

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

4483/02



**BIOLOGY**

**BIOLOGY 3  
HIGHER TIER**

P.M. TUESDAY, 17 May 2016

1 hour

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	8	
2.	6	
3.	4	
4.	6	
5.	6	
6.	8	
7.	4	
8.	5	
9.	7	
10.	6	
<b>Total</b>	<b>60</b>	

**ADDITIONAL MATERIALS**

In addition to this paper you may require a calculator and a ruler.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

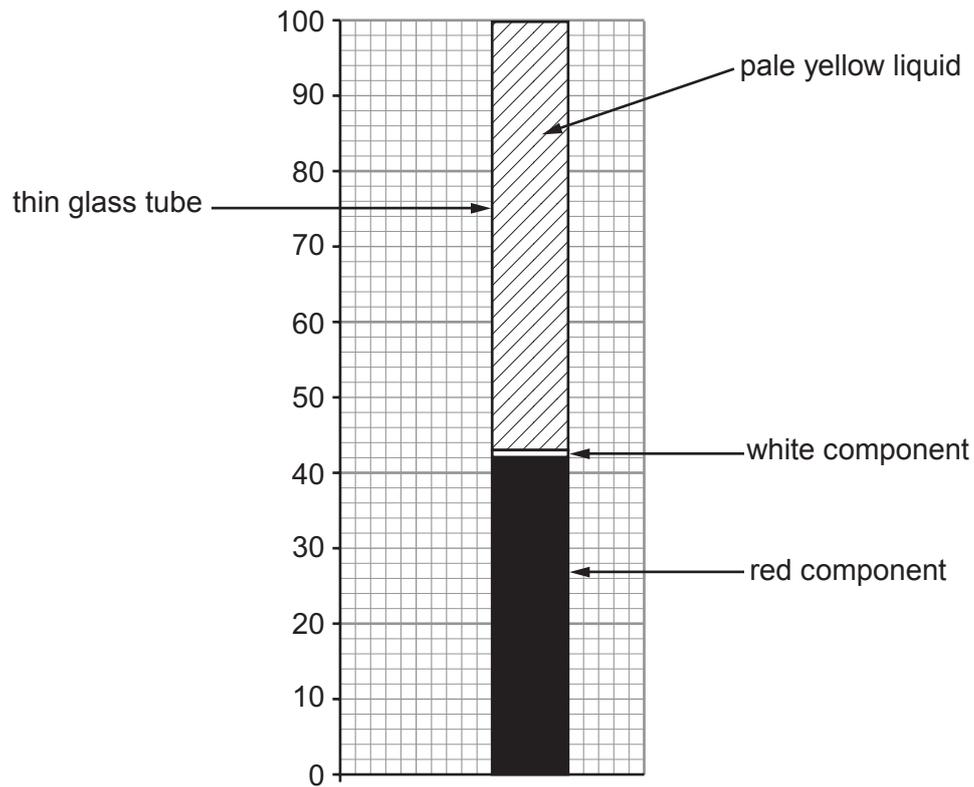
**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (QWC) used in your answer to questions **4** and **10**.

Answer all questions.

1. A sample of blood was mixed with an anti-clotting agent. The blood sample was then placed in a thin glass tube and spun at high speed for 5 minutes to separate the blood into its component parts. The appearance of the tube after being spun is shown below.



- (a) (i) Name the pale yellow liquid and state **one** function it carries out in the body. [2]

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- (ii) Use the diagram to calculate the percentage of the blood taken up by the pale yellow liquid. [1]

Pale yellow liquid = ..... %

(b) Name and state the function in the body of the content of the

(i) white component,

[2]

.....  
.....

(ii) red component.

