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Pearson Edexcel
International GCSE

Centre Number

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Human Biology

Unit: 4HB0

Paper: 01

Wednesday 8 January 2014 – Afternoon

Time: 2 hours

Paper Reference

4HB0/01

You must have:

Ruler

Candidates may use a calculator.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 120.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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PEARSON

Answer ALL questions.

- 1 For each of the questions (a) to (j), choose an answer **A, B, C** or **D** and put a cross in the box . Mark only one answer for each question. If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .


(a) When vaccinated, the human defence system will make (1)

- A** antiseptics
 B antigens
 C antibodies
 D antibiotics


(b) Permanent deafness is most likely to result from (1)

- A** overproduction of wax in the ear passage
 B damage to the semi-circular canals
 C influenza
 D damage to the cochlea

(c) Some people carry donor cards like the one shown.



Organ /Tissue Donor Card



I wish to donate my organs and tissues. I wish to give:

any needed organs or tissues only the following organs and tissues:

Donor
 Signature _____ Date _____

Witness _____

Witness _____

Which one of these body parts is donated regularly? (1)

- A** kidney
 B eye
 C uterus
 D testis



(d) The table shows the percentage composition of the main gases in inspired and expired air.

| Gas | Inspired air (%) | Expired air (%) |
|----------------|------------------|-----------------|
| Nitrogen | 78 | 78 |
| Oxygen | 21 | |
| Carbon dioxide | 0.03 | 4 |

Which of the following values completes the table correctly?

(1)

- A 10
- B 16
- C 21
- D 5

(e) The tricuspid valve of the heart prevents the backflow of blood into the

(1)

- A left atrium
- B right atrium
- C left ventricle
- D right ventricle

(f) Which of these gases is **not** a greenhouse gas?

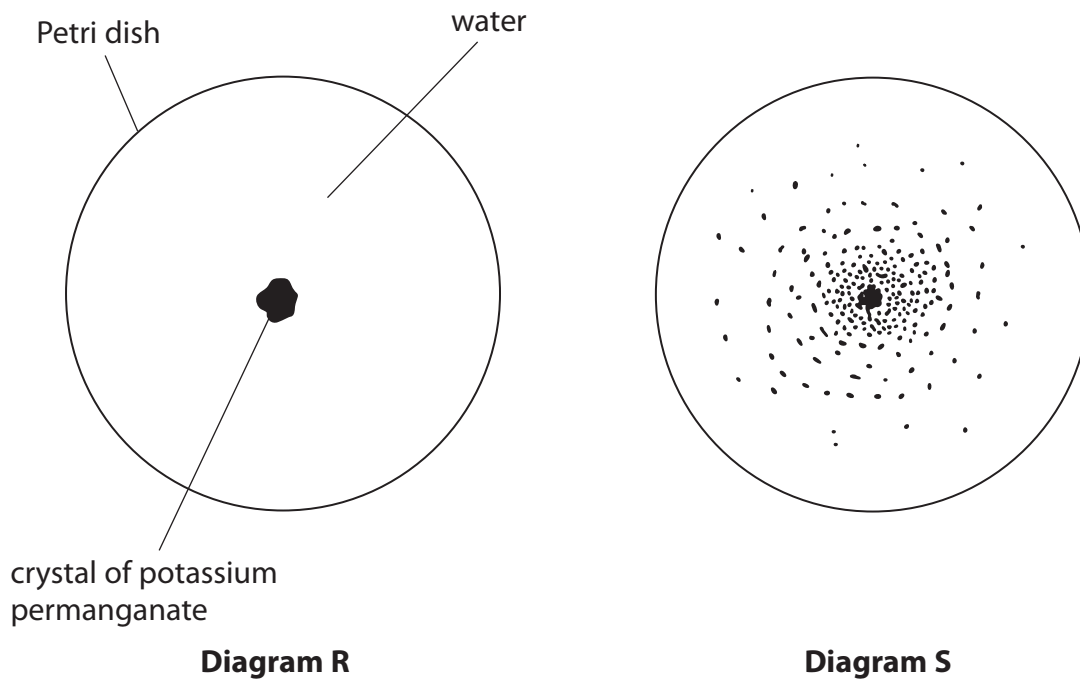
(1)

- A water vapour
- B carbon dioxide
- C nitrous oxide
- D carbon monoxide



(g) Diagram R shows a Petri dish filled with water into which a soluble purple crystal of potassium permanganate has just been placed.

Diagram S shows the same Petri dish after 30 minutes.



