

Candidate Name	Centre Number	Candidate Number
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**GCSE**

239/02

**ADDITIONAL SCIENCE  
HIGHER TIER  
BIOLOGY 2**

P.M. THURSDAY, 19 May 2011

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	4	
2	5	
3	6	
4	6	
5	4	
6	6	
7	3	
8	6	
9	10	
<b>Total</b>	<b>50</b>	

**ADDITIONAL MATERIALS**

In addition to this paper you may require a calculator and a ruler.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

Answer **all** questions.

- 1. Rhys, Angharad and their parents were very excited when they went whale watching from a high powered motor boat.  
Rhys said “We got so close to the whales that we even managed to get in between a mother and its calf”.



Google images

- (a) Suggest **two** harmful effects that this type of ecotourism could have on the whales. [2]

- (i) .....

- (ii) .....

- (b) Ecotourism also occurs in the Manu Biosphere Wildlife Reserve in Peru. This reserve is a good example of a sustainable use of wildlife.

- (i) Explain the meaning of sustainable use of wildlife. [1]

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- (ii) Suggest **one** benefit that ecotourism in the Manu Biosphere Wildlife Reserve has on the local communities. [1]

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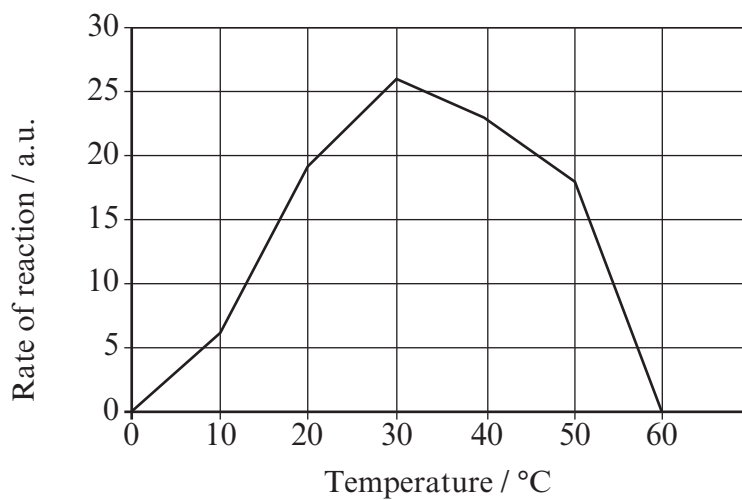
2. (a) What is an enzyme? [2]

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(b) An investigation was carried out in a school laboratory into the effect of temperature on the breakdown of starch by the enzyme amylase. The results of the investigation are shown in the graph below.



From the graph:

(i) **Describe** the effect of temperature, above 30°C, on the amylase. [1]

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(ii) **Explain** the effect of temperature, above 30°C, on the amylase. [1]

