



General Certificate of Secondary Education
2014–2015

Centre Number

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Candidate Number

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Double Award Science: Biology

Unit B1

Higher Tier



[GSD12]

GSD12

TUESDAY 12 MAY 2015, AFTERNOON

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in blue or black ink only. **Do not write with a gel pen.**

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 Question **3(a)**.



1 Shags and cormorants are birds that nest on the same cliffs and feed on prey in the same waters.

(a) (i) What does the term habitat mean?

_____ [1]

(ii) What is the habitat of the shags and cormorants?

_____ [1]

(b) The table shows the results from a study of the birds' feeding habits over a two week period.

Region in water where prey live	Type of prey eaten	Numbers of prey eaten/day by the different types of bird	
		Shag	Cormorant
Surface dwelling	Sand eels	33	0
	Herring	49	0
Bottom dwelling	Flatfish	0	26
	Shrimps	0	33

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

(i) Describe and explain how the shags and cormorants can live together in the same area.

_____ [2]



(ii) A change in currents in the water causes less sand eels and herring to arrive near these cliffs.

Describe and explain what effect this would have on the shag and cormorant populations.

[4]



2 (a) What are enzymes?

[2]

(b) Biological washing powders contain enzymes that break down stains on clothes.

One brand of biological washing powder contains the enzymes lipase and protease. These enzymes work best at 40 °C.

Use this information and your knowledge to answer the following questions.

(i) This brand of washing powder was used on clothes that had **only** protein stains.

Name the breakdown product found in the resulting waste water.

[1]

(ii) What type of stain would be broken down by the lipase enzyme?

[1]

(iii) Suggest **one** reason why it is important to follow the manufacturer's guidelines on the amount of powder to add to each wash.

[1]

(iv) What is the advantage to the **environment** of using a washing powder that works best at 40 °C rather than at a higher temperature?

[1]



(v) Non-biological washing powders do **not** contain enzymes.

Why can non-biological washing powders be used at higher temperatures than biological washing powders?

[1]

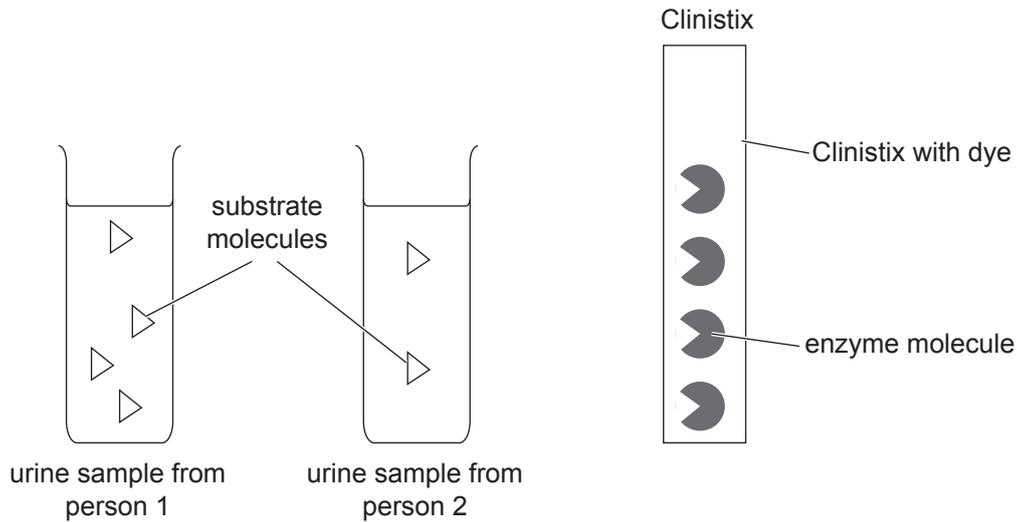
[Turn over



- (c) A Clinistix is a small paper strip containing one type of enzyme and a dye. It is used to test urine to find out if someone has diabetes.

When **each** enzyme molecule on the Clinistix joins with a substrate molecule, it produces a small change in the colour of the dye.

The diagram shows urine samples from two people with untreated diabetes and a Clinistix.



