Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						7	0	4	0	/	0	1	Signature	

Paper Reference(s)

7040/01

London Examinations GCE

Biology

Ordinary Level

Paper 1

Monday 10 May 2010 – Morning

Time: 1 hour 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total	

Materials required for examination
Nil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
Answer **ALL** the questions. Do not use pencil. Use blue or black ink.
Write your answers in the spaces provided in this question paper.

Information for Candidates

Calculators may be used.
The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 12 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.
In calculations, show **all** the steps in your working.

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Leave blank

Answer ALL the questions.

1. (a) Complete the table below to show the effect of adrenaline release on various processes in the body.

For each process indicate whether the adrenaline causes an increase or a decrease. Place a tick (✓) in the correct box. One box has been done for you.

Process	Increase	Decrease
Breathing rate		
Depth of breathing		
Heart rate	✓	
Flow of blood to skeletal muscle		
Flow of blood to digestive system		
Conversion of glycogen to glucose		
Pupil size		

(3)

(b) Explain the advantage to an organism of the increase in heart rate caused by adrenaline.

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(3)

Q1

(Total 6 marks)

Leave blank

2. (a) The table below shows some features of the five main groups of organisms, with examples. Complete the table. Some boxes have been done for you.

Group	Multicellular	Can carry out photosynthesis	Have cell walls	Example
Plants	yes			bean
Animals	yes			human
Fungi	some			
Bacteria		some	yes	
Viruses			no	

(6)

(b) One characteristic of living organisms is that they control their internal conditions. Give **two** examples of internal conditions that are controlled by mammals.

1 .....

.....

2 .....

.....

(2)

Q2

(Total 8 marks)

Leave blank

3. The photograph below shows a plastic bag used to carry shopping.

The disposal of plastic shopping bags is a huge problem because the plastic is made from oil, a non-renewable resource. Plastic does not decompose easily.

(a) Suggest what is meant by the term non-renewable.

.....

(1)

Leave blank

(b) There are bacteria that can make a type of plastic that is biodegradable (decomposed by living organisms). The genetic material for making biodegradable plastic has been transferred from the bacteria and, using a vector, put into crop plants such as oilseed rape. These genetically modified transgenic plants act like biological factories making bioplastic that can be extracted and used to make biodegradable plastic products.

The table below summarises the steps that are taken to genetically modify crops so that the bioplastic can be made by the plants.

Complete the table by using numbers to show the correct order of the steps.

Step	Order of step
Restriction enzyme cuts bacteria DNA	1
Transgenic crops grown in fields	
Ligase used to make recombinant plasmid	
Large amounts of bioplastic extracted	6
Restriction enzyme cuts plasmid DNA	
Recombinant plasmid put into crop plant using a vector	

(4)

(c) Biodegradable plastic bags completely decompose into simple substances in about 60 days. Non-biodegradable plastic bags can take hundreds of years to disappear.

Suggest **two** substances likely to be produced when biodegradable plastic bags are decomposed.

1 .....

2 .....

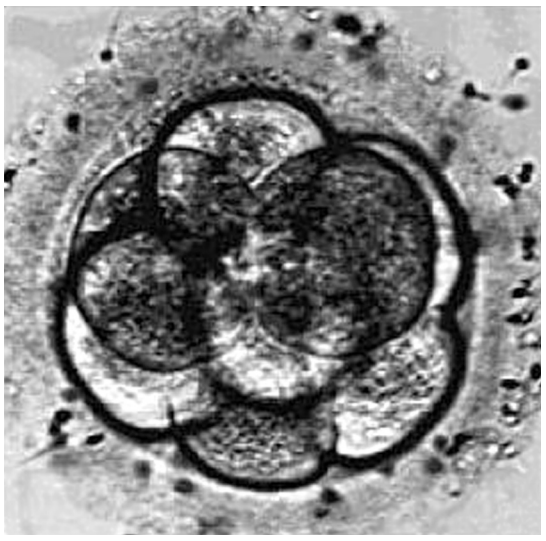
(2)

Q3

(Total 7 marks)

Leave blank

4. Fertilisation of a human egg produces a single cell called a zygote. The zygote soon develops by cell division into an embryo. The photograph below shows a human embryo containing eight cells.



