

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**

Tuesday 8 May 2012 – 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 .

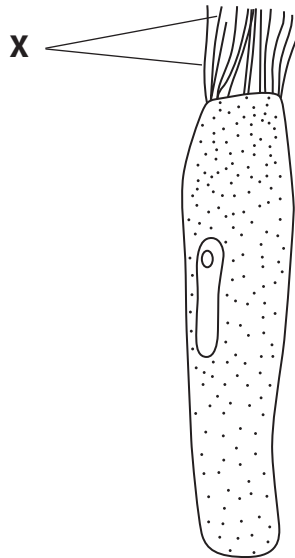
(a) The menstrual cycle of a female is 28 days.

On which day of the cycle is the ovum (egg) likely to be released?

(1)

- A** 1
- B** 14
- C** 20
- D** 28

(b) The diagram shows a cell from a human trachea.



The function of the structures labelled **X** is to

(1)

- A** move air
- B** move mucus
- C** trap bacteria
- D** trap food

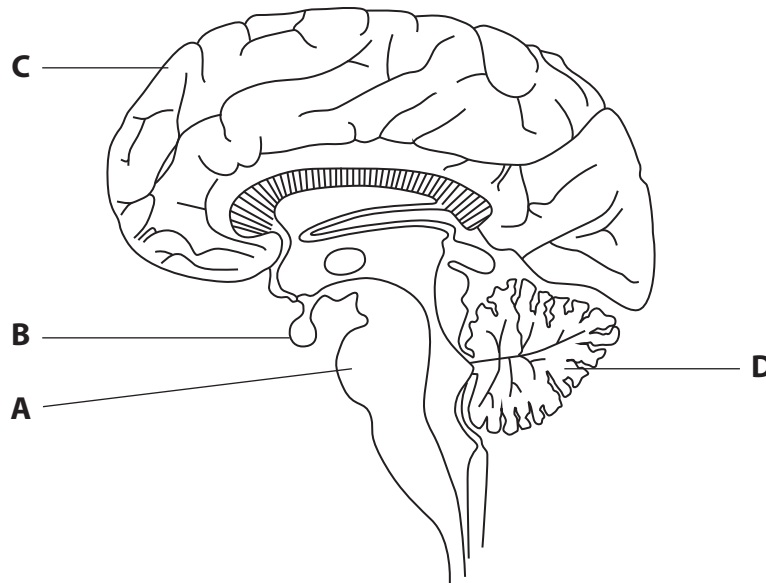


(c) During photosynthesis, light energy is converted mainly into

(1)

- A chemical energy
- B oxygen
- C starch
- D heat energy

(d) The diagram shows a section through the human brain.



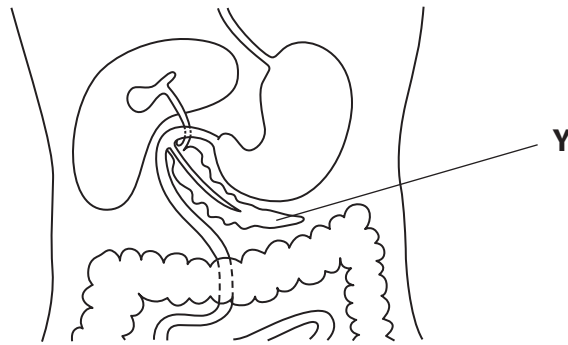
Which label shows a cerebral hemisphere?

(1)

- A
- B
- C
- D



(e) The structure labelled **Y** secretes a hormone.



The name of the hormone is

(1)

- A** antidiuretic hormone (ADH)
- B** follicle stimulating hormone (FSH)
- C** thyroxine
- D** insulin

(f) A pathogenic organism

(1)

- A** is always a virus
- B** causes disease
- C** is used to flavour food
- D** is used in the recycling of nutrients

(g) Which of the following pathways shows the route taken by the blood in its passage through the heart and lungs?

