

# Edexcel IGCSE(9-1) Biology

## Specification Based Exam Questions

### Section 2: Structure and functions in living organisms

- Part2:**
- Gas exchange**
  - Transport**
  - Excretion**
  - Co-ordination and response**

This resource is to help you gain exam technique as well as understand what is needed to develop your answers to nearly all the points of the specification. You should use this in conjunction with other revision practices.

Good luck!



**2.40B understand the role of diffusion in gas exchange**

What is meant by the term gas exchange?

(1)

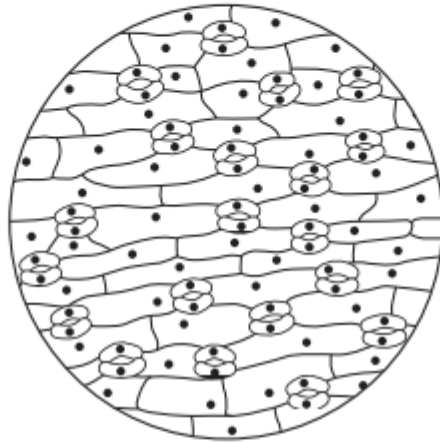
**2.41B understand gas exchange (of carbon dioxide and oxygen) in relation to respiration and photosynthesis**

**2.42B understand how the structure of the leaf is adapted for gas exchange**

**2.43B describe the role of stomata in gas exchange**

(c) A student examined the upper and lower surfaces of a leaf from a land plant using a microscope.

This is her diagram of the lower surface.



(i) How many stomata are shown in the diagram?

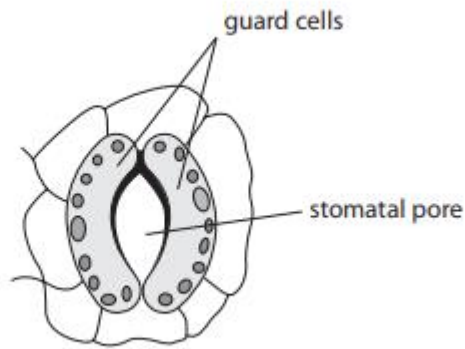
(1)

(ii) Suggest how the upper surface of the land plant would differ from this diagram.

(1)



6 Stomata are pores found mainly on the underside of leaves.



- (a) Explain the role of the stomata in  
(ii) gas exchange in plants

(2)

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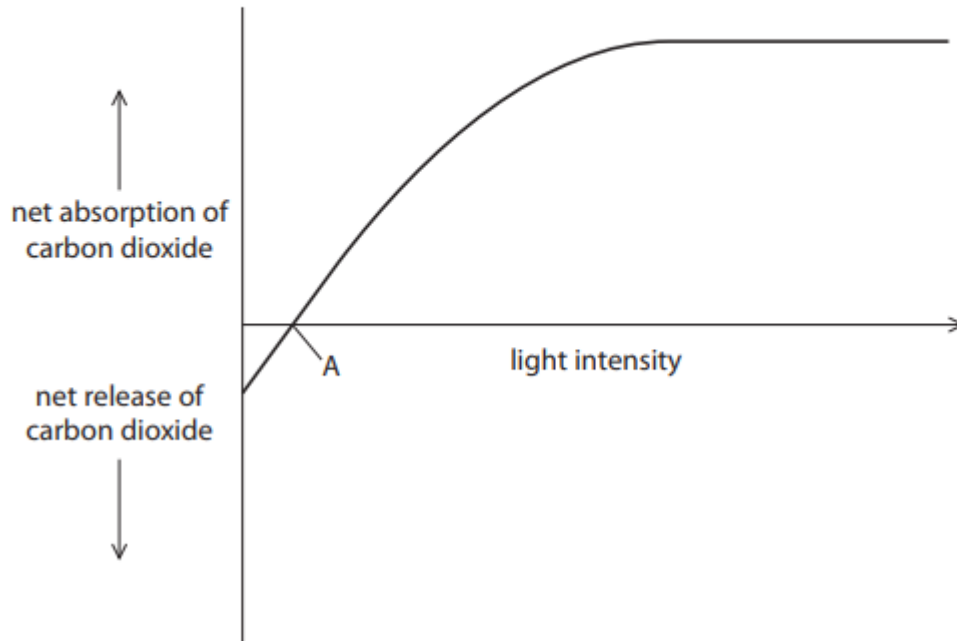
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**2.44B understand how respiration continues during the day and night, but that the net exchange of carbon dioxide and oxygen depends on the intensity of light**



4 The graph shows the effect of increasing light intensity on the exchange of carbon dioxide in a green plant.



(a) Describe the effect of increasing light intensity on the exchange of carbon dioxide. (2)

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(b) Explain why there is no net exchange of carbon dioxide at point A. (1)

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**2.45B practical: investigate the effect of light on net gas exchange from a leaf, using hydrogen-carbonate indicator**



3 Ian wanted to investigate how gas exchange in a flowering plant changed with light intensity.

He set up an experiment using four tubes. Each of the tubes contained orange hydrogencarbonate indicator solution and was sealed with a cork. Ian added a fresh leaf to tubes A, B and C. Tube D had no leaf.

The tubes were then left in the following conditions:

- Tube A was placed in direct sunlight.
- Tube B was covered with aluminium foil to prevent any light entering the tube.
- Tube C was covered with thin cloth which allowed some light to enter the tube.
- Tube D was also placed in direct sunlight.

He left the tubes in the laboratory for one hour and then returned to look at the colour of the indicator solution in the tubes.

(a) Suggest a hypothesis for Ian's investigation.

(2)

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(b) Give **two** variables that Ian should keep constant in his investigation.

(2)

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2 .....

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(c) State the purpose of Tube D in the investigation.

(1)

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(d) Ian recorded his results in a table.

Tube	Colour of indicator at start	Colour of indicator after one hour
A	orange	purple
B	orange	yellow
C	orange	orange
D	orange	orange

(i) Explain the change in colour of the indicator in Tube A.

(2)

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(ii) Explain the change in colour of the indicator in Tube B.

(2)

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(e) Suggest why the indicator did not change colour in:

(i) Tube C

(1)

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(ii) Tube D

(1)

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(f) Limewater is an indicator that can be used to show an increase in the level of carbon dioxide.

Suggest why it would **not** be a suitable indicator for use in this investigation.

(1)

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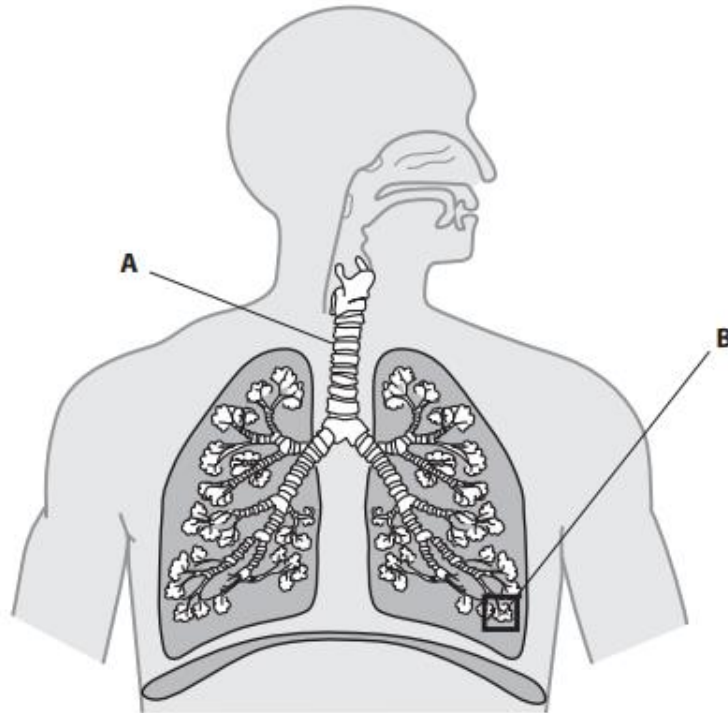
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**2.46 describe the structure of the thorax, including the ribs, intercostal muscles, diaphragm, trachea, bronchi, bronchioles, alveoli and pleural membranes**

2 The diagram shows some structures in the human breathing system.



(a) Name structures **A** and **B**.

