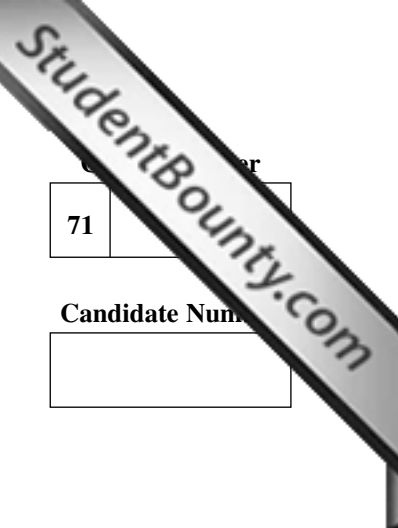




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ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2009



71

Candidate Number

# Biology

## Assessment Unit AS 2

*assessing*

### Module 2: Physiology and Ecology

[ASB21]



FRIDAY 12 JUNE, AFTERNOON

#### 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 eight** questions.

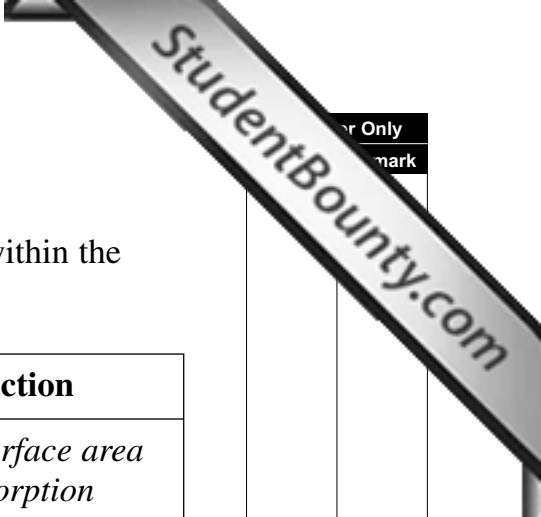
#### INFORMATION FOR CANDIDATES

The total mark for this paper is 55.  
Section A carries 43 marks.  
Section B carries 12 marks.  
You should spend approximately **15 minutes** on Section B.  
You are expected to answer Section B in continuous prose.  
Quality of written communication will be assessed in **Section B**.  
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

<b>Total Marks</b>	
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### Section A



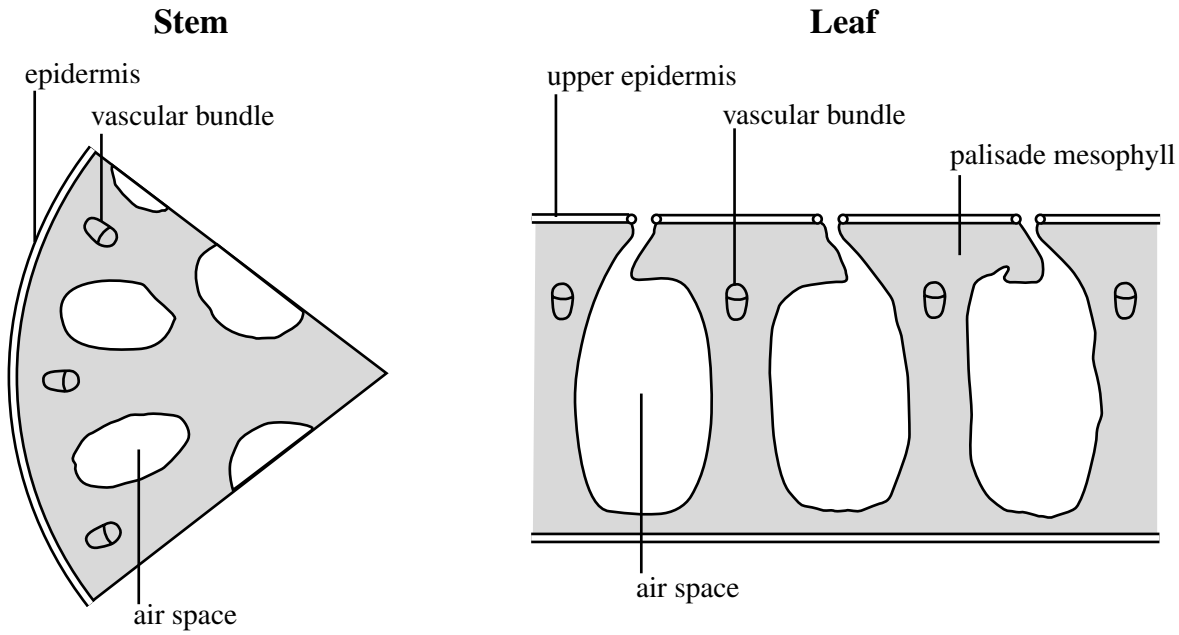
r Only  
mark

1 Describe the structure and function of the following features within the ileum. (The first one has been completed for you.)