The process responsible for the change in the appearance of the water is

(1)

- A osmosis
- B active transport
- C diffusion
- D facilitated diffusion

(h) Which one of these molecules contains carbon, hydrogen and oxygen only?

(1)

- A lipid
- B protein
- C enzyme
- D amino acid



(i) Which of these elements is present in haemoglobin?

(1)

- A calcium
- B fluorine
- C magnesium
- D iron

(j) When a bright light is shone into an eye

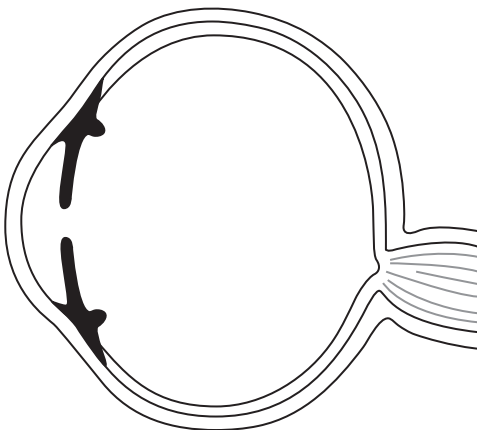
(1)

- A the pupil widens and the iris becomes larger
- B the pupil widens and the iris becomes smaller
- C the pupil becomes smaller and the iris becomes larger
- D the pupil becomes smaller and the iris becomes smaller

(Total for Question 1 = 10 marks)



2 The diagram shows an incomplete section through a human eye.



(a) Complete the diagram to show the position and shape of the lens. (2)

(b) State the function of the lens. (2)

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(c) Explain how the lens carries out this function. (3)

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(Total for Question 2 = 7 marks)



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- 3 A student carried out an investigation into the effect of temperature on the digestion of starch.

She mixed starch solution with saliva. She kept samples of the mixture at different temperatures for 10 minutes. She then tested the samples to find out how much glucose had been produced.

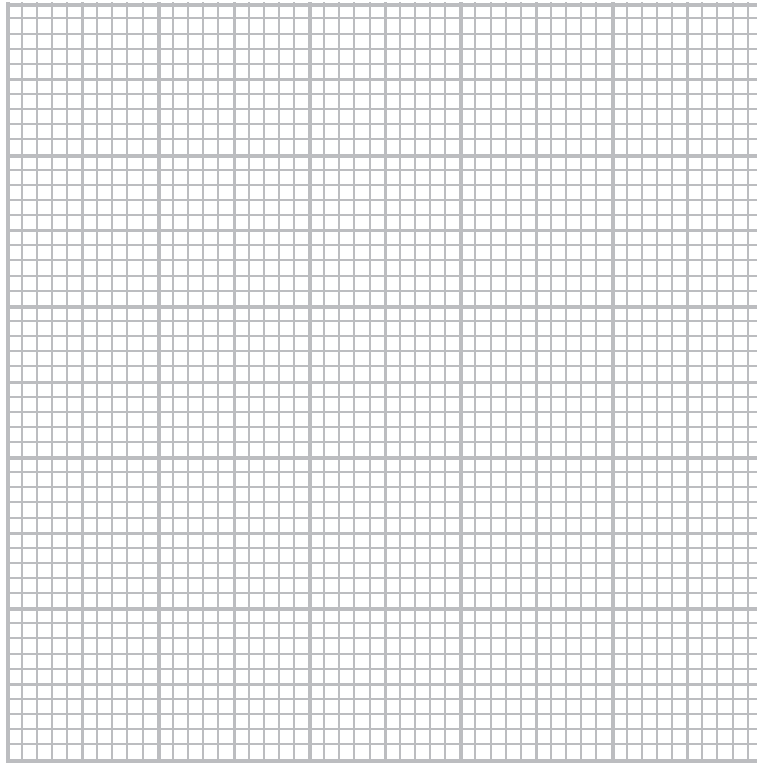
The table shows her results.

| Temperature in °C | Glucose in arbitrary units |
|-------------------|----------------------------|
| 20 | 30 |
| 25 | 46 |
| 30 | 62 |
| 35 | 78 |
| 40 | 78 |
| 45 | 56 |
| 50 | 30 |
| 55 | 10 |
| 60 | 4 |
| 65 | 2 |
| 70 | 0 |
| 75 | 0 |
| 80 | 0 |



(a) (i) Plot a graph of the results.

(5)



(ii) Estimate the temperature at which most glucose was likely to be produced in 10 minutes. Give a reason for your answer.

(2)

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(iii) All the samples were left for 10 minutes before being tested for glucose.

