Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	3	2	5	/	2	H	Signature	

Paper Reference(s)

4325/2H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Biology

Paper 2H

Higher Tier

Wednesday 17 November 2010 – Afternoon

Time: 2 hours

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.
The paper reference is shown at the top of the page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Do not use pencil. Use blue or black ink.
Show all the steps in any calculations and state the units.
Calculators may be used.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 15 questions in this question paper. The total mark for this paper is 120.
There are 32 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.

Question Number	Leave Blank
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Answer ALL the questions. Write your answers in the spaces provided.

1. The table lists the names of different structures found within a human.

Complete the table by numbering each structure in order of its size.
Use number 1 for the smallest structure through to number 4 for the largest.

Name of structure	Order of size
brain	
nucleus	
nervous system	
nerve cell	

Q1

(Total 3 marks)

2. Explain how sewage pollution can affect the plants and animals in a river.

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Q2

(Total 5 marks)

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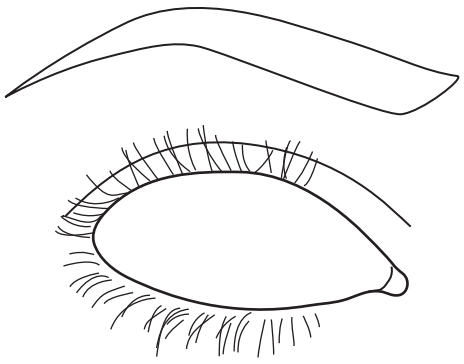
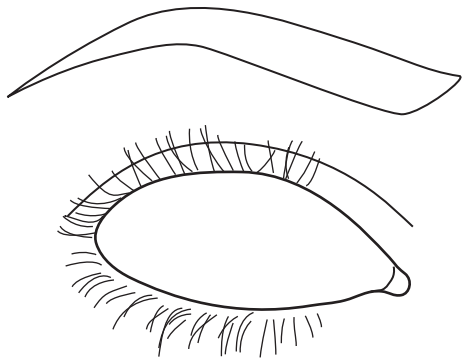
3. The iris of the eye helps the pupil to change as a person moves from an area of bright light to an area of dim light.

(a) (i) Draw and label the iris and the pupil in each eye below to show how they would appear in bright and dim light.

Bright light



Dim light



(3)

(ii) Explain how the iris produces this change in appearance in the pupil.

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(2)

(iii) Explain why it is important to change the appearance of the pupil when moving from bright light into dim light.

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(2)

Leave blank

(b) Changes in the eye also take place to help focus on near objects.
Describe these changes.

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(3)

Q3

(Total 10 marks)

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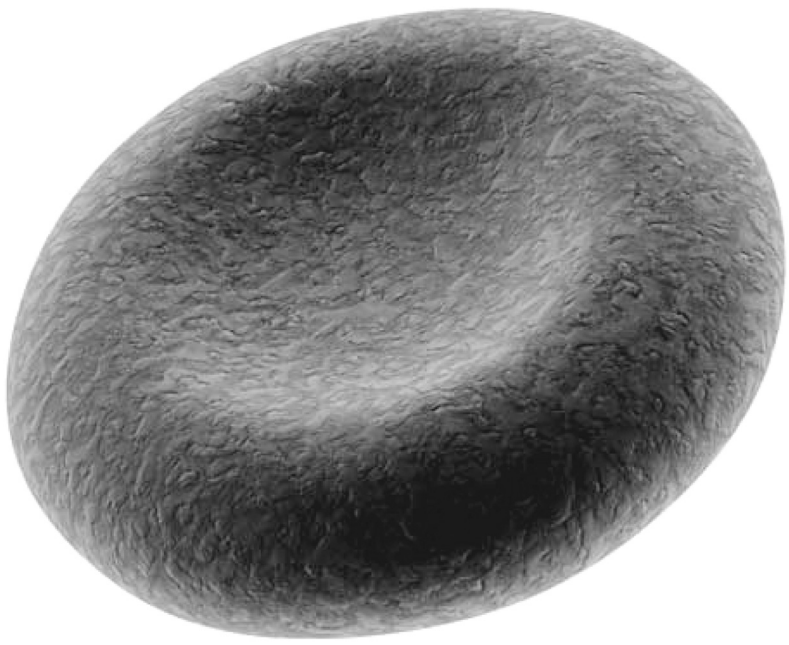
4. The diagram shows a normal red blood cell.



