UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

7604327696

BIOLOGY **0610/32**

Paper 3 Extended **May/June 2013**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **18** printed pages and **2** blank pages.

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For Examiner's Use

1 The kidneys remove metabolic waste from the liquid part of the blood.

Name:

(i) the liquid part of the blood;

..... [1]

(ii) the process that involves removing metabolic waste from the body.

..... [1]

Fig. 1.1 shows a kidney tubule and its associated blood vessels.

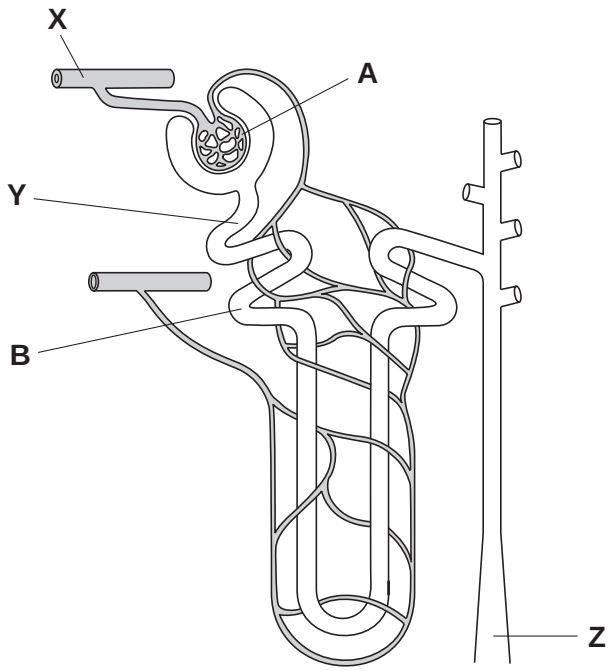


Fig. 1.1

(b) Describe the functions of the regions labelled **A** and **B**.

A .....

.....

.....

B .....

.....

..... [4]

Table 1.1 shows the concentrations of some substances in the blood at **X**, the fluid at **Y** and the urine at **Z**.

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Table 1.1

substance	concentration / g per 100 cm^3		
	blood at **X**	fluid at **Y**	urine at **Z**
glucose	0.1	0.1	0.0
protein	7	0	0
sodium ions	0.35	0.35	0.5
urea	0.03	0.03	2.0

(c) Name the substance shown in Table 1.1 that:

(i) has molecules that are too large to pass through the walls of capillaries;

..... [1]

(ii) is all reabsorbed in the kidney;

..... [1]

(iii) is a metabolic waste product.

..... [1]

(d) Explain why the concentrations of sodium ions and urea are greater at **Z** than at **Y**.

.....

.....

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..... [2]

For Examiner's Use

(e) People who have acute kidney failure are given dialysis treatment.

In dialysis machines, the blood flows through narrow tubes made from partially permeable membranes, surrounded by dialysis fluid.

(i) Dialysis fluid contains sodium ions.

Use the information in Table 1.1 to suggest the concentration of sodium ions that should be in the fluid and give a reason for your answer.

concentration ..... g per 100 cm^3

reason .....

.....

..... [2]

(ii) State **two** components of blood that are **not** in dialysis fluid.

1 .....

2 ..... [2]

(f) Heparin is added to the blood before it returns to the body from the dialysis machine. Heparin prevents a person's blood from clotting.

Describe the process of blood clotting.

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.....

.....

..... [3]

[Total: 18]

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Question 2 begins on page 6.

For Examiner's Use

2 Antibiotics are used to treat human diseases.

Many bacteria have become resistant to antibiotics. Some antibiotics can no longer be used to treat certain diseases.

Samples of bacteria were taken from a person who had an infectious disease. They were spread onto four Petri dishes of agar (agar plates). Three of these agar plates contained the antibiotics **1**, **2** or **3**.

The results are shown in Fig. 2.1.

