Surname	Centre Number	Candidate Number
Other Names		2

GCE AS/A level

1072/01

BIOLOGY/HUMAN BIOLOGY – BY2

P.M. WEDNESDAY, 18 January 2012

1½ hours

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**10**	
2.	**7**	
3.	**18**	
4.	**10**	
5.	**15**	
6.	**10**	
Total	**70**	

1072
010001

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

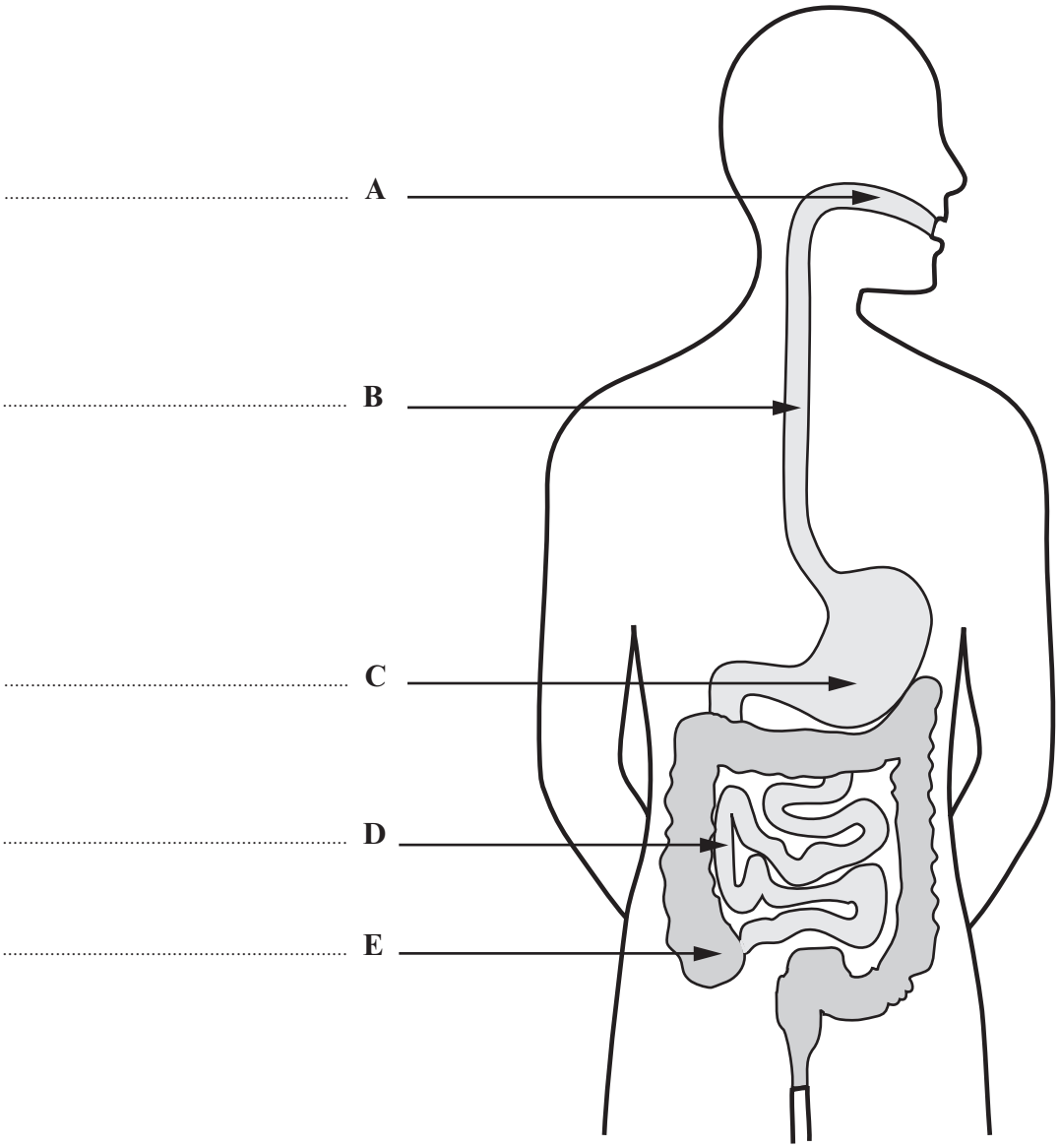
The number of marks is given in brackets at the end of each question or part-question.