(1)

- A** right atrium → left atrium → lungs → left ventricle → right ventricle
- B** right atrium → right ventricle → lungs → left atrium → left ventricle
- C** left atrium → left ventricle → lungs → right ventricle → right atrium
- D** right atrium → right ventricle → left atrium → left ventricle → lungs



(h) Breathing in (inspiration) is brought about by a

(1)

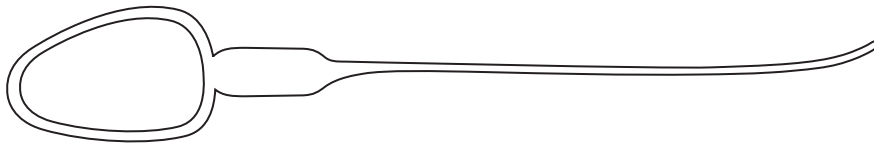
- A dome-shaped diaphragm and contraction of the intercostal muscles
- B flattened diaphragm and relaxation of the intercostal muscles
- C dome-shaped diaphragm and relaxation of the intercostal muscles
- D flattened diaphragm and contraction of the intercostal muscles

(i) A part of the human ear concerned with balance is the

(1)

- A cochlea
- B stirrup
- C semi-circular canal
- D Eustachian tube

(j) The diagram shows a cell found in an organ of the human body.



The organ in which this cell is found is the

(1)

- A testis
- B ovary
- C eye
- D brain

(Total for Question 1 = 10 marks)



2 (a) Name the part of the human eye that is described in each of the following statements.

(i) Controls the amount of light entering the eye.

(1)

(ii) Brings rays of light to a fine focus.

(1)

(iii) A layer that contains a dark pigment to prevent reflection of light in the eye.

(1)

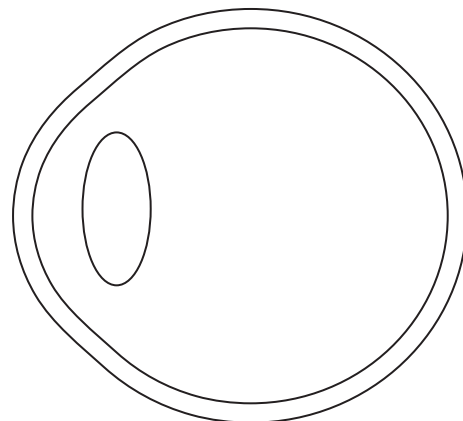
(iv) The area of most sensitive vision.

(1)

(v) Nerve fibres from rods and cones converge here to form the optic nerve.

(1)

(b) The diagram shows a simplified section through an eyeball.



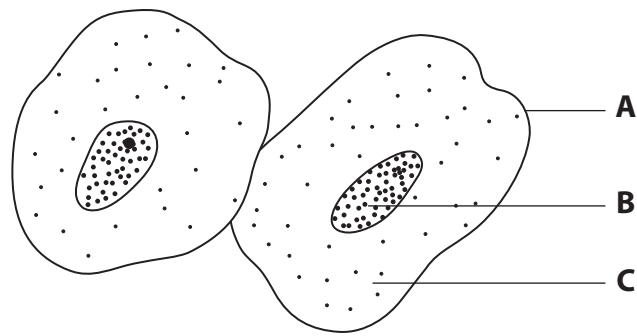
Draw one light ray from the top and one from the bottom of the tree to show how the rays pass through the eye to form an image of the tree at the back of the eye.

(5)

**(Total for Question 2 = 10 marks)**



3 The diagram shows two cells from the cheek lining as seen under a light microscope.



(a) Complete the table by naming parts **A**, **B** and **C** and by giving one function for each part. (6)

Part of cell	Name of part	Function of part
<b>A</b>		
<b>B</b>		
<b>C</b>		

(b) Electron microscopes can also be used to look at cheek cells.