[2]

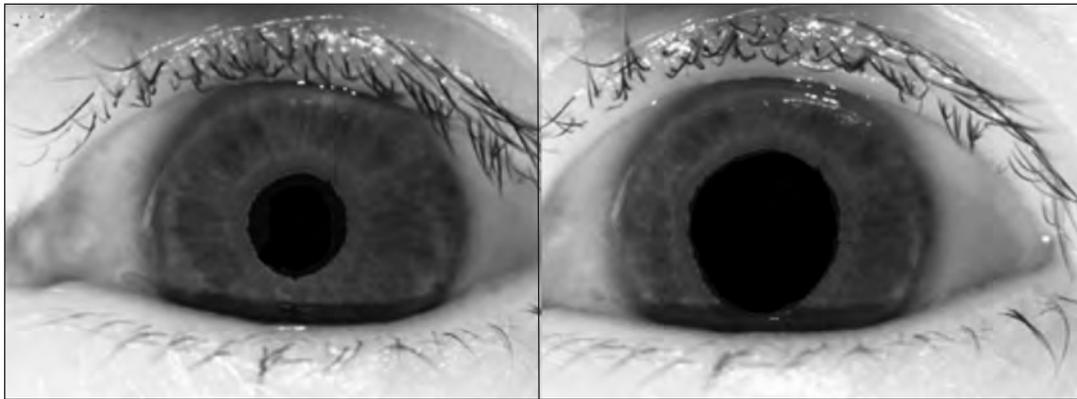
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(c) Name the part of the blood, not shown on the diagram, which was stopped from working by the anti-clotting agent. [1]

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2. The photograph below shows the eye of a volunteer who was taking part in a medical investigation into the effects of the drug LSD on the nervous system. One of the effects of LSD is that it causes dilation of the pupil of the eye. The pupil can remain dilated for many hours after the drug was taken.



Before taking LSD

After taking LSD

- (a) (i) The photographs above show the pupil of a volunteer before and after taking LSD. Measure the diameter of the pupil in both photographs and calculate the percentage increase in the diameter of the pupil caused by LSD. [2]

Percentage increase in diameter = ..... %

- (ii) The part of the brain that controls pupil size is stopped from working by the drug LSD. Explain why pupil size cannot be controlled if this part of the brain stops working. [2]

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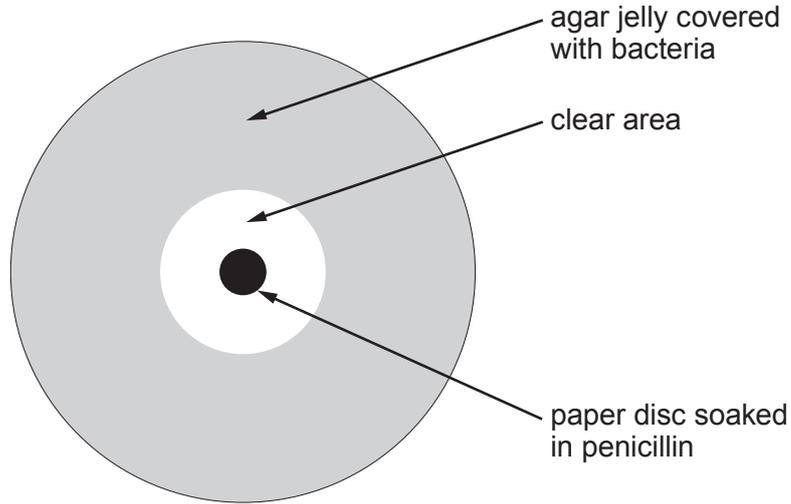
- (b) (i) Control of pupil size is a reflex action. One of the functions of reflex actions is that they protect the body from damage. Name the part of the eye which could be damaged in bright light if the pupil size could not be altered. [1]

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- (ii) Apart from protection, state **one other** property of reflex actions. [1]

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3. The diagram below shows a Petri dish containing agar jelly. The agar jelly has a very large number of disease causing bacteria growing on it. A paper disc soaked in penicillin was placed in the centre of the agar jelly. After 3 days the Petri dish appeared as shown in the diagram below.



- (a) Explain the appearance of the clear area around the paper disc. [2]

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- (b) If the bacteria on the dish had been MRSA no clear area would have developed. State why. [1]

