New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Double Award Science: Biology

Unit B1

Higher Tier

[GSD12]

GSD12

MONDAY 27 FEBRUARY 2012
9.30 am–10.30 am

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

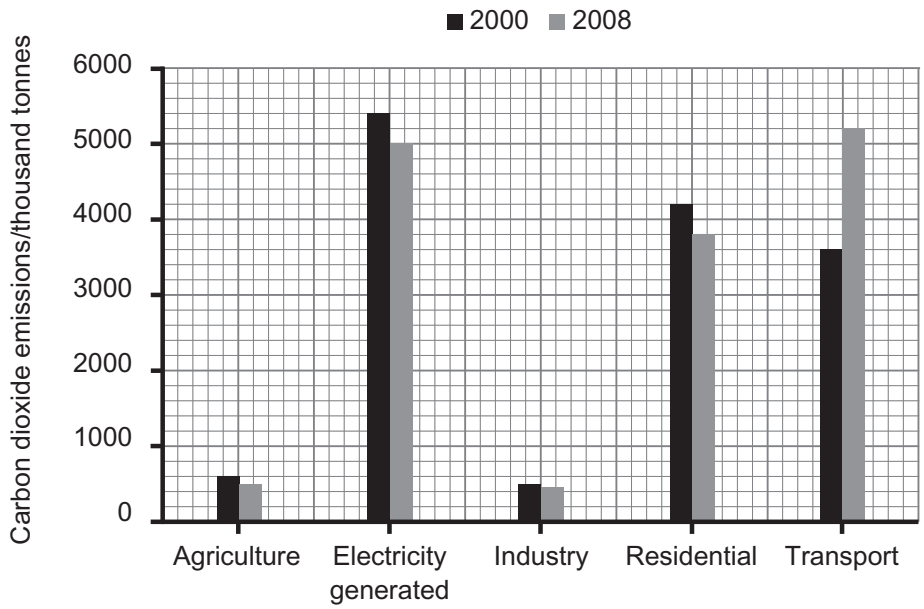
The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in questions **3(c)**, **5(b)** and **6(b)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

Examiner Only	
Marks	Remark

1 Graph A shows the carbon dioxide emissions from various sources in Northern Ireland for the two years, 2000 and 2008.

Graph A



Use the information in Graph A and your knowledge to answer the following questions.

(a) (i) Name the **three** main sources of carbon dioxide emissions.

_____ [1]

(ii) 4200 thousand tonnes of carbon dioxide were produced from the "residential" source in 2000. This had fallen to 3800 thousand tonnes in 2008. Calculate the percentage decrease in carbon dioxide produced.

(Show your working out.)

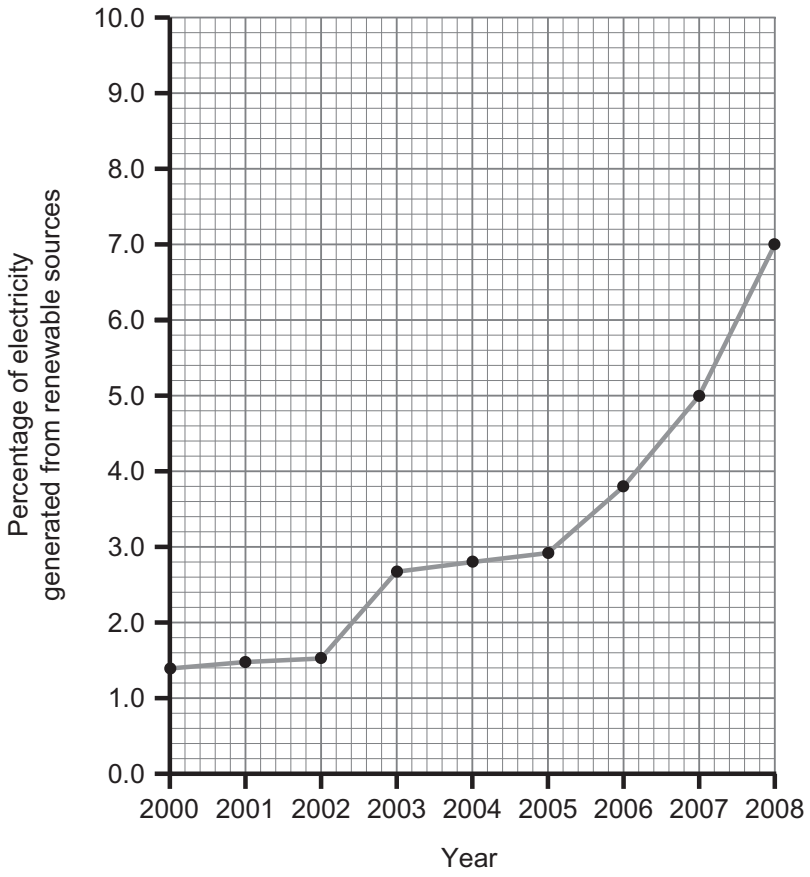
_____% [2]

(iii) Suggest a reason for the decrease in carbon dioxide emissions between 2000 and 2008 in the "residential" source.