(i) Name **three** structures that can be seen in a cheek cell when using an electron microscope but cannot be seen when using a light microscope. (3)

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



(ii) Describe **two** ways in which an electron microscope differs from a light microscope. (2)

1 .....

.....

2 .....

.....

(c) A teacher used a light microscope to show human blood cells to her students.

She carried out the following steps to prepare the blood sample.

**Step 1** She wiped her thumb with cotton wool soaked in ethanol (alcohol).

**Step 2** She pricked her thumb with a pin that had been washed in boiled water.

**Step 3** She placed a drop of her blood onto a microscope slide and spread it out thinly.

**Step 4** She placed stain onto the dried blood smear.

(i) Explain why each of the steps 1, 2, 3 and 4 was carried out.

(4)

**Step 1** .....

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.....

**Step 2** .....

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.....

**Step 3** .....

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.....

**Step 4** .....

.....

.....





(ii) Suggest why many schools do not allow students to carry out this experiment using their own blood.

(2)

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(d) Examination of the blood smear prepared in part (c) showed that most of the cells were small and round.

State **three** other ways in which these small, round blood cells differ from cheek cells.

(3)

1 .....

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2 .....

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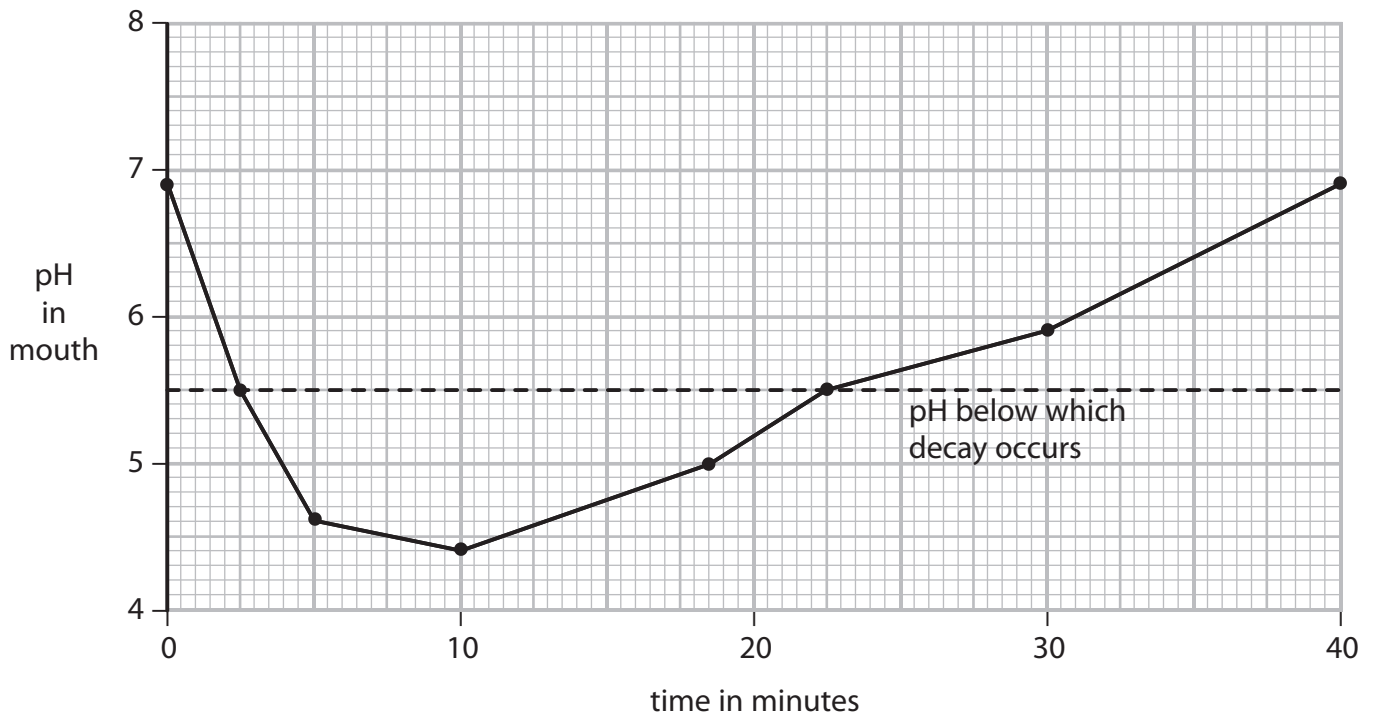
3 .....