(2)

**A** .....

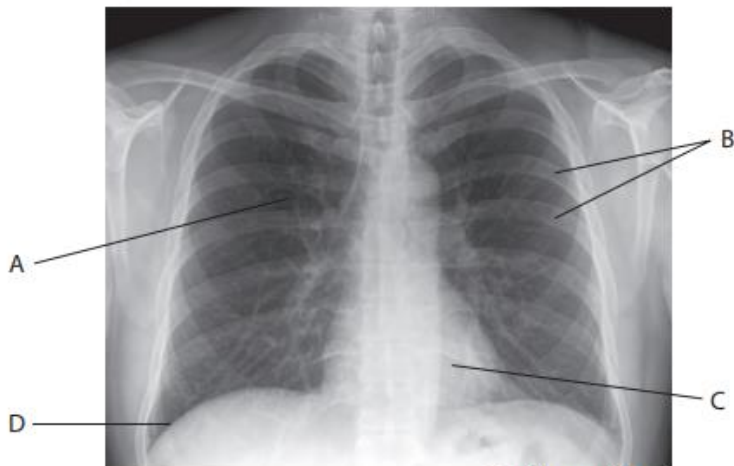
**B** .....





3 Doctors use X-rays to produce images of structures inside the body.

The image shows an X-ray of a normal human thorax.



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(a) Identify the structures labelled A, B, C and D.

(4)

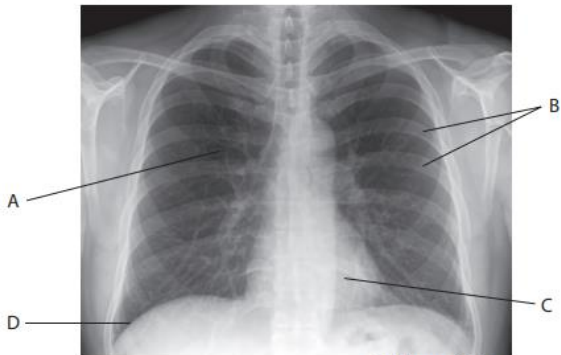
A .....

B .....

C .....

D .....

**2.47 understand the role of the intercostal muscles and the diaphragm in ventilation**



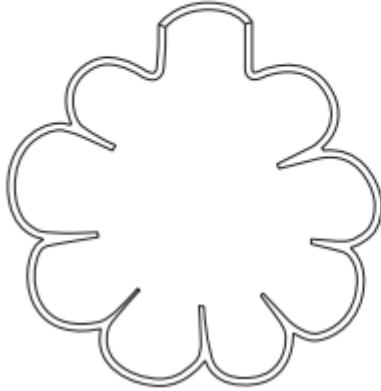
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**2.48 explain how alveoli are adapted for gas exchange by diffusion between air in the lungs and blood in capillaries**

(c) Emphysema is a lung disease that is usually caused by smoking. The diagram shows a cross section through two alveoli X and Y. Alveolus X is from a non-smoker and alveolus Y is from a smoker suffering from emphysema.



X



Y

Use the diagram to suggest and explain the effect of emphysema on gas exchange.

(2)

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**2.49 understand the biological consequences of smoking in relation to the lungs and the circulatory system, including coronary heart disease**

- 4 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

**COPD: chronic obstructive pulmonary disorder**

Chronic obstructive pulmonary disorder (COPD) is the term used to describe several lung diseases including bronchitis and emphysema. People with COPD have trouble breathing because they have damaged their lungs, usually because of smoking. Eighty per cent of people who develop COPD are, or have  
5 been, smokers.

However, breathing in dust or fumes may also cause COPD. There is also a small genetic risk linked to COPD called alpha-1-antitrypsin deficiency. Alpha-1-antitrypsin is a molecule that protects your lungs from being digested by a protease enzyme released by white blood cells in the lungs. People who  
10 have an alpha-1-antitrypsin deficiency usually develop COPD at a younger age.

There are about 65 million people in the UK and 835 000 are known to have COPD. There are thought to be another 2 million who have COPD but have not been diagnosed because they have not asked for medical help. They seem content to put up with what they call smoker's cough. Sadly, there are about  
15 25 000 deaths a year in the UK because of COPD.

The symptoms of COPD do not usually show until after the age of 35. They include breathlessness when exercising, persistent coughing of mucus and frequent chest infections, particularly in winter. The walls of the airways get thicker in response to inflammation, more mucus is made and the air sacs  
20 are damaged. Although any damage that has already happened to the lungs cannot be reversed, it is possible to prevent COPD from getting worse by making lifestyle changes.

Chest infections are common and can be caused by bacteria or viruses. People with COPD are advised to have two vaccinations. A yearly 'flu jab' each autumn protects against possible influenza and any chest infection that may develop due to this. Vaccination against *Pneumococcus*, a bacterium that can cause serious chest infections, involves a one-off injection.  
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Treatment for COPD usually involves relieving the symptoms, such as using an inhaler to make breathing easier. Other treatments such as steroids, antibiotics, breathing oxygen from a cylinder, and inhaling mucolytic (mucus-thinning) medicines are sometimes prescribed in more severe cases, or during a  
30 worsening of symptoms.



(a) COPD includes diseases such as emphysema (line 2).

Give two causes of emphysema.

(2)

1 .....

2 .....

(b) The white blood cells in the lungs release protease (a protein digesting enzyme) (line 9).

Suggest the function of this enzyme in the white blood cells in the lungs.

(2)

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(c) Calculate the number of people who may have COPD that are smokers (lines 4 and 5 and lines 11 and 12).

Show your working.

(2)

Answer .....

(d) (i) Name the air sacs in the lungs responsible for gas exchange (line 19).

(1)

(ii) Suggest how damage to the air sacs can cause the symptom of breathlessness when exercising (line 17).

(2)





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(c) Explain how the students could improve their investigation.

(2)

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**2.51 understand why simple, unicellular organisms can rely on diffusion for movement of substances in and out of the cell**

**2.52 understand the need for a transport system in multicellular organisms**

**2.53 describe the role of phloem in transporting sucrose and amino acids between the leaves and other parts of the plant**

(b) This herbicide is sprayed onto the leaves of plants.

Suggest which vessel could transport the herbicide from the leaf to other parts of the plant.

(1)

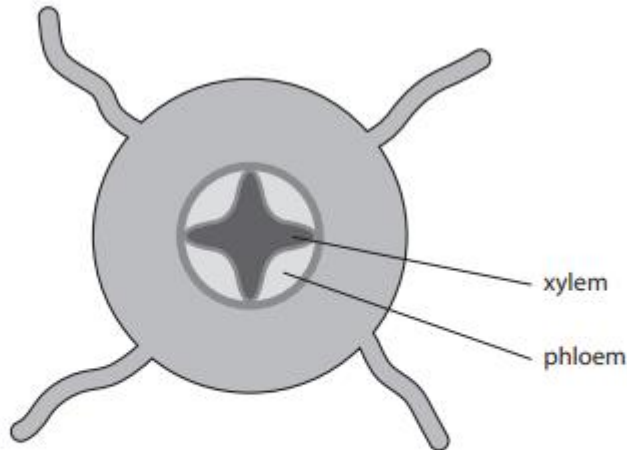
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**2.54 describe the role of xylem in transporting water and mineral ions from the roots to other parts of the plant**

3 The diagram shows a section through the root of a plant.



(a) Name two substances that are transported in the xylem.

(2)

1 .....

2 .....

(iii) Mineral ions are taken up by the root hair cells of plants.

Name the type of vessel that transports these mineral ions through the plant.

(1)

**2.55B understand how water is absorbed by root hair cells**

(b) Draw and label a root hair cell in the following space.

(5)



(d) Describe the process that moves water from the soil into the plant.

