

Write your name here

Surname

Other names

**Edexcel****International GCSE**

Centre Number

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Candidate Number

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# Human Biology

**Unit: 4HB0****Paper: 01**

Monday 9 January 2012 – Morning

**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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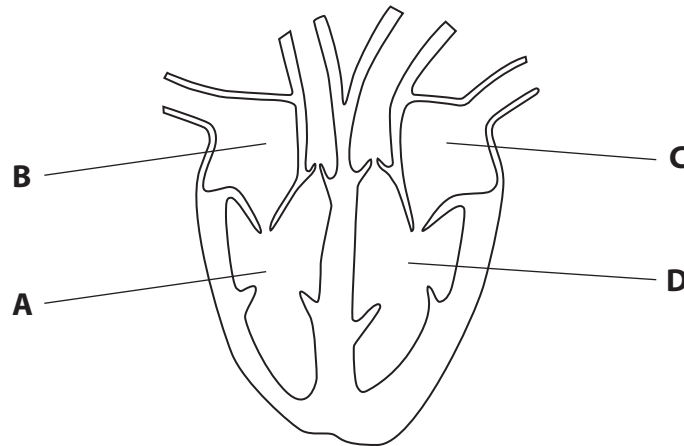
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**PEARSON**

**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) The diagram shows a section through the human heart.



The correct direction for the flow of blood in the heart is from chamber

(1)

- A to B
- B to C
- C to D
- D to A

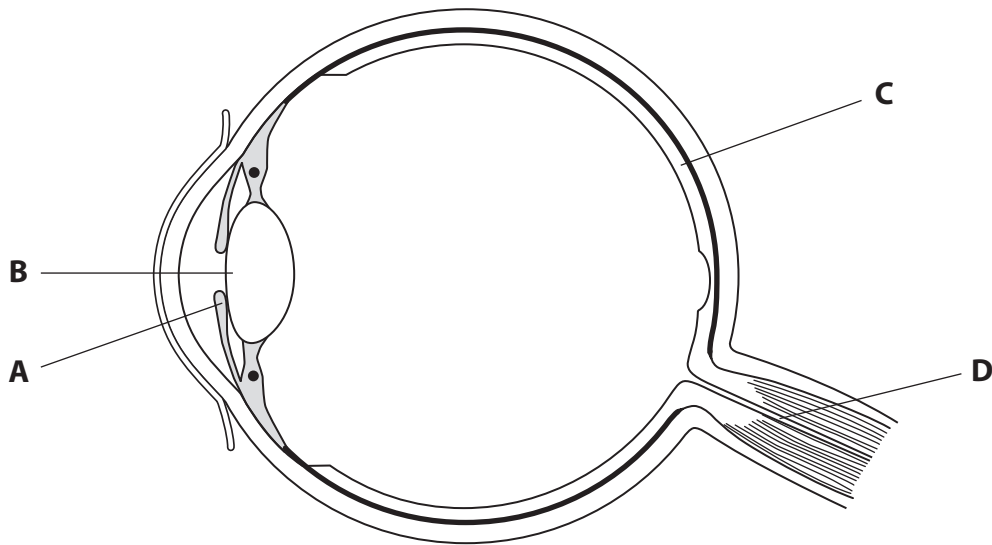
(b) Which of the following processes requires oxygen?

(1)

- A aerobic respiration
- B anaerobic respiration
- C diffusion
- D photosynthesis



(c) The diagram shows a section through the human eye.



Which part of the eye brings light rays to a focus?

(1)

- A
- B
- C
- D

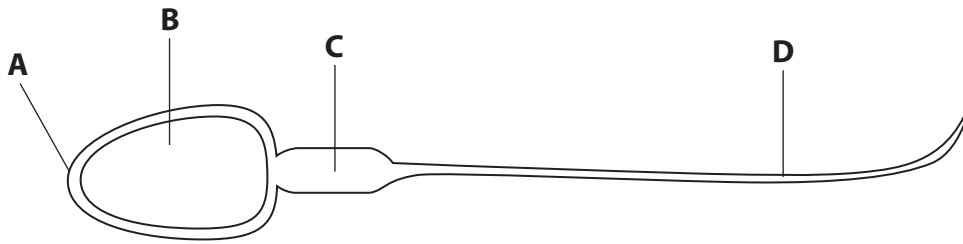
(d) Fertilisation usually occurs in the

(1)

- A ovary
- B oviduct
- C uterus
- D vagina



(e) The diagram shows a human sperm cell.