Ileum feature	Structure	Function
Microvilli	<i>Projections of the exposed membrane of columnar epithelial cells lining the ileum</i>	<i>Increase surface area for the absorption of the products of digestion</i>
Crypts of Lieberkühn		
Goblet cell		
Lacteal		
Muscularis mucosa		

[4]

2 The diagrams below show part of a stem and part of a leaf of a hydrophytic plant.



(a) Explain the presence of the air spaces in the stem.

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[2]

(b) Explain **two** ways in which the leaf exhibits hydrophytic adaptations.

1. \_\_\_\_\_

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2. \_\_\_\_\_

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[2]

3 (a) Distinguish between the terms 'gross productivity' and 'net productivity'.

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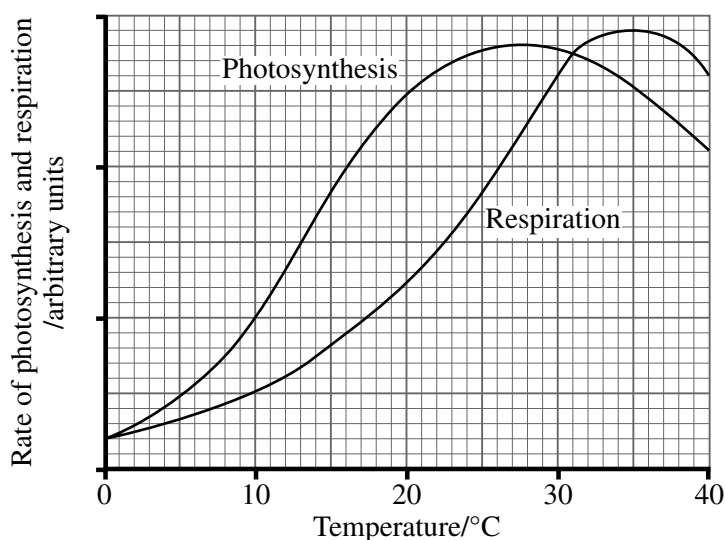
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[2]

(b) The graph below shows the effect of temperature on both the rate of photosynthesis and the rate of respiration in a leaf.



Analyse the graph to explain the influence of temperature on the net productivity (growth) of a leaf.

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[3]

4 The table below shows three agricultural food chains and the subsequent energy yield available for human consumption.

Food chain	Example	Energy yield for human consumption /10 <sup>3</sup> kJ ha <sup>-1</sup> y <sup>-1</sup>
1. Grassland → dairy cows → humans	Milk/dairy products consumed by humans	1356
2. Cultivated plant crop → humans	Wheat/wheat products consumed by humans	7800–11 000
3. Intensively farmed grassland → dairy cows → humans	Milk/dairy products consumed by humans	3813

(a) Much of the energy contained in the grass does not go to the cows in food chain 1. Suggest **two** alternative destinations for this energy.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_ [2]

(b) Explain why food chain 2 has a higher energy yield for human consumption than food chain 1.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

(c) Outline **one** health benefit for humans in food chain 2.

\_\_\_\_\_  
\_\_\_\_\_ [1]

(d) Outline **one** possible way in which the productivity of the intensively farmed grassland may have been increased and explain how this method would increase the productivity.