(2)

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**2.56B** understand that transpiration is the evaporation of water from the surface of a plant

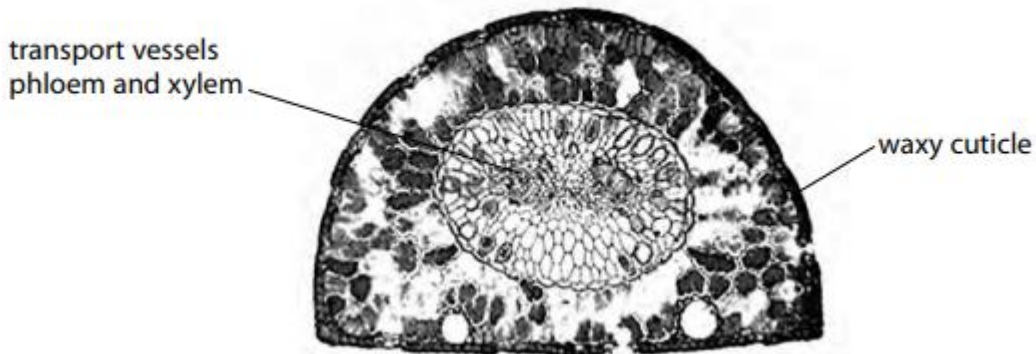
**2** (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

Plants lose water, into the air, by a process called

(1)

- A** active transport
- B** fertilisation
- C** photosynthesis
- D** transpiration

(c) Figure 9 shows a cross section through a pine leaf.



**Figure 9**

(i) Explain why the waxy cuticle is important for this pine leaf.

(2)

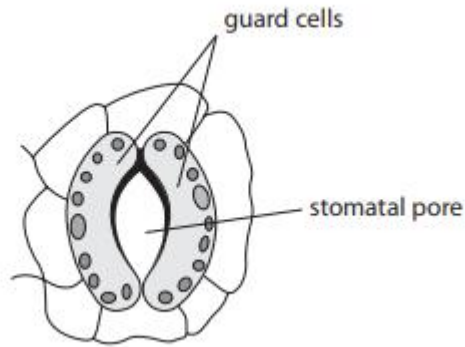
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**6** Stomata are pores found mainly on the underside of leaves.



(a) Explain the role of the stomata in

(i) transport in plants

(2)

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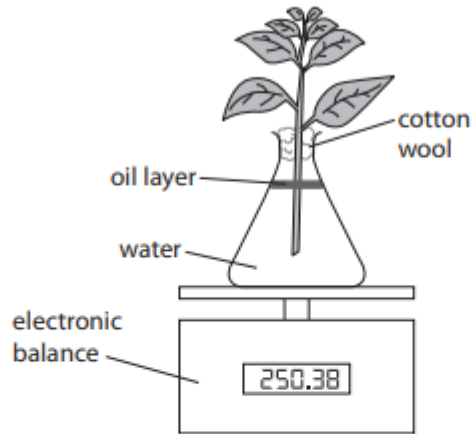
**2.57B understand how the rate of transpiration is affected by changes in humidity, wind speed, temperature and light intensity**





**2.58B practical: investigate the role of environmental factors in determining the rate of transpiration from a leafy shoot**

1 A student sets up this apparatus to investigate the transpiration rate of a plant.



(a) (i) Suggest how the student could determine the transpiration rate of the plant. (2)

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(ii) Draw a diagram of the apparatus that the student should set up as a control. (3)



(b) The student changes the conditions in which the plant is kept. This affects the transpiration rate of the plant.

Complete the table by giving the missing information.

(5)

Change of condition	Change in transpiration rate	Explanation for change in transpiration rate
warmer air		
put in the dark	decrease	
increased wind	increase	
increased humidity		decreased concentration gradient

(c) Explain why transpiration is important to plants.

(2)

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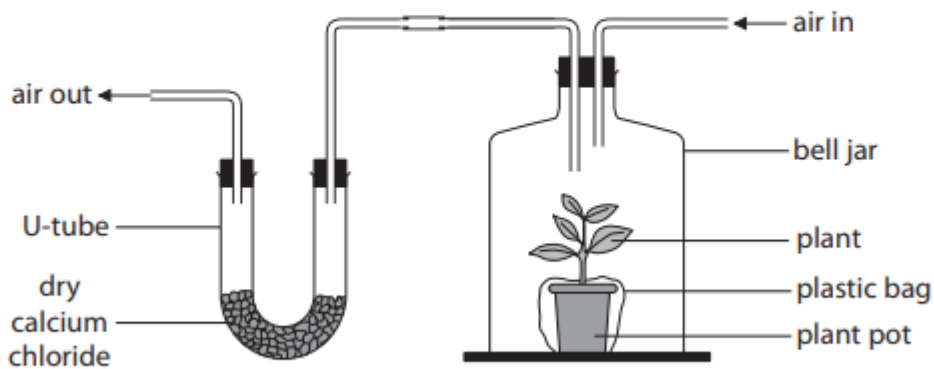
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(b) An investigation was carried out to measure water loss from a plant, at four different temperatures.

The diagram shows the apparatus used.



The calcium chloride absorbs the water lost by the plant.



The table shows the results of this investigation.

temperature / °C	mass of calcium chloride / g	
	before investigation	after investigation
15	90	100
25	90	115
35	90	122
45	90	117

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The maximum mass of water lost from the plant in this investigation was

(1)

- A 27 g
- B 32 g
- C 117 g
- D 122 g

(ii) Describe the effect of temperature on water loss from this plant during the investigation.

(2)

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(iii) Suggest why the plastic bag was placed around the plant pot during this investigation.

(2)

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- (b) An experiment is carried out to examine the effect of the size of stomatal pores on the rate of transpiration.

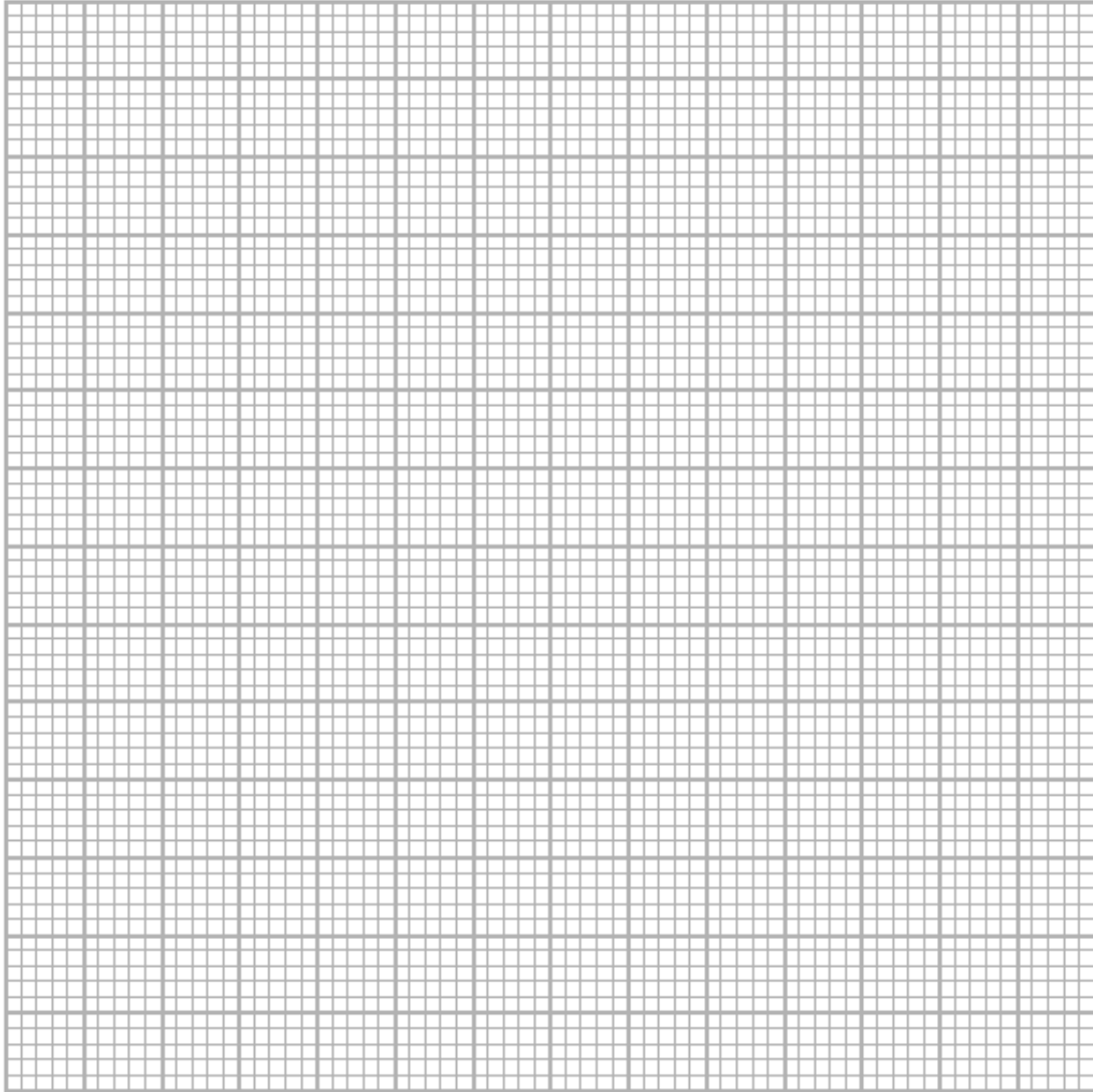
The data were collected in still air and in moving air.