Which part of the sperm contains most DNA?

(1)

- A
- B
- C
- D

(f) Which structure in the body helps to regulate body temperature?

(1)

- A kidney
- B liver
- C lungs
- D skin

(g) Which of the following gases is a greenhouse gas and may lead to global warming?

(1)

- A carbon monoxide
- B methane
- C nitrogen
- D oxygen



(h) Which one of the following statements about muscles is true?

(1)

- A** muscles are attached to bones by ligaments
- B** muscles never work in pairs
- C** muscles can only pull bones not push bones
- D** muscles become shorter when they are relaxed

(i) Which of the following shows the percentage composition of lean meat?

	Water	Protein	Fat	Carbohydrate	Salts
<b>A</b>	38	7	1	52	2
<b>B</b>	72	21	6	0	1
<b>C</b>	77	2	0	20	1
<b>D</b>	15	0.4	84	0	0.6

(1)

- A**
- B**
- C**
- D**

(j) Which of the following passes from a mother to her baby in the uterus?

(1)

- A** blood
- B** carbon dioxide
- C** oxygen
- D** urea

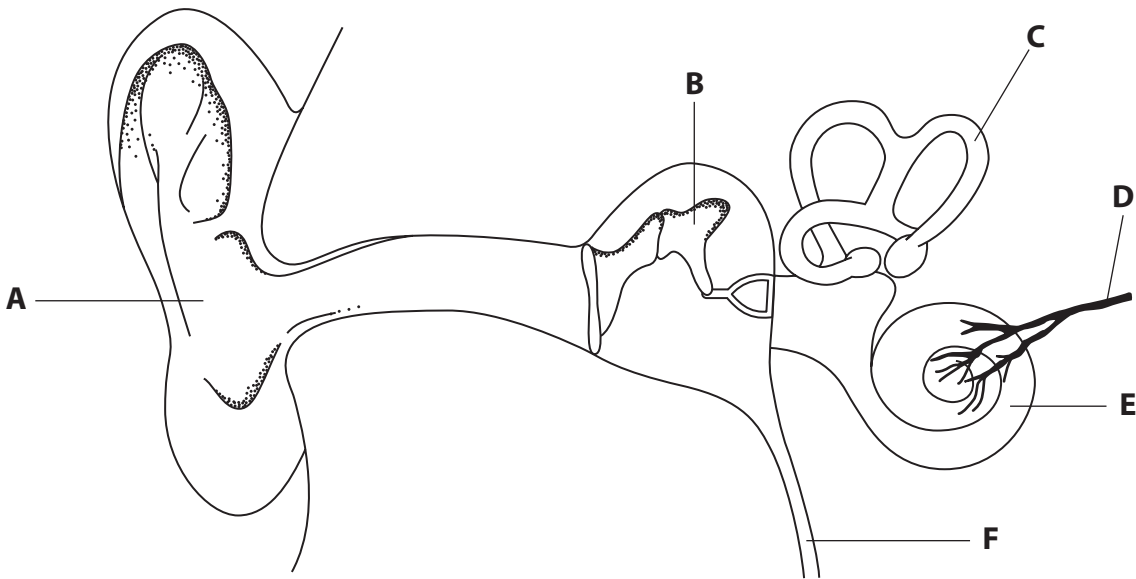
**(Total for Question 1 = 10 marks)**



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2 The diagram shows the structure of the human ear.



Give the letter of the structure which matches the following statements. Each letter may be used once, more than once, or not at all.

