

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

0239/02

**ADDITIONAL SCIENCE
HIGHER TIER
BIOLOGY 2**

A.M. TUESDAY, 24 January 2012

45 minutes

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

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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.

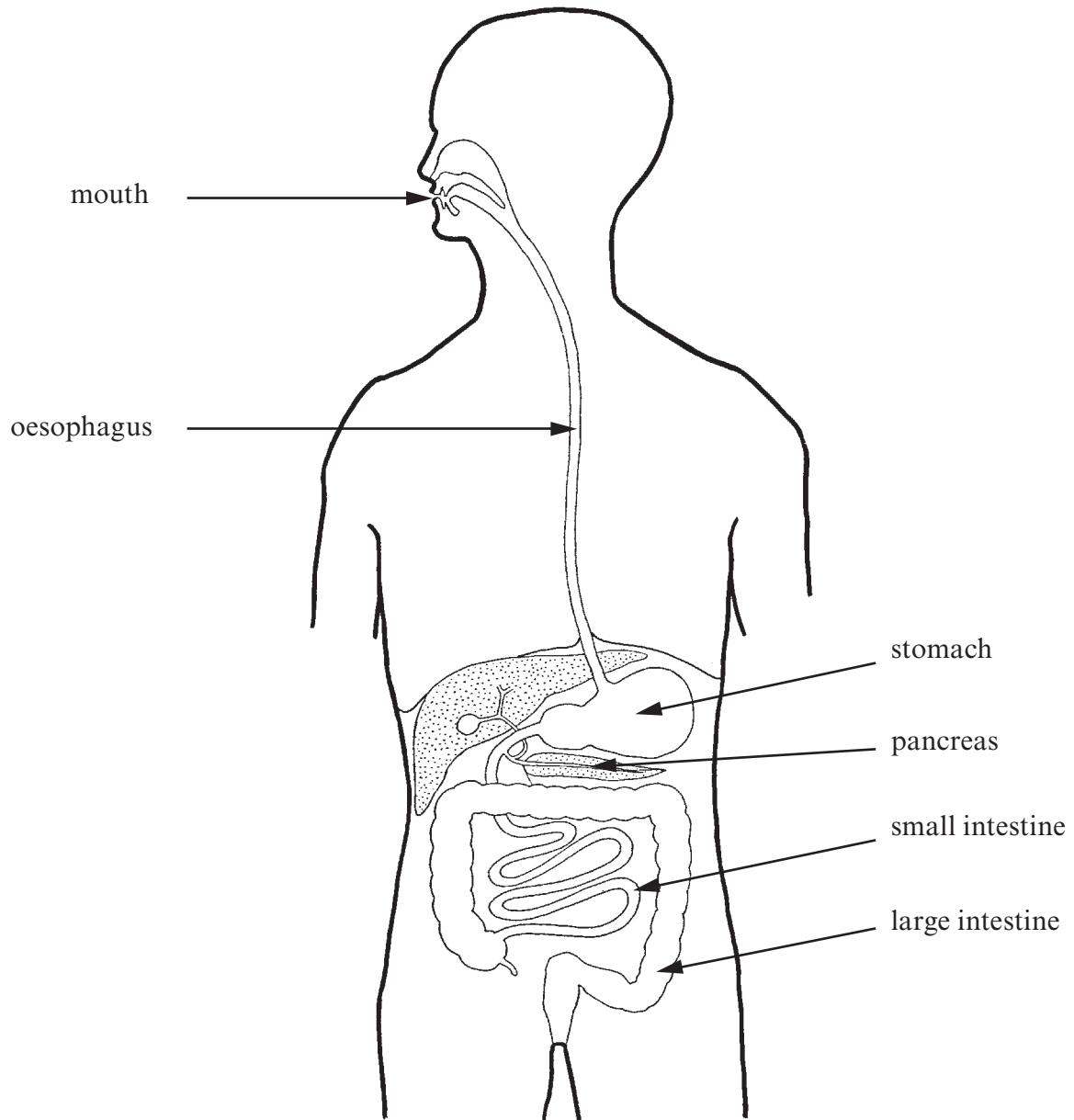
INFORMATION FOR CANDIDATES

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 shows the digestive system.