State two other variables that should be kept constant.

(2)

1

2



(iv) Explain why the starch has been converted into glucose.

(2)

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(v) Explain why no glucose was produced at temperatures above 70 °C.

(3)

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(b) Describe how you could show that there was no starch left in the sample at 35 °C at the end of the 10-minute period.

(4)

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(Total for Question 3 = 18 marks)



4 Complete the passage using the correct word or words from the list.

(8)

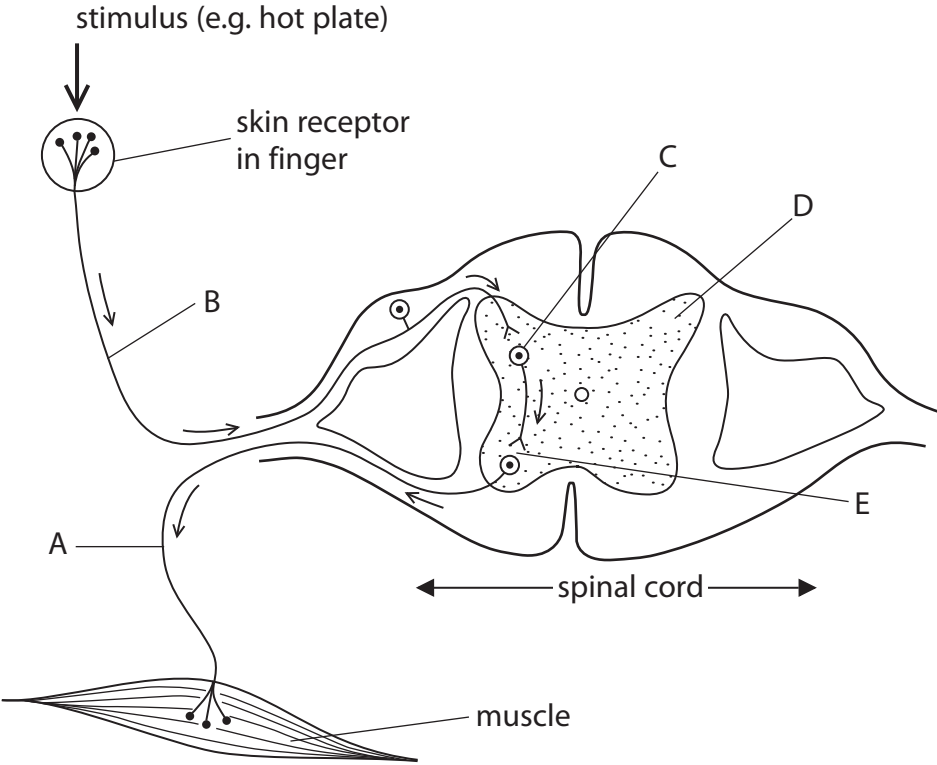
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|-------------|---------|-----------------|
| arteries | veins | carbon dioxide |
| capillaries | blood | lymph vessels |
| pus | plasma | tissue fluid |
| oxygen | glucose | water |
| urea | urine | red blood cells |

Blood leaves the human heart in vessels known as These vessels divide to form vessels with thinner and thinner walls. The vessels with the thinnest walls are known as The walls of these vessels are so thin that some of the liquid from the blood leaks through the walls to bathe the surrounding cells. The liquid bathing these cells is known as and it carries useful substances such as and from the blood to the cells of the body. After picking up waste substances from the cells, for example and, some of the liquid returns to the blood. The rest of the liquid drains into

(Total for Question 4 = 8 marks)



5 The diagram shows the pathway a nerve impulse takes from a receptor to a muscle during a simple reflex action.



(a) State which of the labels, A, B, C, D or E, shows

(5)

- a motor neurone
- grey matter
- a cell body
- a synapse
- a sensory neurone



(b) Complete the table to give **three** differences between the nervous system and the endocrine system.

(3)

| Nervous system | Endocrine system |
|----------------|------------------|
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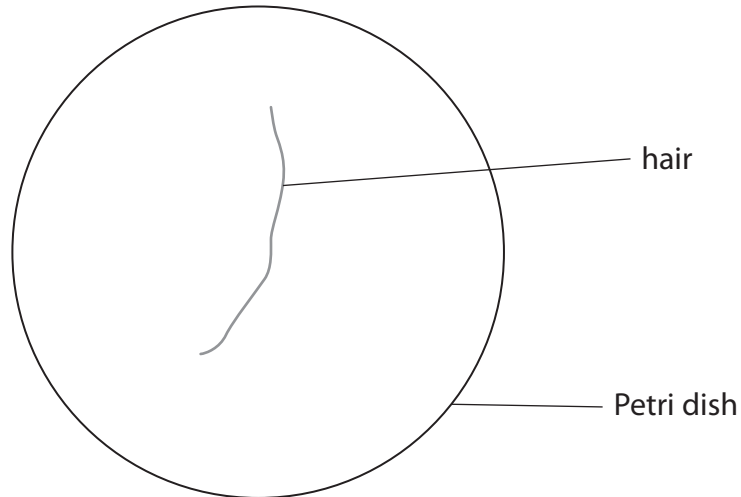
(Total for Question 5 = 8 marks)