_____ [1]

Graph B shows the percentage of electricity generated from renewable sources in Northern Ireland between 2000 and 2008.

Graph B



(iv) Describe and explain the relationship between the trend in **Graph B** and the level of carbon dioxide emissions from electricity generation between 2000 and 2008 (as shown in **Graph A**).

_____

_____

_____

_____ [3]

Examiner Only

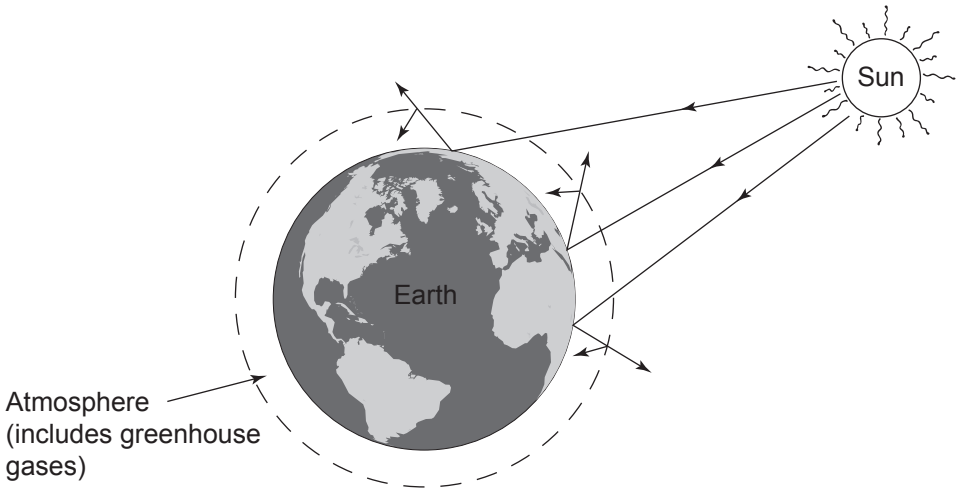
Marks	Remark

Examiner Only	
Marks	Remark

(b) The carbon dioxide level in the atmosphere is an example of an abiotic factor. What is meant by an abiotic factor?

_____ [1]

(c) The diagram shows how global warming occurs.



Use the diagram and your knowledge to explain how an increase in carbon dioxide levels leads to an increase in global warming.

_____

_____

_____ [2]

(d) Explain why it is important to monitor the levels of carbon dioxide in the air.