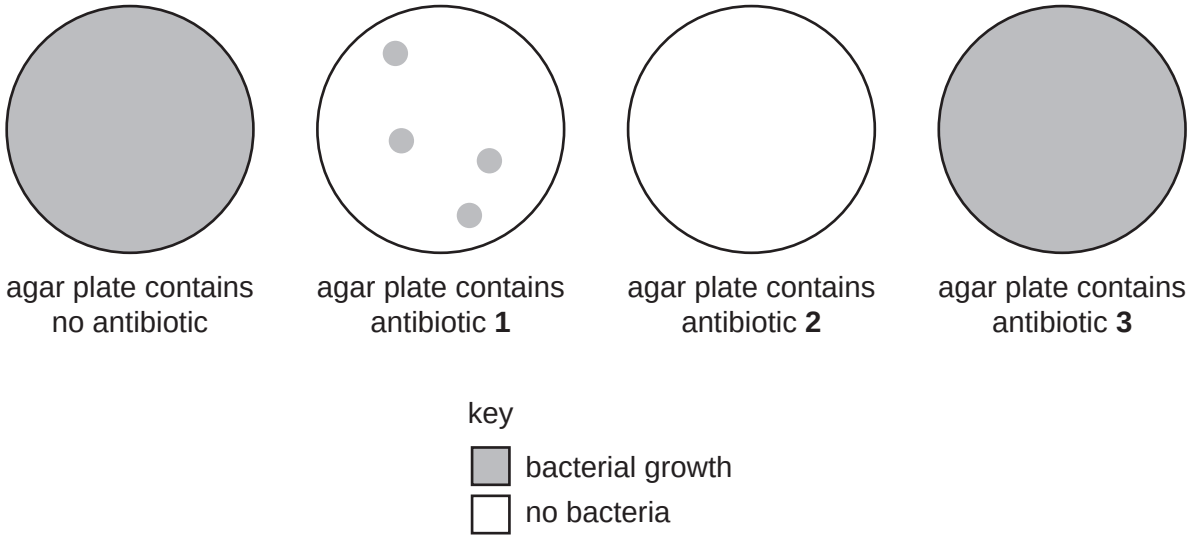


Fig. 2.1

(a) Explain why:

(i) no bacteria grew in the agar plate with antibiotic **2**;

.....

.....

..... [1]

(ii) bacteria grew in the agar plate with antibiotic **3**;

.....

.....

..... [1]

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(iii) only a small number of bacteria grew with antibiotic **1**.

.....

.....

.....

.....

..... [2]

(b) Explain why it is important to carry out a test similar to that shown in Fig. 2.1 before giving an antibiotic to a person infected with a bacterial disease.

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..... [2]

(c) Antibiotic resistance has become a major problem worldwide.

Suggest how the problem of antibiotic resistance can be limited.

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..... [4]

For Examiner's Use

(d) Hormones are used to treat a variety of conditions.

The most common hormonal treatment is the use of insulin to treat diabetes. Most of the insulin is produced using cells that are grown in large fermenters. These cells have been genetically engineered to produce human insulin.

Fig. 2.2 shows the stages involved in transferring the gene for insulin from human cells to bacterial cells.

P	gene from human cell removed from chromosome 11
Q	bacterium produces human insulin
R	plasmid vector enters bacterium
S	gene for human insulin found to be on chromosome 11
T	bacterium divides by binary fission
V	gene for human insulin inserted into a plasmid vector

Fig. 2.2

(i) Put the stages into the correct sequence. Two have been done for you.

S					**Q**

[1]

(ii) Diabetes is often treated with human insulin that has been produced by genetically modified cells. In most countries this type of insulin has replaced the insulin that was prepared from animals.

Suggest the advantages of providing human insulin to people with diabetes rather than insulin obtained from animals.

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..... [3]

[Total: 14]

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Question 3 begins on page 10.

3 Fig. 3.1 shows the front part of the eye.

The eye shown in Fig. 3.1 is **far adapted**, which means that the lens is focusing light from a distance.

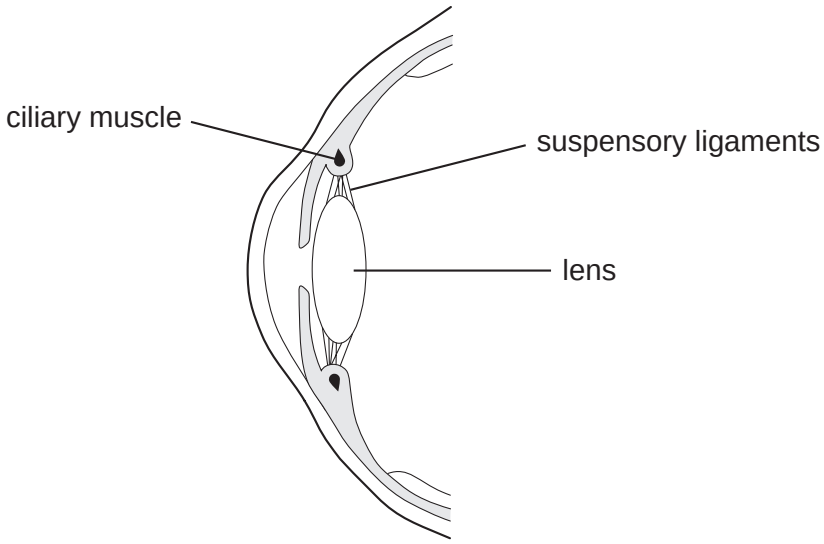


Fig. 3.1

The lens changes shape to alter the direction of light rays passing through the eye.