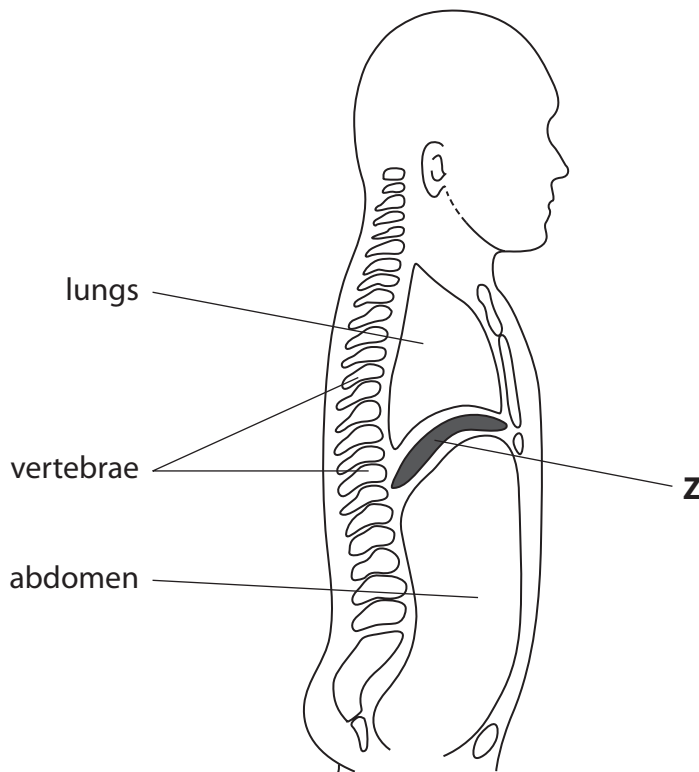
(6)

- Collects sound waves from the air. ....
- Is made of bone. ....
- Allows air to pass to the throat. ....
- Carries nerve impulses to the brain. ....
- Helps with balance. ....
- Turns vibrations into electrical signals. ....

**(Total for Question 2 = 6 marks)**



3 The diagram shows a side view of the human body.



(a) (i) Name the bones that protect the lungs. (1)

(ii) Name the structure protected by the bones labelled vertebrae. (1)

(iii) Other than protection, describe **one** function of bones. (1)





(b) Name **four** organs found within the abdomen.

(4)

- 1 .....
- 2 .....
- 3 .....
- 4 .....

(c) Explain the function of **Z** during breathing in (inspiration).

(3)

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**(Total for Question 3 = 10 marks)**



4 (a) A student was given four white powders labelled A, B, C and D.

The student tested each powder to see if starch was present (by using iodine solution) and if glucose was present (by using Benedict's test).

(i) Describe what the student would see if any of the powders gave a positive test for starch. (1)

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(ii) Describe how the student would carry out Benedict's test on one of the powders. (3)

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(iii) State **one** safety precaution the student should take in performing Benedict's test. (1)

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(b) The student obtained the following results from the tests.

**iodine test:** powder A yellow/brown, powder B blue/black,  
powder C blue/black and powder D yellow/brown

**Benedict's test:** powder D red, powder C blue, powder B red and powder A blue

Present both sets of results clearly in **one** table in the space below.

(5)

(c) State which of the powders contained:

(4)

(i) neither starch nor glucose .....

(ii) glucose but no starch .....

(iii) starch but no glucose .....

(iv) both starch and glucose .....

**(Total for Question 4 = 14 marks)**



5 The box below lists various substances found in the human body.

<b>sweat</b>	<b>urea</b>	<b>glucose</b>
<b>glycerol</b>	<b>oxygen</b>	<b>carbon dioxide</b>
<b>faeces</b>	<b>amino acids</b>	<b>urine</b>

Complete the table by writing in the correct word from the box to match the description.

Each word may be used once, more than once, or not at all.