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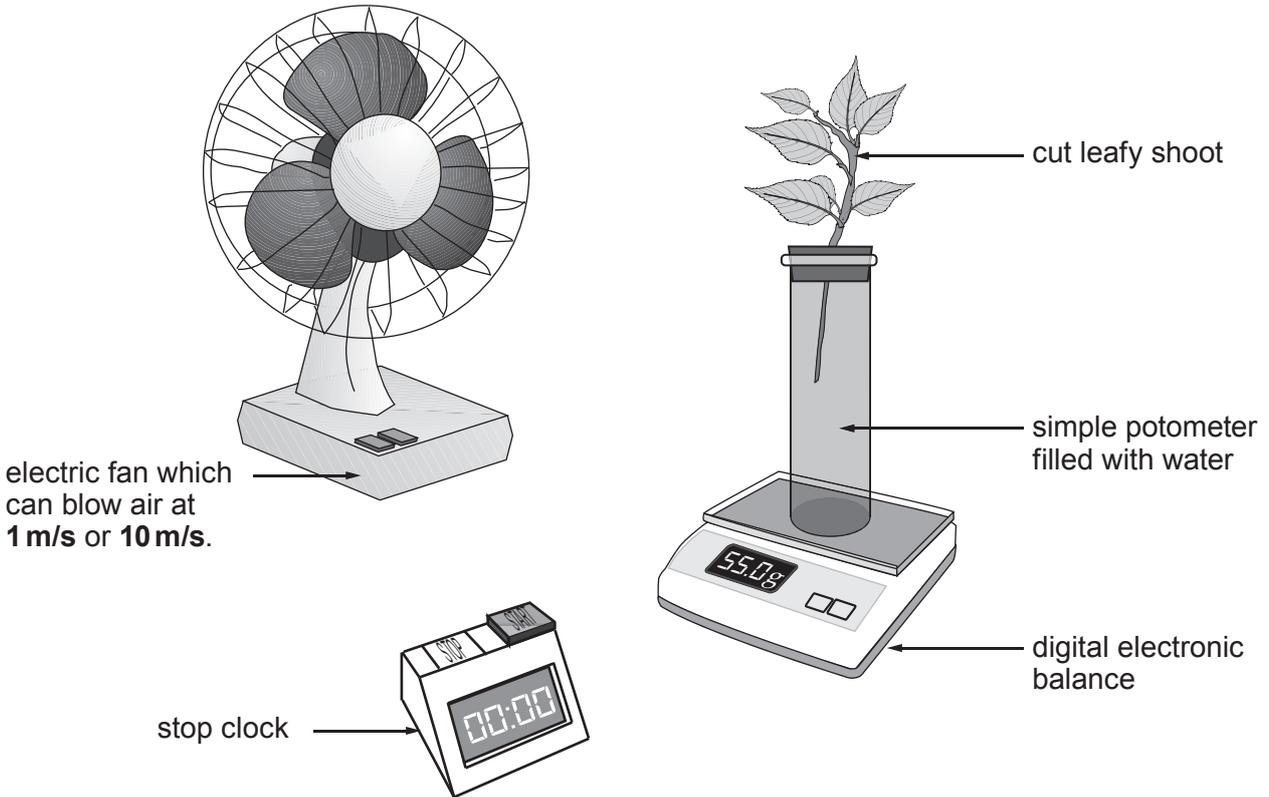
- (c) To which group of chemicals does penicillin belong? [1]

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4. Describe how you would investigate the effect of **two** different wind speeds on the rate of transpiration from a cut leafy shoot using the apparatus shown below. In your account you must include reference to the results you would expect and the conclusions you could make. [6 QWC]



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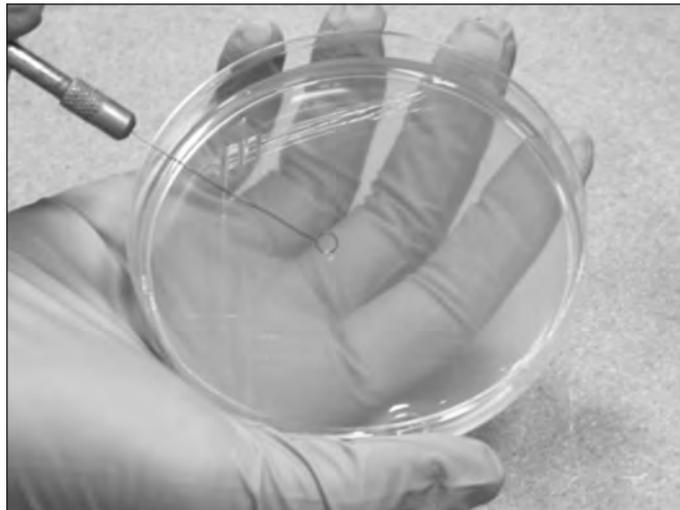
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5. Some fresh meat was cut into three 100g pieces. Each 100g piece of meat was stored at a different temperature for 14 days. The three temperatures used were:

- A**  $-20^{\circ}\text{C}$  (the temperature at which food is stored in a domestic deep freeze)
- B**  $3^{\circ}\text{C}$  (the temperature at which food is stored in a domestic refrigerator)
- C**  $25^{\circ}\text{C}$

After 14 days, meat samples of equal mass from each temperature were inoculated onto agar jelly in Petri dishes. Aseptic techniques were used throughout the investigation.