(a) Name:

(i) another part of the eye that also alters the direction of the light rays;

..... [1]

(ii) the part of the eye where the light rays form an image.

..... [1]

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(b) An eye specialist measured the change in shape of the lens of a patient during an eye test. The specialist recorded the change in shape of the lens with the patient looking at a chart 10 metres away and when reading from a book. This is shown in Fig. 3.2.

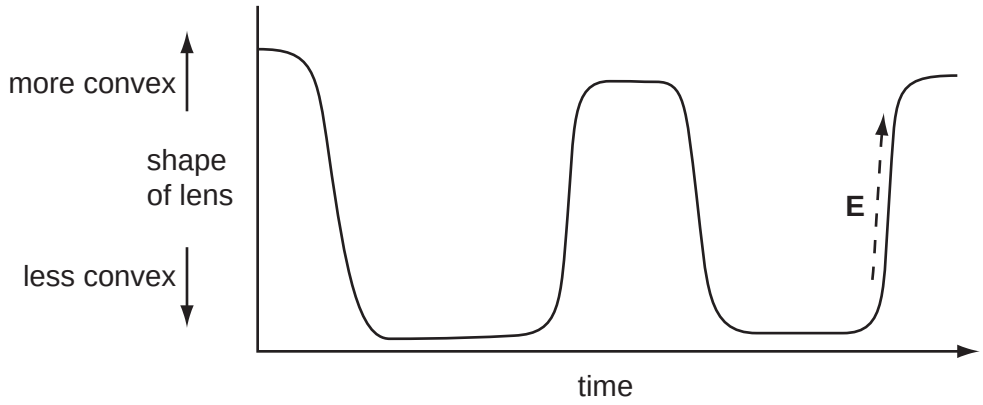


Fig. 3.2

(i) Write the letter **D** on Fig. 3.2 to show a time when the patient was looking at the chart that was 10 metres away. [1]

(ii) State how the ciliary muscles and suspensory ligaments act to change the shape of the lens during the time marked **E** on Fig. 3.2.

ciliary muscles .....

.....

suspensory ligaments .....

..... [2]

(c) Outline how humans are able to see in colour.

.....

.....

.....

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.....

.....

..... [3]

[Total: 8]

For Examiner's Use

4 *Sorghum bicolor* is a cereal crop important in many dry areas of the world.

Fig. 4.1 shows some plants of *S. bicolor* growing in a field in China.



Fig. 4.1

(a) *S. bicolor* is a monocotyledon.

State **two** features that are used to identify plants as monocotyledons.

1 .....

2 ..... [2]

(b) Fig. 4.1 shows the flower heads of sorghum. Pollen is released from the individual flowers when they open.

Most sorghum flowers are self-pollinated and then self-fertilised.

(i) State the meanings of the terms *pollination* and *fertilisation*.

pollination .....

.....

.....

fertilisation .....

.....

..... [2]

For Examiner's Use

(ii) Describe **two** implications of self-pollination.

1 .....

.....

2 .....

..... [2]

(c) Describe the events that occur in flowering plants after fertilisation to form a seed.

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..... [4]

(d) In India, the cultivation of sorghum has decreased because now people prefer foods based on wheat and rice.

There are alternative uses of sorghum in the production of new foods, processed foods and as feed for animals.

Explain why it is less efficient to feed crops, such as sorghum, to animals rather than to use them for human foods.

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..... [3]

[Total: 13]

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[Turn over

For Examiner's Use

5 The alimentary canal is adapted for chemical and mechanical digestion.

(a) Explain how chemical digestion differs from mechanical digestion.

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..... [3]

Fig. 5.1 is a diagram of the human alimentary canal.