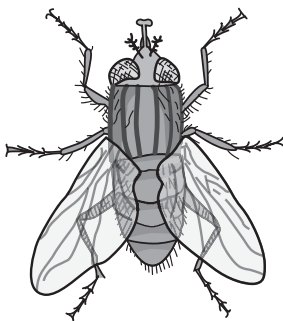
(6)

<b>Description of substance</b>	<b>Name of substance</b>
excreted by the lungs	
nitrogen-containing compound excreted by the kidneys	
involved in temperature regulation	
produced during respiration	
formed in the large intestine	
formed by filtration and reabsorption in the kidney	

**(Total for Question 5 = 6 marks)**



6 The diagram shows a housefly.



(a) (i) On the diagram, circle **three** different structures on the housefly that could be used to spread pathogenic organisms to the food of humans. (3)

(ii) Name a disease that is spread by the housefly. (1)

(iii) Describe how the spread of diseases by houseflies can be prevented. (3)

(b) State **three** ways in which bacteria are useful to humans. (3)

- 1 .....
- 2 .....
- 3 .....

(Total for Question 6 = 10 marks)



7 Sickle cell anaemia is a genetic disorder caused by a recessive allele.

People with the disorder have red blood cells that become sickle shaped when the oxygen concentration of the blood becomes low.

Sickle cells make the person resistant to malaria. About 40% of the population of Africa have this recessive allele.

(a) (i) What is meant by the term **gene**? (2)

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(ii) What is meant by the term **recessive** in the passage above? (2)

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(iii) Suggest an effect of the sickle cell disorder on the function of red blood cells. (1)

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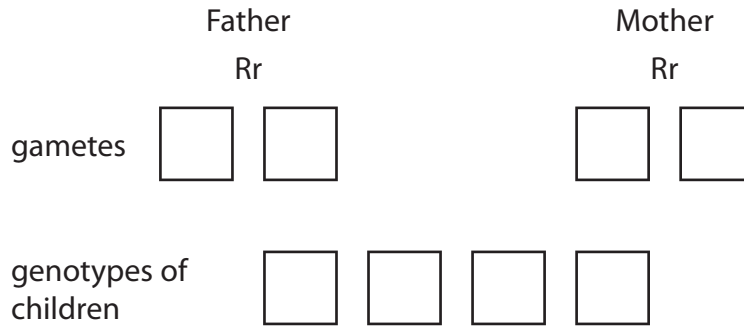
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(b) The diagram shows the genotypes of a father and a mother.

The allele for normal red blood cells is R and the allele for sickle cells is r.

(i) Complete the diagram to show the gametes and the genotypes of the children. (2)



(ii) What proportion of the children will develop sickle cell anaemia? (1)

(c) Suggest why the sickle cell allele continues to spread through the population of Africa. (2)

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**(Total for Question 7 = 10 marks)**



8 A group of 30 pupils performed an experiment to see which areas of the tongue were sensitive to sweet, sour, bitter and salt tastes.

The table shows the number of pupils who said they could taste the solutions on different parts of the tongue.

Part of tongue	Sweet solution	Sour solution	Bitter solution	Salt solution
back	1	10	28	7
front	26	9	13	23
side	7	27	12	24
middle	1	2	1	1

(a) Describe how this experiment should be carried out.

(4)

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(b) Use the results in the table to state the part of the tongue which is most sensitive to the:

(i) bitter solution (1)

(ii) sweet solution (1)