(a) (i) Name the type of cell division that produces the embryo from the zygote.

.....

(1)

(ii) How many chromosomes are in each cell of the human embryo?

.....

(1)

(iii) It is possible to take one of the cells from the embryo and find out if it contains an allele that may result in a harmful condition.

In the table below, tick the box that correctly describes an allele.

Description	Tick
An allele always causes disease	
An allele is a chromosome	
An allele is an alternative form of a gene	
An allele is an alternative form of a chromosome	

(1)

Leave blank

(b) The placenta has an important role in the development of the embryo.

Describe the role of the placenta.

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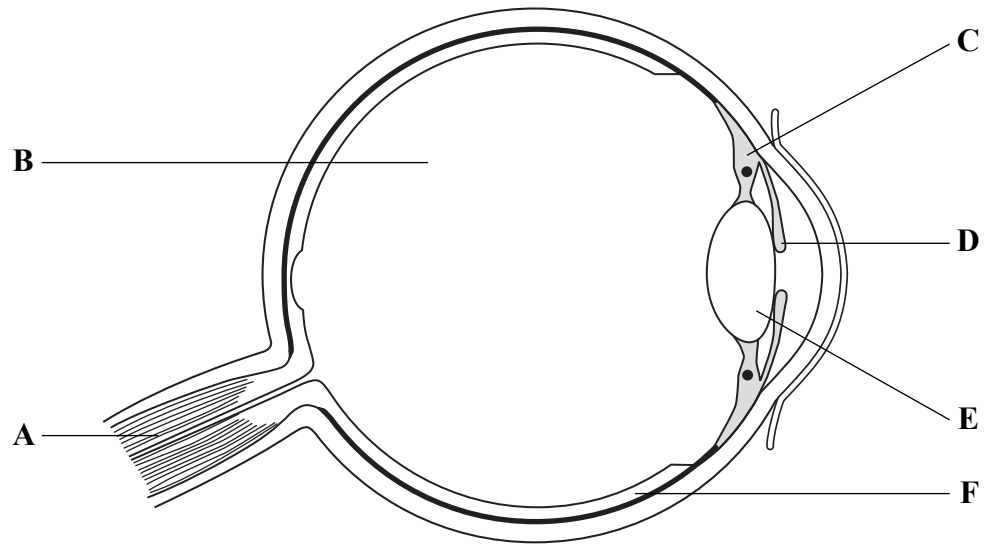
(5) **Q4**

(Total 8 marks)

Leave blank

5. The diagram below shows a section of the human eye. Different parts of the eye have been labelled with the letters A to F.



The table below gives the function of different parts of the eye. Complete the table by writing the correct letter of the part for which the function is described. The first one has been done for you.

Function of part	Letter
Maintains the shape of the eye	**B**
Contracts or relaxes to change the diameter of the pupil	
Helps focus by changing shape	
Detects light	
Sends electrical impulses to the brain	
Helps focus by contracting or relaxing	

(Total 5 marks)

Q5

Leave blank

6. The table below lists the names of some human conditions and their symptoms. Complete the table by writing the name of the organ affected in each empty box. One has been done for you.