Size of stomatal pore in $\mu\text{m}$	rate of transpiration in $\text{mg} / \text{m}^2 / \text{s}$	
	still air	moving air
0	0	0
4	22	38
8	46	140
12	48	165
16	50	210
20	50	248
24	50	264

- (i) Plot a graph to show the effect of stomatal pore size on transpiration rate in still and moving air.

Use a ruler to join your points with straight lines.

(6)



(ii) Use the graph to compare the effect of increasing stomatal pore size on transpiration rate in still and moving air.

(2)

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(iii) Explain the effect that moving air has on transpiration rate.

(3)

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**2.59 describe the composition of the blood: red blood cells, white blood cells, platelets and plasma**

6 The passage describes some of the roles of components found in human blood.

Complete the passage by writing a suitable word or words in each blank space.

(6)

The body uses white blood cells to combat infection. One type of blood cell ingests invading

bacteria and are called ..... After ingesting bacteria they

produce ..... that digest the bacteria breaking them down.

Other white blood cells are called ..... and they release

specific molecules that bind to antigens on the surface of the pathogen.

Other components of the blood are also involved in helping wounds to heal.

Small cell fragments called platelets help the blood to .....

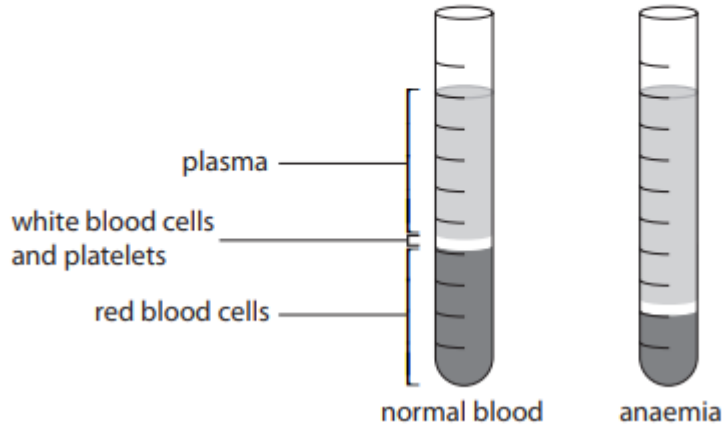
This seals the wound to prevent further ..... and prevent

entry of .....

**11** The diagram shows two samples of blood that have been separated using a machine called a centrifuge.

The centrifuge separates the components of blood by their density.

One sample comes from a person with normal blood. The other sample comes from a person with anaemia.



(a) (i) Suggest why the components of the normal blood sample have separated into different layers as shown in the diagram.

(2)

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(ii) Compare the appearance of the normal blood sample with the appearance of the sample from the person with anaemia.

(2)

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(iii) Explain a symptom of anaemia.

(2)

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(iv) Suggest why adult females are more likely to have anaemia than adult males.

(1)

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**2.60 understand the role of plasma in the transport of carbon dioxide, digested food, urea, hormones and heat energy**

(b) Plasma transports many molecules around the body.

(i) Name a food molecule transported in the plasma.

(1)

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(ii) Name a non-food molecule transported in the plasma.

(1)

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(iii) Describe the function of the liquid part of the blood.

(2)

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**2.61 understand how adaptations of red blood cells make them suitable for the transport of oxygen, including shape, the absence of a nucleus and the presence of haemoglobin**



(iv) Red blood cells are adapted to carry oxygen.

Explain how one feature of a red blood cell increases the amount of oxygen carried.

(2)

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**2.62 understand how the immune system responds to disease using white blood cells, illustrated by phagocytes ingesting pathogens and lymphocytes releasing antibodies specific to the pathogen**

1 The immune system responds to infection using white blood cells. A phagocyte is one type of white blood cell.

(a) (i) Draw and label a phagocyte.

(3)

(ii) Give one way that the structure of this cell differs from a red blood cell.

(1)

(b) Describe how white blood cells are used by the body to defend against infection.

(5)





(d) Fish farms remove nitrogenous waste to improve the growth of fish.

Another method to improve the growth of fish is vaccination.

Explain how the process of vaccination improves the growth of fish.

(4)

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**2.64B understand how platelets are involved in blood clotting, which prevents blood loss and the entry of micro-organisms**

(d) (i) Name the small structures in normal plasma that are involved in blood clotting.

(1)

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(ii) Explain why is it important to have blood that clots.

(2)

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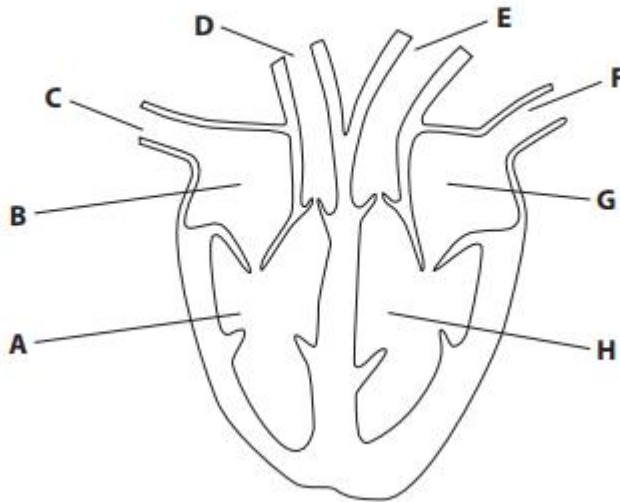
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**2.65 describe the structure of the heart and how it functions**

(b) The diagram shows the human heart with four chambers and four blood vessels labelled **A** to **H**.



Complete the table by writing in the label letter that matches the description of the structure.

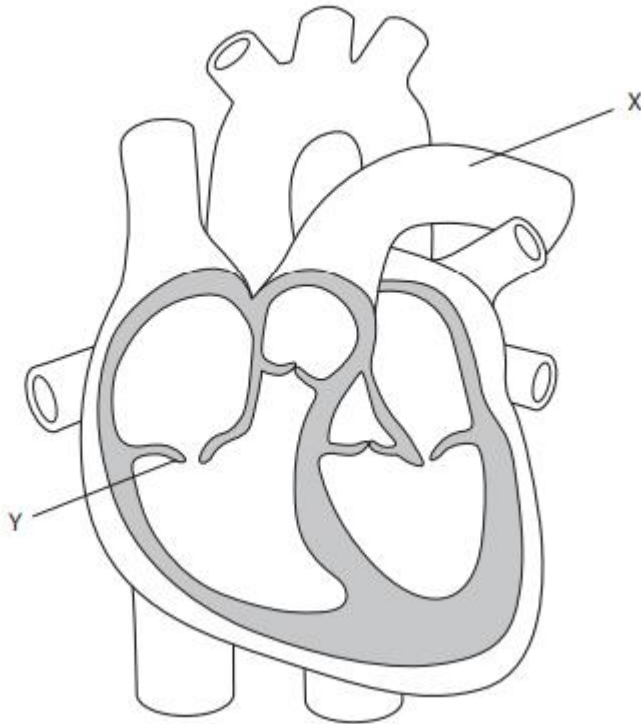
The first one has been done for you.