_____ [1]

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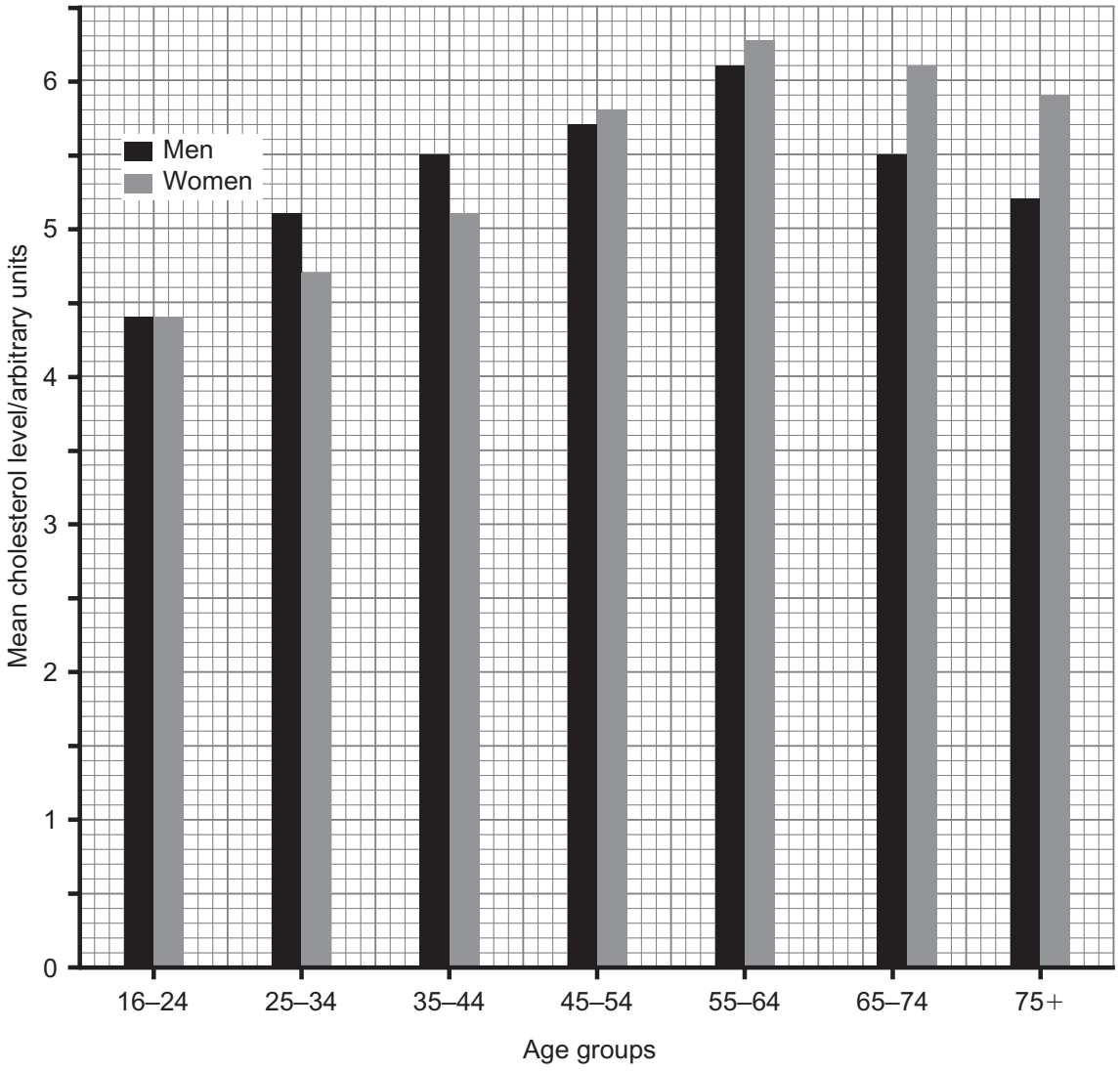
(Questions continue overleaf)

Examiner Only	
Marks	Remark

2 Cholesterol is a fatty substance. A build up of cholesterol can result from eating a fat-rich diet. It can result in circulatory illnesses such as heart disease and strokes.

Graph X shows the mean cholesterol levels for men and women in Northern Ireland in various age groups.

Graph X



(a) Describe **three** trends in Graph X.