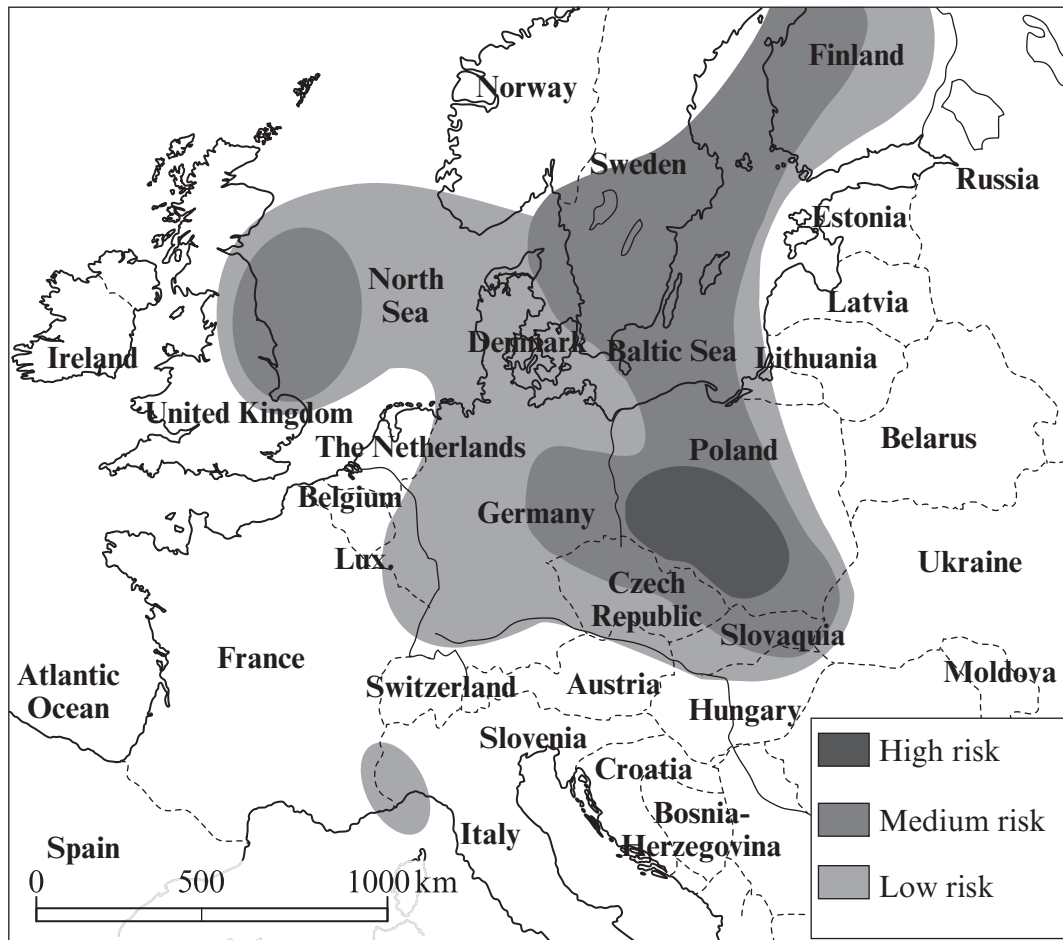
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(c) State **one** factor which should be kept constant during this investigation. [1]

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3. The map shows the regions of Europe which are most at risk from acid rain.



- (a) Which country and sea are most at risk from acid rain? [2]

Country .....

Sea .....

- (b) Acid rain forms when gases such as carbon dioxide ( $\text{CO}_2$ ) and sulphur dioxide ( $\text{SO}_2$ ) dissolve in water in the atmosphere.

- (i) Name the process that releases these gases. [1]

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- (ii) Name the source of these gases. [1]

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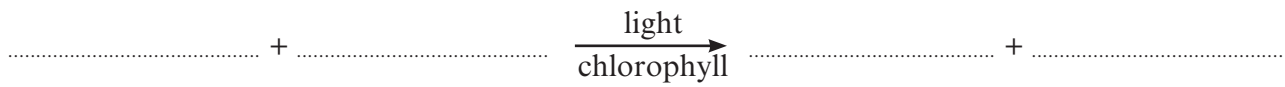
- (c) State **two** effects of acid rain on the environment and living organisms. [2]

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4. (a) Complete the word equation for photosynthesis.

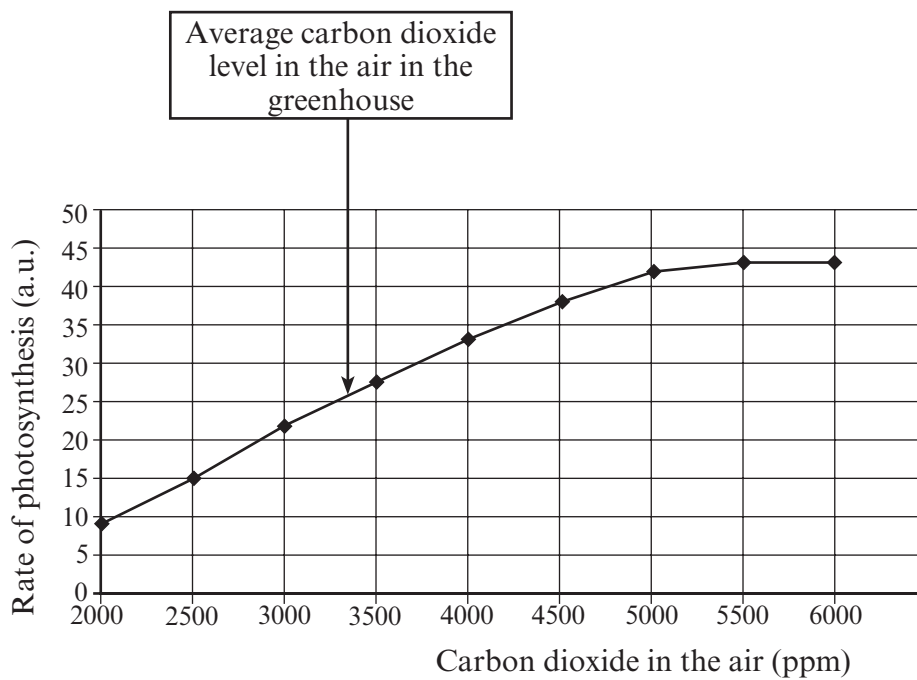
[2]



