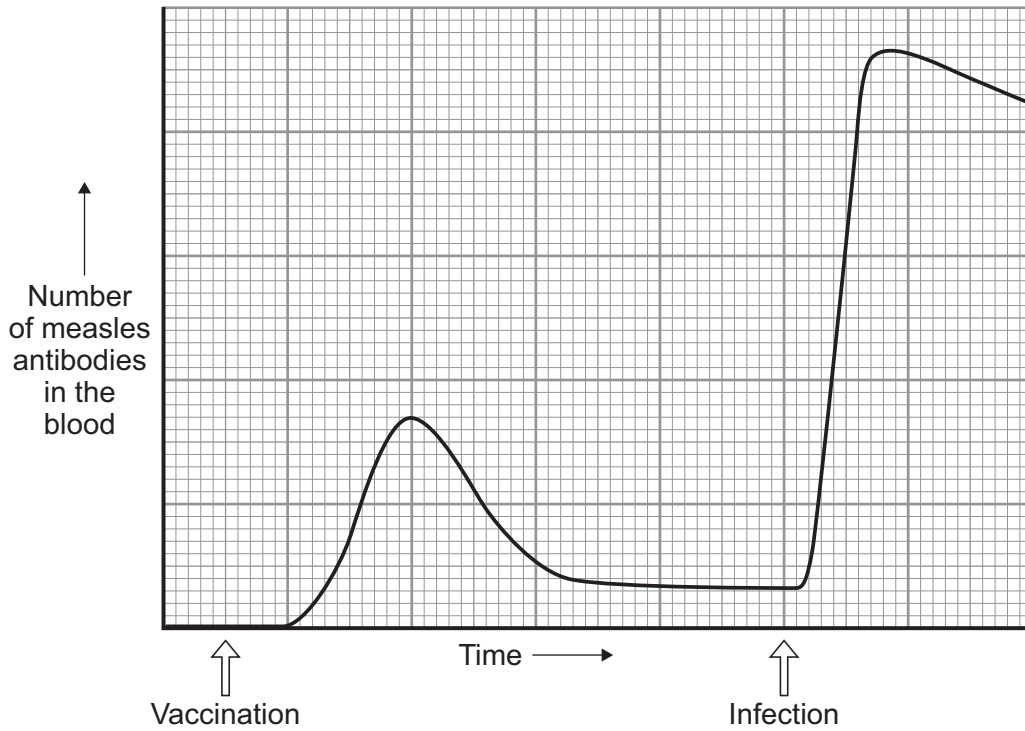
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(2 marks)

6 (b) (ii) A few weeks after the vaccination, the child becomes infected with measles viruses from another person.

The graph shows the number of measles antibodies in the child's blood from before the vaccination until after the infection.

More measles antibodies are produced after the infection than after the vaccination.

Describe other differences in antibody production after infection compared with after vaccination.

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(3 marks)

6 (b) (iii) Vaccination against the measles virus will **not** protect the child against the rubella virus.

Why?

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(1 mark)

6 (c) What is the advantage of vaccinating a large proportion of the population against measles?

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(1 mark)

Turn over ▶

10

7   Darwin suggested the theory of natural selection.

7 (a)   Explain how natural selection occurs.

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(3 marks)

7 (b)   Latitude is a measure of distance from the Earth's equator.

Scientists investigated the effect of latitude on:

- the time taken for new species to evolve
- the number of living species.

The table shows the scientists' results.

Latitude in degrees North of equator	Time taken for new species to evolve in millions of years	Relative number of living species
0 (at the equator)	3−4	100
25	2	80
50	1	30
75 (in the Arctic)	0.5	20

As latitude increases environmental conditions become more severe.

7 (b) (i) Describe the patterns shown by the data.

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(2 marks)

7 (b) (ii) Suggest explanations for the patterns you have described in part **(b)(i)**.

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(2 marks)

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Turn over for the next question

Turn over ▶

8 The photographs show four different species of bird.
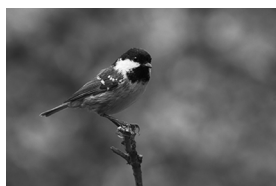
Great tit

Blue tit

Coal tit

Long-tailed tit

The table gives information about the four species of bird in winter.

Bird species	Mean body mass in grams	Mean energy needed in kJ per day	Mean percentage of day spent feeding
Great tit	21	84.2	75
Blue tit	12	62.4	81
Coal tit	9	49.5	88
Long-tailed tit	7	42.0	92

8 (a) (i) Calculate the energy needed per day per gram of body mass for the blue tit.

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Answer = ... kJ per day per gram of body mass

(2 marks)

8 (a) (ii) Describe the trend for energy needed per day per gram of body mass for the four species of bird.

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(1 mark)

8 (a) (iii) Suggest an explanation for the trend you have described in part **(a)(ii)**.

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(2 marks)

8 (b) Describe and explain the trend shown by the data for the time spent feeding in winter for the birds.

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(2 marks)

7

END OF QUESTIONS

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