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

The quality of written communication will affect the awarding of marks.

Examiner only

1. The diagram below shows a simplified diagram of the human digestive system.



(a) Label parts **A** to **E** on the diagram. [1]

(b) Using letters from the diagram identify the **main** regions in the human gut where the following processes take place.

(i) Digestion .....

(ii) Absorption ..... [2]

(c) Explain why the human digestive system is divided into several regions. [1]

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Examiner only

(d) The adult pork tapeworm, *Taenia solium*, is a parasite of the region labelled **D** on the diagram opposite.

(i) What is meant by the term *parasite*? [2]

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(ii) Suggest why it is of benefit to the tapeworm to live in this region of the digestive system. [1]

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(e) Describe how tapeworms such as *Taenia solium* are adapted to overcome the following problems associated with living in the human digestive system. [2]

Peristalsis.

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Digestive enzymes.

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(f) Suggest why tapeworms produce large numbers of eggs. [1]

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(Total 10 marks)

Examiner only

2. The photographs show two species of swallowtail butterfly.

Two-tailed Swallowtail
(*Papilio multicaudata***)**

Blue Mountain Swallowtail
(*Papilio ulysses*)

(a) Butterflies belong to the same phylum as lobsters and spiders.

(i) Name the phylum to which these organisms belong. [1]

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(ii) Describe **two** features that all members of this phylum have in common. [2]

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(b) Based on their physical characteristics the species of butterfly shown above are believed to be closely related. However, the Two-tailed Swallowtail is found in the USA while the Blue Mountain Swallowtail is found in Indonesia. It is possible that these species of butterfly may have become similar in form due to **convergent evolution**.

(i) State what is meant by the term *species.* [1]

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(ii) Name the taxonomic **level** which suggests that the butterflies are closely related. [1]

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(iii) Identify **one** method that could be used to confirm whether these butterflies are closely related or are the result of convergent evolution. [1]

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(iv) Describe how this method would show whether the butterflies are closely related. [1]

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(Total 7 marks)

Examiner only

3. *(a)* State the name of the process by which plants lose water from their leaves. [1]

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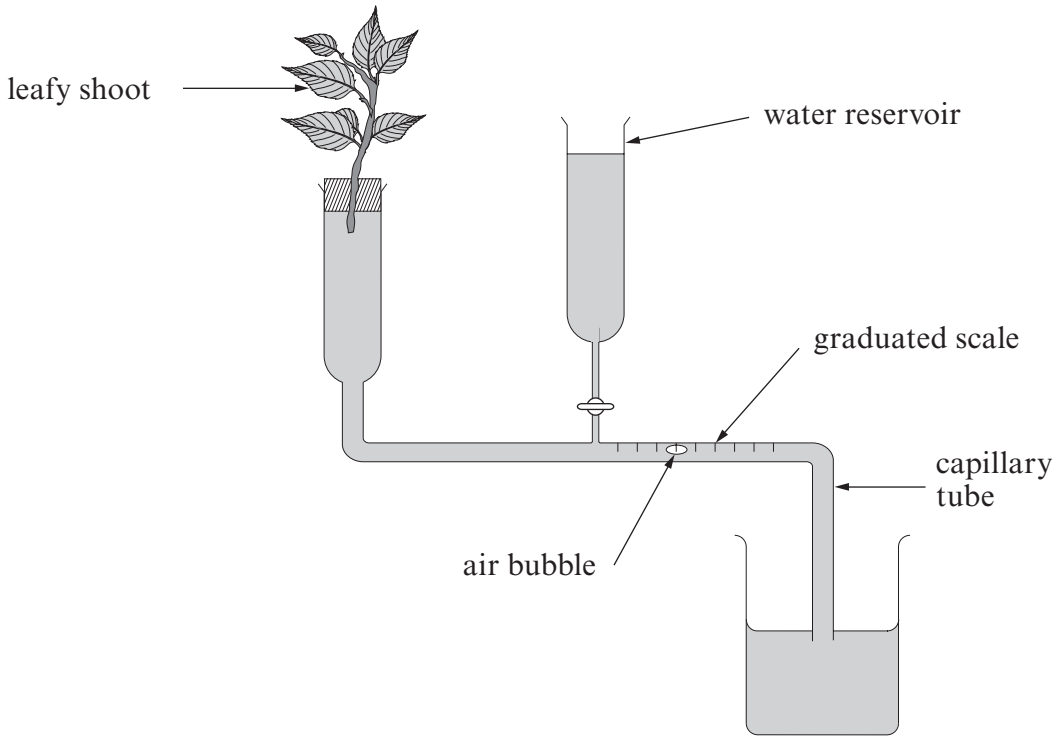
(b) The apparatus shown in the diagram was used to study how wind speed affects the rate at which a leafy shoot loses water.

