

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

0239/02

**ADDITIONAL SCIENCE
HIGHER TIER
BIOLOGY 2**

A.M. TUESDAY, 15 May 2012

45 minutes

**Suitable for Modified
Language Candidates**

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	4	
3.	4	
4.	5	
5.	5	
6.	6	
7.	5	
8.	8	
9.	6	
Total	50	

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.

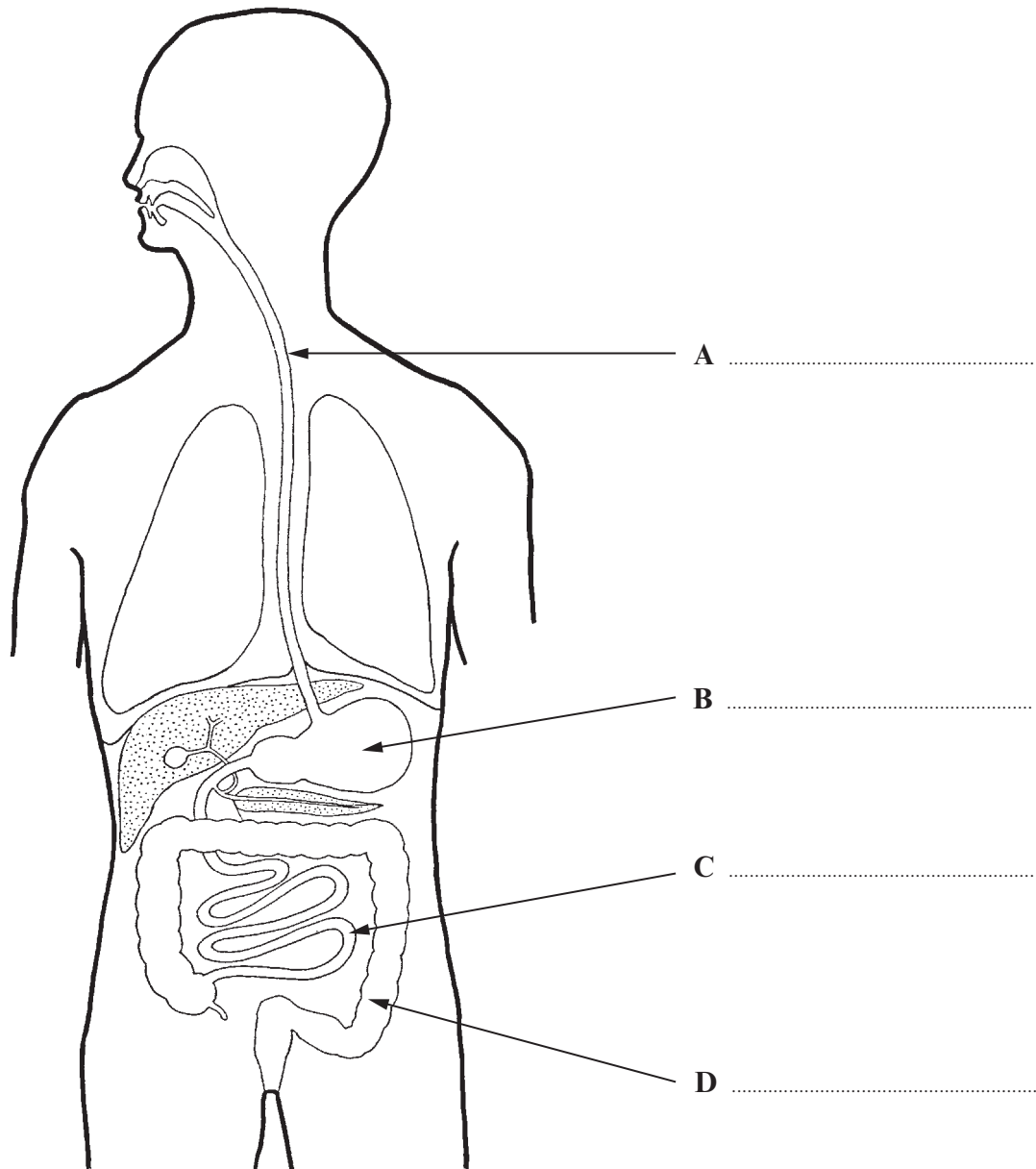
INFORMATION FOR CANDIDATES

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.