(4)

Structure	Label letter
the right atrium	<b>B</b>
the chamber that pumps blood to the lungs	
the chamber with the thickest muscle wall	
the blood vessel containing blood at the highest pressure	
the blood vessel carrying blood with the least oxygen to the heart	



4 The diagram shows a section through a human heart.



(a) The blood in vessel X is transported to an organ.

(i) Name the organ.

(1)

(ii) State two changes to the blood in this organ.

(2)

1 .....

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2 .....

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(b) What is the function of the part labelled Y?

(1)

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**2.66 explain how the heart rate changes during exercise and under the influence of adrenaline**

**4** An investigation was carried out to find out the effect of fear on human heart rate.

Ten students measured their heart rate under normal conditions. The students were then given a fright and asked to measure their heart rate again.

The table shows their results.

Student number	Heart rate in beats per minute	
	Normal conditions	When frightened
1	70	80
2	65	85
3	59	66
4	66	75
5	57	66
6	60	68
7	63	67
8	72	72
9	62	74
10	70	77

(a) (i) Identify the student whose result was anomalous. (1)

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(ii) Describe and explain the results of this investigation. (2)

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(iii) State, with a reason, whether the results of this investigation are reliable. (1)

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**2.67 understand how factors may increase the risk of developing coronary heart disease**

(d) Explain why reducing the blood supply to the heart muscle cells can cause a heart attack.

(3)

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**2.68 understand how the structure of arteries, veins and capillaries relate to their function**

**2** Arteries and veins are important blood vessels in the circulatory system.

(a) Describe two ways in which the structure of an artery differs from the structure of a vein.

(2)

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(d) The scientists obtained blood samples using a needle attached to a syringe.

Explain which type of blood vessel they should use to obtain the blood samples.

(3)

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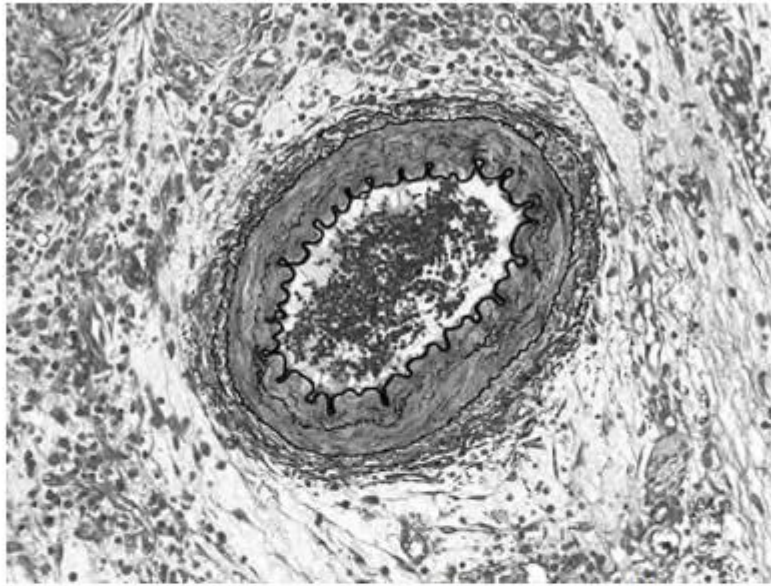
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Figure 2 shows a photomicrograph of a blood vessel.



(Source: Microscape/Science Photo Library)

**Figure 2**

(b) Explain how the structure of this blood vessel is related to its function.

(2)

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**2.69 understand the general structure of the circulation system, including the blood vessels to and from the heart and lungs, liver and kidneys**

(b) Which of the following shows the direction that blood flows towards, through and from the heart?

Place a cross (☒) in the box next to your answer.

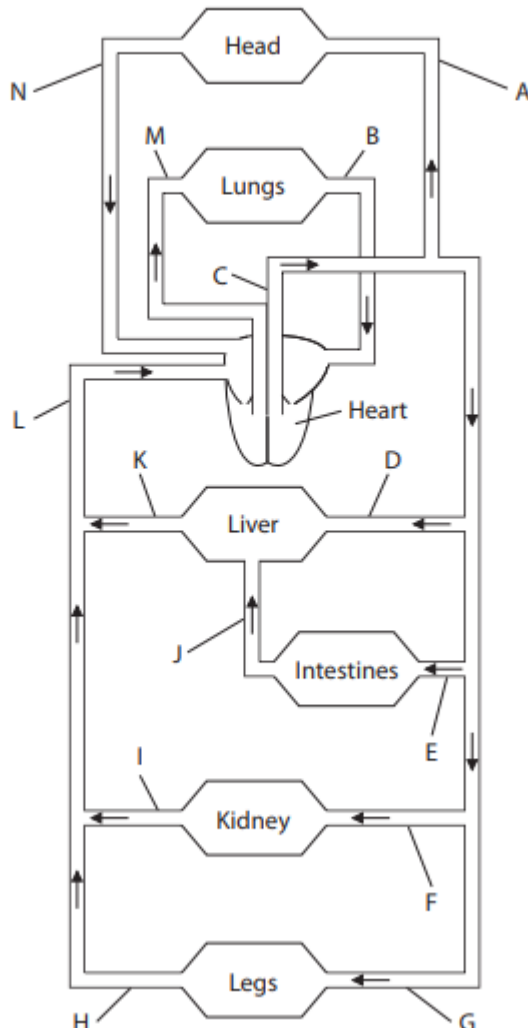
(1)

- A** vena cava → ventricle → atrium → pulmonary vein
- B** pulmonary artery → atrium → ventricle → aorta
- C** aorta → ventricle → atrium → pulmonary vein
- D** pulmonary vein → atrium → ventricle → aorta



(b) The diagram shows the human circulatory system.

The blood vessels are labelled with letters.



(i) The table names some of the blood vessels in this circulatory system.

Complete the table by giving the letter for each blood vessel.

The first one has been done for you.

(4)

Name of blood vessel	Letter
vena cava	L or N
aorta	
pulmonary vein	
hepatic artery	
renal vein	

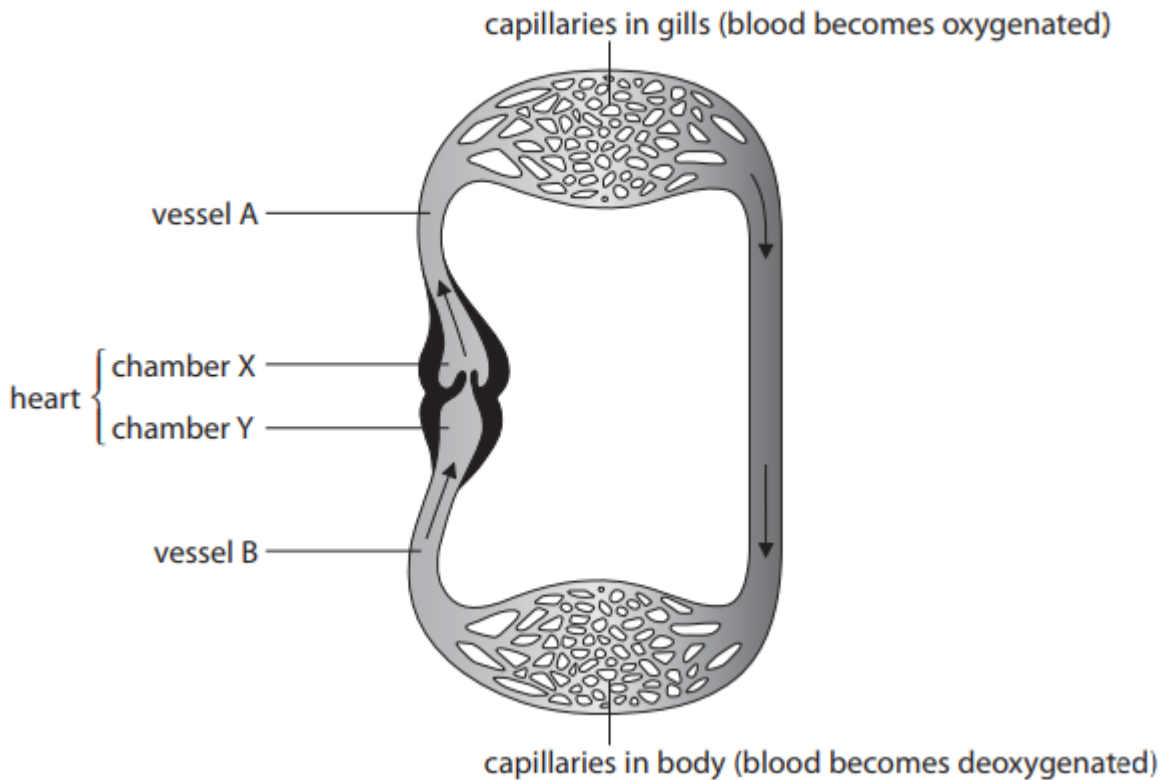
(ii) The plasma in the blood vessels can contain different concentrations of substances.