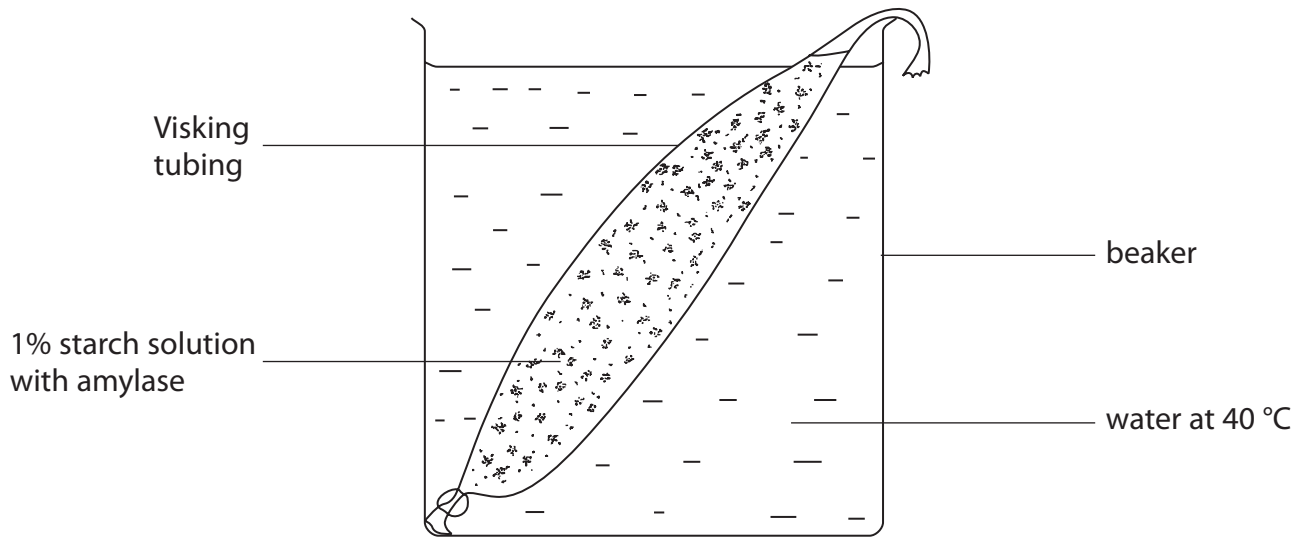
(c) Use the results in the table to explain which part of the tongue is least sensitive to chemical stimuli. (2)

(d) Explain why data was collected for 30 pupils in this experiment, instead of just for one pupil. (2)

**(Total for Question 8 = 10 marks)**



- 9 The diagram shows the apparatus used to demonstrate the action of amylase on starch.  
Visking tubing is a material that allows small molecules to pass through it, but not starch.



- (a) Circle **two** of the words in the box that can be used to describe amylase. (2)

<b>carbohydrate</b>	<b>protein</b>	<b>fat</b>
<b>lipid</b>	<b>enzyme</b>	<b>nucleic acid</b>
		<b>DNA</b>

- (b) Explain why the water bath was at 40 °C, rather than at 80 °C. (2)

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(c) Why does a starch test on the contents of the Visking tubing give a negative result after 20 minutes?

(1)

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(d) Explain which substance would have passed from the inside of the tubing to the surrounding water.

(2)

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(e) Suggest why a 1% starch solution was used rather than a 10% solution.

(1)

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(f) Name **two** places in the human body where amylase is released.

(2)

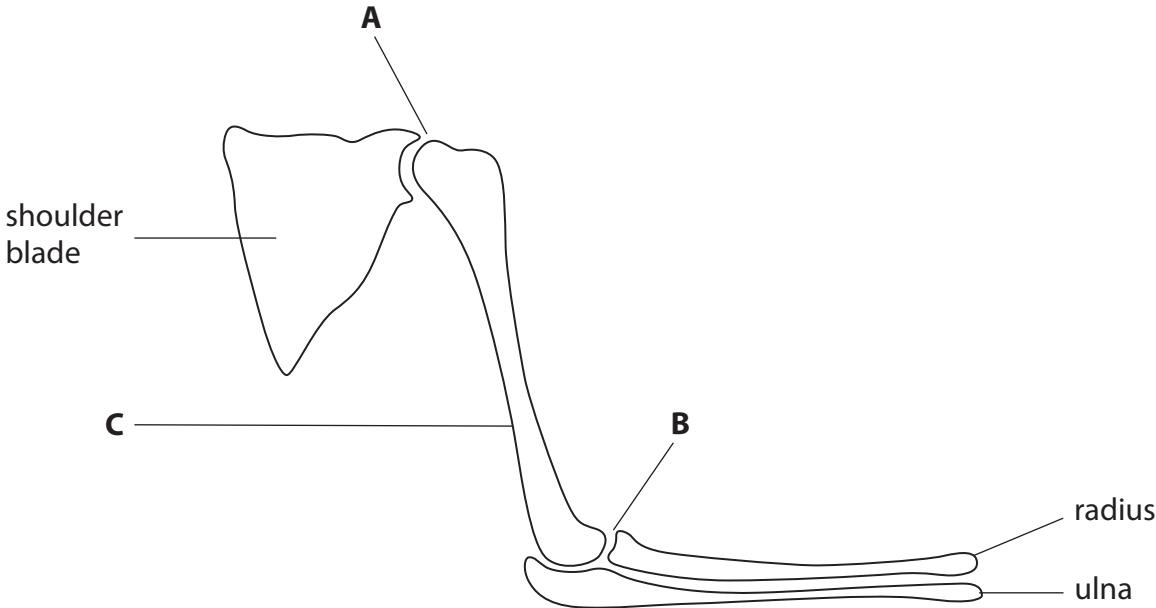
1 .....