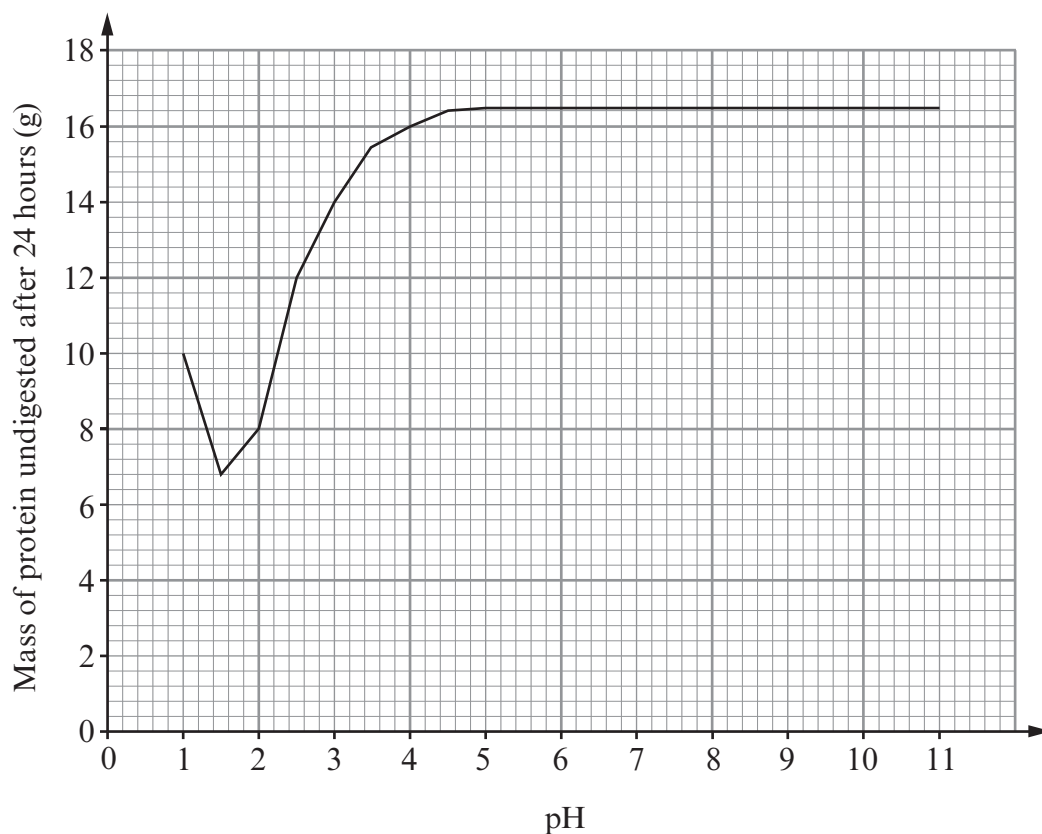
1. The diagram below shows the human digestive system.



- (a) Name the parts labelled **A – D** on the diagram.

[4]

- (b) An investigation was carried out to find the mass of protein digested by a protease enzyme. The mass of protein remaining undigested after 24 hours was recorded. The experiment was repeated at different pH levels. The results are shown in the graph.



- (i) What is the optimum pH of this enzyme? [1]

- (ii) Name the organ where this enzyme can be found in the body. [1]

- (iii) State **one other** feature which should have been kept constant during this investigation. Do not use time. [1]

- 2. Japanese Knotweed is an alien species in the UK. The UK government spend many millions of pounds every year trying to get rid of the plant.

In Japan a small insect, *Aphalara itadoria*, eats Japanese Knotweed. It therefore controls the spread of the plant. This insect has now been imported into the UK from Japan to control Japanese Knotweed. This is the first time that an insect has been licensed for the control of a pest species by the European Union.

Japanese Knotweed



Google Images

- (a) What is meant by an alien species? [1]

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- (b) What term is used to describe the use of a living organism to control a pest species? [1]

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- (c) Japanese Knotweed has caused serious damage to underground drainage, roads and buildings in the UK and Europe for over 50 years. Why has it taken such a long time to approve the use of *Aphalara itadoria* for the control of Japanese Knotweed in the UK and Europe? [2]

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- 3. The sparrowhawk feeds on woodpigeons and blue tits. Blue tits eat insects. Each photo includes the concentration of insecticide found in the flesh of each bird in parts per million (ppm) in Britain in 1965.