The same shoot was exposed to air moving at different speeds. At each speed the distance moved by the air bubble in 5 minutes was recorded.



Name the apparatus shown in the diagram. [1]

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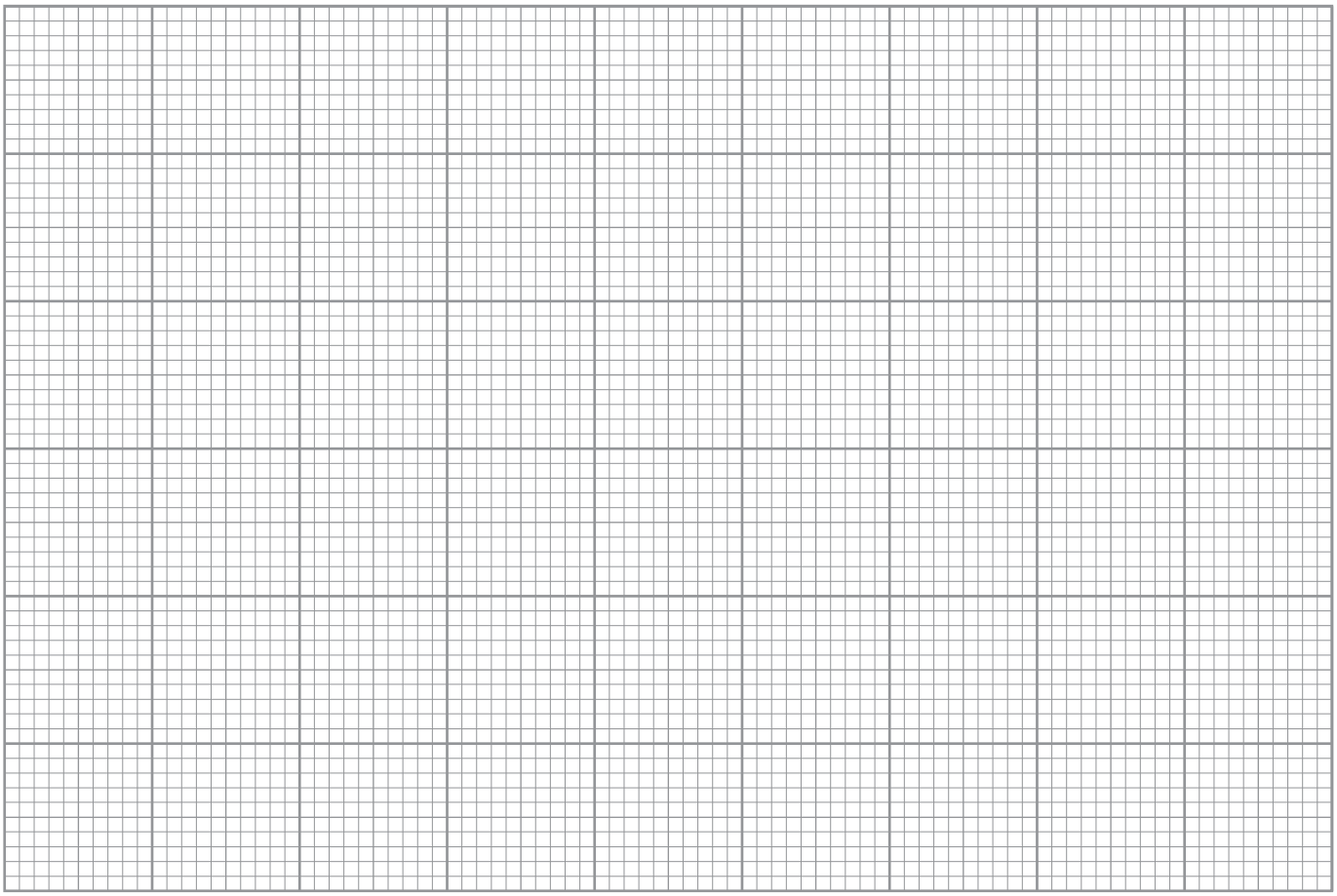
(c) The table below shows the results of the investigation.

