Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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8	
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TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2013

Science A

Unit Biology B1

BL1HP

H

Biology

Unit Biology B1

Wednesday 5 June 2013 1.30 pm to 2.30 pm

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 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 In the 1800s, many women died from disease after giving birth.

Dr Semmelweis compared the death rates of women in two hospital wards, **Ward A** and **Ward B**.

Table 1 shows some of the results.

Table 1

Year	Percentage (%) of women who died	
	Ward A	**Ward B**
1834	7.7	7.4
1836	7.5	7.8
1844	8.4	2.1
1846	11.3	2.8

Before 1840
Doctors and nurses worked in **Ward A** and in **Ward B**.
The doctors often worked in other wards with patients who had diseases.
The doctors did **not** wash their hands.

After 1840
Doctors only worked in **Ward A** and **not** in **Ward B**.
Only nurses worked in **Ward B**.
The nurses did **not** work in other wards with patients who had diseases.

1 (a) (i) Look at the data for **Ward A** and **Ward B** after 1840.

Describe the effect on death rate of having **only** nurses working in **Ward B** and **not** doctors.

To gain full marks you must refer to the data in **Table 1**.

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(2 marks)

1 (a) (ii) Suggest an explanation for the difference you described in part **(a)(i)**.

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(2 marks)

1 (b) In 1847, Dr Semmelweis told the doctors to wash their hands each time before they began to work in **Ward A**.

Table 2 shows the death rates in the two wards, after 1847.

Table 2

Year	Percentage (%) of women who died	
	Ward A	**Ward B**
1848	2.7	2.8
1849	2.0	1.9

Dr Semmelweis was right to tell the doctors to wash their hands.

What evidence is there to support Dr Semmelweis telling the doctors to wash their hands?

Use information from **Table 1** and **Table 2** in your answer.

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(3 marks)

Question 1 continues on the next page

1 (c) In modern hospitals less than 0.1% of women die from disease after giving birth.

Medical understanding has improved since the 1850s to reduce the death rate.

Other than improvements in hygiene, give **two** reasons for the low death rate from infectious diseases in modern hospitals.

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(2 marks)

9

Turn over for the next question

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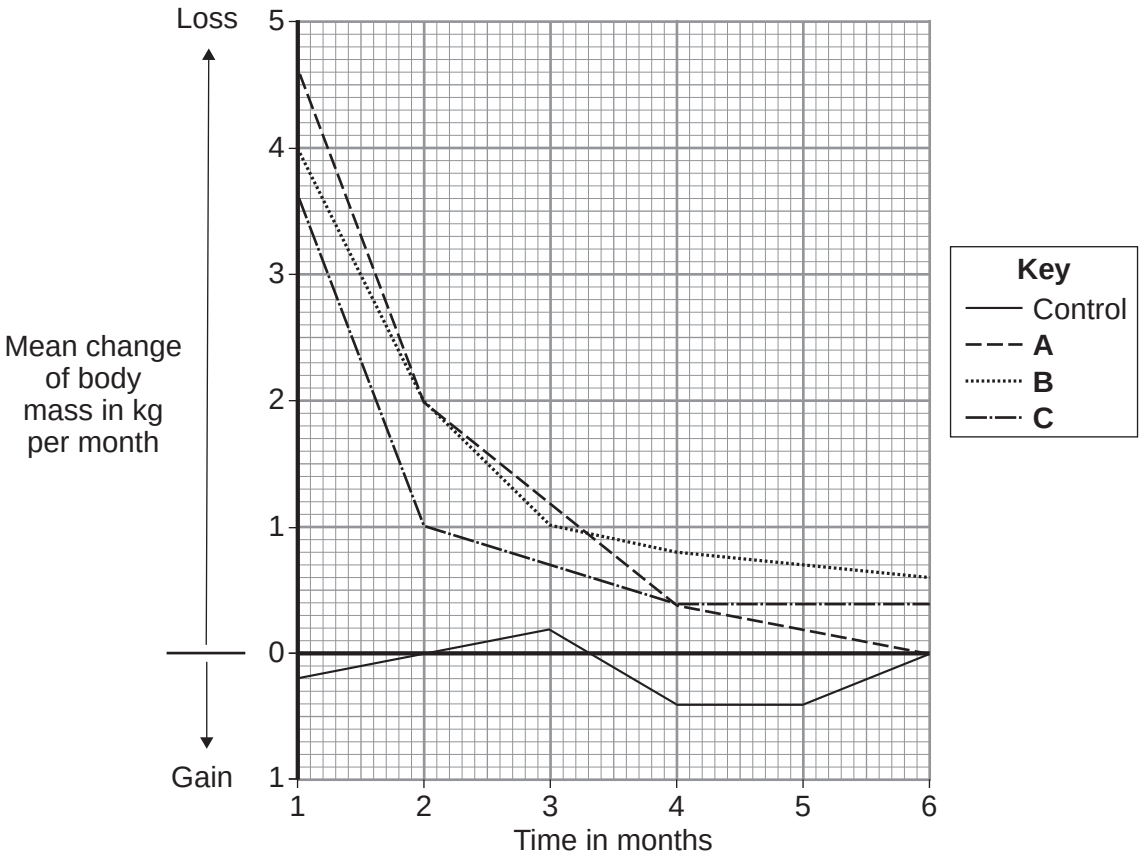
ANSWER IN THE SPACES PROVIDED