1. _____

_____

2. _____

_____

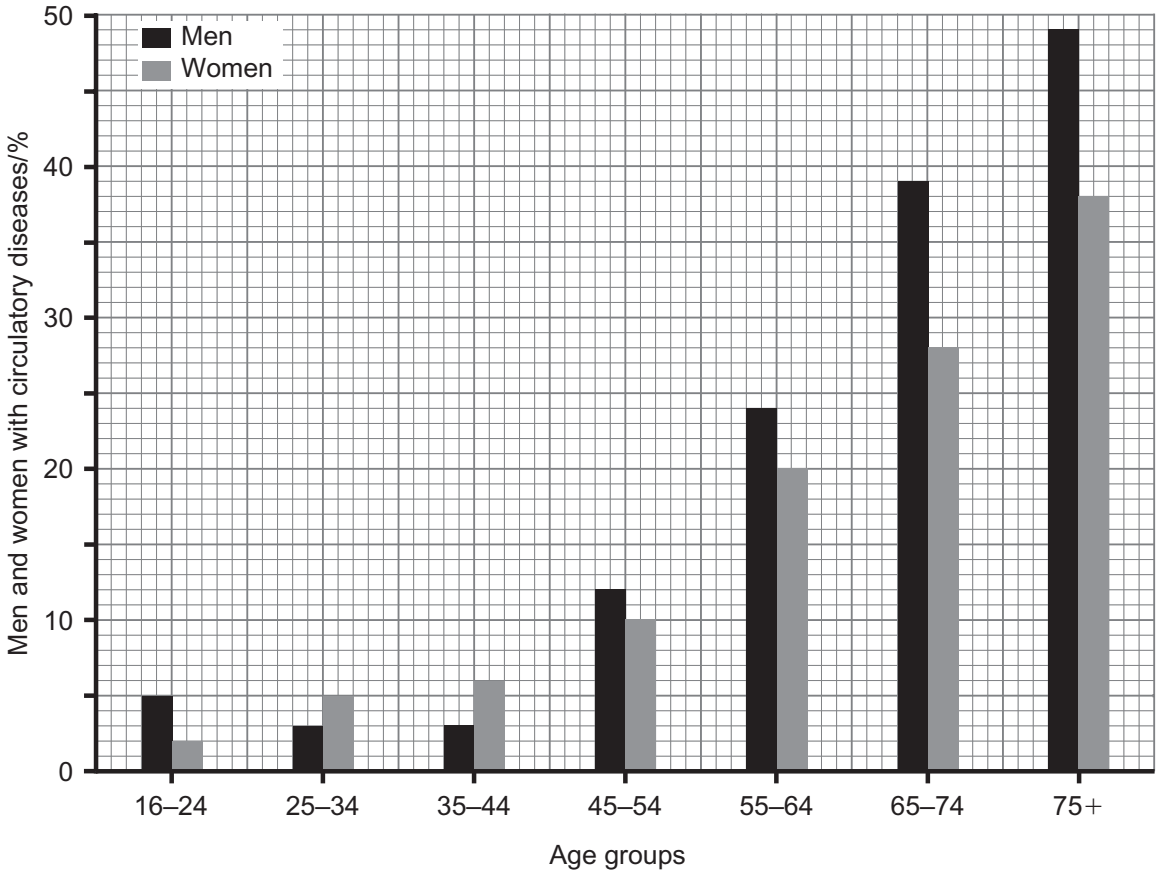
3. _____

_____ [3]

Examiner Only	
Marks	Remark

(b) Graph Y shows the percentage of men and women with circulatory illnesses (heart attacks and strokes) in different age groups in Northern Ireland.

Graph Y



Using the information in **Graphs X** and **Y**, describe the relationship between mean cholesterol levels and the occurrence of circulatory illnesses (heart attacks and strokes) for people up to the age of 64.

_____

_____

_____

_____ [2]

(c) An unhealthy diet can result in circulatory illnesses such as heart disease and strokes. State **two** other impacts of an unhealthy diet on general health.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

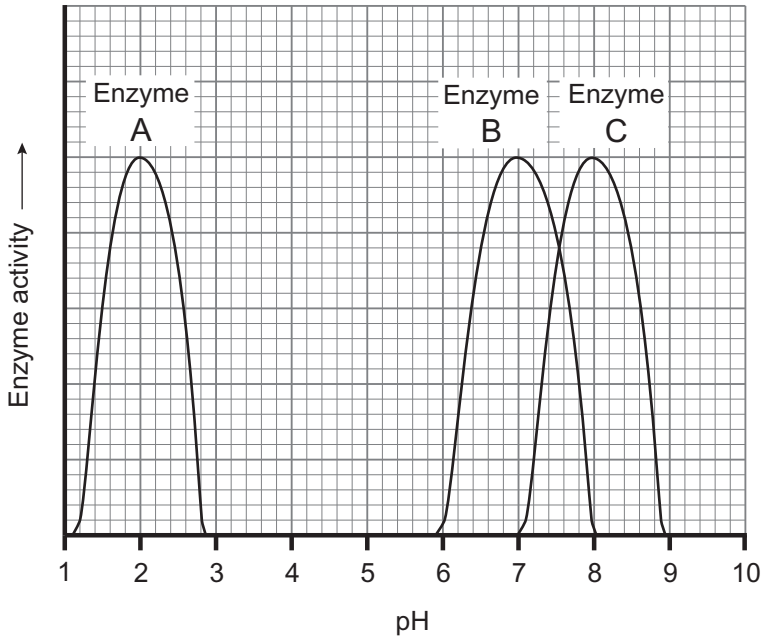
3 **(a)** Describe the function of enzymes in digestion.

_____

_____

_____ [3]

(b) The graph shows the effect of pH on the activity of three enzymes that act in different regions of the digestive system.



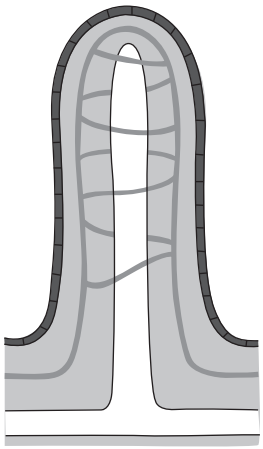
Use the graph and your knowledge to explain which of the three enzymes is present in the stomach.