A farmer wanted to increase the yield of strawberries grown in his greenhouse.



An advisor calculated the average level of carbon dioxide in the air in the greenhouse over a 24 hour period. He compared the average carbon dioxide level in the greenhouse with the carbon dioxide graph below, and marked it on the graph.



(b) (i) Why did the advisor measure the average concentration of carbon dioxide in the air over a 24 hour period rather than taking a single reading at a particular time during the 24 hour period? [1]

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(ii) I. Using the graph, draw a conclusion about the rate of photosynthesis of the strawberry plants in the farmer's greenhouse. [1]

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II. Using only the graph, what advice would you give the farmer in order to gain a **maximum** yield of strawberries? [2]

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5. (a) State the role of the following organs in chemical digestion.

(i) the mouth

[1]

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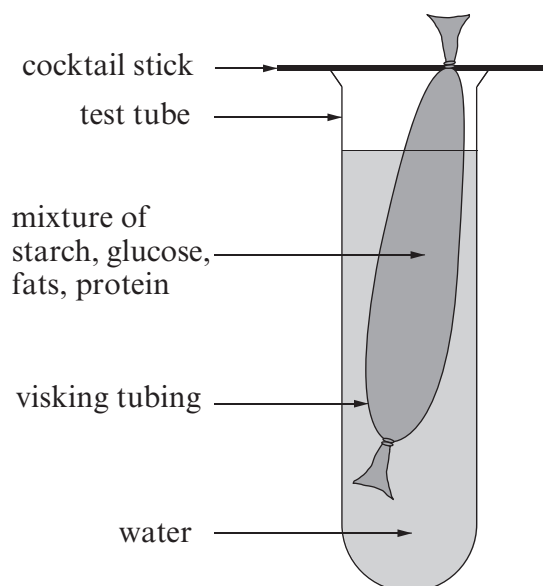
(ii) the stomach

[1]

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(b) The visking tubing below represents a model of the intestine. Starch, glucose, fats and protein were mixed in water. The mixture was poured into the visking tubing. The visking tubing was tied at the end and suspended in a test tube of water.



After 24 hours the water in the test tube was sampled.

In the table below indicate with a tick (✓) or a cross (✗) to show whether each of the food substances was present in the water or not. [2]

Food substance	Contents of the water in the test tube after 24 hours (✓ or ✗)
starch	
glucose	
fats	
protein	



6. Otters live near rivers and eat fish and other small animals that live in water.

(a) Between 1950 and 1970 the otter population in Wales decreased. Conservationists suggested that the decrease was because of the use of pesticides to kill insects. Suggest how the use of pesticides caused a decrease in the population of otters. [2]

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(b) Since 1929 the American mink has been bred in mink farms in Britain for their fur. Mink eat the same food as otters. In 1998 animal rights supporters released over 2000 mink from a mink farm.

(i) What word is used to describe animals which have been introduced to a country where they do not normally live in the wild? [1]

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(ii) Explain how the release of the mink could affect biodiversity in Wales. [3]

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7. When an athlete starts to run a race,

(a) aerobic respiration is taking place in her muscle cells. Complete the word equation (do **not** use chemical symbols) to show this process. [1]

..... → ..... + energy

(b) Towards the end of the race anaerobic respiration is taking place in her muscle cells. Write a word equation (do **not** use chemical symbols) to show this process. [1]