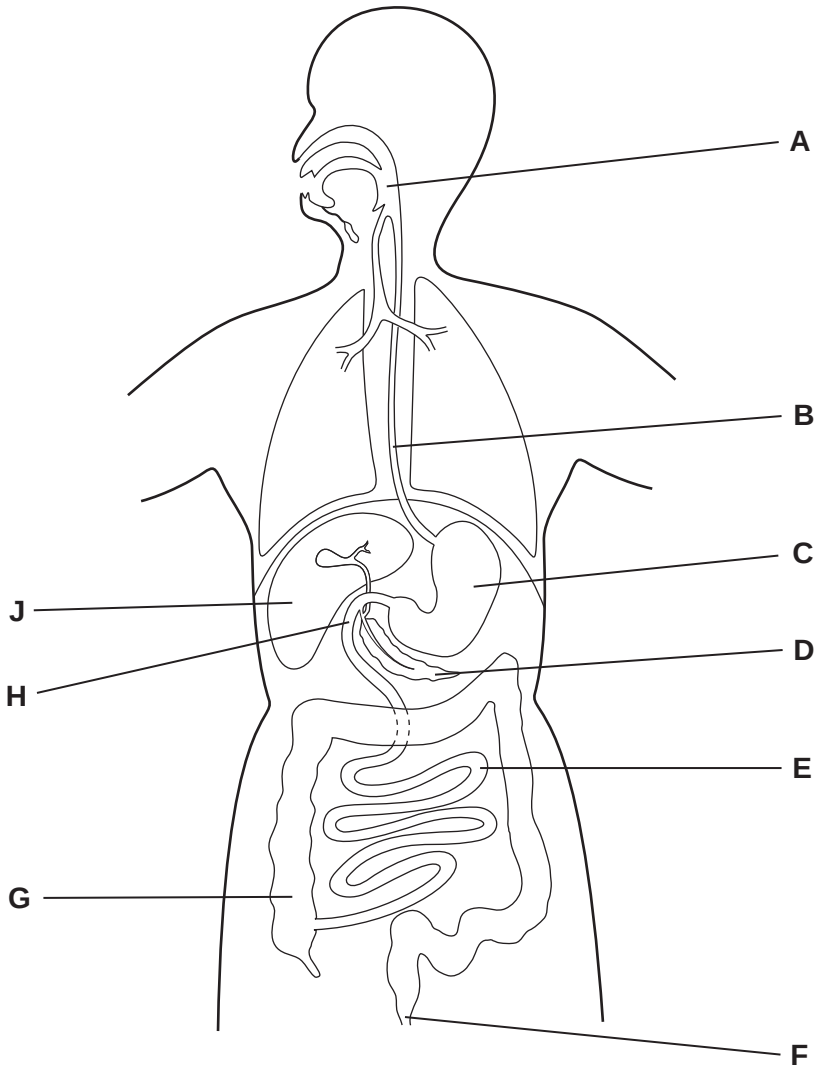


Fig. 5.1

For Examiner's Use

(b) Table 5.1 shows four functions of the alimentary canal.

Complete the table by:

- naming the part of the system that carries out each of the functions;
- using the letters from Fig. 5.1 to identify the part of the system named.

One row has been completed for you.

Table 5.1

function	name of part	letter from Fig. 5.1
produces bile	liver	**J**
most soluble food is absorbed into the blood		
indigestible food is egested		
hydrochloric acid is produced		
protease, lipase and amylase are produced		

[4]

(c) Some people develop gallstones, made of cholesterol, that accumulate in the gall bladder and the bile duct. Gallstones block the flow of bile.

Explain how gallstones can affect the digestion of fat.

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.....

.....

.....

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..... [3]

(d) Cholesterol can also accumulate in the walls of the coronary arteries.

Explain the effects that this might have.

.....

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.....

.....

.....

..... [3]

[Total: 13]

For Examiner's Use

For Examiner's Use

6 In some countries forests are cleared by burning. This produces carbon dioxide and ash.

(a) Outline the environmental effects of an increase in carbon dioxide in the atmosphere as a result of burning forests.

.....

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..... [4]

(b) The ash helps crops to grow because it is rich in minerals, such as magnesium ions, but it is deficient in nitrate ions.

Explain why nitrate ions and magnesium ions are important for plants.

.....

.....

.....

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.....

.....

.....

..... [4]

For Examiner's Use

(c) When mineral ions from soils are washed into streams and rivers there is often a rapid growth of algae.

(i) State the name of the effect that is caused by adding mineral ions to streams and rivers.

..... [1]

(ii) These streams and rivers often have low concentrations of dissolved oxygen. Explain why.

.....

.....

.....

..... [2]

(d) Untreated domestic sewage contains organic waste as well as dissolved minerals.

Outline how sewage is treated so that the water may be recycled as drinking water.

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.....

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..... [3]

[Total: 14]

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Question 4 Figure 4.1 © Ref: 12206819; zhuda; *Autumn sorghum in China;* www.istockphoto.com;

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