Inoculating agar

The three Petri dishes were then kept in an incubator for three days at a temperature of  $30^{\circ}\text{C}$ . At the end of this period the Petri dishes were removed from the incubator and examined. The results are shown below.

Initial storage temperature		
$-20^{\circ}\text{C}$	$3^{\circ}\text{C}$	$25^{\circ}\text{C}$
<b>A</b> 	<b>B</b> 	<b>C</b> 

colonies of bacteria

(a) (i) State **one** conclusion which can be drawn from the results of this investigation. [1]

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.....

(ii) Each of the colonies consists of many thousands of bacteria.

I. How many bacterial cells were spread onto the agar which was inoculated with meat stored at  $-20^{\circ}\text{C}$ ? [1]

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II. Explain the advantage of storing meat at  $-20^{\circ}\text{C}$ . [2]

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.....  
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(b) (i) Why were aseptic techniques used throughout this investigation? [1]

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(ii) Give **one** example of an aseptic technique which would have been used during the investigation. [1]

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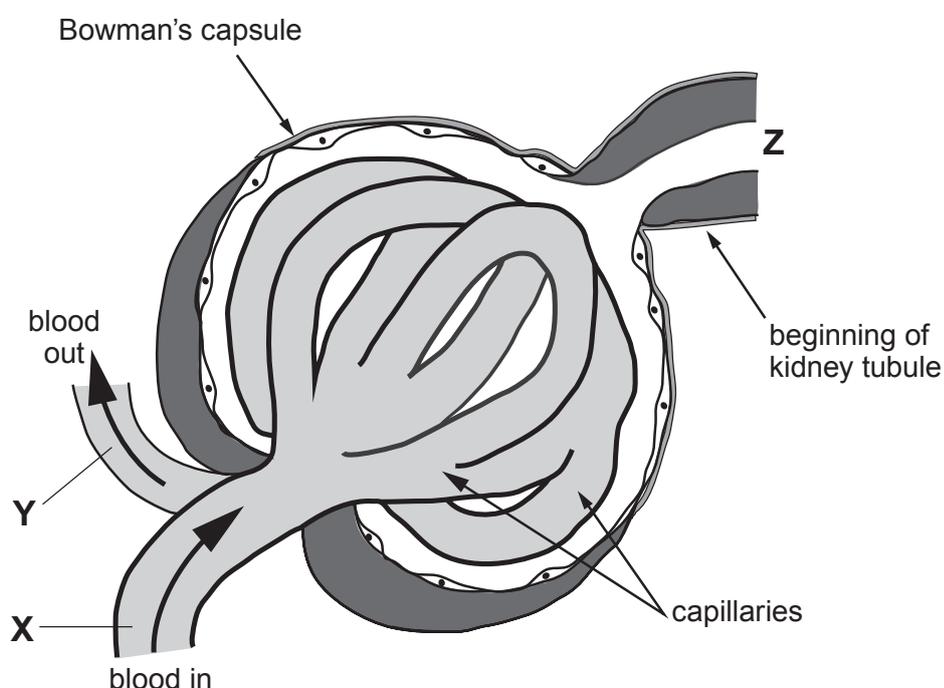
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6. Each minute  $1200\text{cm}^3$  of blood passes into a healthy human kidney. This volume of blood contains  $700\text{cm}^3$  of plasma.  $125\text{cm}^3$  of plasma passes into the kidney tubules.

(a) Calculate the percentage of plasma passing into the tubule to the nearest whole number. Show your working. [2]

Percentage of plasma = ..... %

(b) The diagram shows the blood vessels in a Bowman's capsule.