(a) Describe **two** ways in which the structure of a normal red blood cell helps it to absorb and transport oxygen.

1 .....

.....

2 .....

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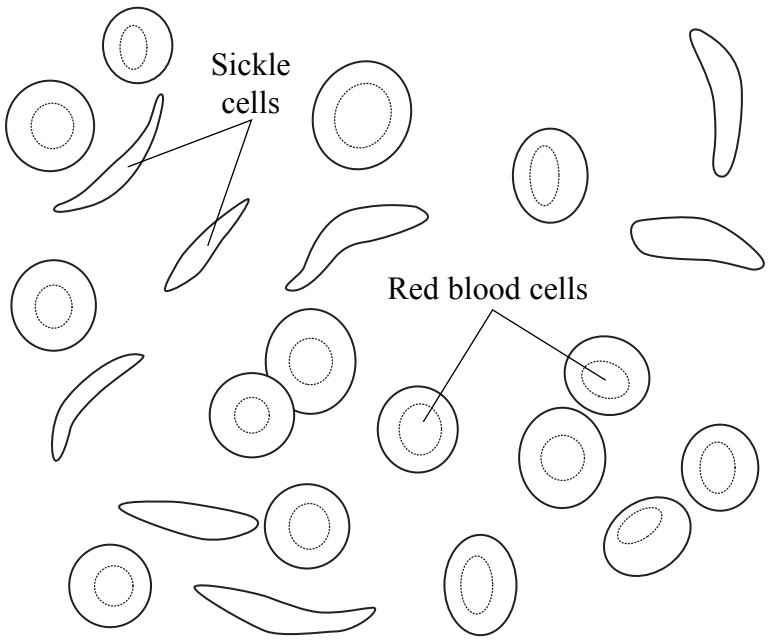
(2)

Leave blank

(b) Sickle cell anaemia is an inherited condition that affects the shape of red blood cells. It is caused by a recessive allele, **n**, which causes the cells to buckle and look sickle-shaped. The dominant allele, **N**, allows red blood cells to develop normally.

The diagram shows normal red blood cells and sickle-shaped red blood cells.



(i) What is an allele?

.....

(1)

Leave blank

(ii) Two parents know they are both heterozygous for sickle cell anaemia.

Complete the genetic diagram below to show the genotypes of the parents, their gametes and their possible offspring.
Use the letter **N** for the dominant allele and the letter **n** for the recessive allele.

Parent genotypes

Gamete genotypes

Possible offspring genotypes

(3)

(iii) What are the phenotypes of the possible offspring?

.....

(1)

(Total 7 marks)

Q4

Leave blank

5. Mitosis and meiosis are two ways by which cells may divide.

(a) Complete the statements in the table about mitosis and meiosis by writing a number in each empty box.

Statement to complete	Mitosis	Meiosis
Starting with one cell, the number of cells produced will be		
If the parent cell has 46 chromosomes, each daughter cell will have		

(4)

(b) Mitosis occurs during growth.

Name **two** other processes that involve mitosis.

1 .....

2 .....

(2)

(c) Choose **two** words from the list that describe cells produced by meiosis.

diploid **gametes** **haploid** **homozygous** **identical**

1 .....

2 .....

(2)

Q5

(Total 8 marks)

Leave blank

6. The heart rate of an athlete was measured every ten minutes for one hour during a training session.

The results are shown in the table.

Time in minutes	0	10	20	30	40	50	60
Heart rate in beats per minute	66	77	88	100	112	114	113

(a) Describe how heart rate changes during the training session.

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(2)

(b) Explain the change in the results from 0 minutes to 40 minutes.

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(4) **Q6**

(Total 6 marks)

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7. The passage describes the way in which alcohol is made by a fungus during the production of beer.

Write on the dotted lines the most suitable word or words to complete the passage.