6 A student wanted to find out if microorganisms were present in her hair.

She prepared a sterile Petri dish containing sterile nutrient agar.

She lifted the lid of the dish and placed one of her hairs in the middle of the agar, as shown in the diagram.



She replaced the lid and left the dish in an incubator for a period of time.

She then examined the dish.

(a) (i) Name two types of microorganism that could grow on the nutrient agar.

(2)

1

2

(ii) At which temperature should the student have set the incubator?

(1)

- A 0 °C
- B 37 °C
- C 70 °C
- D 100 °C



(iii) Explain why the student chose this incubation temperature.

(3)

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(iv) Suggest a possible source of error in this investigation.

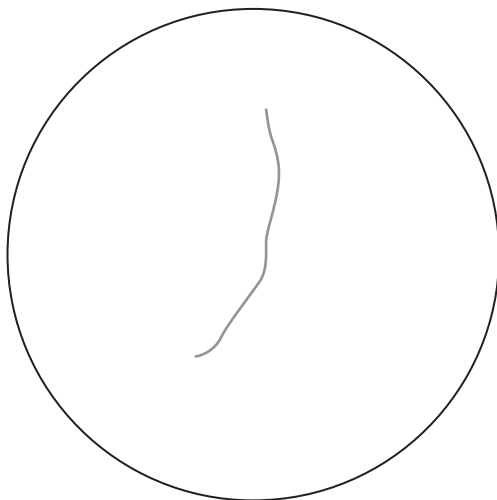
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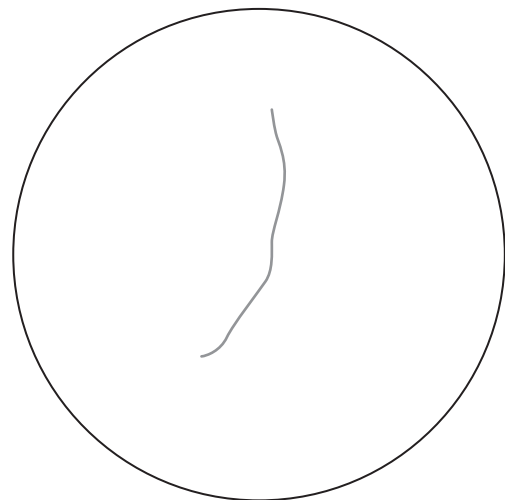
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(b) Complete the two diagrams to show the likely appearance of the agar after incubation for 2 days and after 7 days.

(2)



2 days



7 days



(c) Briefly describe a control experiment that the student could have used as part of her investigation and explain what it would show.

(3)

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(d) A hair shampoo manufacturer claims that their shampoo has antiseptic properties. The student washed her hair in the shampoo then repeated the investigation.

How would you expect her results to differ, if the manufacturer’s claim is correct?

(2)