Wind speed / m s^{-1}	0	5.0	10.0	15	20	25.0
Distance travelled by air bubble / mm	50	195	260	285	300	275

(i) Plot the data as a graph on the grid provided. [4]



(ii) Describe and explain the effect of wind speed on the distance travelled by the air bubble as the wind speed increased from 0 to 20 ms^{-1}. [2]

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(iii) Describe **one** theory that would explain how water moves up the stem of the leafy shoot. [3]

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Examiner only

(d) The results show that at wind speeds above 20ms^{-1} the distance travelled by the bubble decreased. One explanation for this decrease could be due to the closure of the stomata by guard cells.

Describe the role of **each** of the following in the operation of guard cells in closing stomata.

(i) K^+ (potassium ions). [1]

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(ii) Water potential of the cells. [1]

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(iii) Unevenly thickened cell walls. [1]

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(e) Humidity and temperature also affect the rate at which water is lost from leaves.

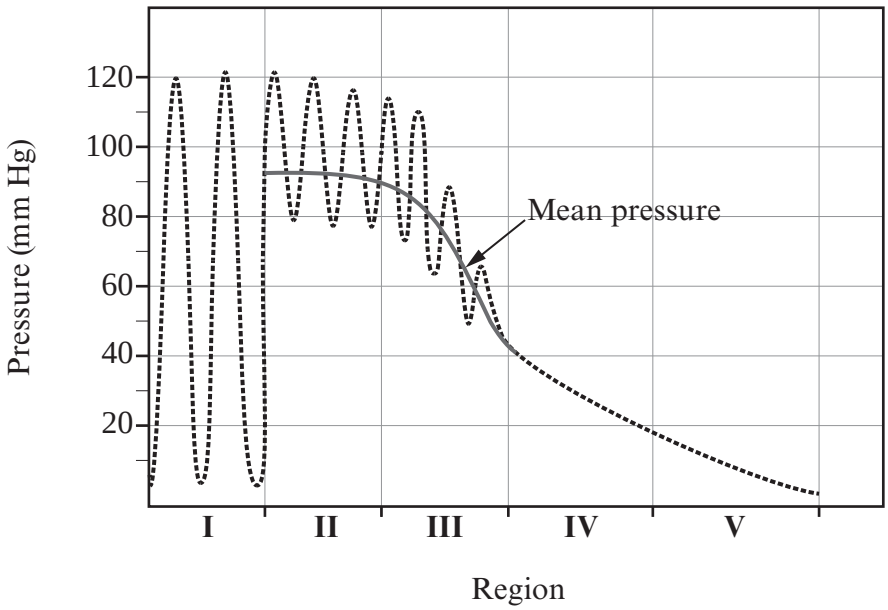
In the table below underline the correct word to show whether **an increase** in each factor would increase or decrease the rate of water loss from plants and explain how each factor causes this change. [4]