Most fungi are made from thread-like structures called .....

and have ..... made of chitin. They also have lots of the

organelle called a ..... in their cytoplasm. The fungus

used to make beer is single-celled and is called ..... .

This fungus uses a process called ..... respiration to

convert a sugar called ..... into ethanol and a gas

called ..... .

Q7

(Total 7 marks)

Leave blank

8. The photograph shows a bird called a goose.

Two breeds of goose called Toulouse and Embden grow quickly. However, both breeds lay very few eggs. Another breed of goose called Chinese lays lots of eggs but grows slowly.

Farmers have used a breeding process to produce a commercial breed of goose from these three different breeds. The diagram below shows the breeding process.

Toulouse male	×	Chinese female	→	Cross-bred offspring (male and female)
Embden male	×	Cross-bred offspring (female)	→	Commercial breed

(a) Name the **two** desired characteristics farmers wanted to obtain with the commercial breed of goose.

1 .....

2 .....

(2)

Leave blank

(b) Use the information opposite to suggest **one** difference in the characteristics of the cross-bred female and the Chinese female.

.....

.....

(1)

(c) The breeding process involves farmers choosing which birds breed with each other.

What name describes a breeding process in which humans choose which animals breed together?

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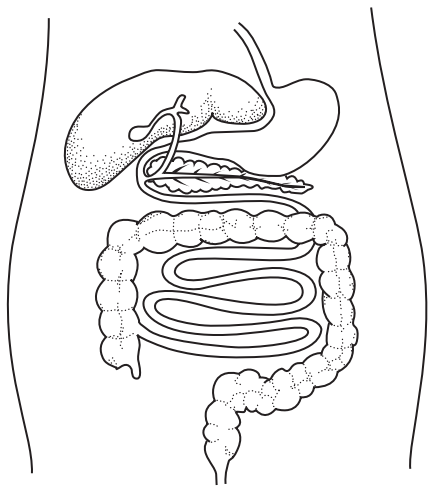
(1)

Q8

(Total 4 marks)

Leave blank

9. The diagram shows part of the human digestive system and some other organs.



(a) (i) Using the letter **P** and a guideline, mark on the diagram the pancreas.

(1)

(ii) Using the letter **S** and a guideline, mark on the diagram the small intestine.

(1)

(b) The pancreas secretes enzymes that digest large molecules into smaller molecules.

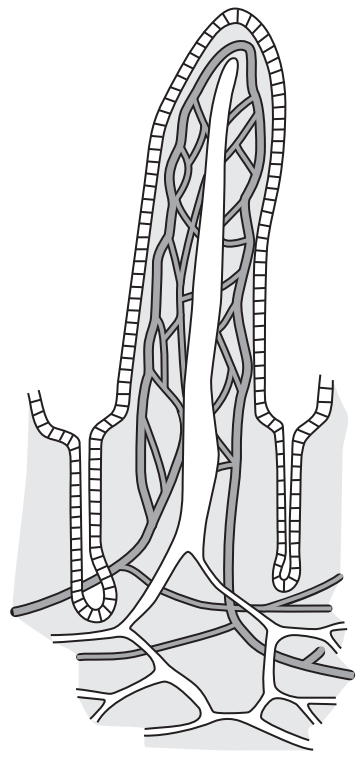
Complete the table to show the missing large molecule, smaller molecule and enzymes.

Large molecule	Smaller molecule	Enzyme
protein		
	fatty acids and glycerol	
starch	maltose	

(5)

Leave blank

(c) The diagram shows a villus.



Explain how the structure of a villus helps it perform its function.

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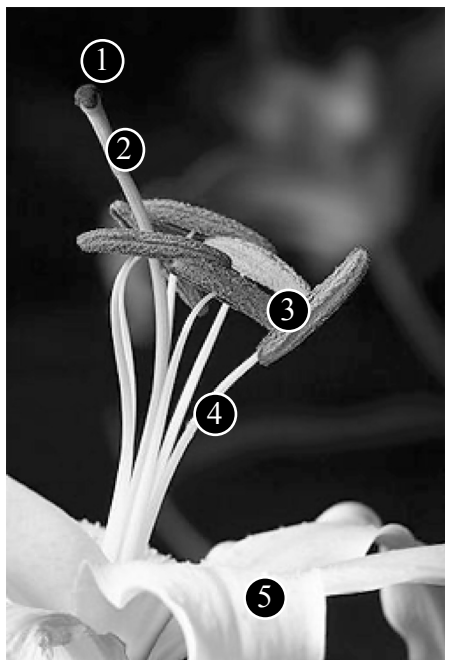
(5)

Q9

(Total 12 marks)

Leave blank

10. The photograph shows the reproductive structures of a flower called a lily.



(a) (i) Which number labels an anther?