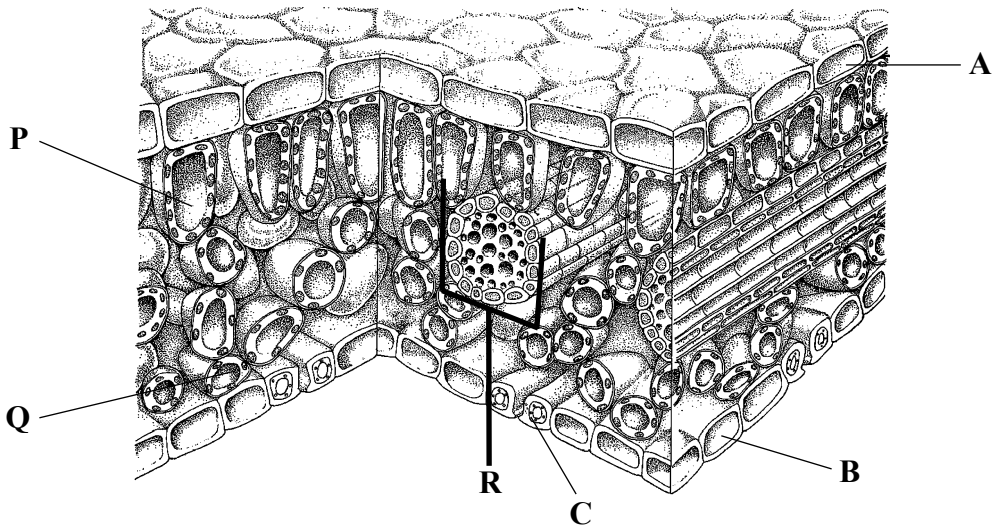
Condition	Symptom	Organ affected
Emphysema	poor gas exchange	
Cataract	cloudy lens	
Alzheimer's	loss of memory	
Hepatitis	yellow skin and eyes	liver
Diabetes	high blood glucose	
Infertility	lack of sperm	

Q6

(Total 5 marks)

Leave blank

7. The diagram below shows a three-dimensional section through a leaf with some parts labelled.



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

A .....

B .....

C .....

(3)

(b) (i) Describe how the arrangement of the cells in the layer labelled **P** enables them to carry out their function in the leaf.

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(2)

(ii) Describe how the arrangement of the cells in the layer labelled **Q** enables them to carry out their function in the leaf.

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(2)

Leave blank

(c) Explain the role of the structures in the part labelled **R** in the leaf.

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(3)

(d) If you stand under a tree and look up towards the sky, you can see that the leaves on the branches fit closely together to form a leaf mosaic. Suggest how this arrangement benefits the plant.