Factor	*Effect on rate of water loss*	*Explanation*
Increased humidity	Increase / Decrease	
Increased temperature	Increase / Decrease	

(Total 18 marks)

Examiner only

4. *(a)* The graph below shows how the blood pressure changes as the blood is transported through the human circulatory system.



(i) Region **I** of the graph shows the blood pressure in the left ventricle and region **II** shows the blood pressure in the aorta.

Explain fully the reasons for the differences in the maximum and minimum blood pressure in the left ventricle and the aorta. [3]

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(ii) Why does the blood pressure decrease so rapidly in region **III**? [1]

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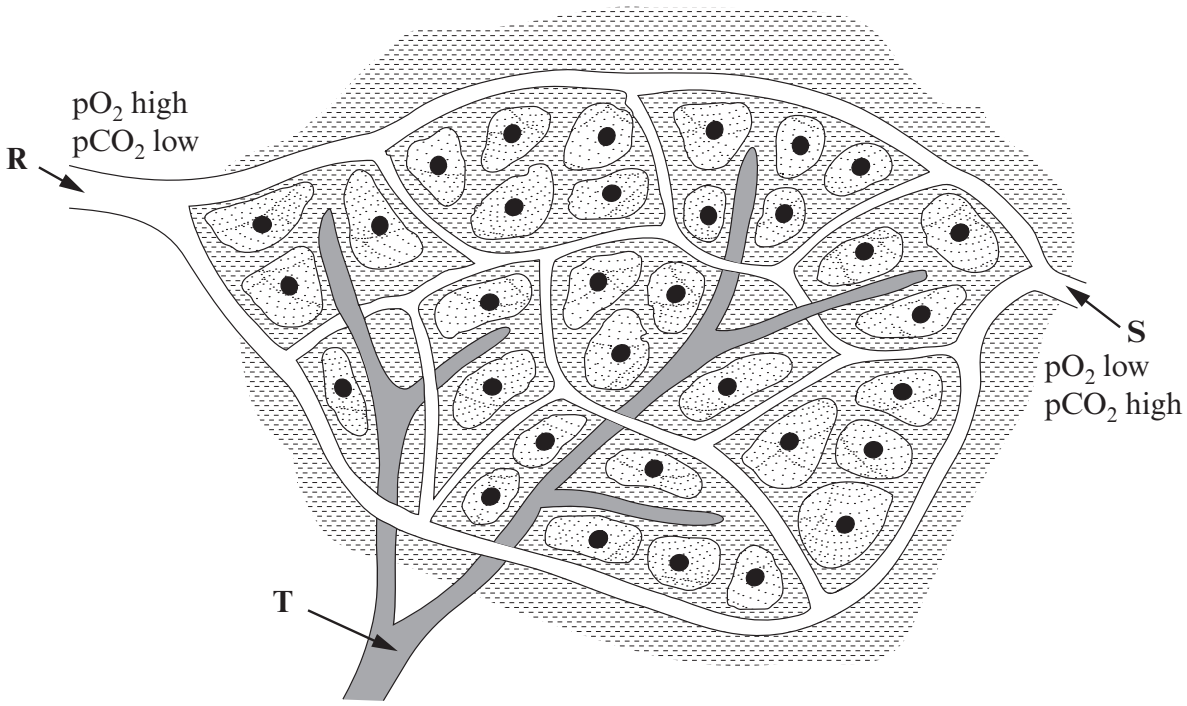
Examiner only

(b) The diagram below shows the blood supply to the cells of the body tissues. The relative amounts of oxygen and carbon dioxide in the blood vessels are given.