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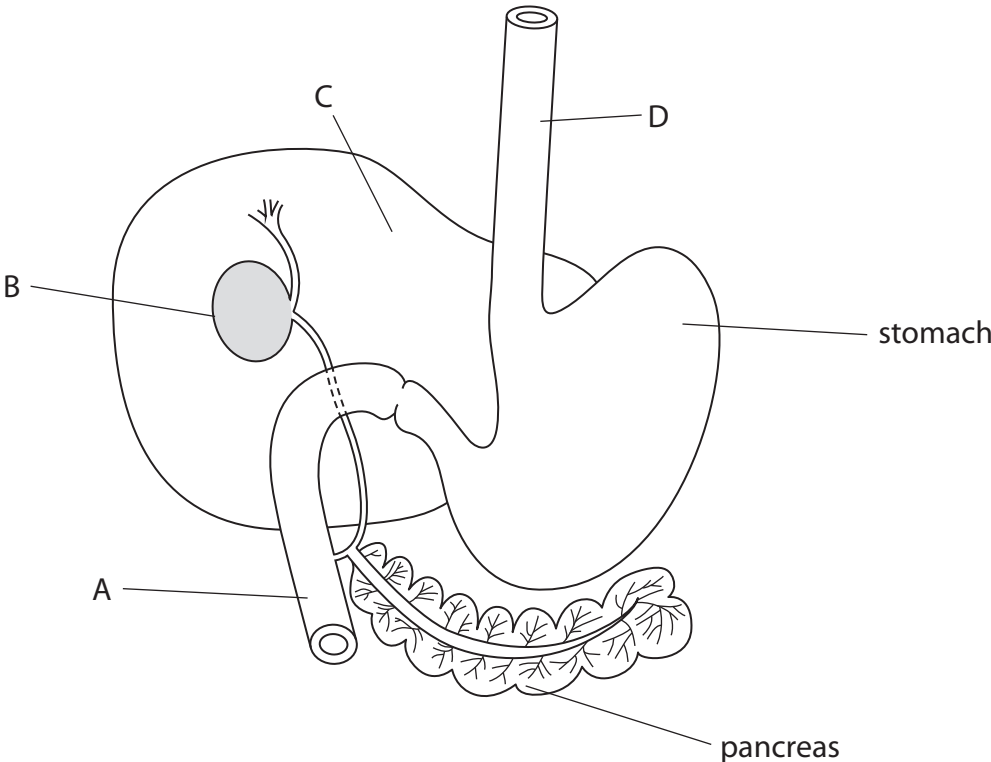
(Total for Question 6 = 14 marks)



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7 The diagram shows part of the human digestive system.



(a) Name the parts labelled A, B, C and D. (4)

- A
- B
- C
- D

(b) The pancreas produces several secretions involved in digestion and other processes. Name any three of these secretions. (3)

- 1
- 2
- 3



(c) Explain how food travels along tube D.

(3)

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(d) Structure C secretes a fluid which is stored in structure B.
Explain the function of this fluid in digestion.

(4)

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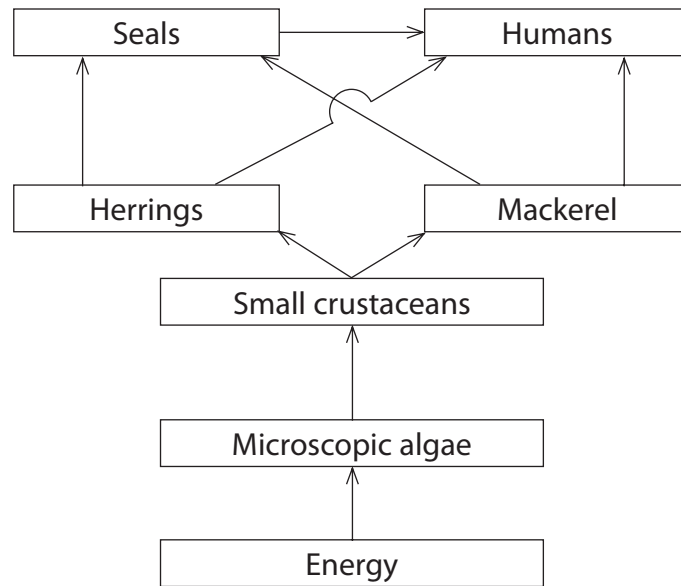
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(Total for Question 7 = 14 marks)



8 Food chains can link together to form a food web.

The diagram shows a food web for some organisms living in the sea.



(a) Using information from the diagram, draw a food chain containing **four** organisms.

(3)



(b) Name the source of energy for this food chain.

(1)