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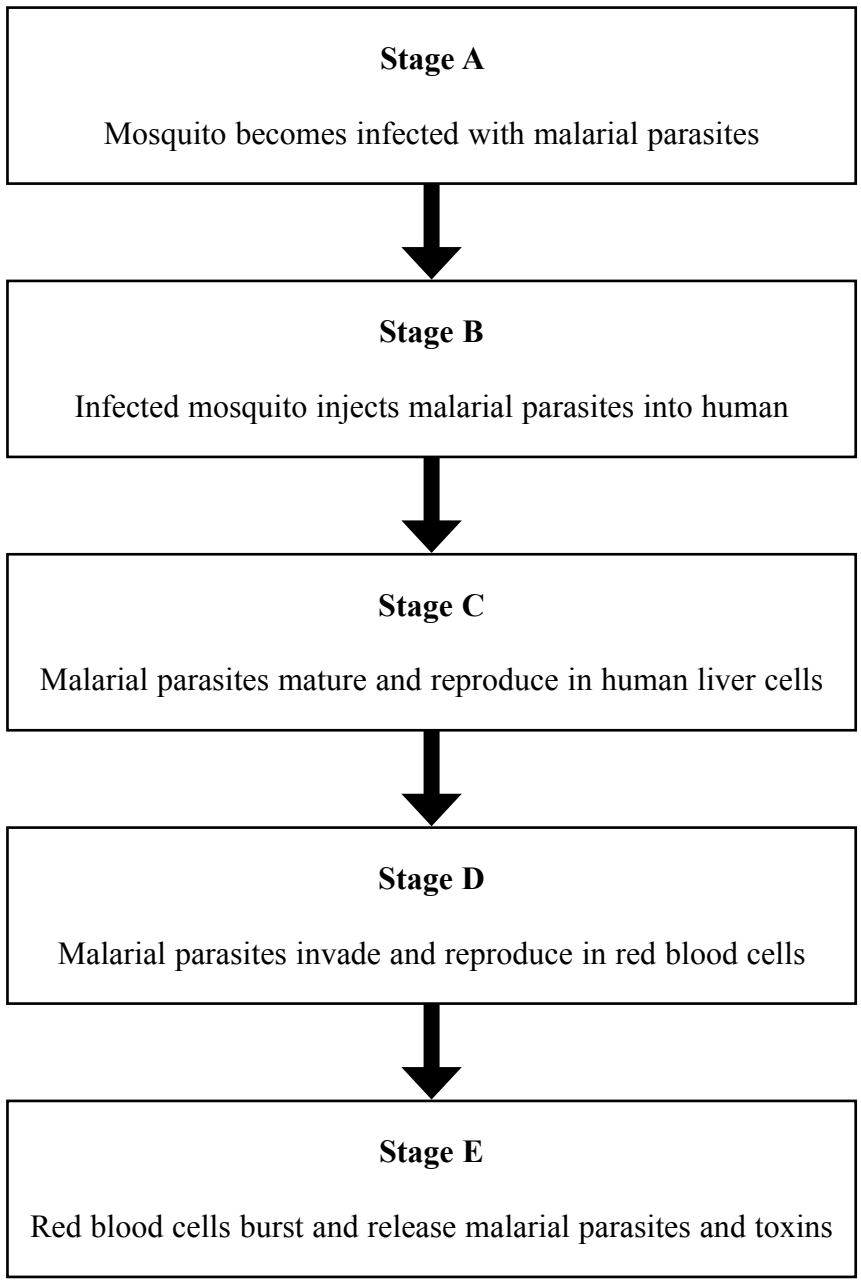
(2)

Q7

(Total 12 marks)

Leave blank

8. The diagram below shows five stages in the disease called malaria.



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(a) (i) What is the name of the malarial parasite?

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(1)

(ii) How does the mosquito become infected with malarial parasites in stage A?

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(2)

(iii) In which stage do the symptoms of malaria appear in an infected human?

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(1)

(b) Give **two** methods used to control the spread of malaria.

1 .....

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2 .....

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(2)

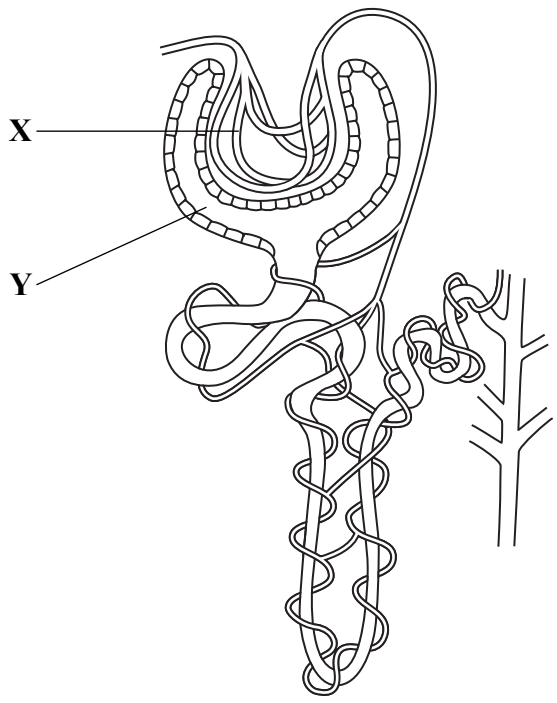
Q8

(Total 6 marks)

Leave blank

9. At birth, each human kidney has about one million nephrons.

The diagram below shows a nephron.



(a) Name the parts labelled **X** and **Y**.

X .....

Y .....