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**(Total for Question 3 = 20 marks)**



4 The graph shows the change in pH in the mouth over a 40-minute period after eating a glucose-rich food. When the pH in the mouth falls below pH 5.5, the tooth enamel is likely to start decaying.



(a) (i) How many minutes after the glucose-rich food was eaten does the tooth enamel start decaying?

(1)

(ii) What is the pH in the mouth at the following times?

(2)

When the food is placed in the mouth .....

30 minutes after the food is eaten .....

(iii) How long does the pH in the mouth remain at a level at which decay can occur?  
Show your working.

(2)

..... minutes



(b) Explain why the pH in the mouth falls after the glucose-rich food is eaten.

(3)

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(c) (i) Describe a test that could be carried out to show that glucose is present in the food.

(3)

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(ii) Describe **one** safety precaution that should be taken when carrying out this test.

(1)

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(d) Two ways of protecting the teeth from decay are to strengthen the enamel and to use a mouthwash.

(i) Describe how the enamel could be strengthened.

(1)

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.....

(ii) Suggest **one** property that a mouthwash should have in order to be effective in preventing decay.

(1)

.....

.....

(Total for Question 4 = 14 marks)



5 The table shows the energy used by a person walking at five different speeds on level ground.

Speed of walking in km/hr	Energy used in kJ/min
1	3.7
2	6.8
3	10.0
4	13.1
5	16.3

(a) (i) State **two** conclusions that can be made from these results.

(2)

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(ii) Describe how the results would be different if the person were walking **uphill** at the five different speeds.

(2)

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(b) (i) Name the process that results in a large amount of energy release in the person's muscles.

(2)

.....

(ii) This process can be described using a word equation.

Complete the word equation to show the process of energy release.

(2)

glucose + ..... → ..... + carbon dioxide + energy



(c) (i) Describe how the carbon dioxide produced during the process of energy release is removed from a muscle cell and excreted by the body.

(4)

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(ii) Describe a simple test to prove that the gas released by the person walking on level ground is carbon dioxide.

(2)

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(iii) Suggest how and why the results of this test might be different if the person tested had walked **uphill** instead of on level ground.

(2)

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**(Total for Question 5 = 16 marks)**



6 Here are some functions of structures in the mammalian reproductive system.

- A Receives the penis during sexual intercourse
- B Produces sperm cells
- C Produces ova (eggs)
- D The site of fertilisation
- E The organ in which the fetus develops
- F The site at which oxygen passes into the fetal blood
- G Produces most of the fluid in which sperm are transported

Complete the table by using the correct letter from the list to match each of the structures shown.

(4)

Structure	Letter of function
uterus	
vagina	
seminal vesicle	
placenta	

(Total for Question 6 = 4 marks)



7 A DNA molecule consists of two strands linked together by base pairing.

One of the bases is adenine.

(a) Name the other **three** bases.

(3)

1 .....

2 .....

3 .....

(b) Which of these bases pairs with adenine?

(1)

.....

**(Total for Question 7 = 4 marks)**



8 The list shows four ways in which microorganisms may be spread.

**vector**

**water**

**air**

**food**

The diseases poliomyelitis, tuberculosis and malaria are caused by different types of microorganism.

Complete the table to show the disease caused by each type of microorganism and the main method by which it is spread.