2 Scientists investigated the effectiveness of three slimming programmes, **A**, **B** and **C**.

The scientists recorded the body mass of four groups of volunteers each month for 6 months. Three of the groups were each given a different slimming programme. The fourth group was a control group.

The graph shows the mean change of body mass each month for all four groups.



2 (a) (i) What should the control group eat?

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(1 mark)

2 (a) (ii) Why did the scientists include a control group in this study?

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(1 mark)

2 (b) (i) The three groups of volunteers using the slimming programmes each showed a similar pattern of body mass loss over the 6 months.

Describe this pattern.

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(2 marks)

2 (b) (ii) All the slimming programmes seemed to be effective.

How does the information in the graph show this?

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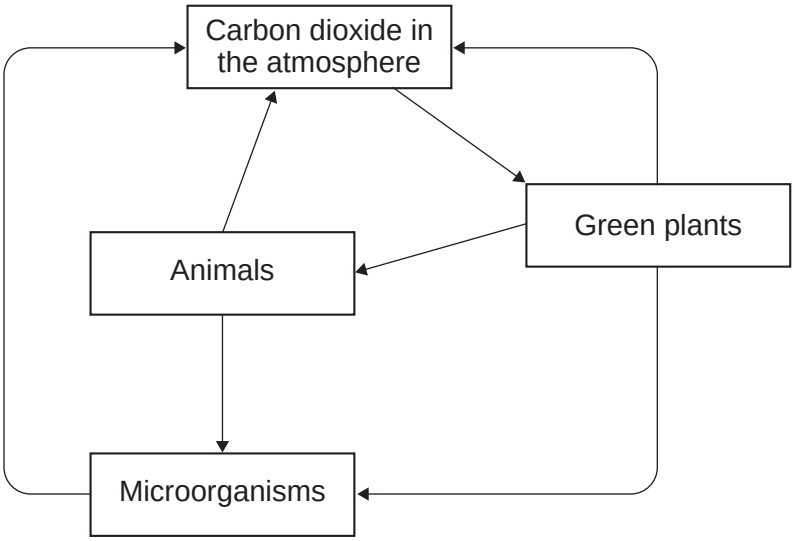
(1 mark)

5

Turn over for the next question

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

The diagram shows part of the carbon cycle.



Describe how living things are involved in the constant cycling of carbon.

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(6 marks)

6

Turn over for the next question

4 One factor that may affect body mass is *metabolic rate*.

4 (a) (i) What is meant by *metabolic rate*?

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(1 mark)

4 (a) (ii) Metabolic rate is affected by the amount of activity a person does.

Give **two** other factors that may affect a person's metabolic rate.

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2 .....