2 .....

**(Total for Question 9 = 10 marks)**



10 The diagram shows the bones and joints of the human arm.



(a) (i) Name the **types** of synovial joint labelled **A** and **B**. (2)

**A** .....

**B** .....

(ii) Name the bone labelled **C**. (1)

.....

(b) The bones of the lower arm are raised by the action of the biceps muscle.

(i) On the diagram, draw the biceps muscle showing how it is attached to the bones. (3)

(ii) Explain how the biceps muscle causes the lower arm to be raised. (2)

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(c) Exposure to sunlight is said to be of benefit in the formation of bones.

(i) Name the mineral that forms most of the bone. (1)

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(ii) Explain how exposure to sunlight can be of benefit in bone formation. (2)

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(iii) Describe the disadvantages to the body of over-exposure to sunlight. (2)

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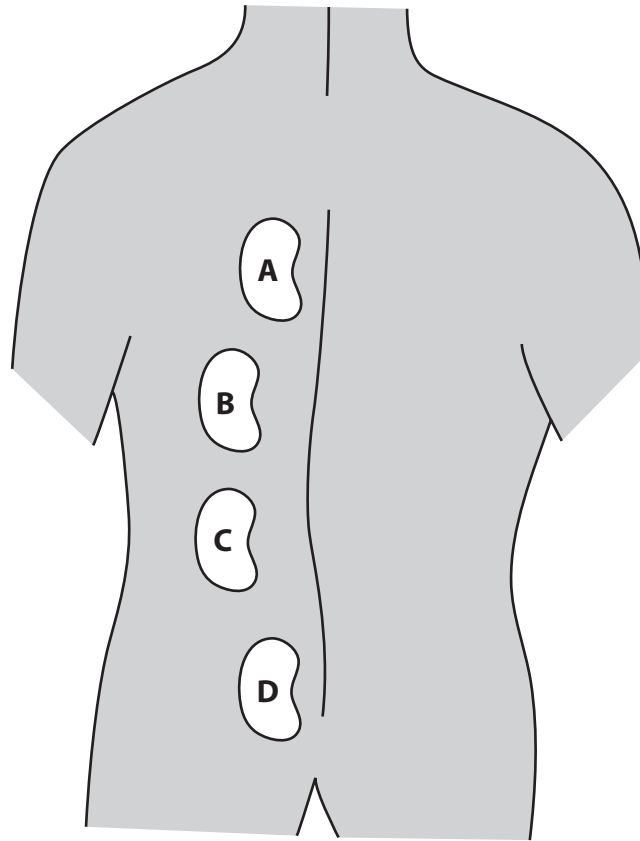
**(Total for Question 10 = 13 marks)**

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11 The kidneys are organs that filter waste substances out of the body.

The diagram shows a view of the human body.



(a) (i) Put a cross in the box next to the letter which shows the correct position of the kidney.

(1)

A

B

C

D

(ii) The kidneys form part of a system.  
What is the name given to this system?

Put a cross in the correct box.