- (a) Write down the name of the organ from the diagram that best fits each description below.

(i) An organ that secretes lipases, proteases and carbohydrases. [1]

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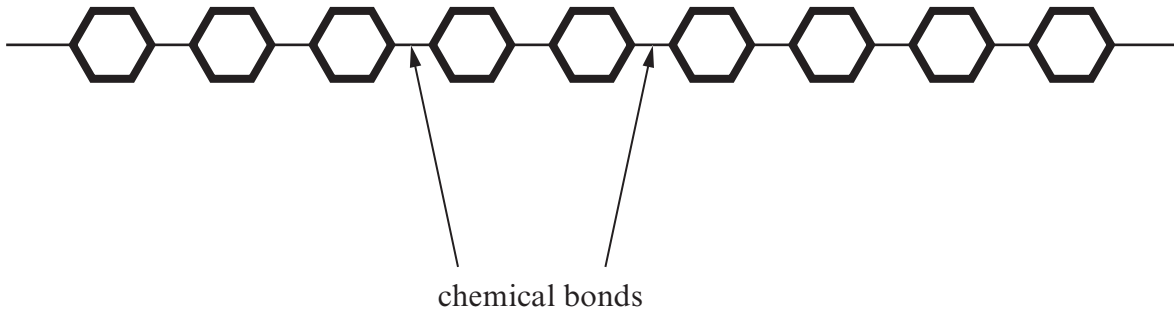
(ii) The organ where fats are digested to fatty acids and glycerol. [1]

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(iii) The organ where the digestion of starch begins. [1]

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(b) The diagram below represents a short length of a starch molecule.



(i) Name the type of enzyme that digests the chemical bonds in the starch molecule. [1]

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(ii) Name the end product of starch digestion. [1]

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2. (a) What is meant by the term *biological control*? [2]

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(b) What name is given to a species of animal or plant which is introduced to an area where it has not previously lived? [1]

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3. A commercial tomato grower was concerned that the temperature in his greenhouses was too high at certain times of the year. The high temperature was reducing the yield of tomatoes.

He experimented by using 7 greenhouses made of ‘SMARTglass’. When an electric current is passed through ‘SMARTglass’ the percentage of light and heat, it lets in, changes. By adjusting the strength of the electric current, the ‘SMARTglass’ can let a varying percentage of light and heat into the greenhouse.

The experiment was allowed to run for a complete growing season.

The results of the experiment are shown in the table below.

	Greenhouse number						
	1	2	3	4	5	6	7
Light and heat allowed to pass (%)	0	30	40	50	60	70	80
Mean mass of tomatoes produced (kg/plant)	0.0	3.4	5.2	5.6	6.9	4.3	2.2

- (a) (i) To obtain the largest mass of tomatoes, what percentage of heat and light is it best to allow to pass into the greenhouse? [1]

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- (ii) All the plants were given as much water as they needed. Name **one other** factor, which affects the rate of photosynthesis, which should be kept the same for all the tomato plants. [1]

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- (iii) When setting up this experiment suggest **two other** ways in which the tomato grower could have kept the experiment fair. [2]

I.

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II.

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- (b) Explain fully why the yield of tomatoes in greenhouse number 2 was less than greenhouse number 5. [3]

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4. (a) In the space below draw a large diagram of a plant cell.
Label **three** parts which are **only** found in **plant cells**.

[3]

(b) Plants and animals have different patterns of growth and development.
State **one** of these differences.

[1]

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(c) State **one** medical use of human stem cells.