Source: Principal Examiner

Use this information, the diagram and your knowledge to answer the following questions.

- (i) What substance is found in the urine of a person indicates that they may have diabetes?

[1]



- (ii) Separate Clinistix were placed in the urine samples of person 1 and person 2.

Describe and explain the difference you would expect to see in the two Clinistix test results.

[2]

- (iii) Explain why the Clinistix will **not** react to the presence of other molecules in the urine.

[1]

- (d) Some people with diabetes have to inject a hormone into their bloodstream.

- (i) Name this hormone.

[1]

- (ii) Where in the body is this hormone produced?

[1]

- (iii) Describe and explain the action of this hormone.

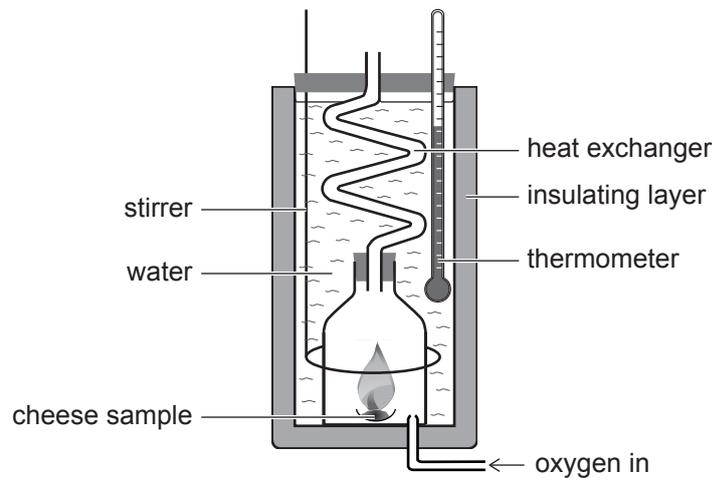
[3]

[Turn over



[6]

(b) The diagram shows apparatus that a manufacturer would use to check the energy content of 1 gram of cheese.



Source: Examining Team

This apparatus will give more accurate values compared to the student's apparatus.

Give **three** reasons why.

1. _____

2. _____

3. _____

[3]

[Turn over



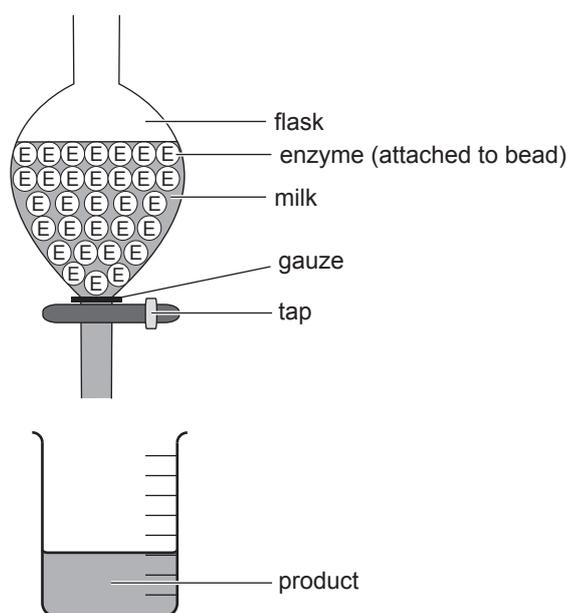
- 4 Lactose is the sugar present in milk. Lactose is made up of two other sugars, glucose and galactose joined together.

Some people cannot digest lactose because they do not have the enzyme to break it down. This causes them to have digestive problems.

Milk that is suitable for these people can be commercially produced by treating it with an enzyme that breaks down the lactose.

All the enzyme molecules are permanently attached to beads.

The diagram shows the type of apparatus used during this process.



Source: Principal Examiner

Use the information above, the diagram and your knowledge to answer the following questions.

- (a) Suggest why the tap is kept closed for one hour after the milk is added to the flask.

[1]



(b) (i) Name a substance present in the milk at the start that is absent in the product.

_____ [1]

(ii) Name a substance present in the product that was **not** present in the milk at the start.