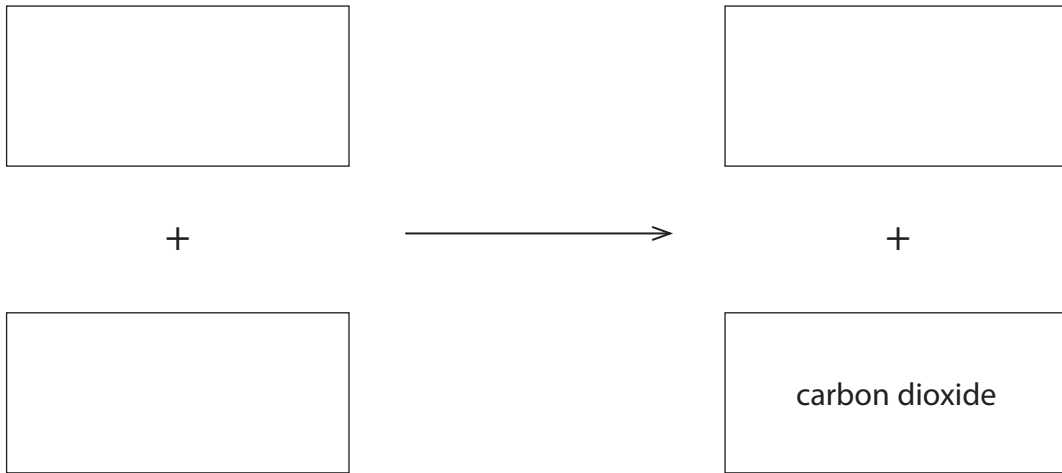
Source of energy

(c) Carbon dioxide is produced by the organisms in the food web.

Name the process by which organisms produce carbon dioxide and complete the word equation giving details of the process.

(5)

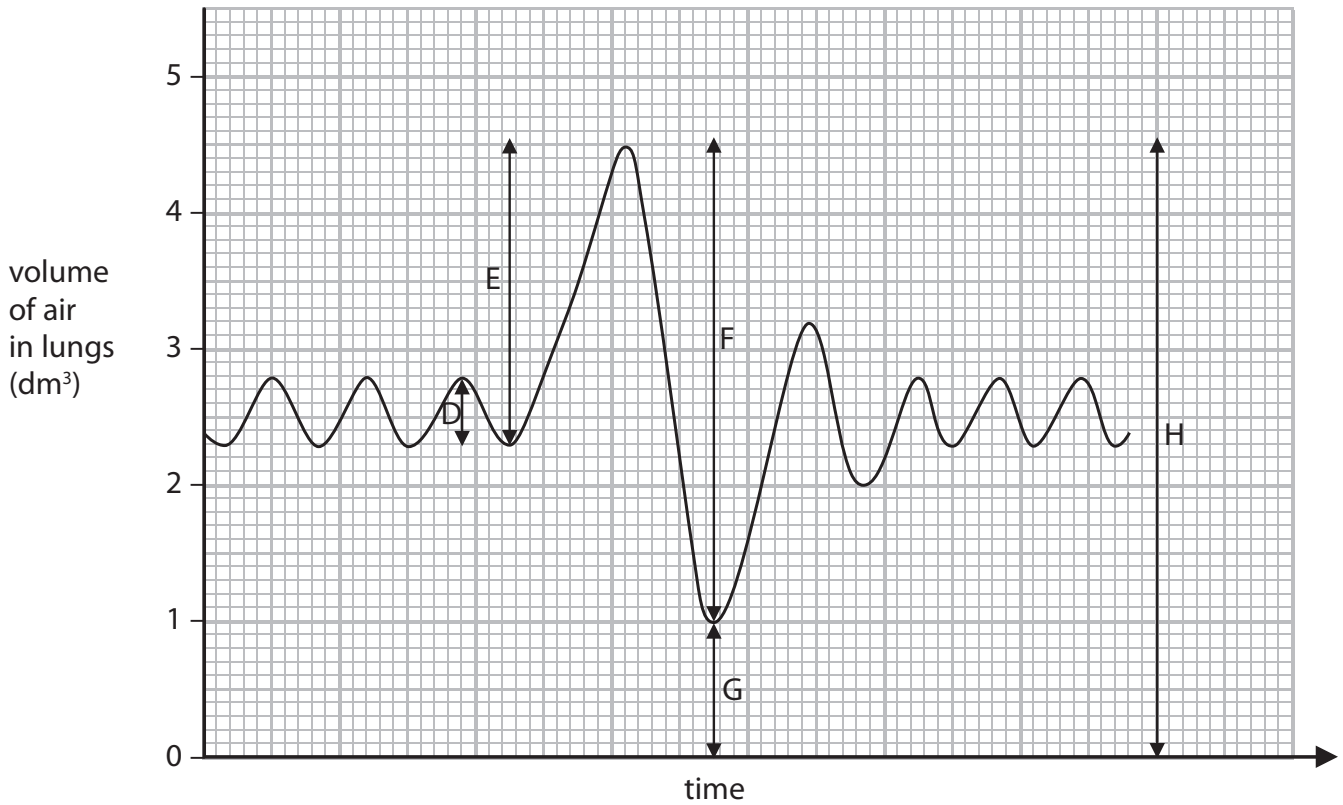
Name of process



(Total for Question 8 = 9 marks)



- 9 (a) The graph shows the volume of air in the lungs of a human during various stages of breathing.



- (i) State the letter which shows the vital capacity.