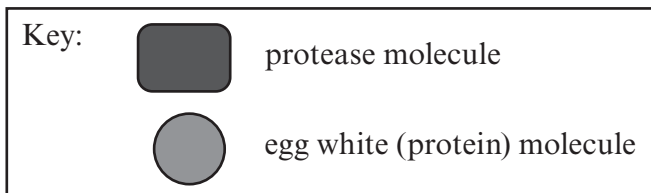
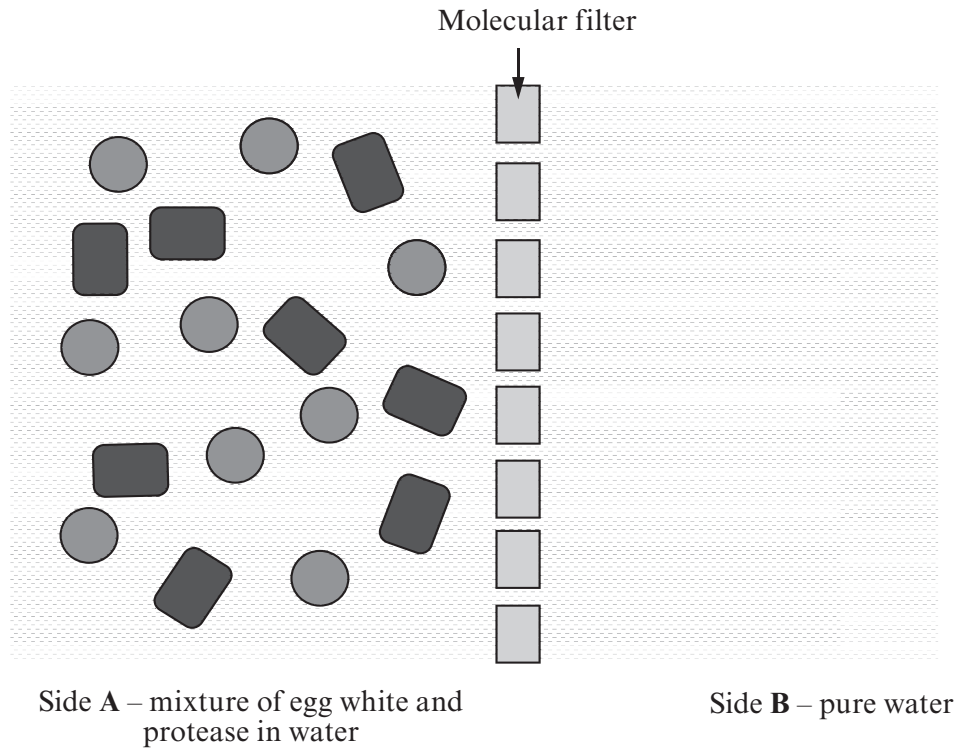
[1]

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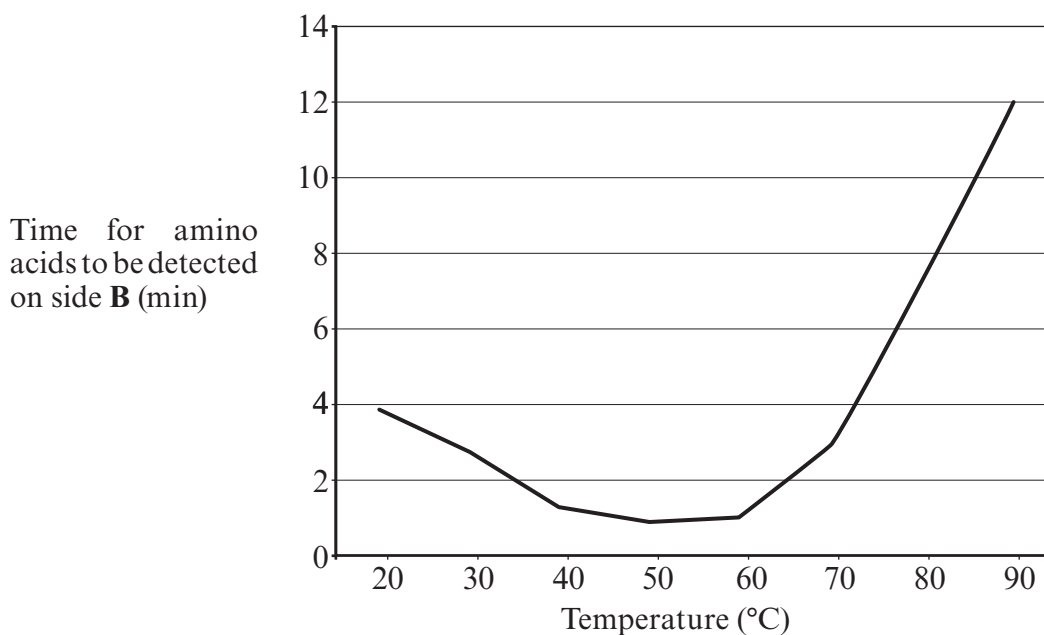
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5. An experiment was set up to investigate the effect of temperature on the action of protease enzyme. A mixture of egg white (protein) and protease in water was separated from pure water by a molecular filter.