.....

(1)

(ii) What is the function of the anther?

.....

(1)

(iii) Using the information in the photograph, suggest why this flower does not pollinate itself.

.....

.....

(1)

Leave blank

(b) Lilies can be cloned and then mass produced using micropropagation.

(i) What does the term **cloned** mean?

.....

.....

(2)

(ii) Complete the following passage about micropropagation. Write the most suitable word on the dotted lines.

Micropropagation is sometimes known as tissue ..... .

Small pieces of plants called ..... are grown on nutrient jelly. All procedures must be carried out under ..... conditions to make sure that there are no fungi or ..... present. The small pieces of plants grow because the cells ..... and then develop into new plants.

(5)

Q10

(Total 10 marks)

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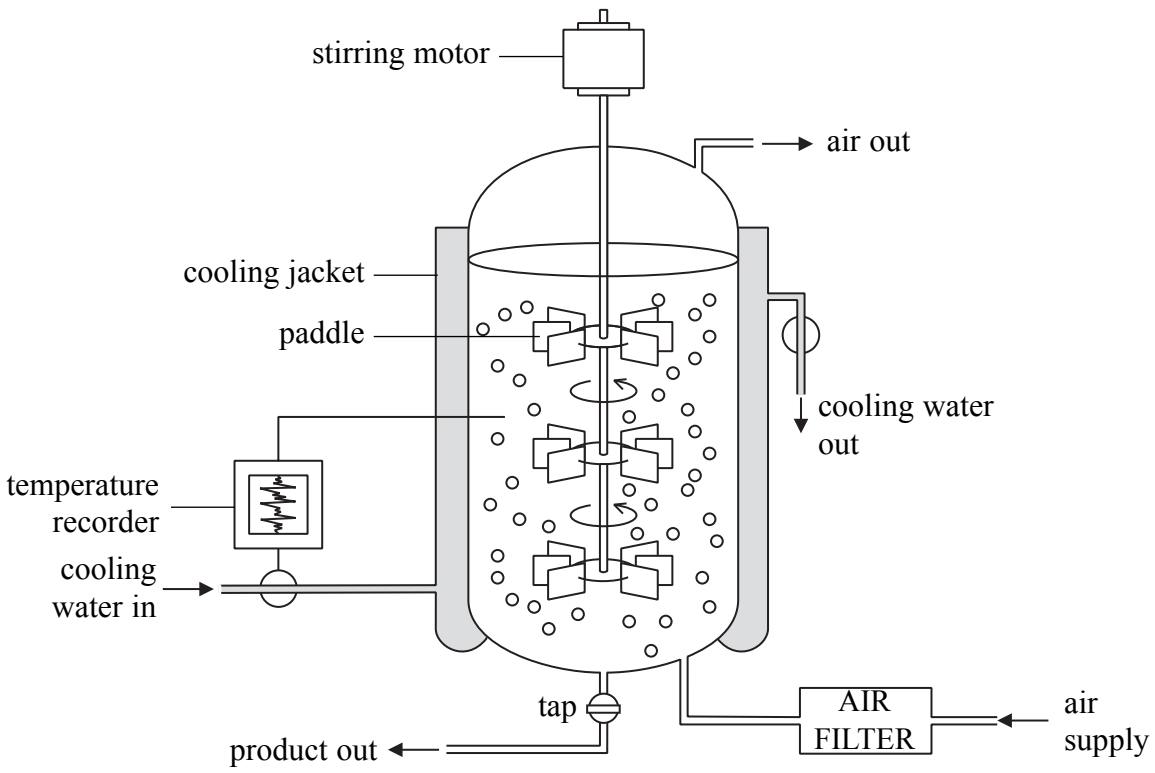
11. The antibiotic penicillin can be made in an industrial fermenter called a bioreactor. Penicillin is produced by a fungus which is grown in large quantities in a bioreactor.