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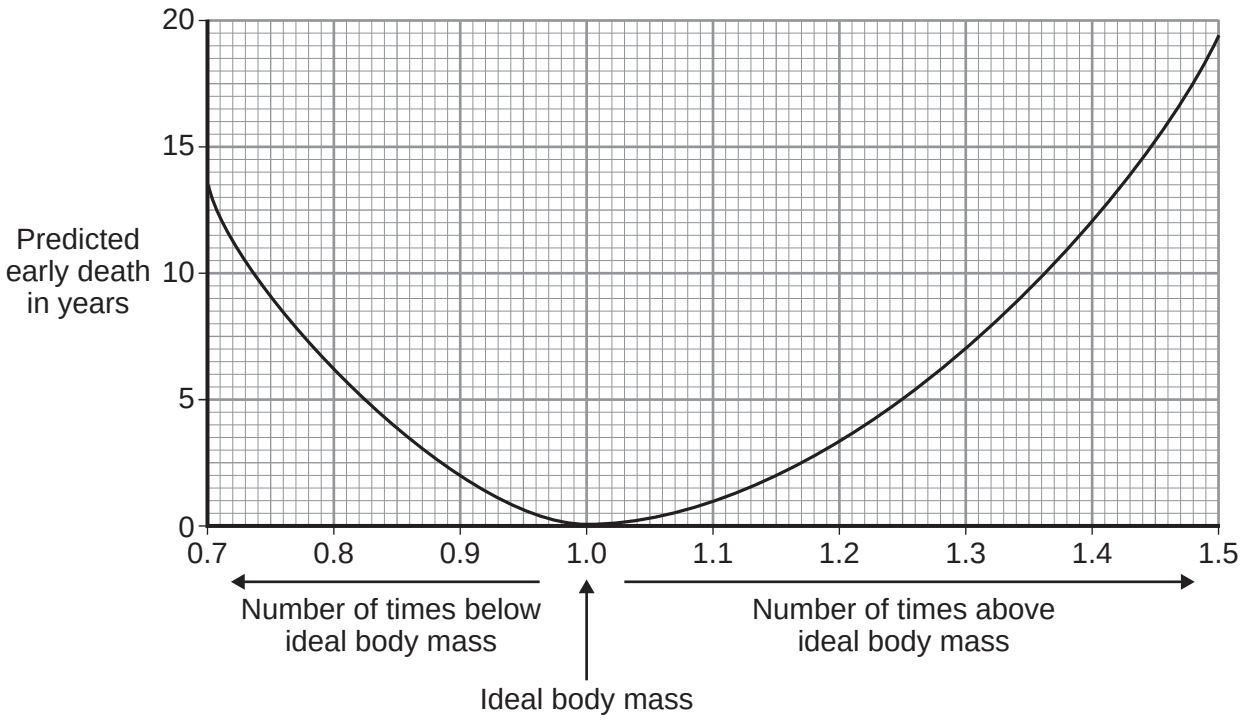
(2 marks)

4 (b) Predicted early death is the number of years that a person will die before the mean age of death for the whole population. The predicted early death of a person is affected by their body mass.

Scientists have calculated the effect of body mass on predicted early death.

The graph shows the results of the scientists' calculations.



The number of times above or below ideal body mass is given by the equation:

$$\frac{\text{Actual body mass}}{\text{Ideal body mass}}$$

In the UK the mean age of death for women is 82.

A woman has a body mass of 70 kg. The woman's ideal body mass is 56 kg.

4 (b) (i) Use the information from the graph to predict the age of this woman when she dies.

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Age at death = ... years

(2 marks)

4 (b) (ii) The woman could live longer by changing her lifestyle.

Give **two** changes she should make.

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2 .....

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(2 marks)

7

Turn over for the next question

5 Plant hormones are used in horticulture.

5 (a) Name **one** plant hormone.