..... → ..... + energy

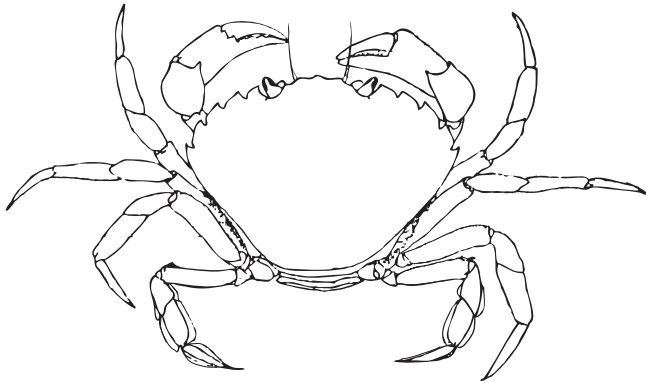
(c) Explain why aerobic respiration is more efficient than anaerobic respiration. [1]

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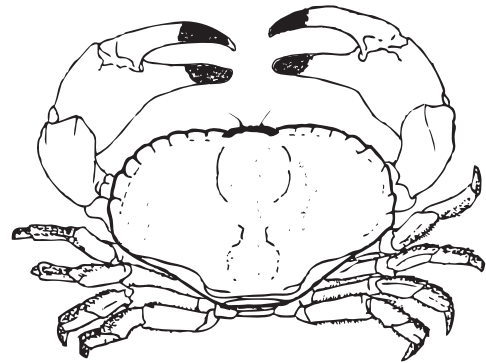
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8.



*Carcinus maenas*



*Cancer pagurus*

The common shore crab, *Carcinus maenas*, lives in sea water and also in the mouths of rivers where sea water is very dilute. It is able to keep a constant concentration of salts in its body fluids. This overcomes the problem of osmosis. It does this by transporting salts in or out of its body by active transport.

(a) (i) What does *active transport* mean? [2]

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(ii) How does the common shore crab adjust the concentration of its body fluids, by active transport, in very dilute sea water? [1]

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(b) The edible crab, *Cancer pagurus*, only lives in sea water and not in the mouths of rivers. It is unable to adjust the concentration of its body fluids like the common shore crab. Explain how osmosis would affect the edible crab if it was kept in very dilute sea water. [3]

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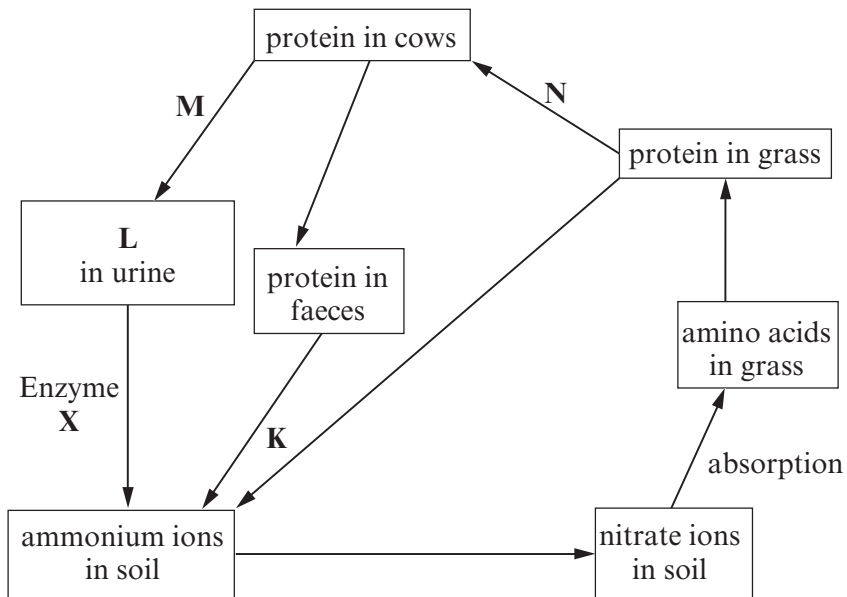
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9. The flow diagram shows part of the nitrogen cycle in a field grazed by cows.



(a) Name the processes **M**, **N** and **K**.

[3]

**M** .....

**N** .....

**K** .....

(b) Name the chemical **L** and the enzyme **X**.

[2]

**L** .....

**X** .....

(c) There are internationally recognised areas where the use of chemical fertiliser is restricted. In 2009, the Welsh Assembly Government designated such an area around a lake, Llyn Caron, in Anglesey. This was because the lake had an algal bloom (overgrowth of water plants).

(i) Name a **non-chemical** factor which affects the rate of growth of the algal bloom.

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[1]

(ii) Describe and explain the possible effect on the fish in Llyn Caron if the algal bloom was allowed to increase.

[4]

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