(1)

- (ii) The tidal volume is represented by the letter D.

State what is meant by the term tidal volume and calculate its value from the graph.

(2)



(iii) State the maximum volume of air that these lungs can contain.

(1)

(iv) Give the value of the residual volume shown by letter G, and suggest what this volume represents.

(3)

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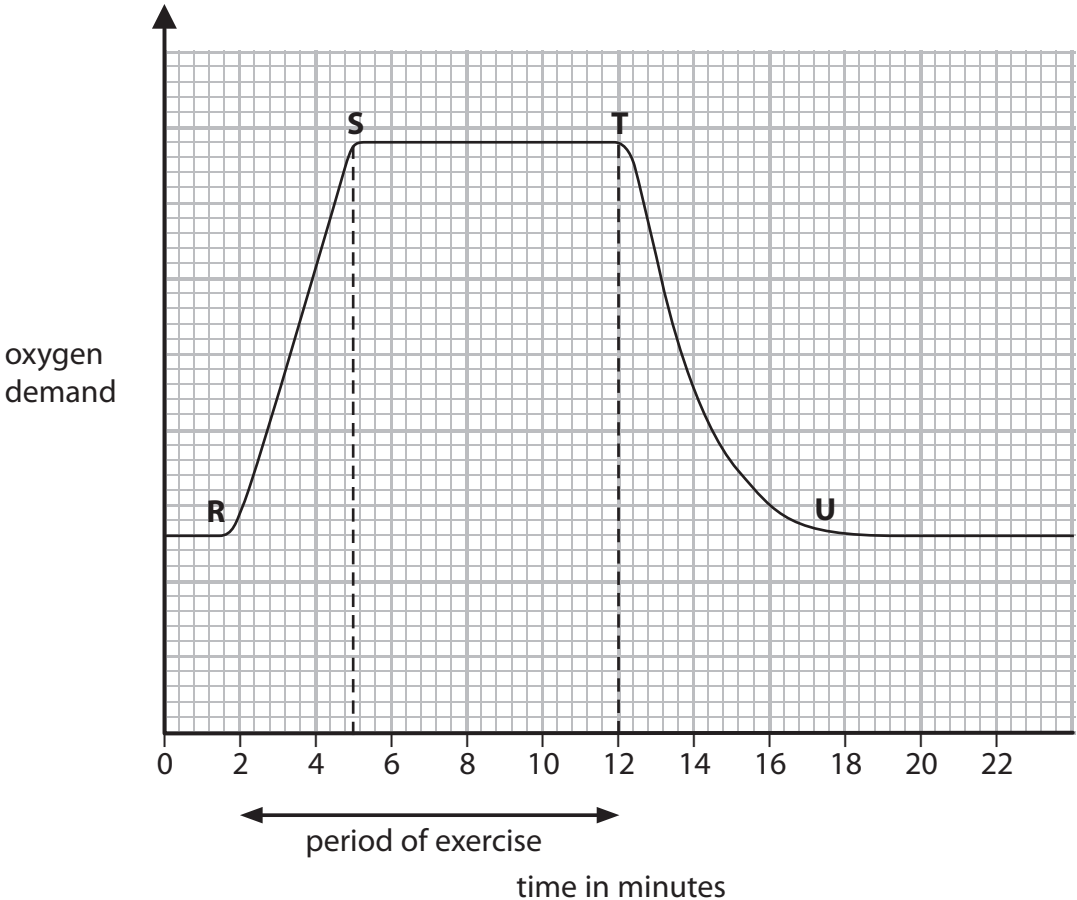
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(b) The graph shows the oxygen demand before, during and after a period of exercise.



(i) State two changes that would occur in breathing between R and S. (2)

- 1
- 2

(ii) After the period of exercise, how long did it take for the oxygen demand to return to normal? (1)

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(c) Using information from the graph and your own knowledge, explain why the oxygen demand does not return to normal immediately after exercise.