Complete the table by giving the letter for the blood vessel that matches the contents.

(3)

Contents of blood vessel	Letter of blood vessel
contains the most glucose after a meal	
contains the least urea	
contains the least oxygen	

1 The diagram shows the heart and circulation system of a fish.





(a) The circulation system and heart structure of a fish have similarities and differences to those of a human.

Use your knowledge of human circulation and heart structure to answer these questions.

(i) What type of blood vessel is vessel A?

(1)

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(ii) What type of heart chamber is chamber Y?

(1)

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(iii) Describe how the structure of a fish heart differs from that of a human heart.

(3)

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(b) The concentrations of the gases in the blood leaving the fish heart are different from the concentrations of the gases in the blood leaving the human heart in the aorta.

Explain the differences in the concentrations of gases.

(4)

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(c) Explain why the pressure of the blood returning to the fish heart is lower than the pressure of the blood returning to the human heart.

(2)

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**2.70 understand the origin of carbon dioxide and oxygen as waste products of metabolism and their loss from the stomata of a leaf**

(iv) Plants, like all living organisms, need to excrete waste products.  
Explain how the excretory product of photosynthesis is removed from the leaf.

(2)

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**2.71 know the excretory products of the lungs, kidneys and skin (organs of excretion)**

**1** The skin is an organ of homeostasis and excretion.

(a) Describe what is meant by the term **excretion**.

(2)

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(c) Name **one** excretory organ in humans and name the substance it excretes.

(2)

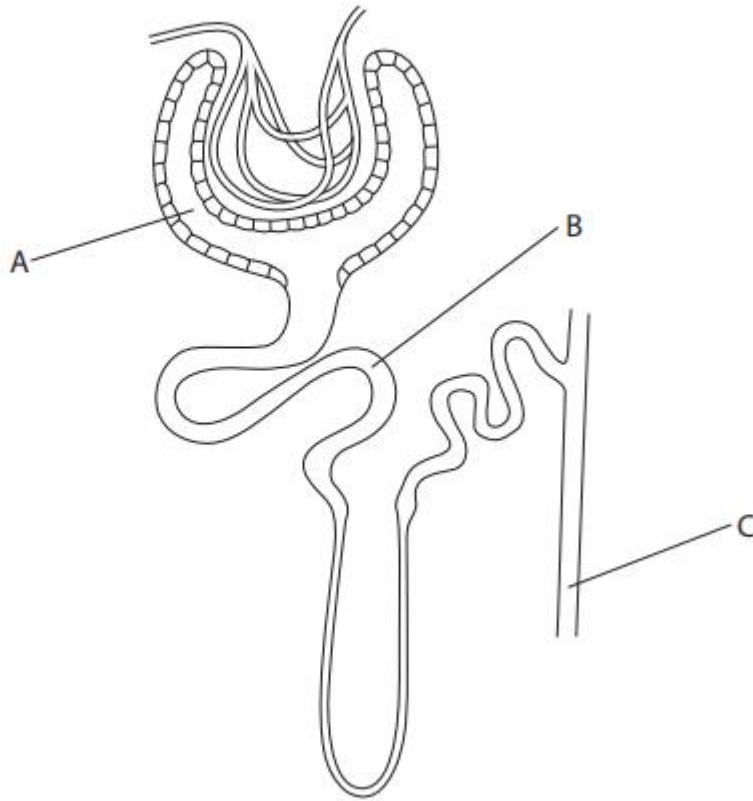
organ .....

substance .....



2.74B describe the structure of a nephron, including the Bowman's capsule and glomerulus, convoluted tubules, loop of Henle and collecting duct

3 (a) The diagram shows a kidney nephron with parts labelled A, B and C.



The table lists events that take place in the nephron.

Complete the table by giving the letter of the part where each event takes place.

(2)

Event	Letter
ultrafiltration	
glucose reabsorption	

(b) What type of blood vessels are found in the glomerulus?

(1)



**2.75B describe ultrafiltration in the Bowman's capsule and the composition of the glomerular filtrate**

(b) The table shows the concentration of plasma proteins and glucose in the blood entering the kidney and in the urine.

Name of substance	Concentration of substance in mg per 100 ml	
	blood entering the kidney	urine
plasma proteins	740	0
glucose	90	0

(i) Explain why there are no plasma proteins in the urine.

(2)

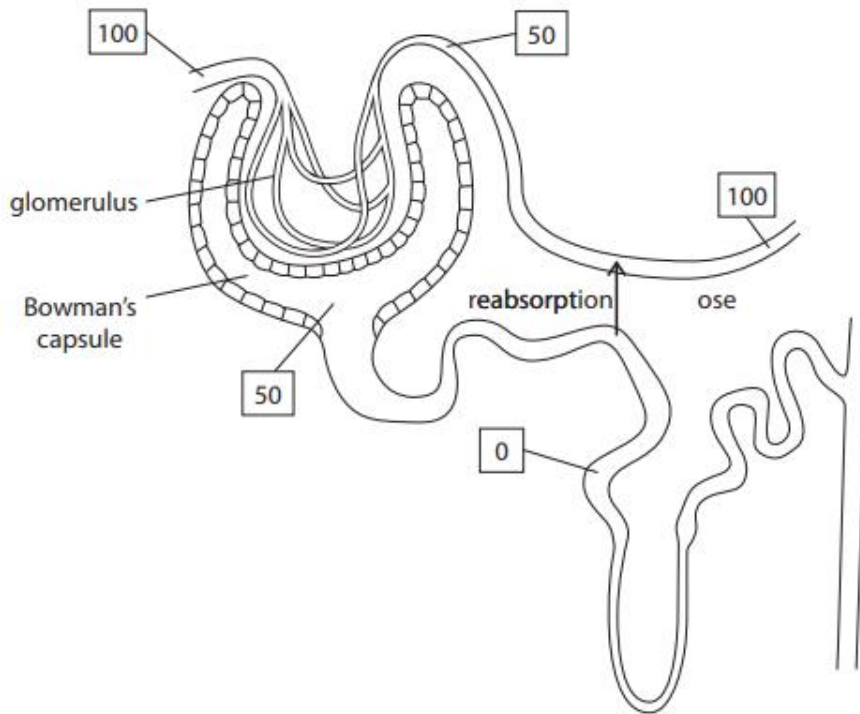
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- 5 The diagram shows some of the blood vessels and a nephron in the human kidney. The numbers represent the concentration of glucose at various places in the blood vessels and in the nephron, in arbitrary units.



- (a) Explain how the structure of the blood vessels entering and leaving the glomerulus help to move glucose into the Bowman's capsule.

(2)

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**2.76B understand how water is reabsorbed into the blood from the collecting duct**

- (d) On a hot day there is less water in urine.

Explain how the kidney is able to reduce the water content of urine produced on a hot day.

(3)

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**2.77B understand why selective reabsorption of glucose occurs at the proximal**





**convoluted tubule**

(ii) Explain why there is no glucose in the urine.

(2)

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(c) (i) Describe how glucose is reabsorbed from the nephron back into the blood.

(2)

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(ii) Suggest why glucose needs to be returned to the blood.

(2)

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**2.78B describe the role of ADH in regulating the water content of the blood**

(b) The photograph shows a flower called a dandelion.



If a person picks this flower and then licks their fingers, they will want to urinate. This is because the plant produces a chemical called a diuretic that affects the regulation of the water content of the blood.

Suggest how this diuretic causes more urine to be produced.

(5)

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**2.79B understand that urine contains water, urea and ions**

(iii) Water is found in the urine.

Name two other substances you would also find in the urine.

(2)

1 .....