(i) Explain the importance of the blood vessel labelled Y being narrower than the blood vessel labelled X. [2]

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(ii) Explain the role of ADH when the water content at point **Z** is decreased due to shortage of water in the blood. [4]

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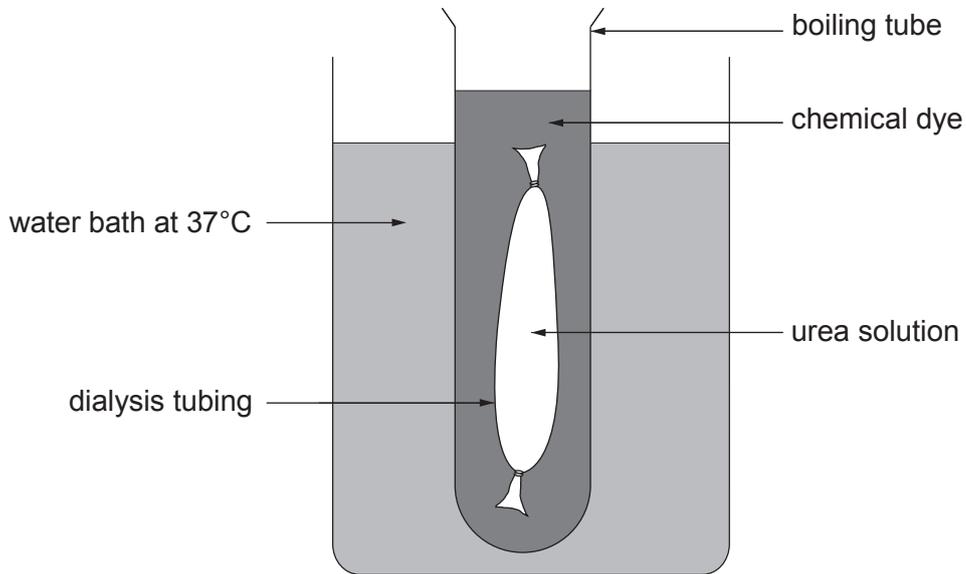
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7. The apparatus shown below was set up to investigate the permeability of a newly invented dialysis tubing to be used in a renal dialysis machine. A chemical dye was used which changes from colourless to blue in the presence of urea.



(a) Which part of the diagram represents: [2]

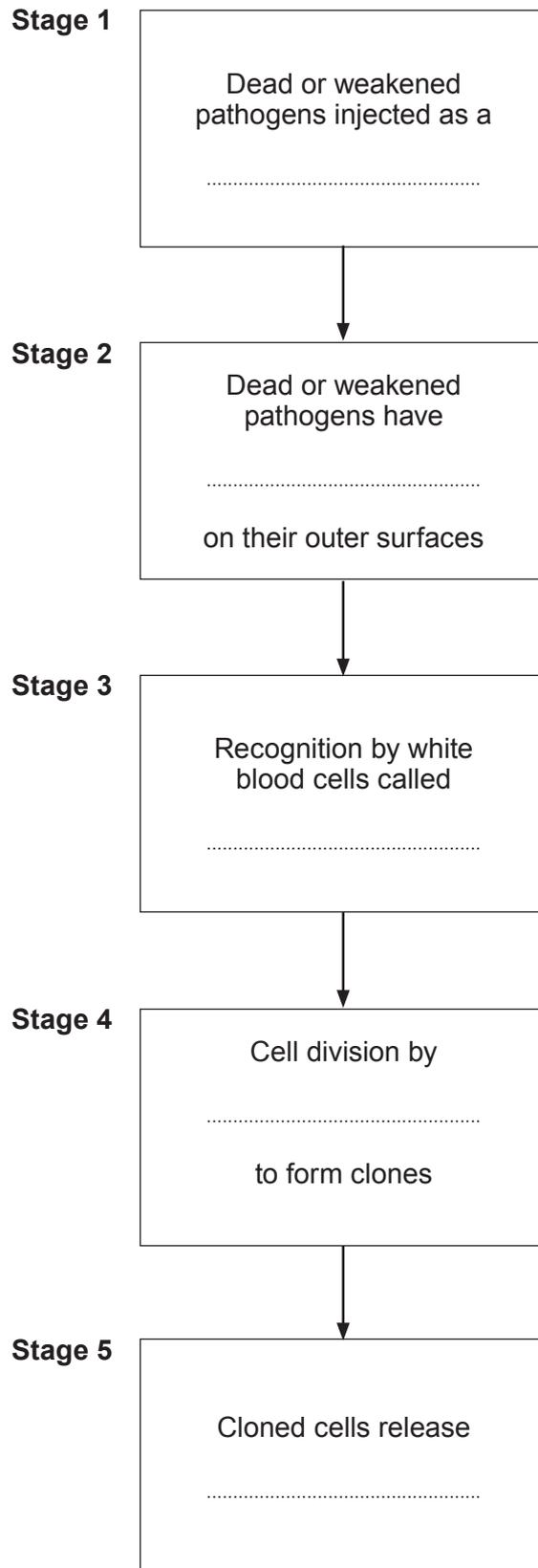
- (i) dialysis fluid in a dialysis machine;  
.....
- (ii) blood in a dialysis machine?  
.....