A diagram of a bioreactor is shown below.



(a) Describe the function of the paddles in the bioreactor.

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(2)

(b) Air is pumped into the bioreactor. Explain how this helps the growth of the fungus.

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(2)

Leave blank

(c) Explain how the temperature is kept constant in the bioreactor.

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(2)

(d) Explain why it is important that the pH in the bioreactor remains constant.

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(2)

Q11

(Total 8 marks)

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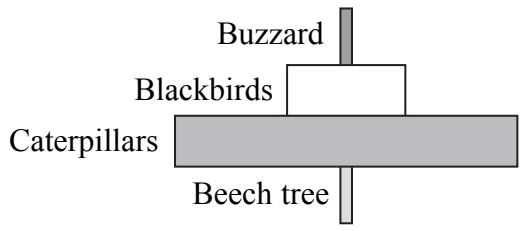
12. (a) The diagram shows the pyramid of numbers for a food chain found in a wood.



(i) Name the secondary consumer in this food chain.

.....

(1)

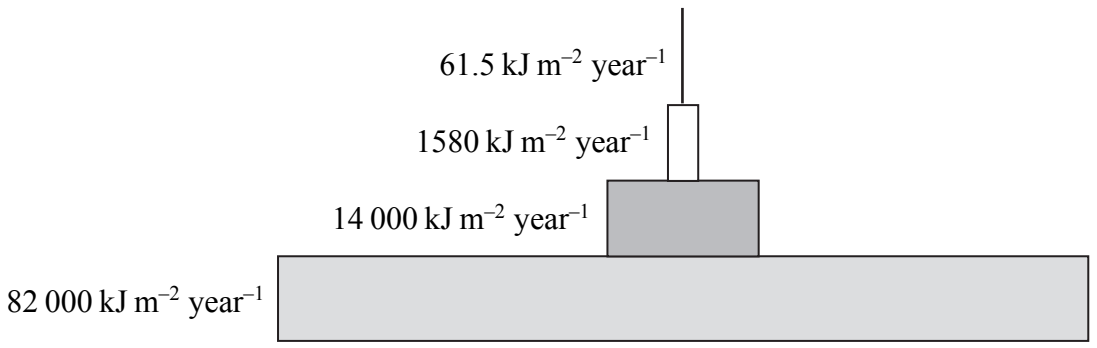
(ii) Sketch a labelled pyramid of biomass for this food chain.

(3)

Leave blank

(b) Pyramids of energy show the rate of energy flow at successive trophic levels in a given area over a fixed period of time.

The diagram below shows a pyramid of energy.



(i) Calculate the percentage of energy transferred from the producer trophic level to the tertiary consumer trophic level.

Answer.....%

(2)

(ii) Explain why so little energy is transferred from one trophic level to the next.

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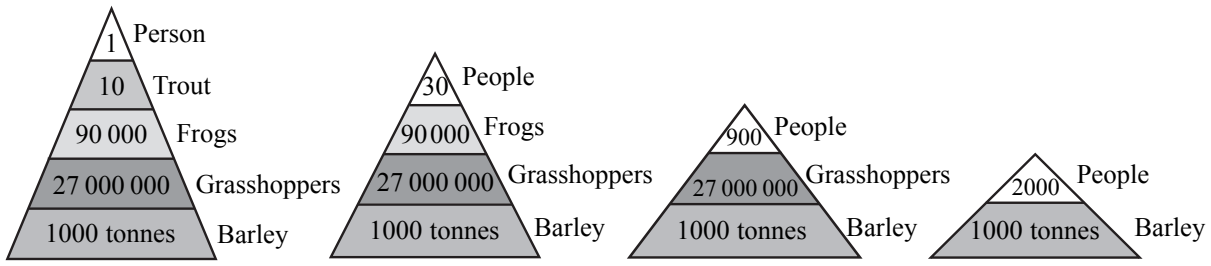
(3)

Leave blank

(c) The diagram below shows the different numbers of humans that can be supported in food chains of different lengths.