(i) Which of vessels **R** and **S** represents the arterial end of the blood supply to the tissues? Give a reason for your answer. [2]

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(ii) Explain how differences in the hydrostatic and osmotic pressures between the arterial and venous ends of the blood supply results in the formation of tissue fluid. [3]

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(iii) What is the function of the vessel labelled **T** in the diagram? [1]

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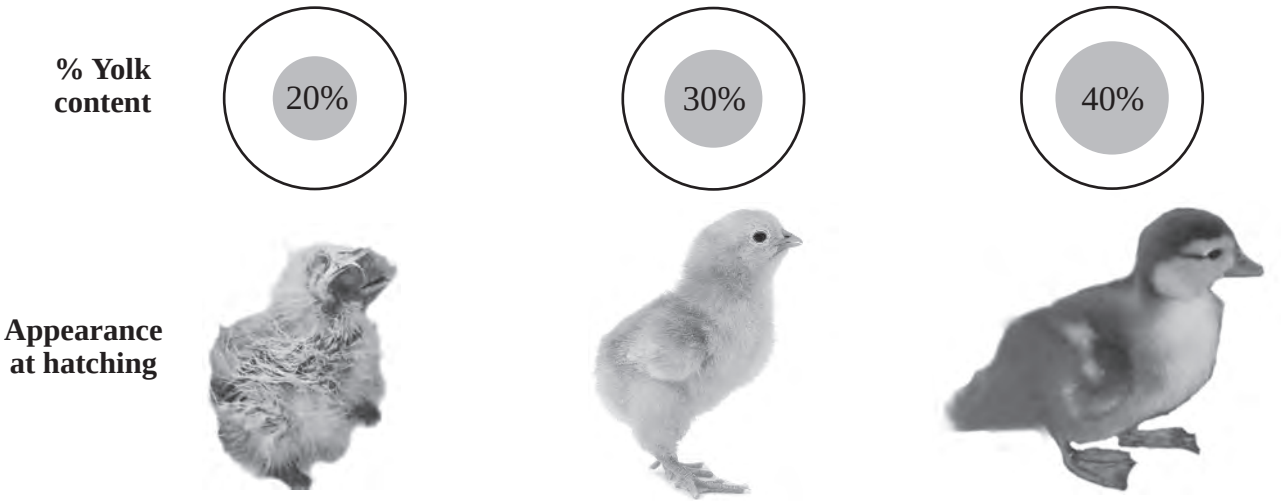
(Total 10 marks)

Examiner only

5. *(a)* The different classes of vertebrates show a gradual change from an aquatic to a terrestrial existence.
Tick (✓) the boxes in the table below, to show the class or classes of vertebrates to which each statement refers. [4]

Statement	*Fish*	*Amphibia*	*Reptiles*	*Birds*	*Mammals*
Fertilisation is **always** internal					
Eggs are laid in an aquatic environment					
The embryo is surrounded by a membrane called the amnion					
Both fertilisation and embryo development are **always** internal					

(b) The diagram shows the percentage of yolk found in the eggs of three different species of birds and the appearance of the chicks at hatching.



(i) Explain why the chick hatched from the egg with 20% yolk would need the greatest level of parental care after hatching. [2]

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(ii) Suggest a reason why organisms that provide a high level of parental care to their young often produce fewer offspring. [2]