Sparrowhawk



Woodpigeon



Blue tit



Google Images

- (a) The woodpigeon eats only plants. Suggest how it has insecticide in its body. [1]

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- (b) The sparrowhawk feeds on woodpigeons and blue tits.
 - (i) Why does the sparrowhawk have a higher concentration of insecticide in its body than either the woodpigeon or the blue tit? [2]

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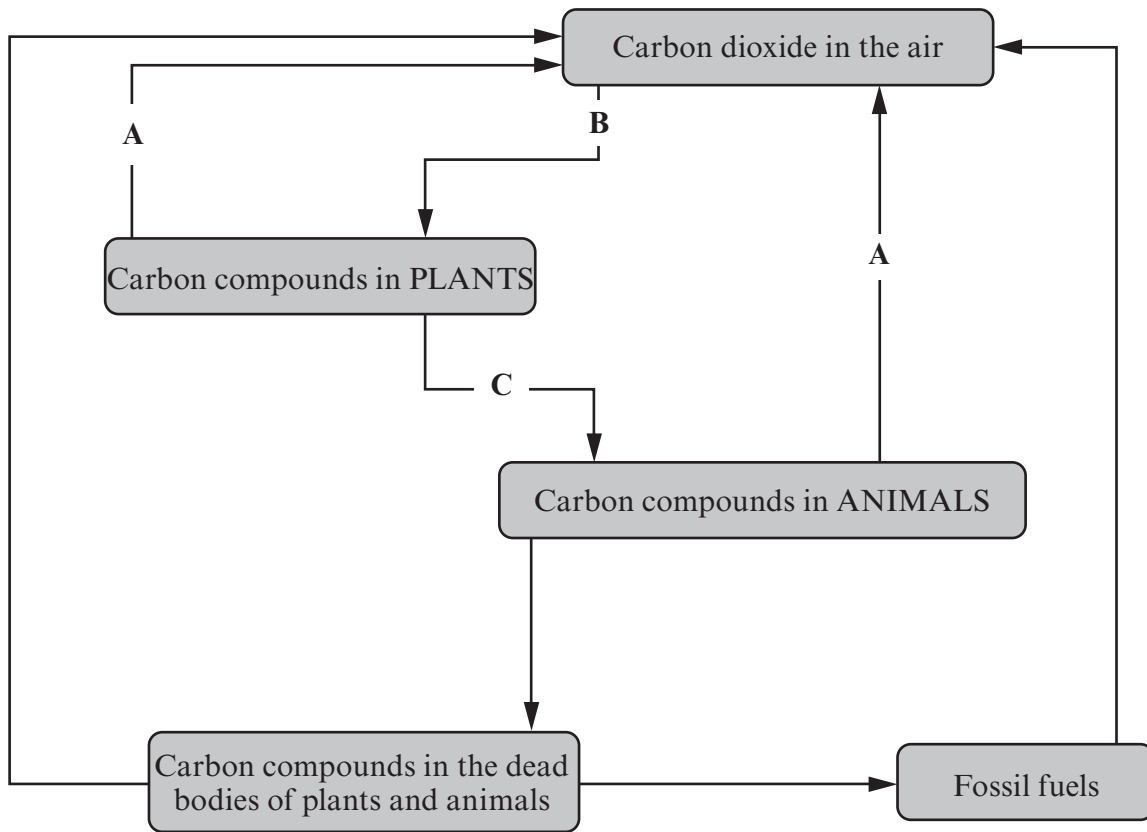
- (ii) Sparrowhawks were often killed by the concentration of insecticide in their bodies but woodpigeons and blue tits were not. Explain the reason for this. [1]

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4. The diagram below shows the carbon cycle.



(a) Name the processes **A**, **B** and **C**.