_____

_____ [2]

(c) The wall of the small intestine (ileum) is lined with numerous microscopic structures called villi.

The diagram shows a section of a single villus.



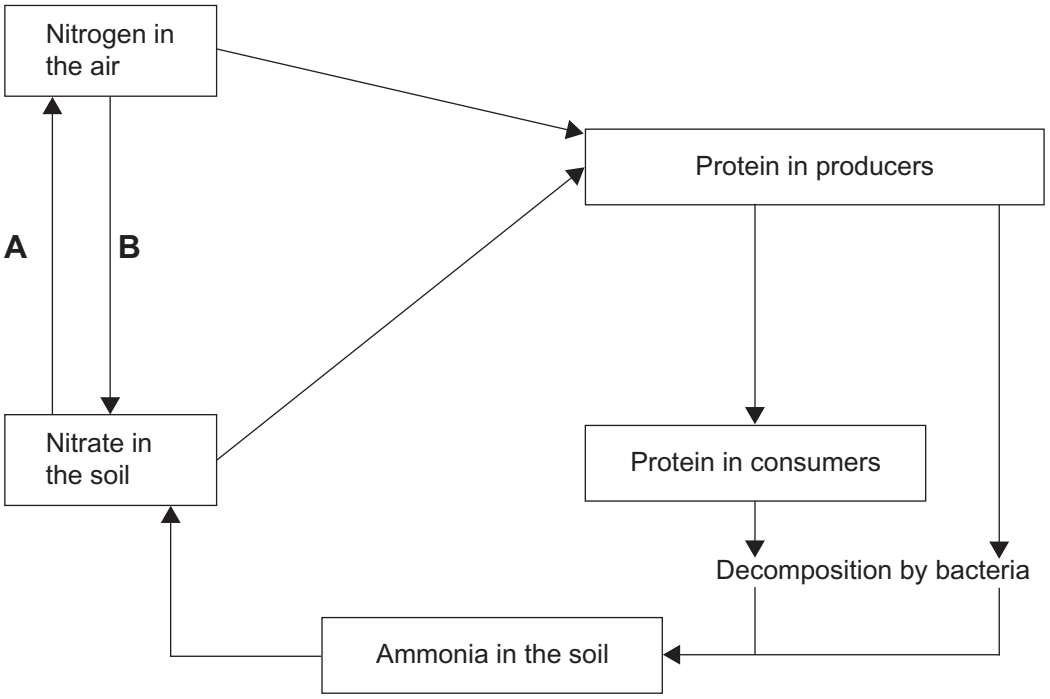
Describe and explain how the structure of a villus is adapted for the efficient absorption of digested food molecules.

In this question, you will be assessed on your written communication skills, including the use of specialist science terms.

[6]

Examiner Only	
Marks	Remark

4 The diagram shows an outline of the nitrogen cycle.



(a) Use the diagram and your knowledge to name the two processes, **A** and **B**.

A _____

B _____ [2]

(b) The table below gives information on some sources of nitrate in the rivers that flow into Lough Neagh for the periods 1971–1976 and 1994–1999.

Nitrate source	Tonnes nitrate/year	
	1971–1976	**1994–1999**
Towns	362	388
Nitrification	482	482
Agricultural land	2938	5615
Rough grazing and forestry	128	128
Total		

Source: www.doeni.gov.uk/niea/de/darddoeoct.02.pdf

Examiner Only

Marks	Remark

Use the information in the table and your knowledge to answer the following questions.

Examiner Only

Marks	Remark

(i) Calculate the total **increase** in nitrate entering the rivers from all sources between the periods 1971–1976 and 1994–1999.

(Show your working out.)

_____ tonnes nitrate/year [2]

(ii) One source of nitrate entering rivers is nitrification in nearby soils.

Describe the process of nitrification.

_____

_____ [2]

(iii) Increased nitrate in the rivers causes eutrophication.

The process begins with a rapid increase in the growth of algae and other plants in the rivers. Explain how this eventually leads to the death of fish in these rivers.

_____

_____

_____

_____

_____ [3]

Photograph 1 shows farmyard manure which is a natural fertiliser.
Photograph 2 shows a farmer spreading artificial fertiliser.

Examiner Only	
Marks	Remark

1

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2

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(c) Use the photographs and your knowledge to describe **two** advantages and **two** disadvantages of a farmer using farmyard manure (FYM) compared to artificial fertilisers.