(1)

digestive

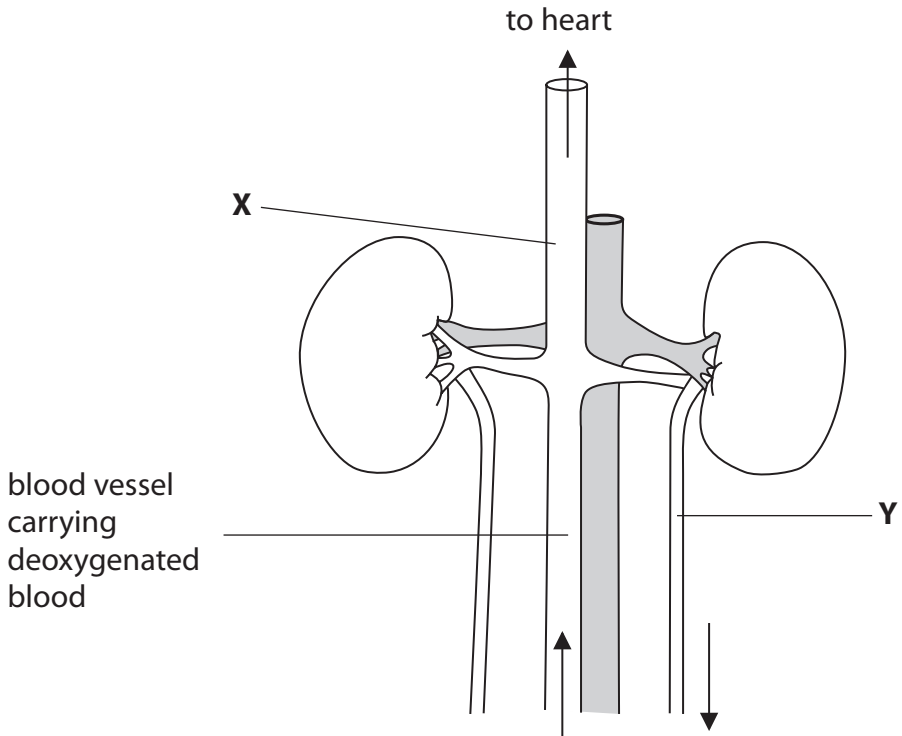
excretory

nervous

endocrine



(b) The diagram shows part of this system.



(i) Name tube **Y**. (1)

(ii) State the **type** of blood vessel labelled **X**, giving **two** reasons for your answer. (3)

Type of blood vessel .....