(6)

Microorganism causing the disease	Name of the disease	Main method by which the disease is spread
bacterium		
virus		
protozoan		

(Total for Question 8 = 6 marks)

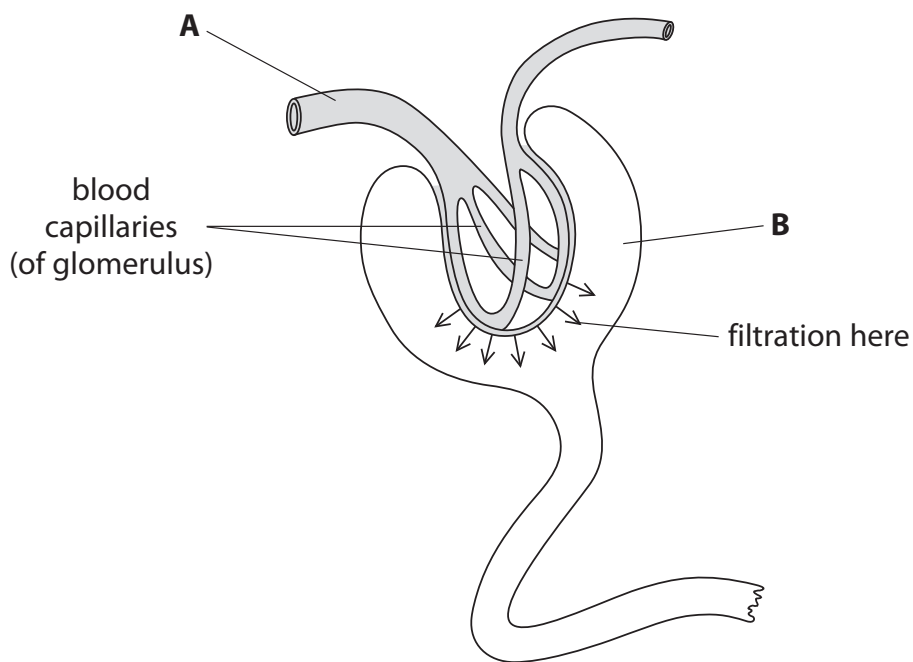




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9 The diagram shows part of a kidney tubule.



(a) Name the structure labelled **B**.

(1)

(b) The table shows the composition of three different fluids: the plasma in artery **A**, the filtrate in structure **B** and the urine.

Substance	% in plasma	% in filtrate	% in urine
water	90–93	90–93	95
protein	7.0	0	0
glucose	0.1	0.1	0
urea	0.03	0.03	2.0

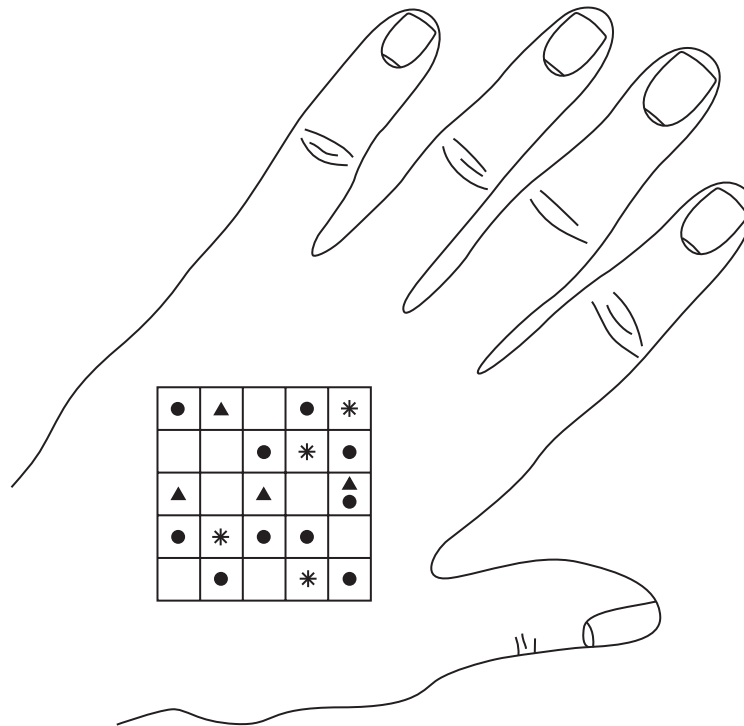
(i) Explain the difference in the percentages of protein in the plasma and in the filtrate.