_____ [1]

(c) Suggest an advantage of using enzyme molecules attached to the beads rather than using the enzyme in solution.

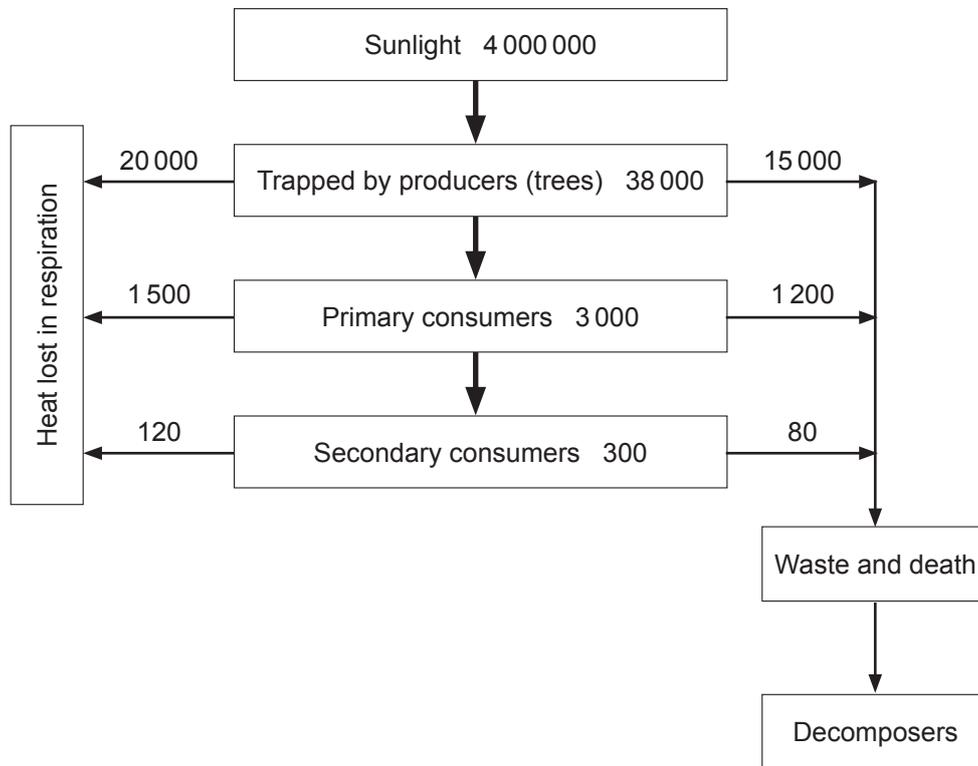
_____ [1]

[Turn over



5 The diagram shows energy flow through a forest.

The figures give the energy flow in $\text{kJ/m}^2/\text{year}$.



Source: Principal Examiner

Use the diagram and your knowledge to answer the following questions.

(a) Only a small amount of the sunlight that reaches the forest is trapped by producers in photosynthesis. Suggest why.

_____ [1]

(b) Give **two** ways plants use glucose produced in photosynthesis.

1. _____

2. _____ [2]



(c) At what trophic level do secondary consumers feed?

_____ [1]

(d) (i) Calculate the amount of energy that is left in the secondary consumers that could be transferred to the next trophic level.

Show your working.

_____ kJ/m²/year [2]

(ii) Suggest why there may **not** be another trophic level in this food chain.

_____ [1]

[Turn over



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- 6 (a) Nitrates are needed for plant growth.
In the nitrogen cycle there are two types of bacteria that help **increase** the nitrate content of soils.

Name these **two** types of bacteria and describe their functions in the nitrogen cycle.

Bacteria 1 _____

Function _____

Bacteria 2 _____

Function _____

_____ [4]

- (b) Root hair cells absorb nitrates from soil.

- (i) Describe how these cells are adapted to absorb nitrates from the soil.

_____ [1]

- (ii) Name and explain the process by which root hair cells absorb nitrates.

_____ [3]

[Turn over



- (ii) Suggest **one** reason why nitrate levels would have decreased 2 km further down the river.

[1]

- (iii) Biological oxygen demand (BOD) is one way of measuring pollution.