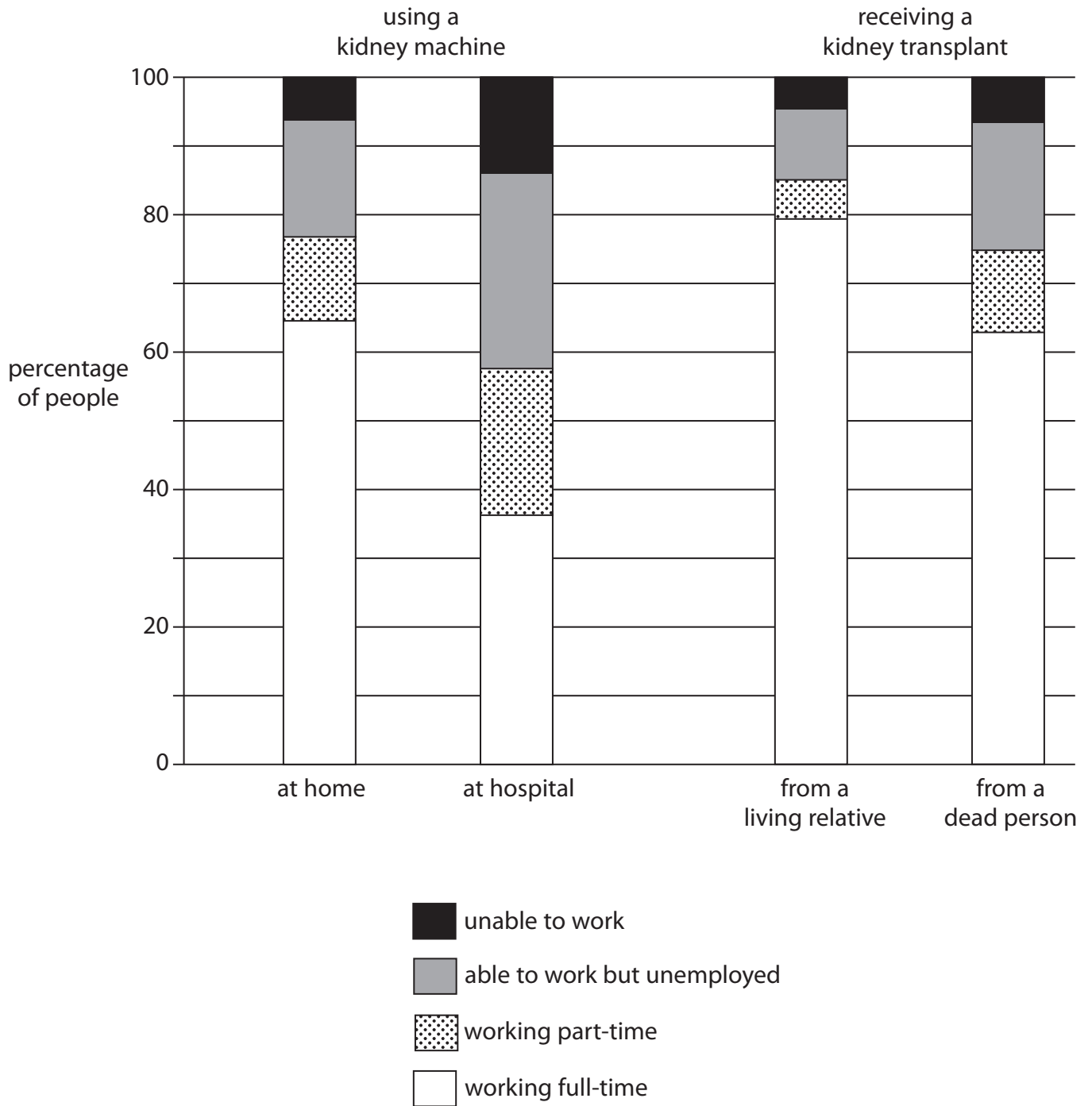
1 .....

2 .....



(c) People whose kidneys do not function can be treated either by using a kidney machine (dialysis machine) or by receiving a kidney transplant.

The bar chart shows two ways in which each of these treatments can be carried out. It also shows the work patterns of the people according to the treatment they receive.





(i) What percentage of people receiving a kidney transplant from a dead person are working full-time? (1)

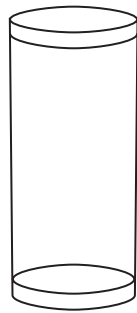
(ii) What percentage of people using a kidney machine at home are working part-time? (1)

(iii) Using the information in the bar chart, explain which method of treatment is least effective for a person who wants to go to work. Explain your answer. (4)

(Total for Question 11 = 12 marks)



- 12** The diagram shows the different amounts of alcoholic drinks which release 15 mg of alcohol into  $100 \text{ cm}^3$  of the drinker's blood.  
The body can break down 15 mg of alcohol per  $100 \text{ cm}^3$  of blood every hour.



1 glass of  
beer



1 glass of  
wine



1 glass of  
sherry

- (a) Name the organ in the body where alcohol is broken down.

(1)

- (b) In the United Kingdom it is against the law to drive a vehicle with more than 80 mg of alcohol per  $100 \text{ cm}^3$  of blood.

- (i) If a person drank four glasses of beer, five glasses of wine and two glasses of sherry, calculate how much alcohol passed into  $100 \text{ cm}^3$  of the person's blood.

Show your working.

(3)



(ii) The person was drinking over a three-hour period and then drove home in a car but had an accident.

Was the driver legally fit to drive? Explain your answer.

(4)

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(c) Describe **one** effect on the body of drinking excess alcohol over a long period.

(1)

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**(Total for Question 12 = 9 marks)**

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**TOTAL FOR PAPER = 120 MARKS**



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