(2)





10 (a) In an investigation into skin receptors, a grid was drawn on the back of a student's hand. Experiments were carried out to find the location of touch, heat and cold receptors. The diagram shows the positions of these receptors found during the investigation.



**key**

- touch receptor
- ▲ heat receptor
- \* cold receptor

(i) How many receptors of each type are shown on the grid?

(3)

Touch .....

Heat .....

Cold .....



(ii) Describe how the experiment to find the positions of **touch receptors** should be carried out.

(3)

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(b) Suggest how the results would be different if the investigation were repeated on the fingertips instead of the back of the hand.

(2)

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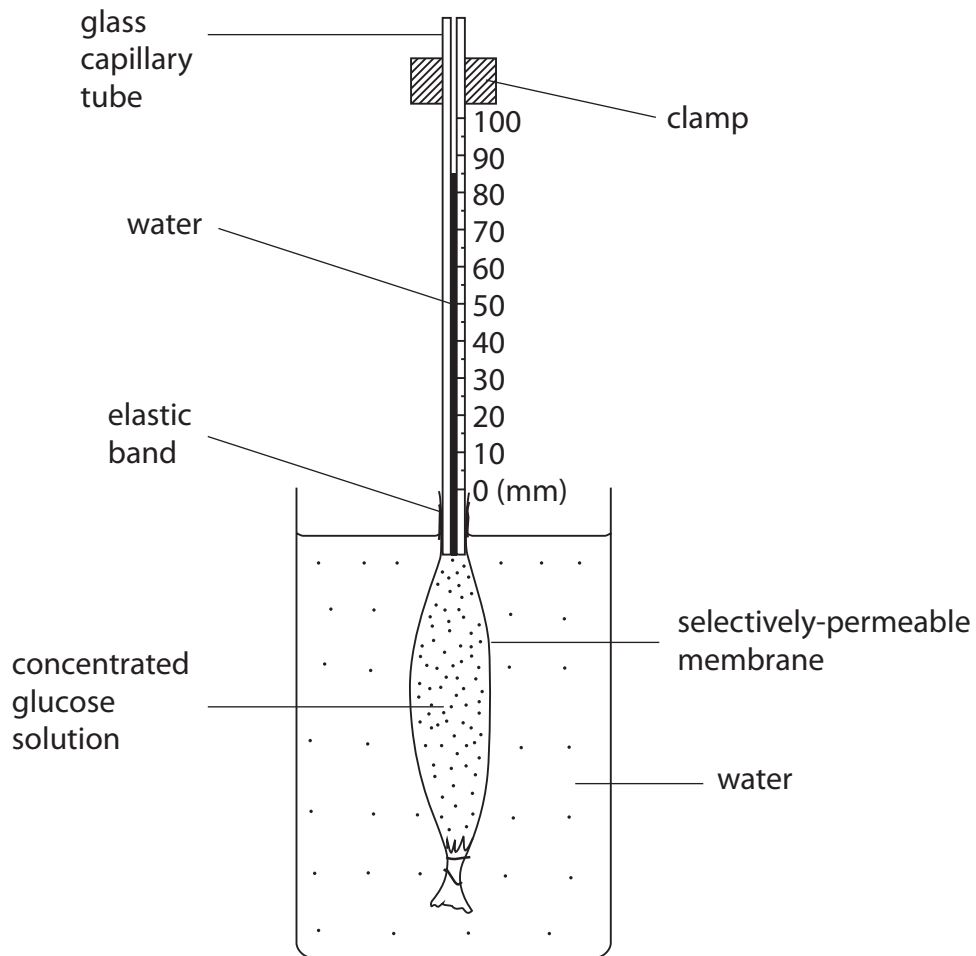
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**(Total for Question 10 = 8 marks)**



11 The diagram shows the end of an experiment to investigate the movement of water molecules. At the start of the experiment, the height of the water in the capillary tube was 0 mm.