The experiment was carried out at different temperatures and the time taken for amino acids to be detected in the pure water on side **B** was noted. The results are shown in the graph below.



(a) Explain **fully** why the time taken for the amino acids to appear in the pure water at 40°C was less than at 20°C. [3]

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(b) Explain **fully** why the time taken for the amino acids to appear in the pure water at 50°C was less than at 90°C. [2]

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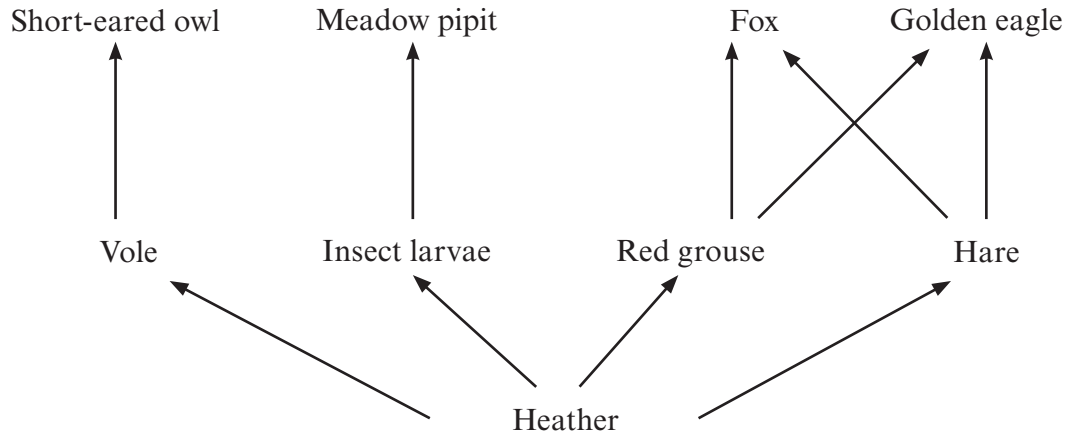
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6. The diagram below shows part of a food web from a heather moorland.



(a) A number of kestrels moved into the area. Kestrels are birds that feed on insect larvae and meadow pipits.

Add the kestrel to the food web to show the relationship of the kestrels to the other organisms. [1]

(b) The owner of the moorland wants to use it for grouse shooting but is not certain how this will affect the hare population.

(i) Explain why the hare population may decrease if grouse numbers are reduced. [1]

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(ii) Explain why the hare population may increase if grouse numbers are reduced. [1]