(2)

(b) Ultrafiltration occurs in the nephron and allows some substances, such as mineral ions, to be removed from the blood plasma.

(i) Name **two** other substances that are removed from the blood plasma during ultrafiltration.

1 .....

2 .....

(2)

(ii) Give **one** reason why some substances remain in the blood plasma during ultrafiltration.

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(1)

Leave blank

(c) The graph below shows how the estimated number of working nephrons in a kidney changes as a person gets older.

(i) How many years, from birth, does it take for the number of working nephrons to decrease by 50%?

.....

(1)

(ii) Calculate the rate of loss of working nephrons per year between the ages of 15 and 25. Show your working.

Answer ..... nephrons per year

(2)

(d) Damaged nephrons sometimes allow protein molecules to pass from the blood plasma into the urine. This decreases the concentration of the blood plasma.

Suggest why the tissues in the body may swell if there is a lack of protein molecules in the blood plasma.

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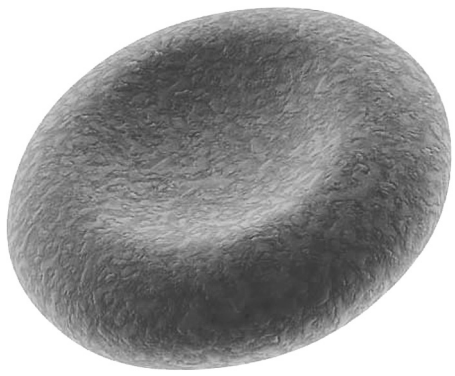
(2)

Q9

(Total 10 marks)

Leave blank

10. The photograph below shows a red blood cell.



(a) Explain how the structure of a red blood cell helps it to transport oxygen.

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(2)

Leave blank

(b) There are two types of white blood cell.

(i) In the space below draw and label a white blood cell.

(3)

(ii) Describe how the two types of white blood cell help to destroy pathogens.

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(4)

Q10

(Total 9 marks)

Leave blank

11. Digestion involves the breakdown of large insoluble molecules into small soluble molecules. The process is helped by enzymes.

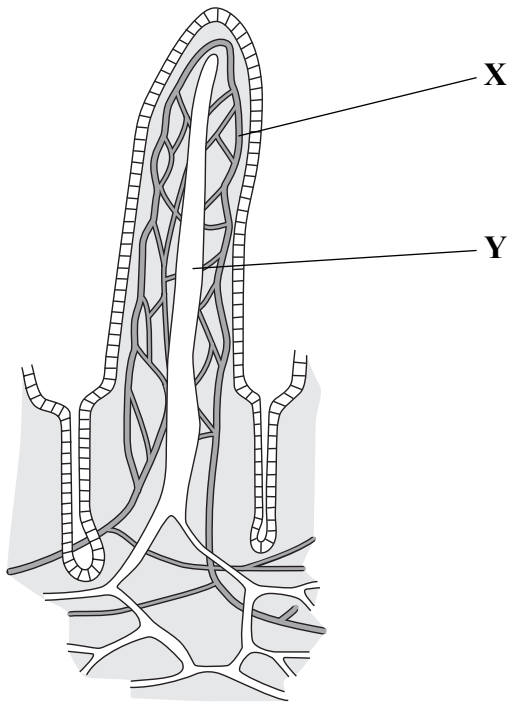
(a) Use this information to complete the table below.

Large insoluble molecule	Small soluble molecule	Enzyme
	maltose	
protein		protease
	fatty acids and glycerol	

(5)

(b) The small soluble molecules are absorbed in the small intestine. The absorption is helped by structures called villi.

The diagram below shows one of the villi from the small intestine.



(i) Name the parts labelled **X** and **Y**.

X .....

Y .....

(2)

(ii) Name the liquid in part **X**.

.....

(1)

Leave blank

(c) Villi increase the surface area for absorption. Some people with a condition called coeliac disease lack villi. The surface area of their gut is reduced to about 0.5 m^2. In people without the condition this figure is 600 times greater.