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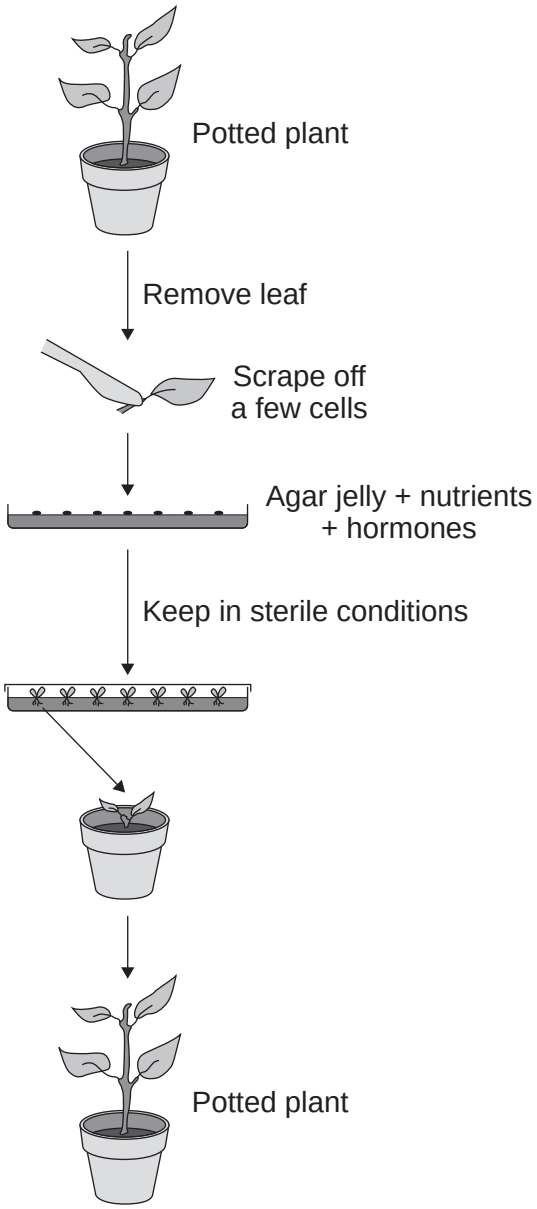
(1 mark)

5 (b) The diagram shows how new plants are produced using tissue culture.



5 (b) (i) Tissue culture is a type of *asexual reproduction*.

Give the main features of *asexual reproduction*.

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(3 marks)

5 (b) (ii) Another method of producing new plants is by taking cuttings.

Suggest **one** advantage of using tissue culture and **not** using cuttings to produce plants.

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(1 mark)

5

Turn over for the next question

6 Drugs are used to treat cardiovascular diseases (diseases of the heart and blood vessels).

6 (a) What is a drug?

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(1 mark)

6 (b) People can be treated for cardiovascular diseases with statins or aspirin.

Information about these two drugs is given in the table.

STATINS	ASPIRIN
Statins are only available on prescription from doctors. In studies, 30 000 patients were monitored over several years. Statins were found to reduce the rate of non-fatal heart attacks by about 30%. Approximately 0.1% of the patients suffered serious muscle damage and 0.01% suffered kidney failure. Statins reduce blood cholesterol which builds up in the walls of blood vessels. The cost of treating patients with statins can vary between £150 and £500 per year, depending on the type of cardiovascular disease being treated.	Aspirin can be bought over the counter. Treatment with aspirin costs up to £15 per year. In a study of 1000 patients, aspirin was found to cause bleeding of the stomach in around 0.5% of patients and there was a slightly increased risk of poor blood clotting at cuts. There was a slightly increased risk of damage to the blood vessels in the brain in older patients. Aspirin was found to reduce the risk of non-fatal heart attacks by 31%.

Would you recommend statins or aspirin for the treatment of cardiovascular diseases?

In your answer you should:

- give your recommendation
- use information from the table to support your recommendation by making comparisons of the two drugs.