[3]

A

B

C

(b) How are carbon compounds in the bodies of dead animals and plants returned to the air as carbon dioxide? [2]

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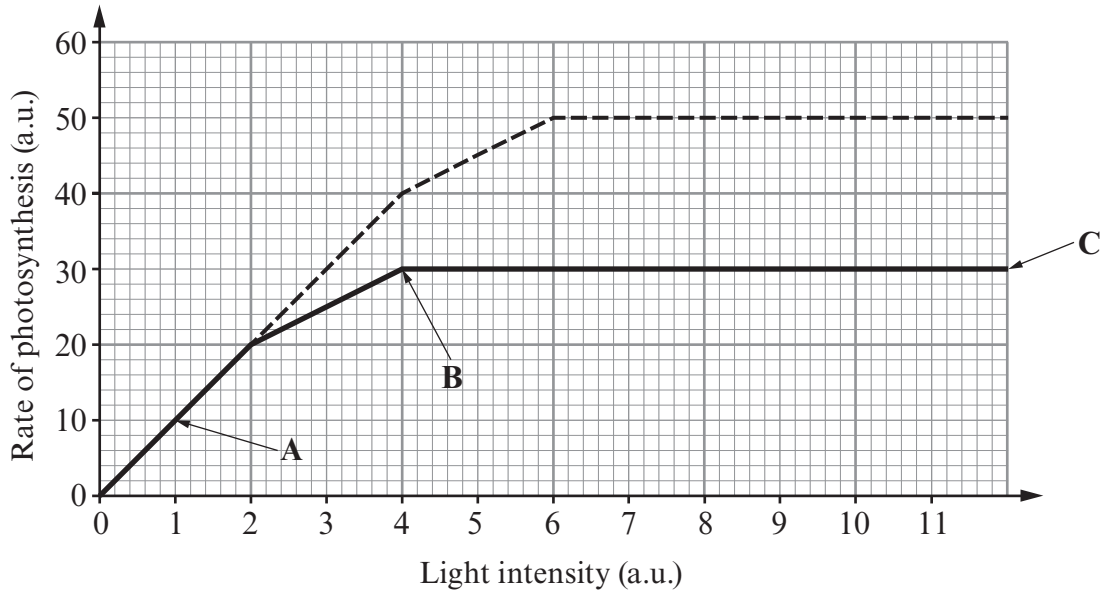
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5. (a) Complete the word equation for photosynthesis below (do not use chemical formulae). [1]



(b) The graph below shows the rate of photosynthesis under different environmental conditions of light and carbon dioxide.



Key
 ----- High concentration of CO₂
 _____ Low concentration of CO₂

(i) State why the rate of photosynthesis is low at point A. [1]

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(ii) Explain why the rate of photosynthesis has levelled off between points B and C. [1]

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(c) How can the rate of photosynthesis be measured in the laboratory? State **one** way. [1]

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(d) Glucose is produced during photosynthesis. How is it used by the plant? State **one** way. [1]

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6. The following information is about the feeding habits of some birds. They feed on a mud flat on the coast of South Wales.

Key: + means that the bird eats the animal

Animal used as food	Type of bird			
	Oystercatcher	Sandpiper	Turnstone	Knot
Spire shell (1st consumer)	+	+	+	+
Clam (1st consumer)	+	+	+	+
Sand hopper (1st consumer)			+	+
Crab (2nd consumer)		+	+	
Fish (2nd consumer)		+	+	

1st consumers = herbivores; 2nd consumers = carnivores.

Using only the information in the table

(a) Name the bird with the least varied diet. [1]

(b) The food chain for the mud flat begins with primitive plants called diatoms. Suggest a possible four stage food chain using only the animals given in the table. The first stage, diatoms, is given.

Diatoms → → → [3]

(c) The mud flat became polluted by heavy metals.

(i) Which **two** animals would be the most affected by the heavy metals? [1]