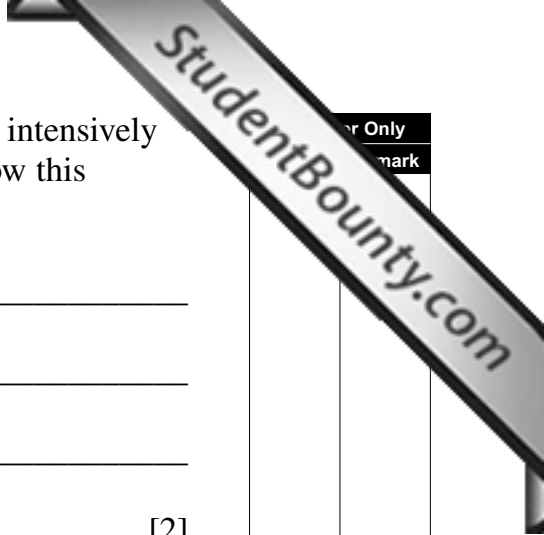
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[2]



Mark	Answer Only

- 5 The table below shows the red blood cell counts for a person living at sea level, and the same person after acclimatisation at high altitude in preparation for climbing Mount Everest.

	Red blood cell count/dm <sup>-3</sup>
At sea level	$5.0 \times 10^{12}$
After acclimatisation at high altitude	$5.6 \times 10^{12}$

- (a) Describe how the partial pressure of atmospheric oxygen varies with altitude.

\_\_\_\_\_ [1]

- (b) Explain the advantage of having a higher red blood cell count at high altitude.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

People such as the Quechua Indians in the Andes, who live permanently at high altitude, not only have increased red blood cell counts but possess other adaptations for life at high altitude.

- (c) Describe **one** other adaptation to life at high altitude which might be expected, and explain how this adaptation aids their survival.

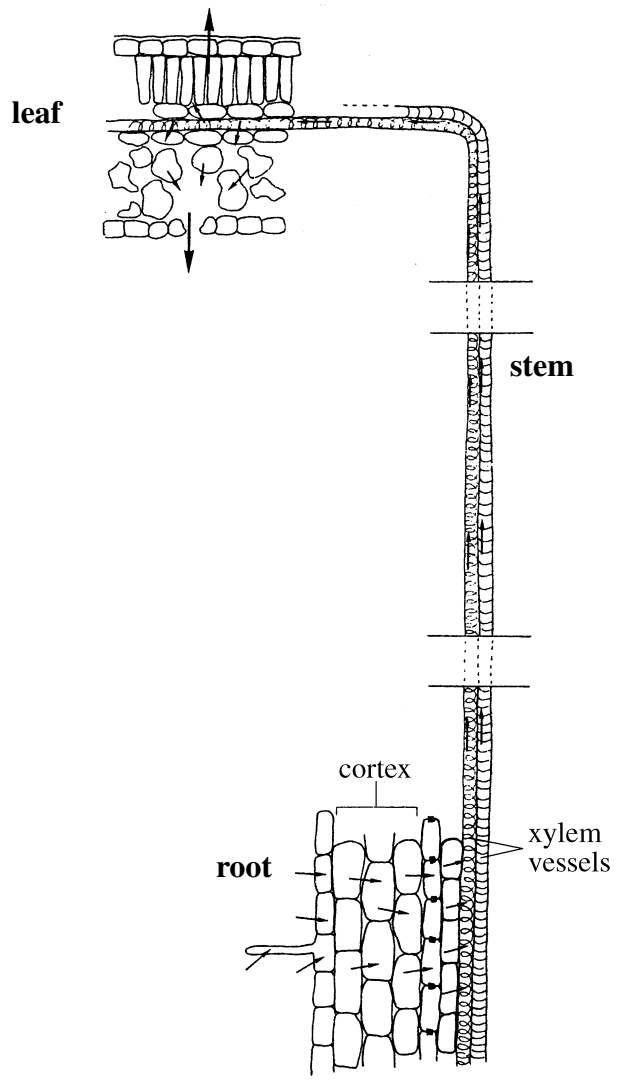
\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

The increased production of red blood cells is due to the release of the hormone erythropoietin (EPO) in the body. Athletes can inject EPO to artificially stimulate the red blood cell count and so boost performance.

- (d) Suggest **one** possible danger to the athlete of an artificially raised blood cell count.

\_\_\_\_\_ [1]

6 The diagram below summarises the movement of water through a plant.



*A-Level Biology by W D Phillips and T J Chilton (OUP, 1989), copyright © Oxford University Press, reprinted by permission of Oxford University Press*

(a) Describe the movement of water through the root cortex and into the xylem vessels.