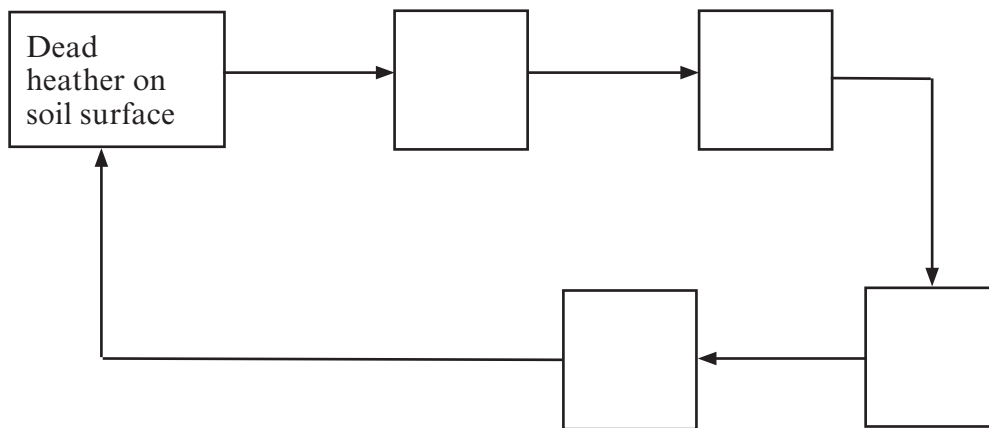
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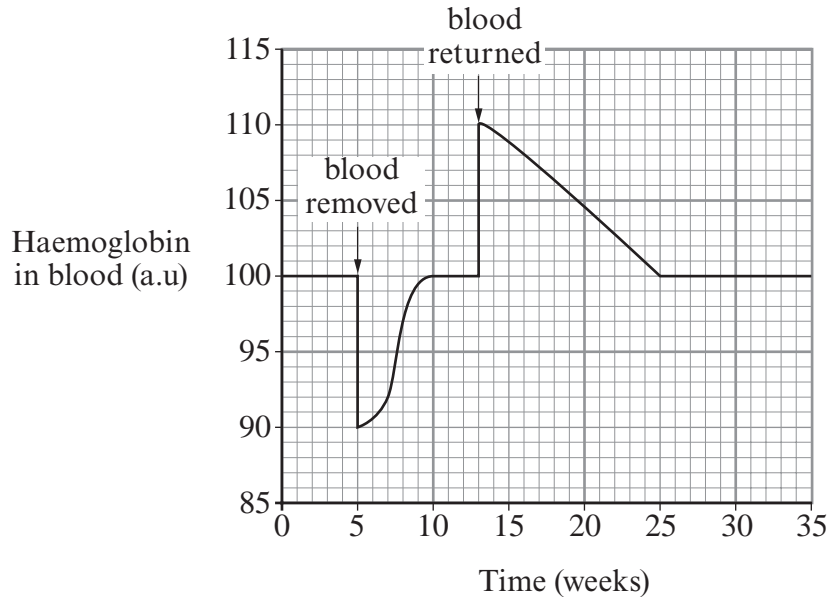
(c) To make sure that the heather on the moorland remains healthy and plentiful, it is necessary to understand how the nitrogen cycle works. The processes involved are listed below but are NOT in the correct order.

- A The roots of heather take up nitrogen compounds.
- B Nitrates are produced in moorland soil.
- C Heather plants produce protein.
- D Dead heather plants decay and ammonium compounds are produced.
- E Ammonia is formed from nitrogen in the air.

Using some of the letters given above, complete the diagram below to show the correct order of the stages in this cycle. [4]



7. Medical technology has been used in sport to improve the performance of athletes. An athlete had 500 cm³ blood removed, stored, and later returned to his body. Haemoglobin is the chemical in the red blood cells which carries oxygen. The graph shows how the haemoglobin content of the blood in the athlete changed during the treatment. This procedure is now banned in international athletics.



- (a) Use the graph to answer the following.
- (i) What is the normal level of haemoglobin in the blood?
 a.u. [1]
- (ii) How many weeks did it take for the athlete's haemoglobin to return to normal after the blood was removed?
 weeks. [1]
- (b) The athlete ran a 100m sprint race seven weeks after having the blood returned to his body. Explain why he produced less lactic acid in his muscles than before he received the treatment. [4]

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8. Mrs Savemore did not want to spend money on weedkillers. Weeds were growing in her garden so she made a concentrated solution of salt and poured it on the weeds. After four days the weeds were dead.

(a) Explain why the high concentration of salt caused the weeds to die. [4]

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(b) In salt marshes, the soil is covered by sea water at high tide. Specially adapted plants (Halophytes) are able to survive in these areas of high salt concentration. They survive because the contents of their cells have high concentrations of salts.

(i) Name the process by which these plants can take salts into their cells against a concentration gradient. [1]

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(ii) Name **two** chemicals which are needed to release energy for this process to occur. [2]

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9. An industrial town near lake Nakuru in Kenya has become bigger since 1996. One effect of this is an increase in the volume of sewage that flows into lake Nakuru. Explain how this sewage pollution might affect the organisms in the lake. [5]

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