(4)

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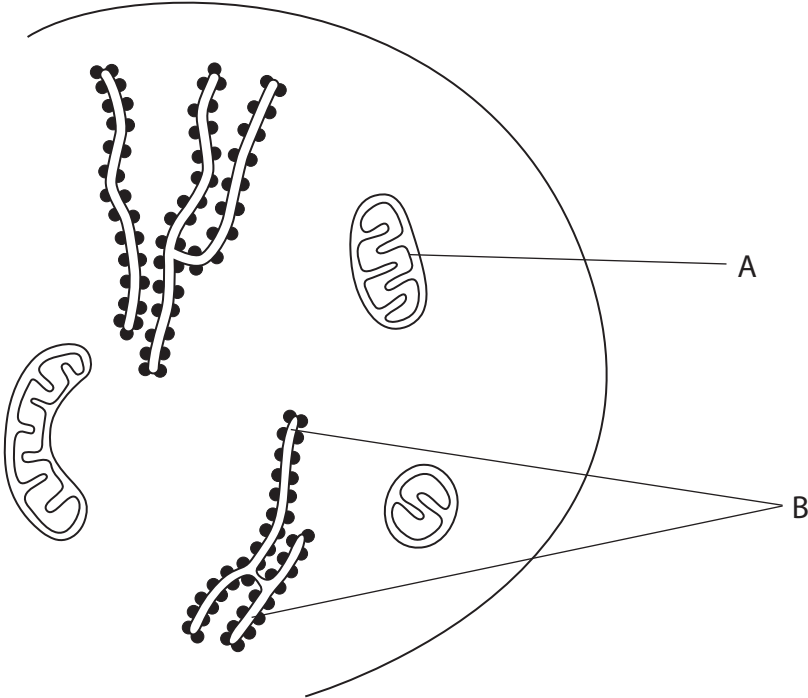
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(Total for Question 9 = 14 marks)



10 The diagram shows part of a cheek cell.



(a) Give a name and function for the parts labelled A and B. (4)

A

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B

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(b) How is it possible to tell that this is a diagram of a cell as seen under an electron microscope rather than a light microscope? (2)

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(c) Suggest how the appearance of a red blood cell might differ from the cheek cell when viewed under an electron microscope.

Give reasons for your answer.

(4)

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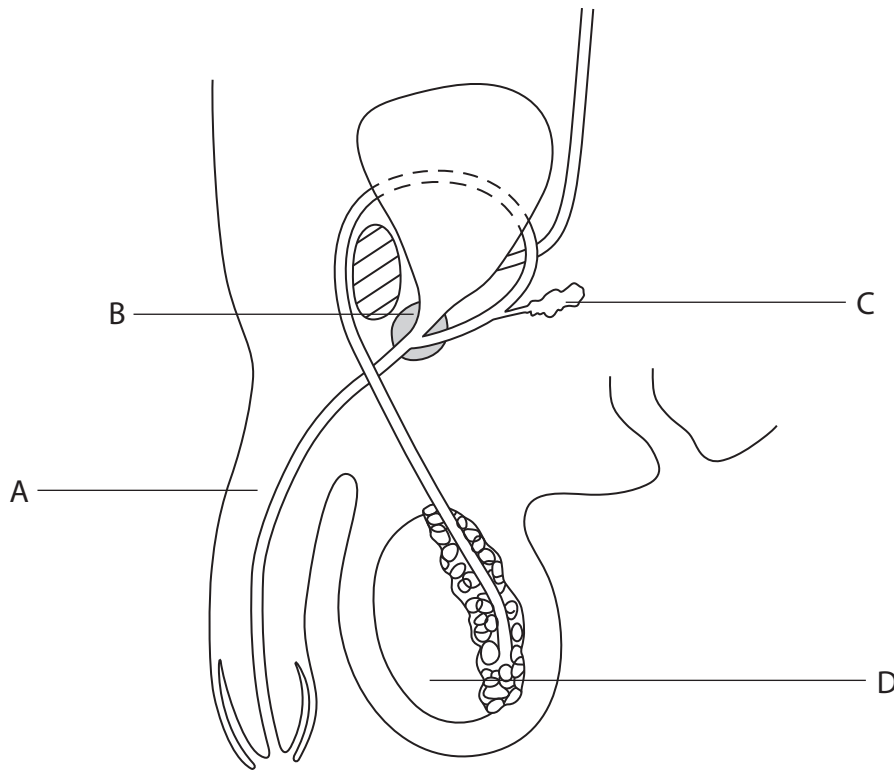
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(Total for Question 10 = 10 marks)



11 The diagram shows a side view of the male reproductive system.



(a) (i) The following is a list of some of the parts of the male reproductive system.

- | | | | |
|----------|-----------------|------------|------------|
| penis | testis | sperm duct | epididymis |
| prostate | seminal vesicle | urethra | |

Select the correct name from the list to identify each of the parts labelled A, B and D.

(3)

A

B

D



(ii) Explain the function of parts B and C in the process of transferring sperms to a female.

(2)

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(b) In the space draw a large diagram of a single sperm. Label **two** parts.

(3)

(Total for Question 11 = 8 marks)

TOTAL FOR PAPER = 120 MARKS



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