(i) How many more humans can be supported on a diet of barley compared to a diet of trout?

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(1)

(ii) What is the relationship between the length of a food chain and the number of people who can be supported by it? Explain your answer.

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(2)

Q12

(Total 12 marks)

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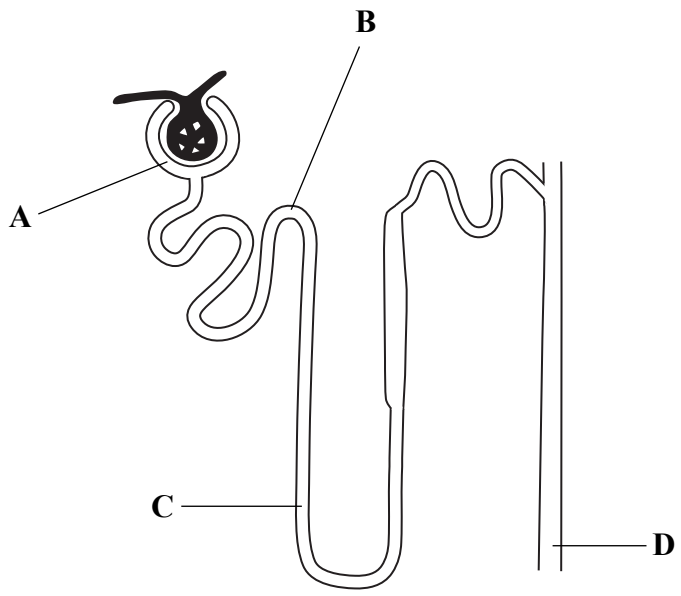
13. The diagram shows a nephron from a human kidney.



(a) Identify the parts of the nephron labelled **A**, **B**, **C** and **D**.

A .....

B .....

C .....

D .....

(4)

(b) In which part, **A**, **B**, **C** or **D**, does each of the following occur?

(i) Ultrafiltration .....

(ii) Reabsorption of glucose .....

(iii) Increased permeability to water in response to ADH .....

(3)

Leave blank

(c) The table shows the amount of some substances (in arbitrary units) filtered, excreted and reabsorbed by the kidneys in a day.

Substance	Filtered	Excreted	Reabsorbed
water	180	1.50	178.5
glucose	800	0	800
urea	56	28	28

(i) Calculate the percentage of filtered urea that is reabsorbed.

Answer ..... %
(2)

(ii) Suggest why it is important to excrete urea.

.....

.....
(1)

(iii) Suggest why it is important that all the glucose is reabsorbed.

.....

.....
(1)

(iv) Use the information in the table to name the process by which glucose is reabsorbed.
Give a reason for your answer.

.....

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.....
(2)

Q13

(Total 13 marks)

Leave blank

14. Green plants carry out the processes of photosynthesis and respiration.

(a) Complete the balanced chemical symbol equation for photosynthesis.

$6CO_2$ + ... ⟶ ..... + $6O_2$

(2)

(b) Identify **two** environmental factors that can affect the rate of movement of carbon dioxide into the palisade cells of a plant.

1 .....

2 .....

(2)

(c) Describe and explain how the net exchange of carbon dioxide in a green plant is different during the day compared to the night.

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(4) **Q14**

(Total 8 marks)

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15. Human body temperature is 37°C. When a person is in a hot environment where the air temperature is much higher than 37°C, changes take place to make sure that their body temperature remains at 37°C.

(a) Explain **two** changes that take place in the body to keep its temperature at 37°C in a hot environment.

1 .....

.....

.....

2 .....

.....

.....

(4)

(b) Maintaining a constant body temperature is an example of homeostasis.

Give **two** other examples of homeostasis in the human body.

1 .....

2 .....

(2)

(c) Homeostasis involves negative feedback.

With reference to body temperature, describe what is meant by the term **negative feedback**.

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(1)

Q15

(Total 7 marks)

TOTAL FOR PAPER: 120 MARKS

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