Advantages

1. _____

_____

2. _____

_____

Disadvantages

1. _____

_____

2. _____

_____ [4]

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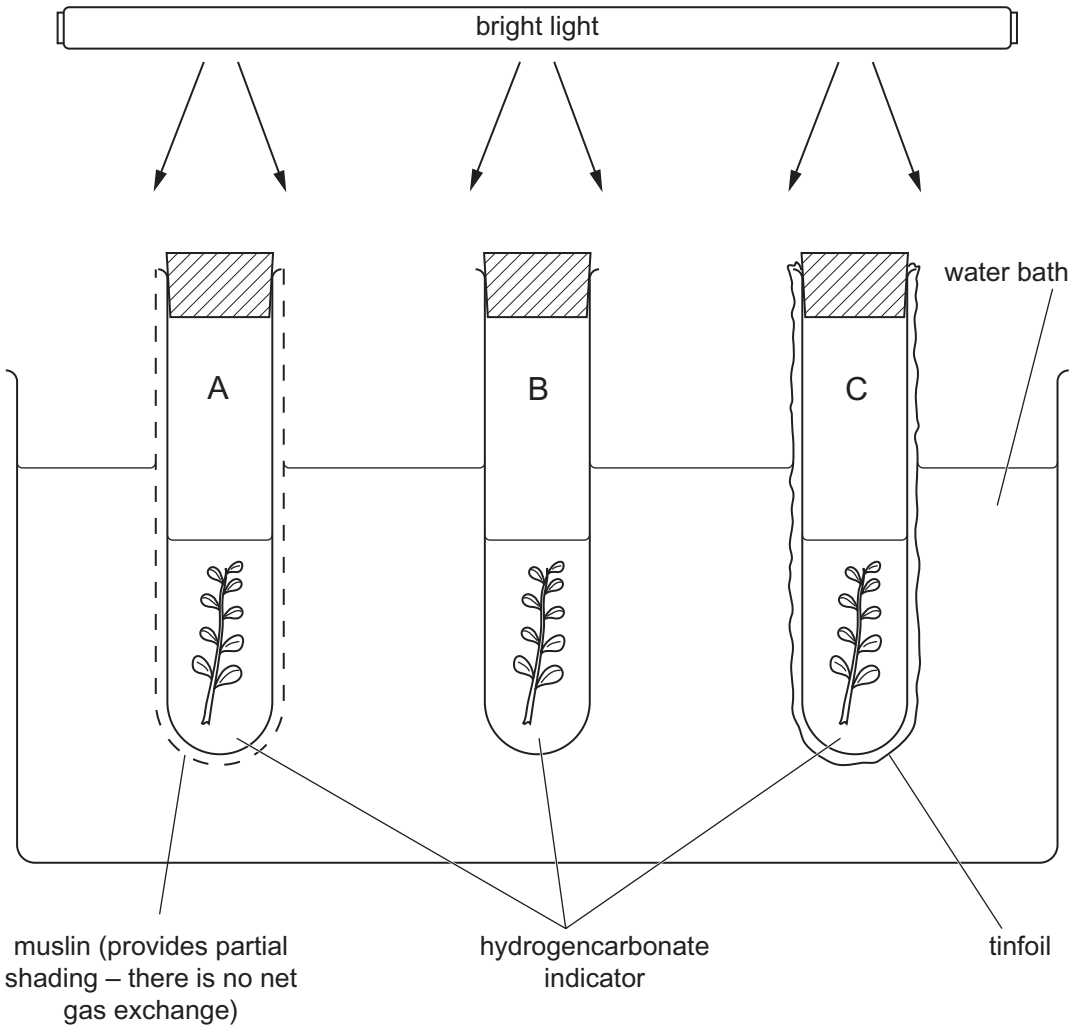
(Questions continue overleaf)

Examiner Only	
Marks	Remark

5 The diagram shows apparatus used to investigate gas exchange in a water (aquatic) plant. Hydrogencarbonate indicator was used to show any changes in the carbon dioxide level.

At normal levels of atmospheric carbon dioxide, the hydrogencarbonate indicator is red in colour.



The experiment was left for one hour in bright light.

(a) What is the function of the water bath?

_____ [1]

(b) Describe and explain the colour changes, if any, you would expect in each of test tubes A, B and C.

In this question you will be assessed on your written communication skills, including the use of specialist science terms.