(i) Calculate the total surface area available for absorption in people without the condition. Show your working.

Answer = ...

(2)

(ii) Give **two** other ways in which the structure of villi helps in the absorption of small soluble molecules.

1 .....

2 .....

(2)

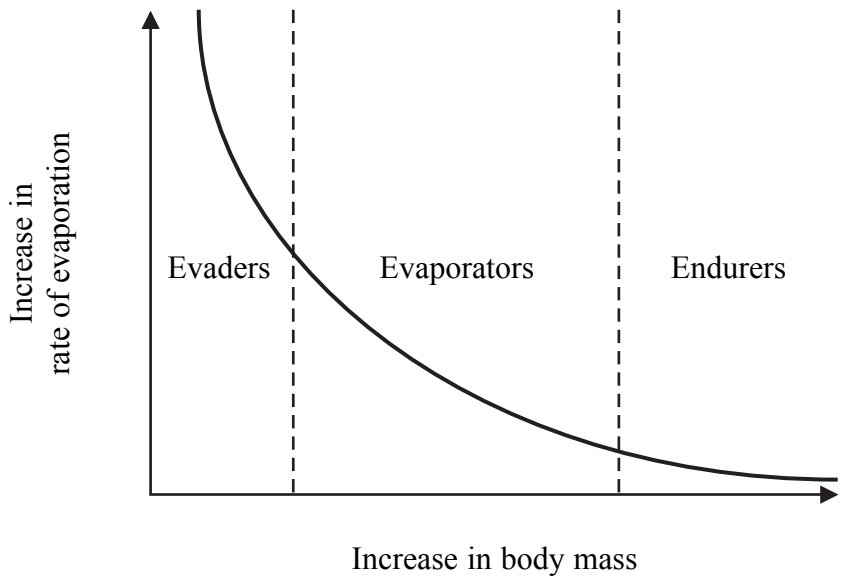
Q11

(Total 12 marks)

Leave blank

12. Desert animals can be classified in terms of how they behave when exposed to high temperatures. One classification system uses the terms ‘evaders’, ‘evaporators’ and ‘endurers’ to describe how animals cope with high temperatures in a desert environment.

The graph below shows the relationship between body mass and rate of water loss by evaporation for these three groups.



Adapted from *openlearn.open.ac.uk*

(a) Describe the relationship between body mass and rate of evaporation.

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(1)

(b) The term ‘evader’ refers to animals whose behaviour helps to prevent overheating of the body on hot sunny days. ‘Evaders’ make use of shady rock crevices, underground burrows and shade cast by plants to stay out of the hot sun. ‘Evaders’ include reptiles and some small mammals.

Suggest why the body size of ‘evaders’ means that they are at greatest risk from high temperatures.

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(3)

Leave blank

(c) ‘Evaporators’ are animals that cool themselves by sweating. Only a few of these species can survive in deserts, and those that do often live on the edges of deserts where they can drink water. ‘Evaporators’ include mammals such as jack rabbits and foxes.

(i) Why do ‘evaporators’ require access to water?

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(1)

(ii) Suggest how eating plants such as cacti help jack rabbits to survive?

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(1)

(iii) ‘Evaporators’ are often nocturnal and are therefore active only at night. Suggest how this could reduce their need for water.

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(1)

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(d) ‘Endurers’ are desert animals that cannot hide in crevices or burrows. Examples include the oryx and camels.

(i) Suggest why ‘endurers’ are unable to hide in crevices or burrows.

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(1)

(ii) Suggest why ‘endurers’ are less active during the hottest part of the day.

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(2)

(iii) A camel is able to maintain the water content of its blood plasma even when its body has become dehydrated. Suggest why it is important that the water content of its blood plasma is maintained.

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(2)

Q12

(Total 12 marks)

TOTAL FOR PAPER: 100 MARKS

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