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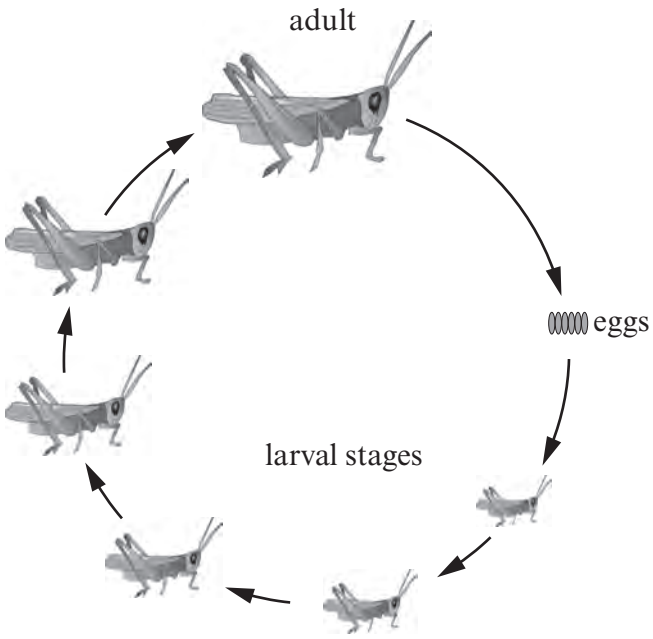
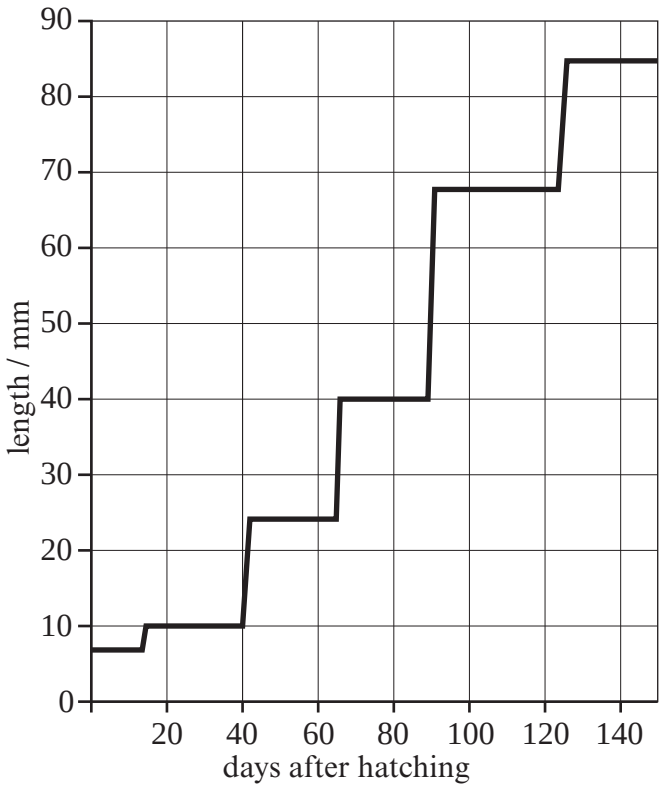
Examiner only

(c) Insects are a group of organisms adapted to a terrestrial way of life.

The diagrams below show the stages in the life cycle of a locust and the length of the insect at different times following hatching.





(i) Name the type of insect life cycle shown by the locust. [1]

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(ii) What name is given to the different larval stages shown in the diagram? [1]

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(iii) Use your knowledge and understanding of this type of insect life cycle to explain the changes in length of the insect following hatching. [3]

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(d) As an adaptation to life on land, insects have evolved a different system of gaseous exchange to vertebrates.

Complete the following sentences, about gaseous exchange, by inserting the most appropriate words to fill in the blanks. [2]

Insects have a system of tubes, called ....., instead of lungs. These transport oxygen directly to the cells. Air enters these tubes through pores called ..... .

(Total 15 marks)

Examiner only

6. Answer **one** of the following questions.

Any diagrams included in your answers must be fully annotated.

Either, *(a)* Describe the uptake of water by plants from the soil into the xylem. [7]

Explain the role of ions in this process. [3]

Or *(b)* Explain why large, multi-cellular organisms have evolved special surfaces for gaseous exchange. [3]

Describe and explain how terrestrial mammals are adapted for gaseous exchange in air. [7]

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Examiner only

(Total 10 marks)