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(5 marks)

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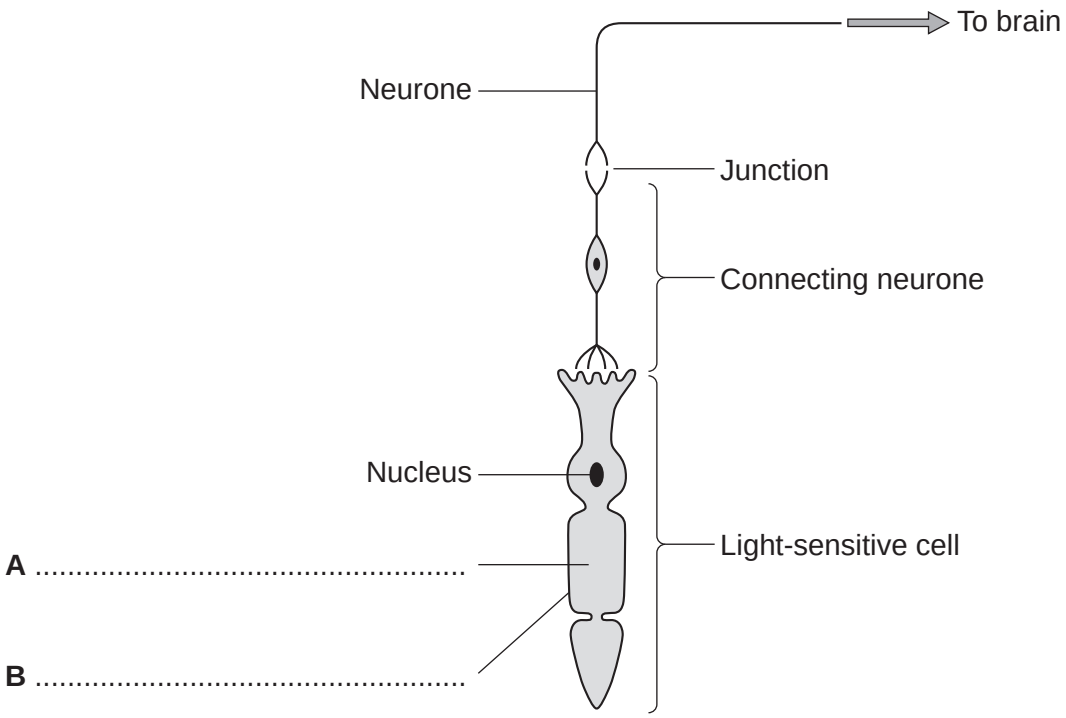
7 **Diagram 1** shows cells from the light-sensitive layer in the eye.

Diagram 1



7 (a) On **Diagram 1**, add labels to name part **A** and part **B** of the light-sensitive cell.

(2 marks)

7 (b) There is a junction between the connecting neurone and the neurone carrying the impulse to the brain.

7 (b) (i) What name is given to the junction?

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(1 mark)

7 (b) (ii) In what form is information passed across the junction?

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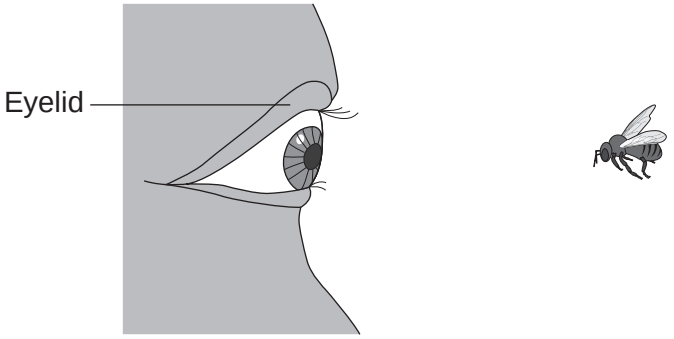
(1 mark)

7 (c) **Diagram 2** shows a bee flying towards a man's eye.

Diagram 2



In the *blink reflex*, light from the bee reaches the light-sensitive cell in the eye. The muscles in the eyelid shut the man's eye before the bee hits the eye.

Describe the pathway taken by the nerve impulse in the *blink reflex*.