(b) The apparatus was left for 40 minutes. During this time the dye changed to blue but the solution within the dialysis tubing, remained colourless.

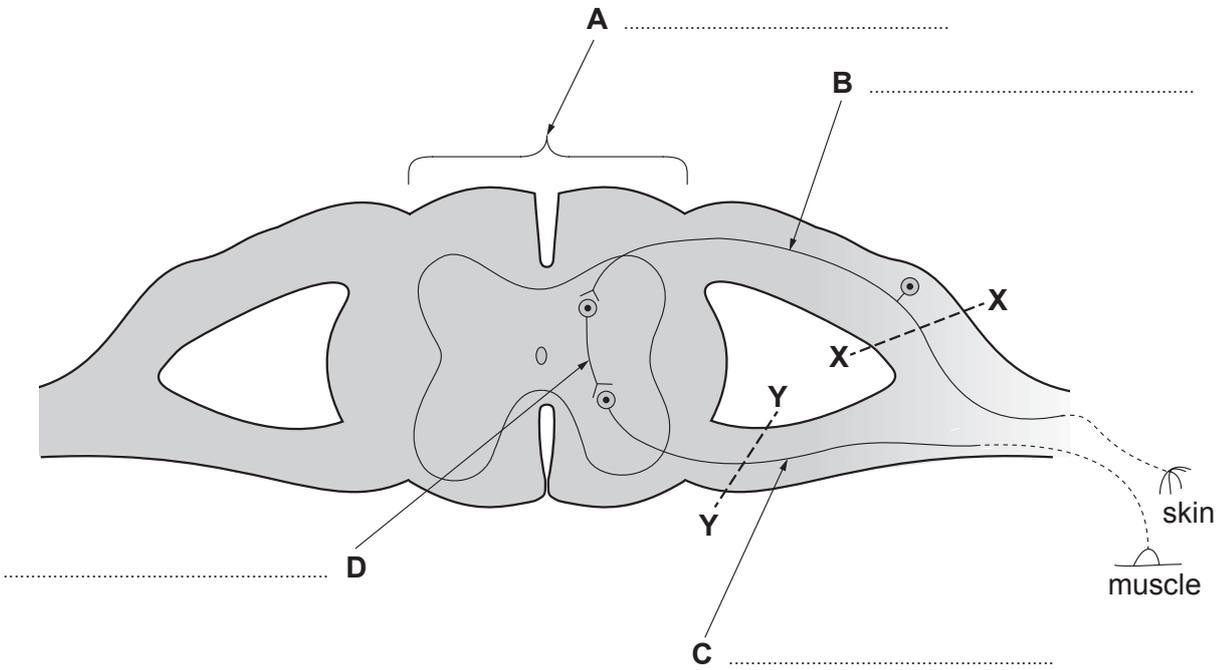
What **two** conclusions can you make from these observations? [2]

- (i) .....
- .....
- (ii) .....
- .....