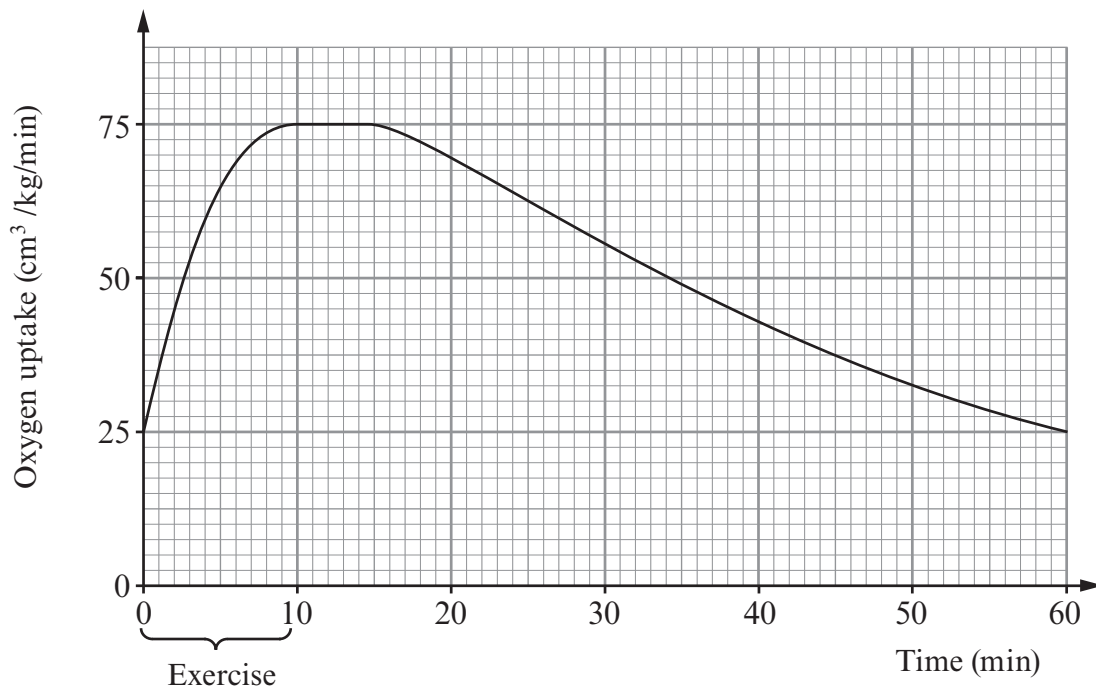
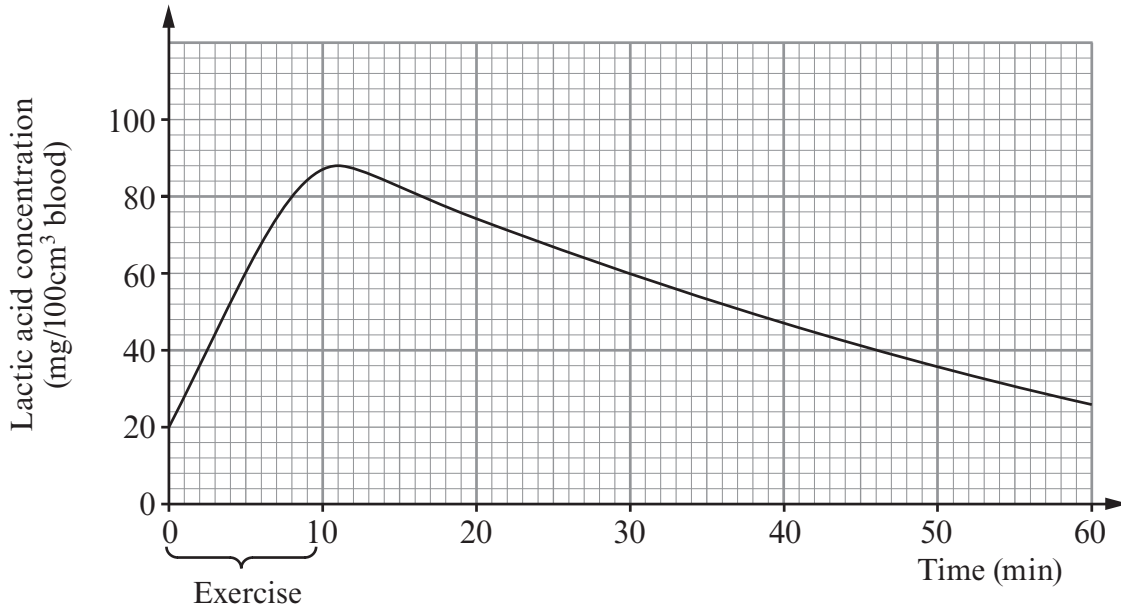
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(ii) Suggest a source of the heavy metal pollution. [1]

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7. The effects of exercise on lactic acid concentration and oxygen uptake in the blood are shown below.