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(4 marks)

8

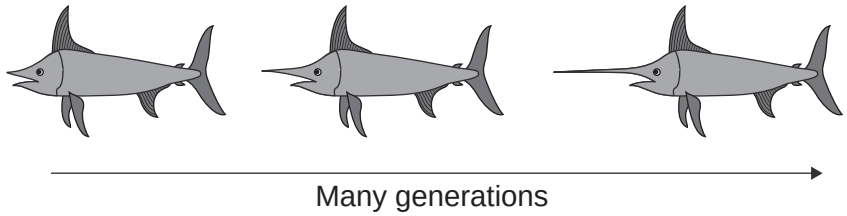
Turn over for the next question

8 The picture shows a modern swordfish.

Ancestors of swordfish had short swords. Modern swordfish have long swords. Swordfish use their swords to injure prey. The injured prey are easier to catch.

The information in the box shows one theory of how the length of the sword of swordfish changed.

The sword grew longer as each swordfish used its sword more and more.
Each time a swordfish reproduced, the longer sword was passed on to its offspring.



8 (a) Which scientist suggested the theory shown in the box?

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(1 mark)

8 (b) (i) Darwin suggested that evolution is a result of natural selection.

Describe how natural selection could result in modern swordfish with long swords developing from ancestors with short swords.

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(4 marks)

8 (b) (ii) Scientists in the 1800s accepted both the theory shown in the box, and Darwin's theory.

Now most scientists only accept Darwin's theory.

Give **one** reason why.

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(1 mark)

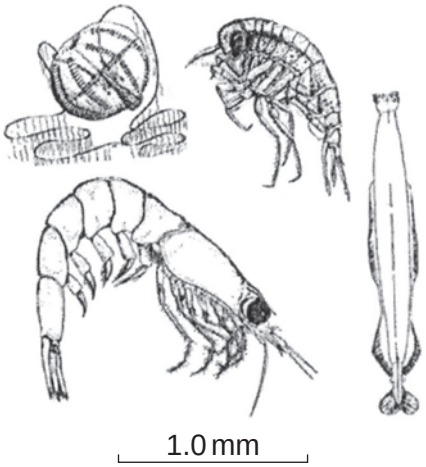
6

Turn over for the next question

9 Plankton live in the sea.
The diagram shows plant plankton and animal plankton drawn to the scales shown.

Plant plankton

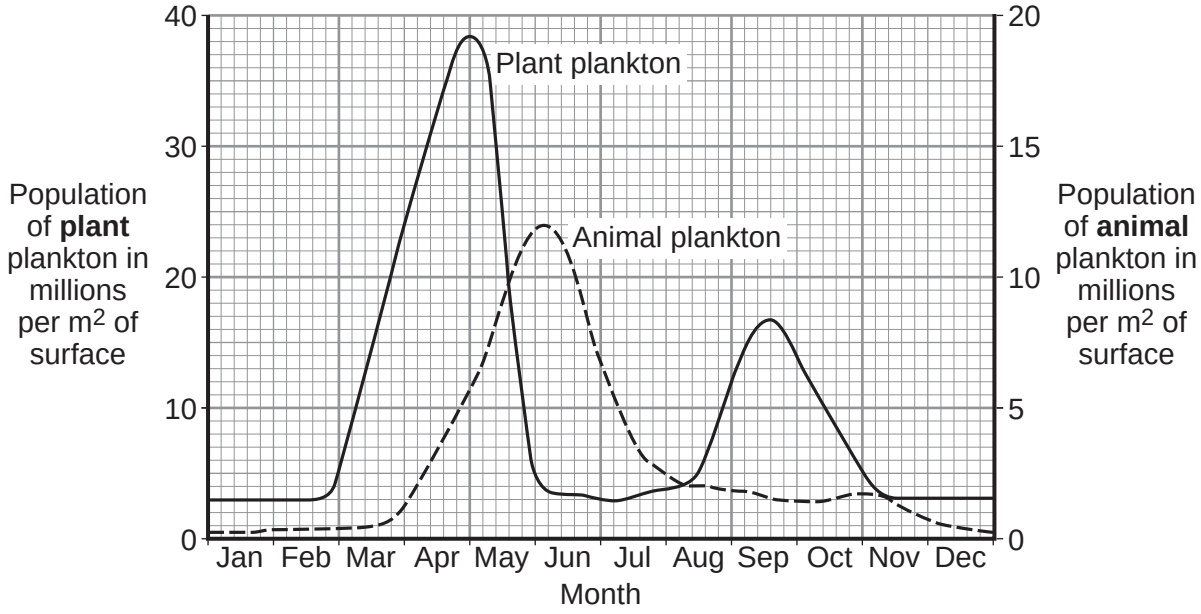
Animal plankton



Animal plankton eat plant plankton.