(a) (i) What was the height of the water in the capillary tube at the end of the experiment? (1)

(ii) Explain the change in the water level in the capillary tube. (3)



(b) Some of the concentrated glucose solution used in the experiment was placed into a separate beaker and a sample of blood was added.

(i) In the space below, draw a diagram to show the appearance of **one** of the red blood cells as it would appear under a light microscope.

(1)

(ii) Explain why this red blood cell would have this appearance.

(2)

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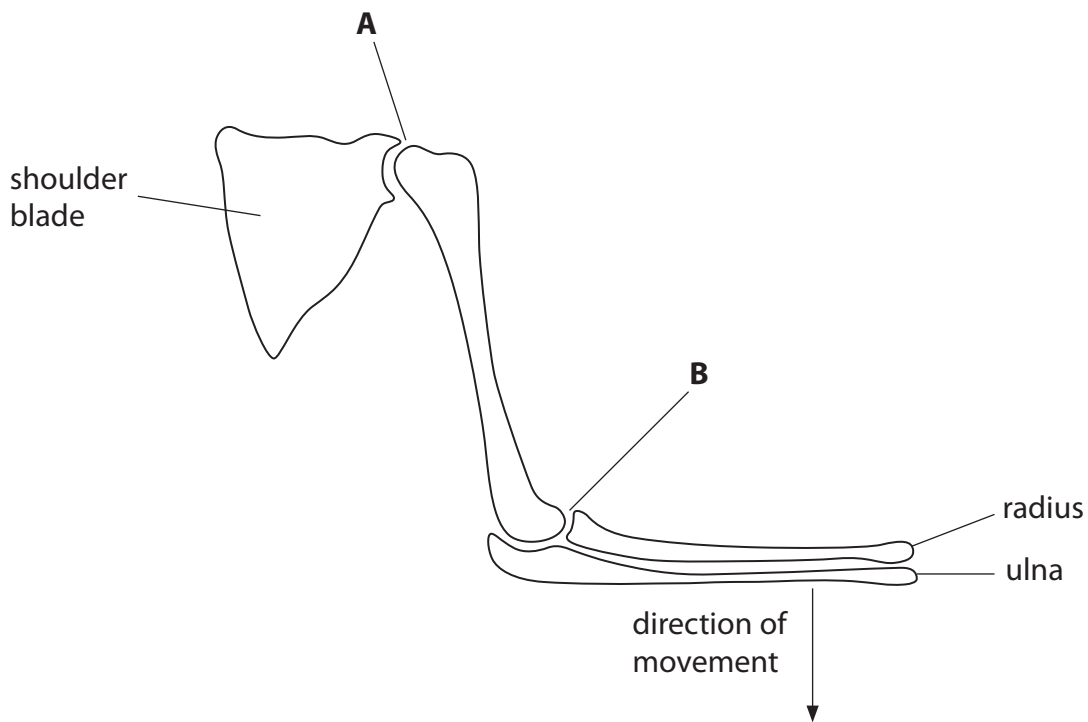
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**(Total for Question 11 = 7 marks)**



12 (a) The diagram shows the skeleton of the human forearm.



(i) Name **two** mineral ions required in the diet in order to form hard bones. (2)

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(ii) On the diagram, **draw** the muscle which is responsible for moving the forearm in the direction shown by the arrow. Show the points of attachment of the muscle to the bones. (3)

(iii) Explain how the forearm is moved in the opposite direction to the arrow. (3)

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(b) Describe how the movement of joints **A** and **B** is different.

(2)

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**(Total for Question 12 = 10 marks)**

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**TOTAL FOR PAPER = 120 MARKS**



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