[6]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

6 The photographs show two different types of grassland that are open and not shaded.

Source: Principal Examiner

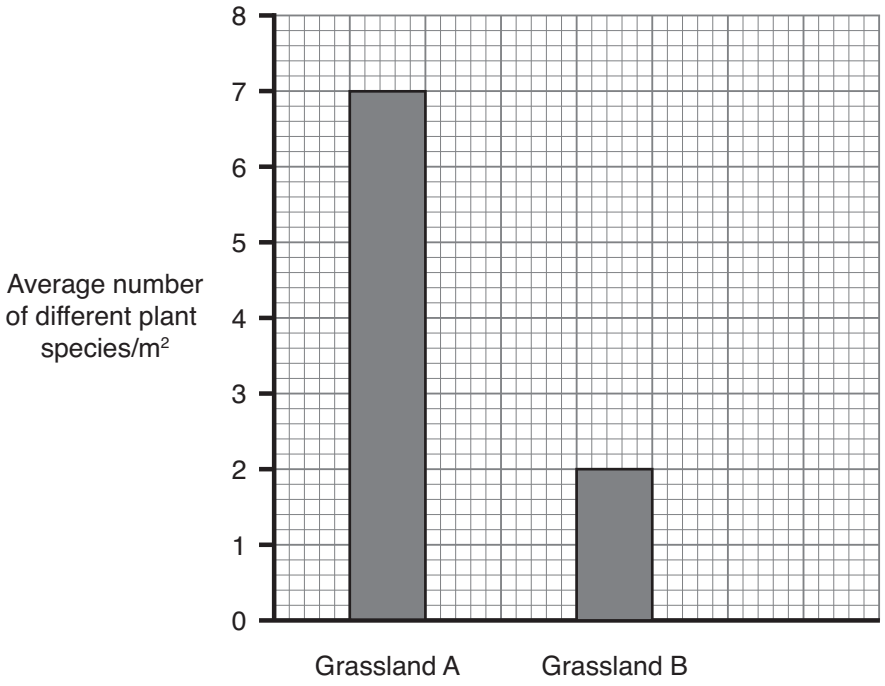
Grassland A

Source: Principal Examiner

Grassland B

The bar chart shows the results obtained by a class during an investigation in Grasslands A and B.

The pupils estimated the number of different plant species in a 1 m^2 quadrat.



(a) (i) Use the bar chart to describe why Grassland A has the higher biodiversity.

_____ [1]

(ii) Suggest **one** environmental factor that could account for the difference in the results between the two grasslands.

_____ [1]

(b) Describe how the pupils would have carried out this investigation and explain how they would have obtained these results.

In this question, you will be assessed on your written communication skills, including the use of specialist science terms.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

Examiner Only	
Marks	Remark

(c) Flowers are sources of a sugary substance called nectar. Butterflies visit flowers to feed on the nectar.

A sample of butterflies in each grassland was captured and the number of each species counted. The results are shown in the table.

Butterfly species	Grassland A	Grassland B
Meadow Brown	21	0
Large White	17	2
Red Admiral	8	0
Ringlet	7	1

(i) Name the sampling equipment used to capture the butterflies.

_____ [1]

(ii) Use the photographs and the bar chart (on page 16) to explain the difference in the number of butterflies captured in Grasslands A and B.

_____

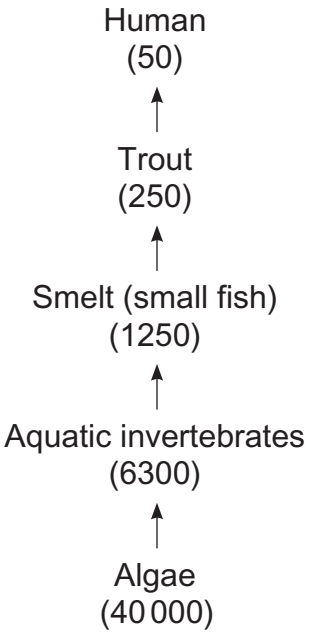
_____

_____ [2]

Examiner Only

Marks	Remark

(d) The food chain shows the amount of energy (kJ/m^2/year) available at each trophic level for a lake.



(i) Name the energy source for this food chain.

_____ [1]

(ii) At what trophic level do primary consumers feed?

_____ [1]

(iii) Give two reasons why not all of the energy in the trout is transferred to humans.