Graph 1 shows how the populations of the plankton change through the year in the seas around the UK.

Graph 1

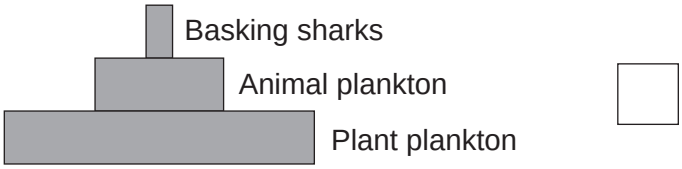


9 (a) Basking sharks eat animal plankton. Basking sharks grow up to 8 metres long.

Look at the diagram and **Graph 1**.

Which is the correct shape for the pyramid of biomass to show the relationship between plant plankton, animal plankton and basking sharks, in June?

Tick (✓) **one** box.



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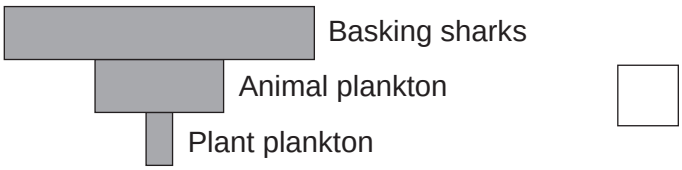

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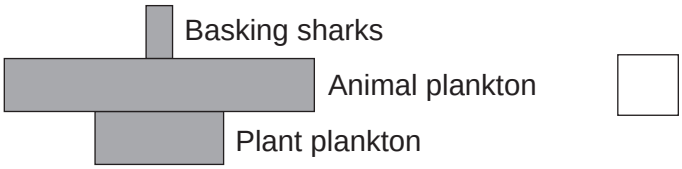

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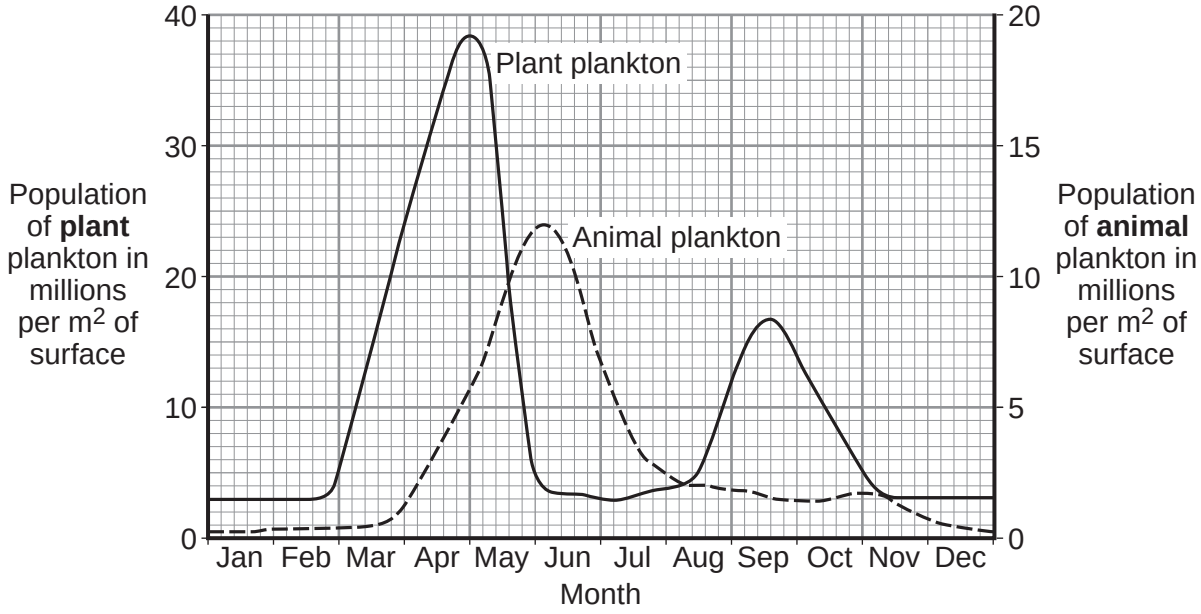
(1 mark)