(a) (i) Calculate the increase in the concentration of lactic acid in the blood during the period of exercise. [1]

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(ii) Name the process taking place in the muscle cells which causes the production of lactic acid. [1]

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(iii) Name the chemical broken down to produce lactic acid in cells. [1]

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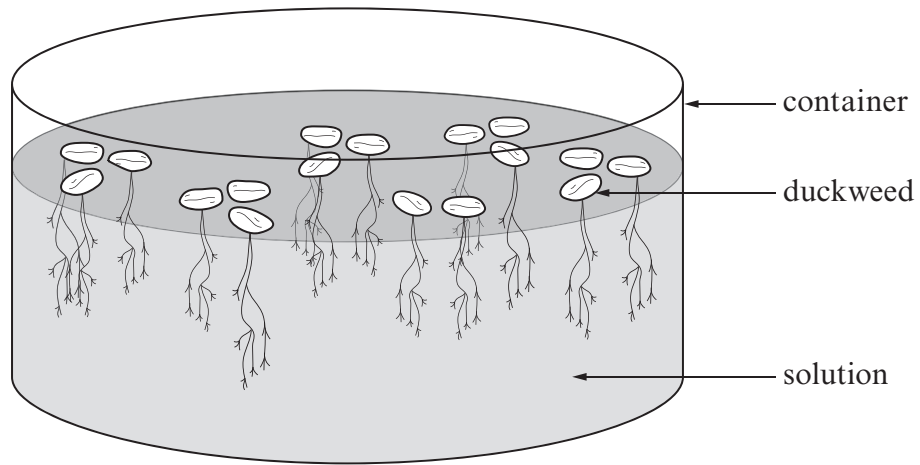
(b) Explain the level of oxygen uptake during the five minutes AFTER the exercise has finished. [2]

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8. A student wanted to investigate the effects of nitrate concentration on plant growth. She used a water plant called duckweed (*Lemna minor*). This plant reproduces asexually by repeatedly dividing into two.



10 plants were added to 5 containers. They contained equal volumes of sodium nitrate of different concentrations. They were left for 7 days and the numbers of plants counted.

The results are shown in the table below.

Container	Sodium nitrate (M)	Number of plants at start	Number of plants after 7 days
1	0.1	10	12
2	0.4	10	15
3	0.6	10	20
4	0.8	10	8
5	1.0	10	2

- (a) In this investigation, state **two** factors which should have been kept constant. Do not use the factors stated above. [1]

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- (b) What do the results suggest about the use of nitrate as a fertiliser? [2]

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(c) A control experiment was set up. All conditions were kept identical to the original investigation, except that sodium sulphate was used instead of sodium nitrate. After 7 days all the plants were dead. What was the reason for using sodium sulphate instead of sodium nitrate? [2]

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(d) Describe how the leaching of fertilisers containing nitrate from farmland might affect fish living in a lake. [3]

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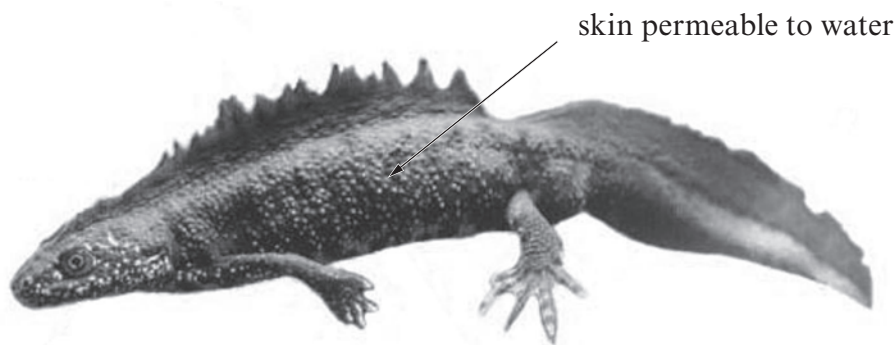
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9. During the very cold winter of 2009 - 2010, thousands of tonnes of salt were put on many roads in Wales to melt the ice. Some of this salt was washed into ponds which were near roads. Some of the ponds are breeding areas for the protected Great Crested Newt, *Triturus cristatus*.



Google Images

- (a) Explain in detail how the salt in the water could affect the Great Crested Newts. [4]

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- (b) This salt water is dangerous to the Great Crested Newt. It is also in danger because of building developments. A breeding colony lives on a proposed building site. What can the builders do to protect the Great Crested Newts before they go ahead with building? [2]

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**THERE ARE NO MORE QUESTIONS
IN THE EXAMINATION.**