2 .....

**2.80 understand how organisms are able to respond to changes in their environment**



**2.81 understand that homeostasis is the maintenance of a constant internal environment, and that body water content and body temperature are both examples of homeostasis**

(c) Body temperature can vary.

Describe how the brain is involved in thermoregulation.

(2)

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**2.82 understand that a co-ordinated response requires a stimulus, a receptor and an effector**

(c) The deer runs away when it sees the wolf.

(i) Name the effector in this response.

(1)

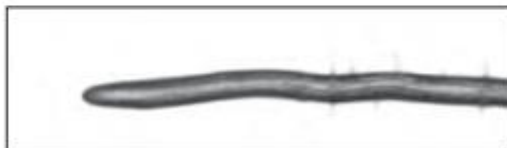
**2.83 understand that plants respond to stimuli**

**2.84 describe the geotropic and phototropic responses of roots and stems**

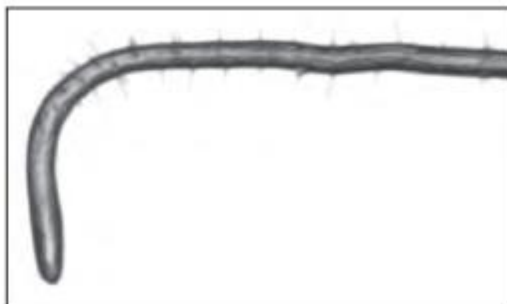
1 Photograph **A** shows the root of a plant when it was positioned horizontally.

The root was kept in the dark and left in this position.

Photograph **B** was taken three days later.



photograph **A**



photograph **B**



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The process that resulted in the type of root growth shown in photograph **B** is (1)

- A** negative gravitropism
- B** negative phototropism
- C** positive gravitropism
- D** positive phototropism

**2.85 understand the role of auxin in the phototropic response of stems**

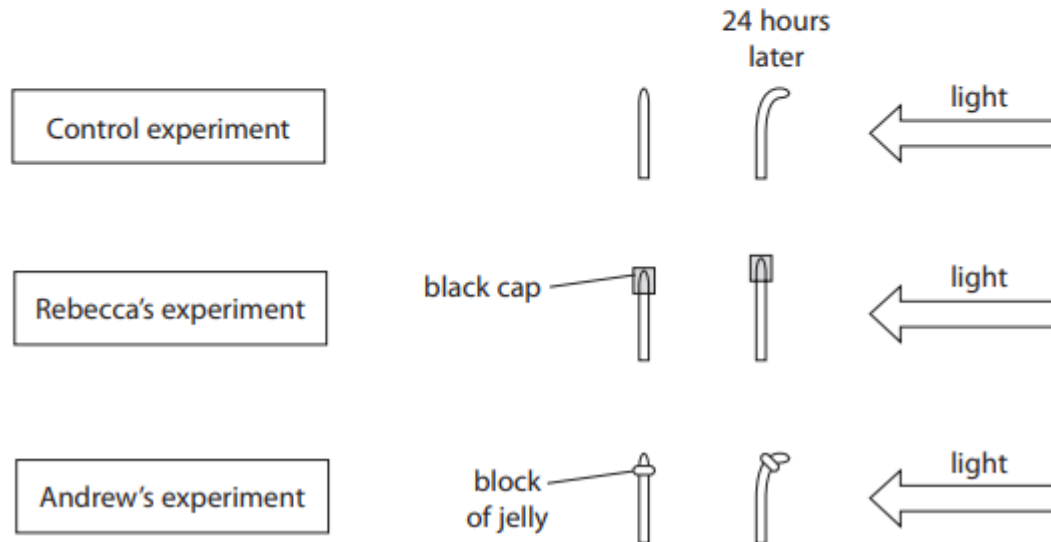
(b) Rebecca and Andrew each set up an experiment to investigate the effect of light on plant shoots.

They also set up a control experiment.

Rebecca placed a black cap over the tip of her plant shoot.

Andrew removed the tip from his plant shoot, placed a thin block of jelly on top of the plant shoot and then replaced the tip.

All three experiments were left for 24 hours.



(i) Suggest why Rebecca and Andrew set up a control experiment.

(1)

(ii) Explain the results of Rebecca's experiment and Andrew's experiment.

(3)



(ii) Explain how auxins cause the shoot of a plant to grow towards light.

(2)

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**2.86 describe how nervous and hormonal communication control responses and understand the differences between the two systems**

(b) Reflexes in animals and phototropism in plants are both responses to stimuli.

(i) Give two **similarities** between the mechanisms involved in each response.

(2)

1 .....

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2 .....

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(ii) Give two **differences** between the mechanisms involved in each response.

(2)

1 .....

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2 .....

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(c) Nervous communication differs from hormonal communication.

State three ways that nervous communication differs from hormonal communication. (3)

1 .....

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2 .....

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3 .....

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**2.87 understand that the central nervous system consists of the brain and spinal cord and is linked to sense organs by nerves**

**2.88 understand that stimulation of receptors in the sense organs sends electrical impulses along nerves into and out of the central nervous system, resulting in rapid responses**

(b) Complete the table by giving two sense organs that the dogs use to detect the arrival of food and the stimulus that each sense organ detects.

(2)

Sense organ	Stimulus

(c) Explain how reflex responses, such as blinking (line 2), differ from other nerve responses, such as picking up a pencil.

(2)

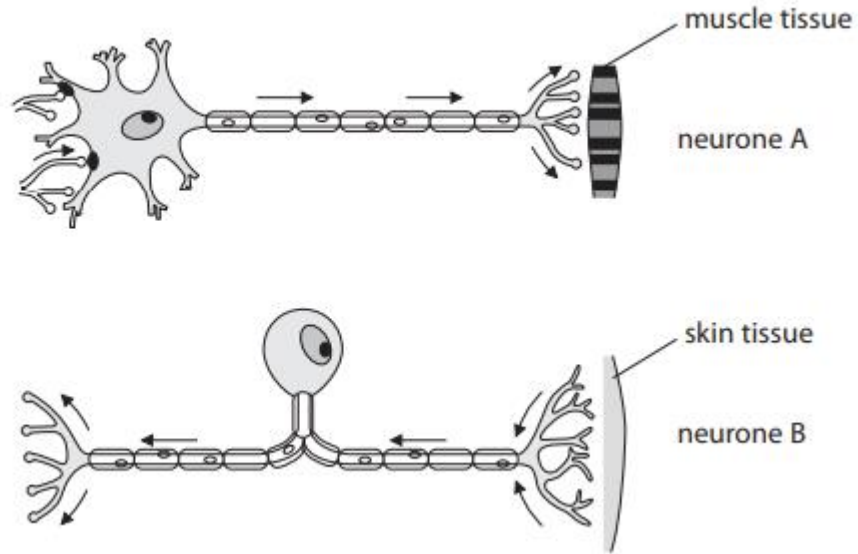
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3 The diagrams show the structure of two neurones A and B.



(a) Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) Neurone A is a (1)

- A motor neurone
- B reflex neurone
- C relay neurone
- D sensory neurone

(ii) Neurone B sends information to the (1)

- A brain and spinal cord
- B hormones which results in a response
- C muscle tissue
- D receptor cells in the skin





(b) Explain how information travels along the axon of a sensory neurone.

(2)

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(c) Describe the role of the myelin sheath.

(2)

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(d) Describe the pathway of a nerve impulse through a reflex arc.

(3)

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**2.89 understand the role of neurotransmitters at synapses**

(iv) There is a gap between neurones.

State the name for this gap between neurones.

(1)

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(c) Describe how a synapse is involved in the conduction of a nerve impulse.

(2)

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**2.90 describe the structure and functioning of a simple reflex arc illustrated by the withdrawal of a finger from a hot object**

(c) Another characteristic shown by animals is the ability to respond to their surroundings.  
For example, a person may withdraw their hand from a hot object.

Describe the sequence of events that cause this response.

(5)

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(f) Simple reflexes are responses to stimuli.

Explain the structure and functioning of a simple reflex arc, using the example of the withdrawal of a finger from a hot object.