The **higher** the BOD value, the **lower** the oxygen level is in the water.

Compare the BOD levels you would expect to find in water samples from **A** and **B**.

[1]

- (iv) Indicator species can be used to monitor pollution.

Bloodworms and mayfly larvae are indicator species.

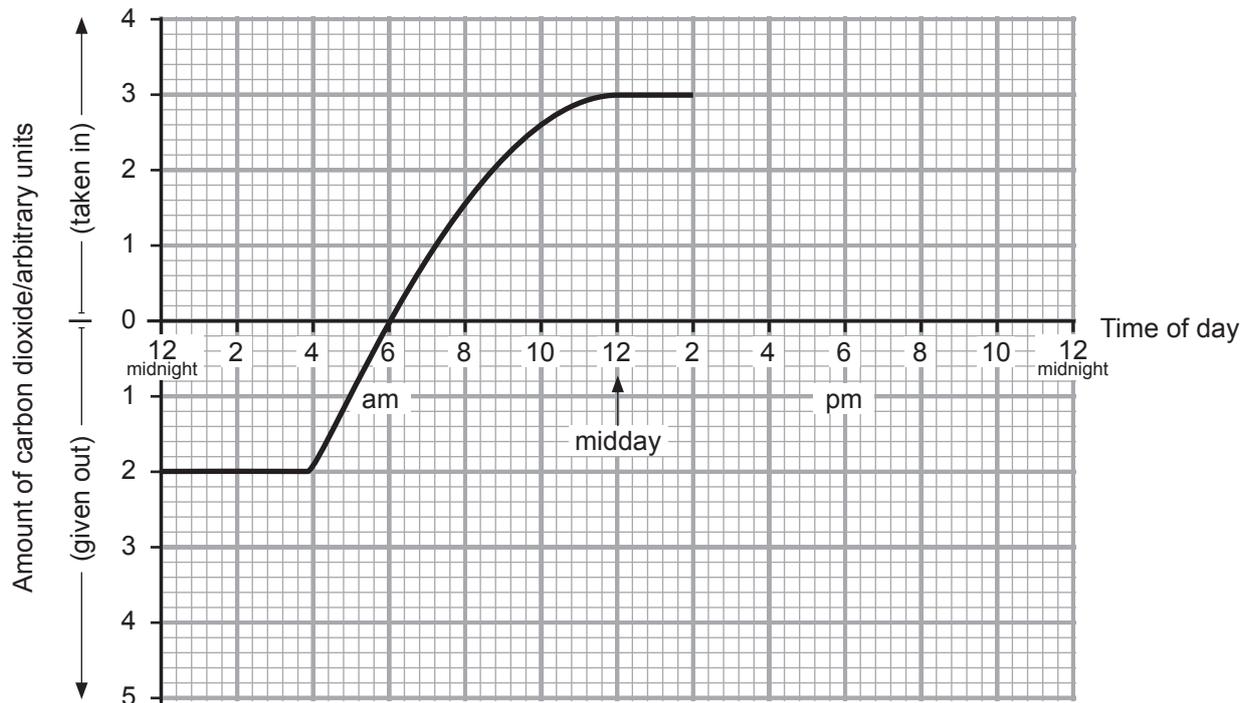
Describe and explain the changes in numbers of each indicator species in the river between **A** and **B**.

[2]

[Turn over



- 7 The graph shows the amount of carbon dioxide taken in and given out by a plant at different times during a summer's day.



Source: Principal Examiner

- (a) Use the graph and your knowledge of photosynthesis and respiration to **explain** the amount of carbon dioxide taken in or given out at the following times.

- (i) midnight to 4 am

[2]



(ii) 6 am

[2]

(iii) 12 (midday) to 2 pm

[2]

(b) Complete the graph by drawing a line to show what you would expect to happen to the amount of carbon dioxide between 2 pm and midnight. [2]

(c) Some plants are adapted to grow in shade. They are able to absorb **more** of the available light at **lower** light levels than normal plants.

What is the advantage to plants of this adaptation to shade?

[2]

THIS IS THE END OF THE QUESTION PAPER



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

Total Marks	
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Examiner Number

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