1. _____

_____

2. _____

_____ [2]

Examiner Only

Marks	Remark

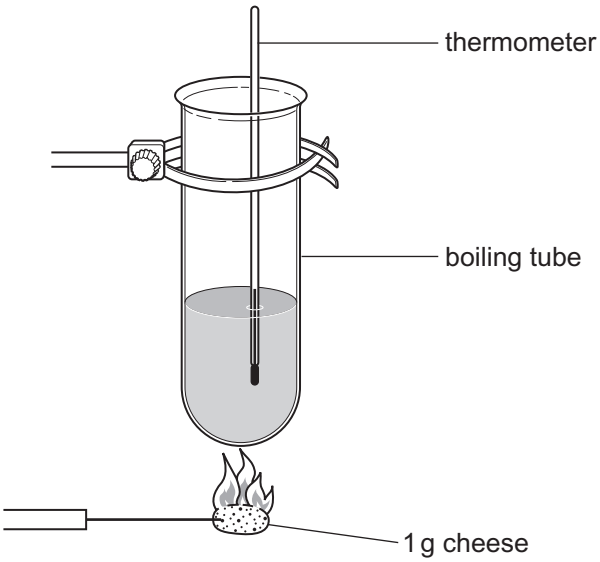
Examiner Only	
Marks	Remark

7 **(a)** Name the reagent used to test for fats and give the end colour for a positive result.

_____

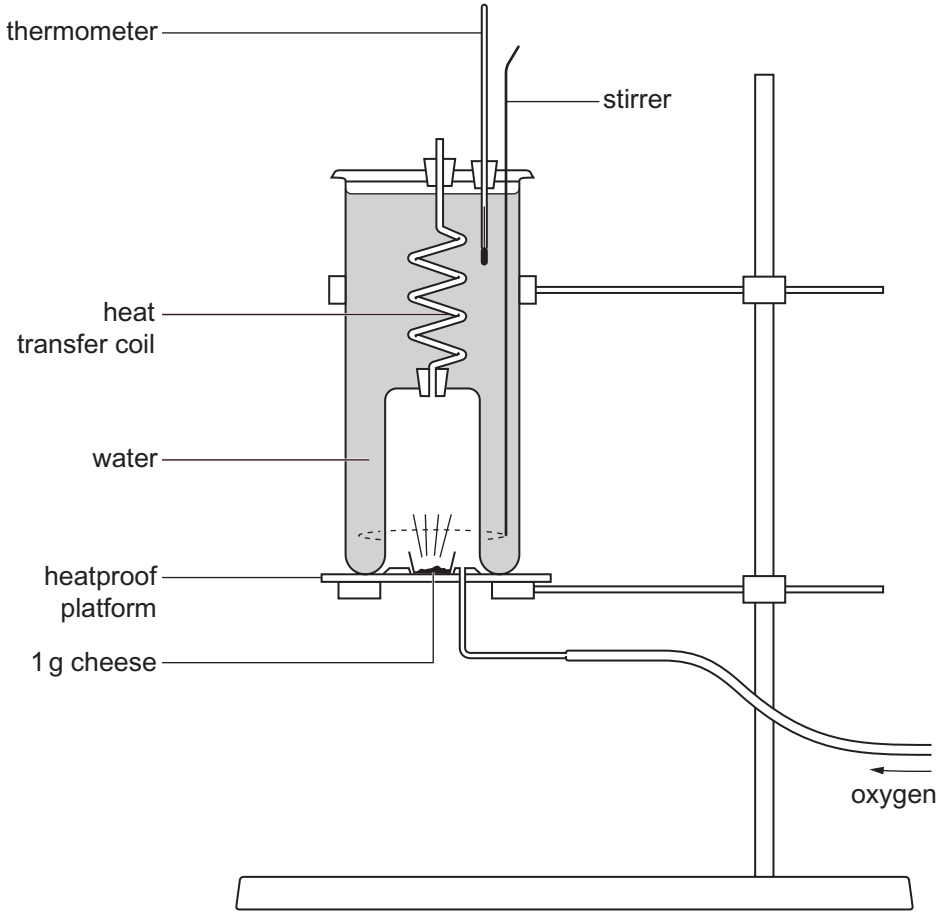
_____ [2]

(b) The diagram below shows the apparatus a group of pupils used to calculate the energy released from one gram of cheese.



The energy released when one gram of cheese was burnt was calculated as 9.8 kJ.

The diagram below shows apparatus (calorimeter) a different group of pupils used to calculate the energy released from one gram of cheese.



The energy released when one gram of cheese was burnt in the calorimeter was calculated as 27.2 kJ.

Use the diagrams and the information provided to explain three reasons why the group of pupils using the calorimeter obtained a higher value for the energy in one gram of cheese.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

Examiner Only

Marks	Remark

(c) Burning food is one form of energy release. Energy can also be released from food in respiration. Respiration can be aerobic or anaerobic.

Give the word equation for anaerobic respiration in mammalian muscle.

_____ [1]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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