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[4]





7 The balance between predator and prey populations is rarely stable and may show periodic fluctuations.

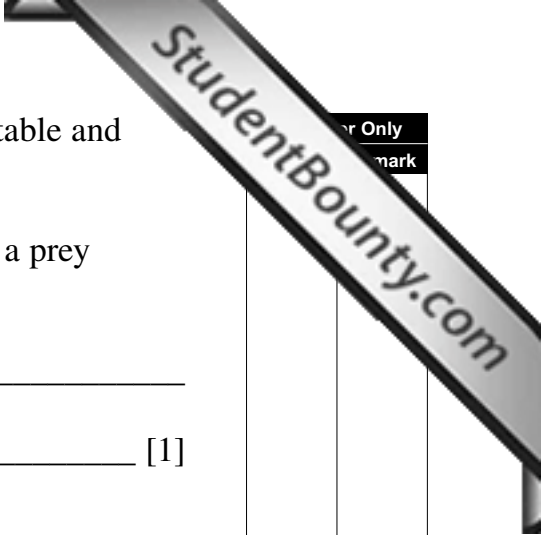
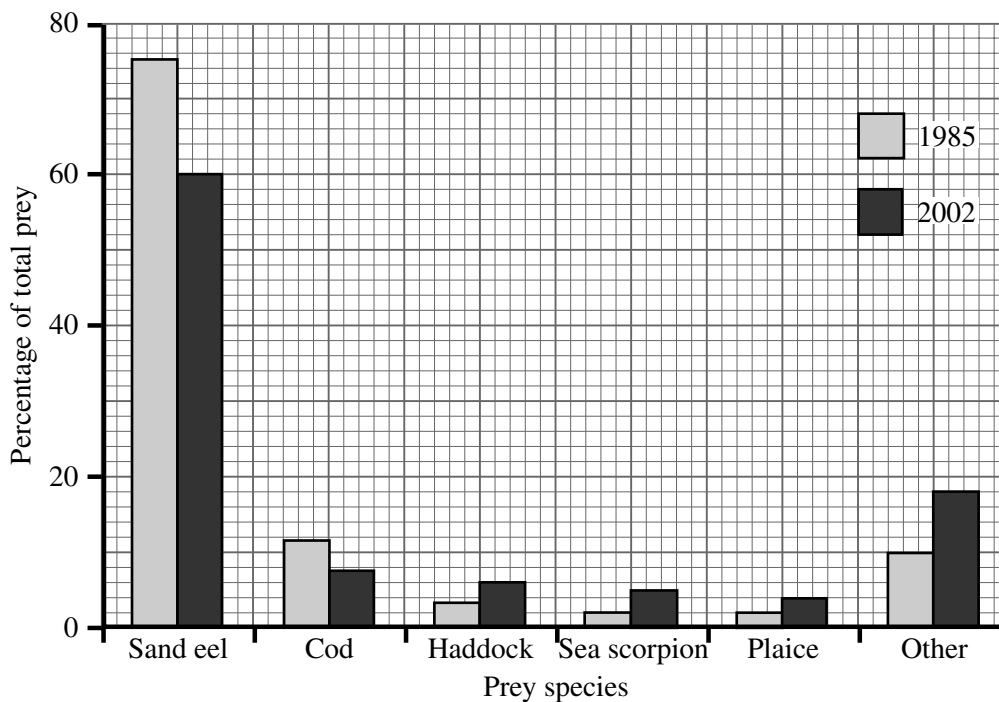
(a) Explain the effect of an increasing predator population on a prey population.

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[1]

Grey seals, *Halichoerus grypus*, are predators of a wide range of fish. A study of their feeding behaviour was undertaken in the North Sea during two years, 1985 and 2002. The estimated total amount of fish consumed by the seals was 39 000 tonnes in 1985 and 116 000 tonnes in 2002. The graph below shows the percentage of different prey species taken by the seals in both years.



**(b) (i)** Suggest why the total amount of fish consumed by the grey seals was greater in 2002.

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[1]

**(ii)** The most common prey of the grey seal is sand eels. Calculate the mass of sand eels consumed by the grey seals in 2002. (Show your working in the space below.)

Answer \_\_\_\_\_ [3]

**(iii)** Comment on the relative amounts of the different prey consumed in the two years.

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[3]

## Section B

In this section you are expected to answer in continuous prose, supported, where appropriate, by diagrams. You are reminded that up to two marks in this question are awarded for the quality of written communication. [2]

8 Give an account of the co-ordinated sequence of events which result in the flow of blood through the heart during one cardiac cycle. [10]

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**THIS IS THE END OF THE QUESTION PAPER**

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