Question 9 continues on the next page

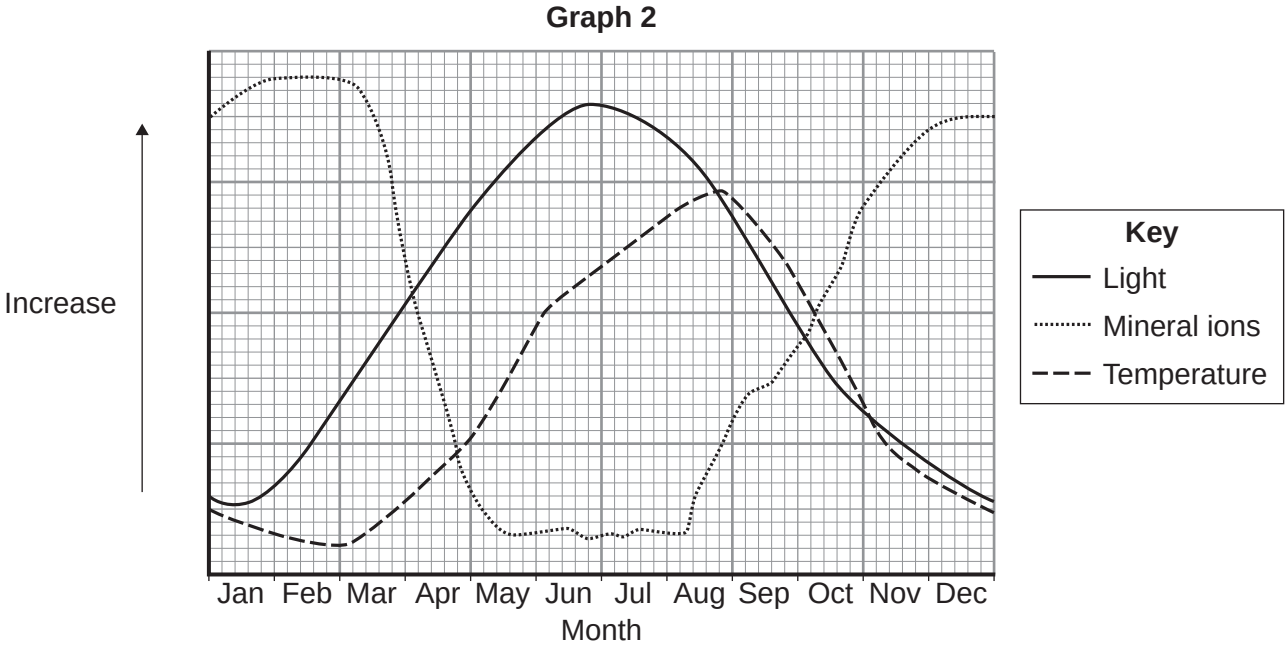
Graph 1 is repeated here to help you answer the following questions.

Graph 1



Graph 2 shows changes in some of the conditions in the upper layers of the sea around the UK.

Graph 2



9 (b) The population of plant plankton increases between February and April.

Suggest **one** reason for the increase.

Explain your answer.

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(2 marks)

9 (c) The population of animal plankton changes between April and July.

Suggest explanations for the changes.

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(2 marks)

9 (d) The concentration of mineral ions changes between February and December.

Suggest explanations for the changes.

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(3 marks)

8

END OF QUESTIONS

There are no questions printed on this page

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Question 9: Diagram: John Vigor, The Practical Encyclopedia of Boating: An A–Z Compendium of Navigation, Seamanship, Boat Maintenance and Nautical Wisdom, 2007. © The McGraw-Hill Companies, Inc.