8. The incomplete flow chart below shows the stages that occur after a person has been given an injection for protection against a disease caused by a pathogen. Complete the flow chart by adding the most appropriate words. [5]



9. The diagram shows part of a human nervous system involved in a withdrawal reflex.



(a) Label **A** to **D** on the diagram above. [4]

(b) Add **two** arrows on the diagram, **one** on the structure labelled **B** and the **other** on the structure labelled **C** to show the direction of a nerve impulse during a reflex action. [1]

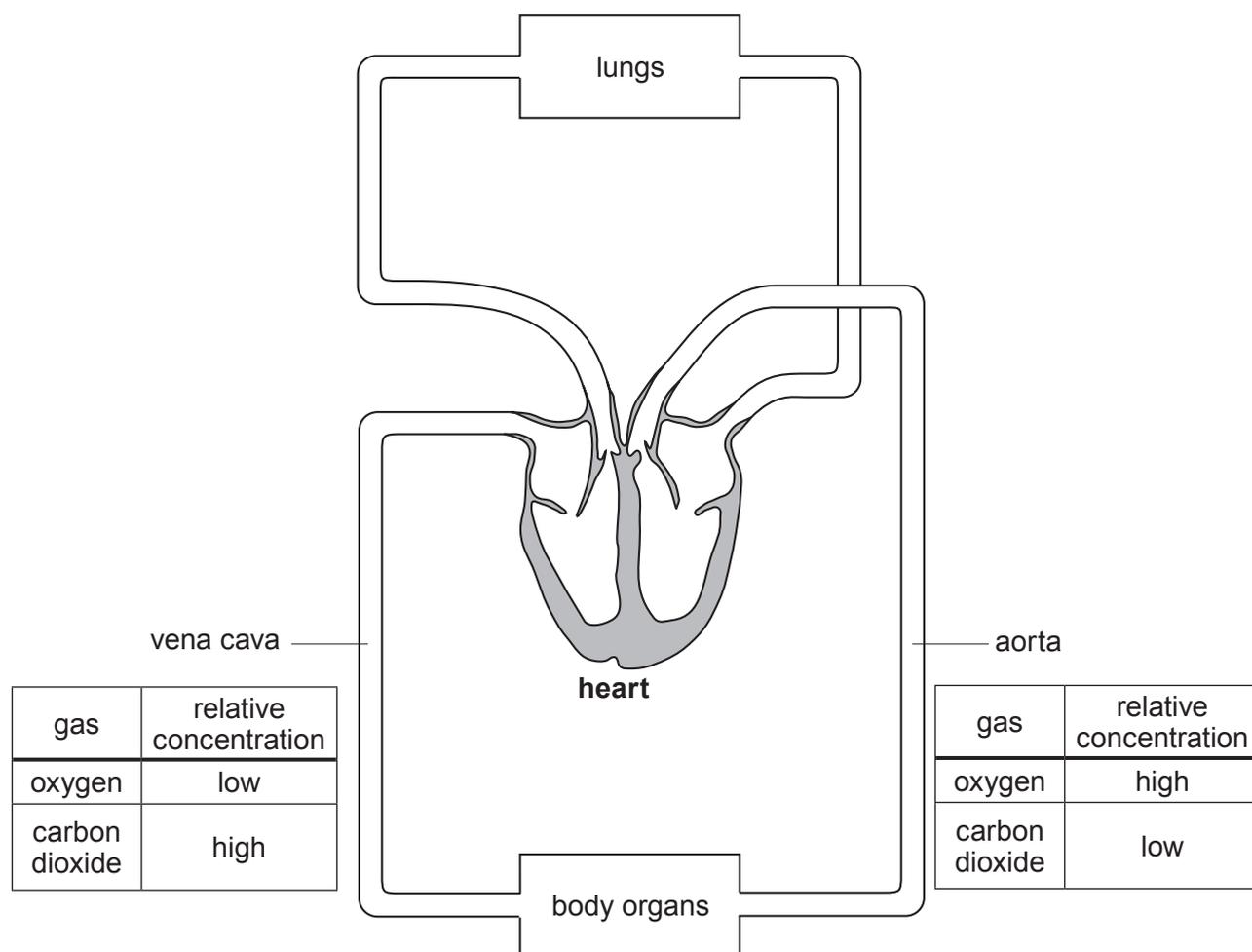
(c) Suggest the effect on the withdrawal reflex if cuts were made at [2]

(i) **X-X** .....

(ii) **Y-Y** .....

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10. The diagram illustrates the basic plan of the human circulatory system. The relative concentrations of oxygen and carbon dioxide are shown.



Explain the difference in the relative concentrations of oxygen and carbon dioxide in the blood vessels entering and leaving the body organs. [6 QWC]

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