(5)

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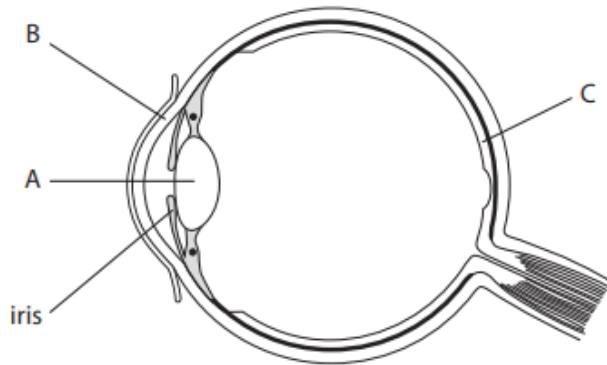
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**2.91 describe the structure and function of the eye as a receptor**



5 The diagram shows a section through an eye with the iris and parts A, B and C labelled.



(a) Name parts A, B and C.

(3)

A .....

B .....

C .....

**2.92 understand the function of the eye in focusing on near and distant objects, and in responding to changes in light intensity**

(ii) Describe the changes that would take place in the eye of a pigeon to help it focus on an approaching hawk.

(4)

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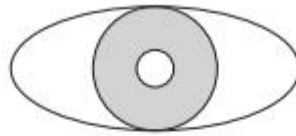
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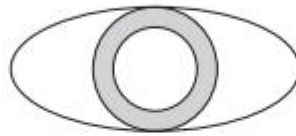


3 The eye can respond to changes in light intensity.

The diagram below shows how pupil size changes in different levels of light.



bright light



dark room

(a) Use a ruler to measure the change in pupil diameter between bright light and a dark room.

(1)

change in diameter = .....mm

(b) Where in the eye are the cells that detect the change in the stimulus to cause this response?

(1)

(c) Explain the changes that take place in the pupil as a person moves from bright light into a dark room.

(3)

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(ii) Describe the changes that take place in the iris when moving into the dark room and explain how they help you to see more clearly.

(3)

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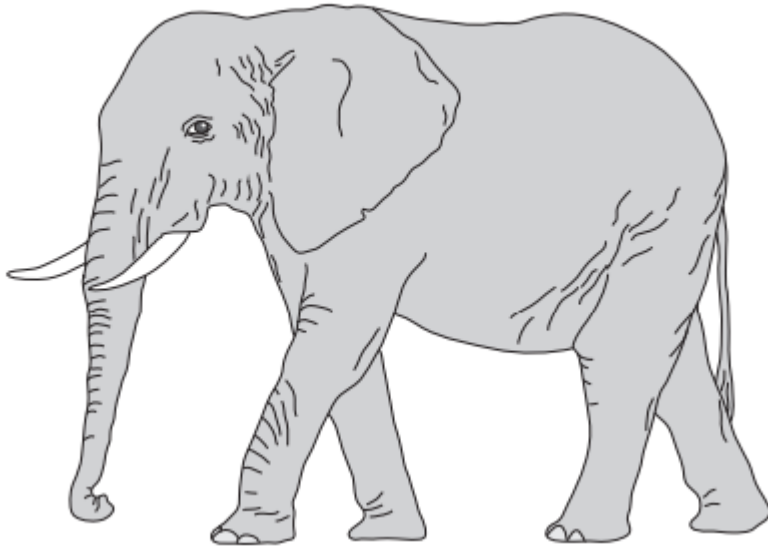
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**2.93 describe the role of the skin in temperature regulation, with reference to sweating, vasoconstriction and vasodilation**

**6** The drawing shows an elephant. Elephants live in Africa where it is hot.



(a) The elephant is adapted to live in a hot environment by having large ears.

Suggest how having large ears helps prevent the body temperature of the elephant from rising too high.

(3)

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(d) Exercise increases the rate of sweating, but people also sweat at rest.

(i) Explain how the rate of sweating of a person at rest is affected if that person is in hot air.

(2)

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(ii) Explain how the rate of sweating of a person at rest is affected if that person is in air with a high humidity.

(2)

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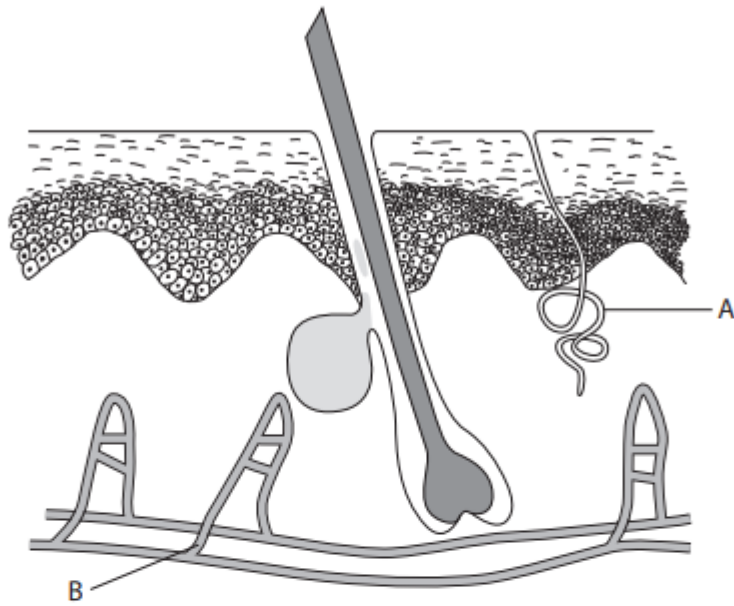
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(b) The diagram shows a section through the skin with two structures labelled A and B.



The structures labelled A and B play a part in homeostasis when a person enters a very warm environment.

(i) Explain the role of structure A.

(3)

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(ii) Explain the role of structure B.

(3)

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**2.94 understand the sources, roles and effects of the following hormones: adrenaline, insulin, testosterone, progesterone and oestrogen**

**2** (a) The table lists the effects of some hormones.

Complete the table by naming each hormone and its source.

The first one has been done for you.

(5)

Effect	Name of hormone	Source
converts glucose to glycogen	insulin	pancreas
stimulates male secondary sexual characteristics		testis
increases permeability of the collecting duct		
repairs the uterus lining		

**1** Insulin is an important hormone.

(a) Name the organ that produces insulin.

(1)

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(b) State the role of insulin in the body.

(2)

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(ii) The deer releases a hormone when it sees the wolf.

Explain how this hormone helps the deer to run away.

(3)

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**2.95B understand the sources, roles and effects of the following hormones: ADH, FSH and LH**

(ii) Explain the role of ADH in homeostasis.

(3)

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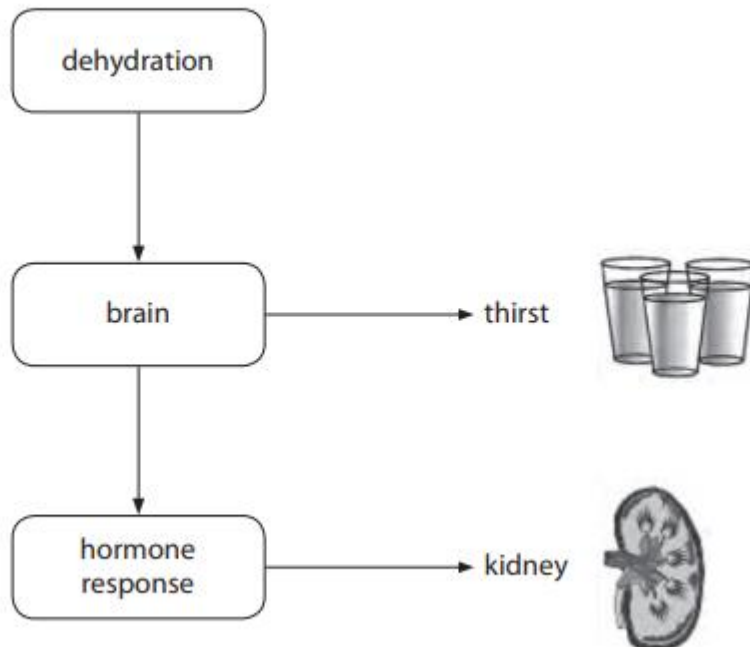
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**3** The diagram shows the body's response to dehydration.





(a) Use the diagram to help explain the body's hormonal response to dehydration.

(4)

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