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| Surname | Centre Number | Candidate Number |
| Other Names | | 0 |



GCSE

4483/01



BIOLOGY

**BIOLOGY 3
FOUNDATION TIER**

P.M. TUESDAY, 17 May 2016

1 hour

| For Examiner's use only | | |
|-------------------------|--------------|--------------|
| Question | Maximum Mark | Mark Awarded |
| 1. | 7 | |
| 2. | 5 | |
| 3. | 9 | |
| 4. | 8 | |
| 5. | 7 | |
| 6. | 8 | |
| 7. | 6 | |
| 8. | 4 | |
| 9. | 6 | |
| Total | 60 | |

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.

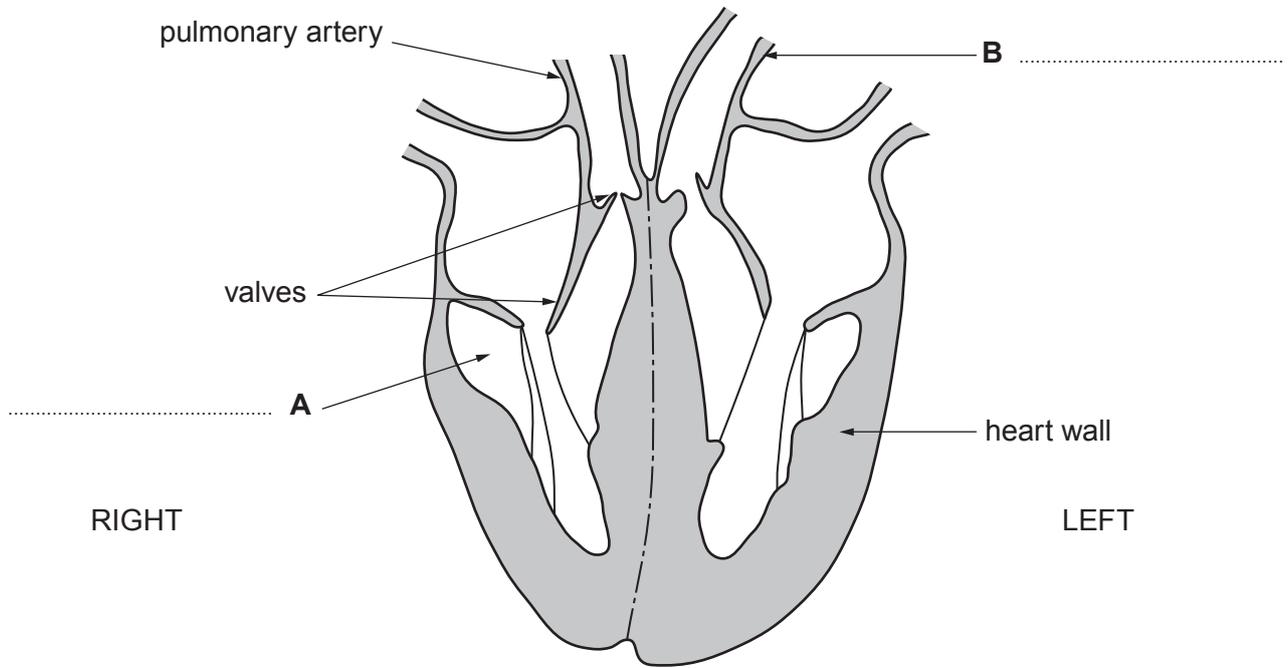
INFORMATION FOR CANDIDATES

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 question **9**.

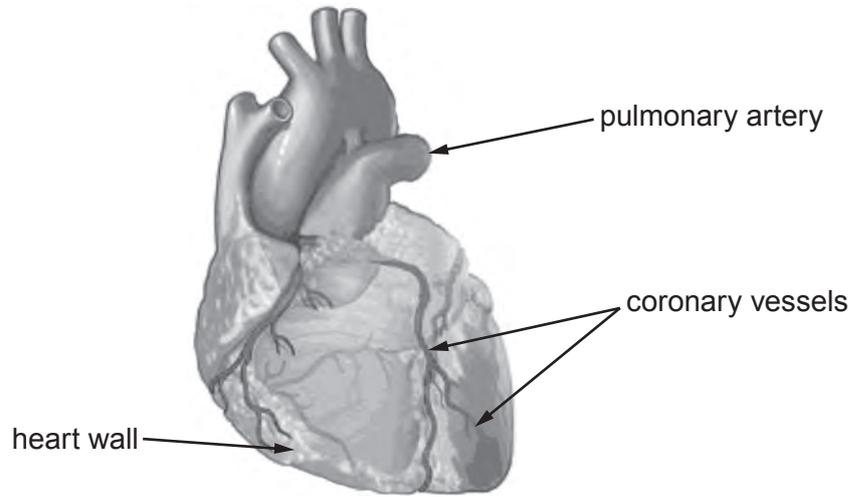
Answer all questions.

1. (a) The diagram below shows a section through the human heart.



- (i) Complete labels **A** and **B** on the diagram. [2]
- (ii) Draw an arrow to show the pathway taken by the blood as it passes through the left side of the heart. [1]
- (iii) Give the functions of [2]
 - I. the pulmonary artery
 - II. the valves

The diagram below shows the external appearance of the heart.



(b) Why are the coronary vessels important in the functioning of the heart?

[2]

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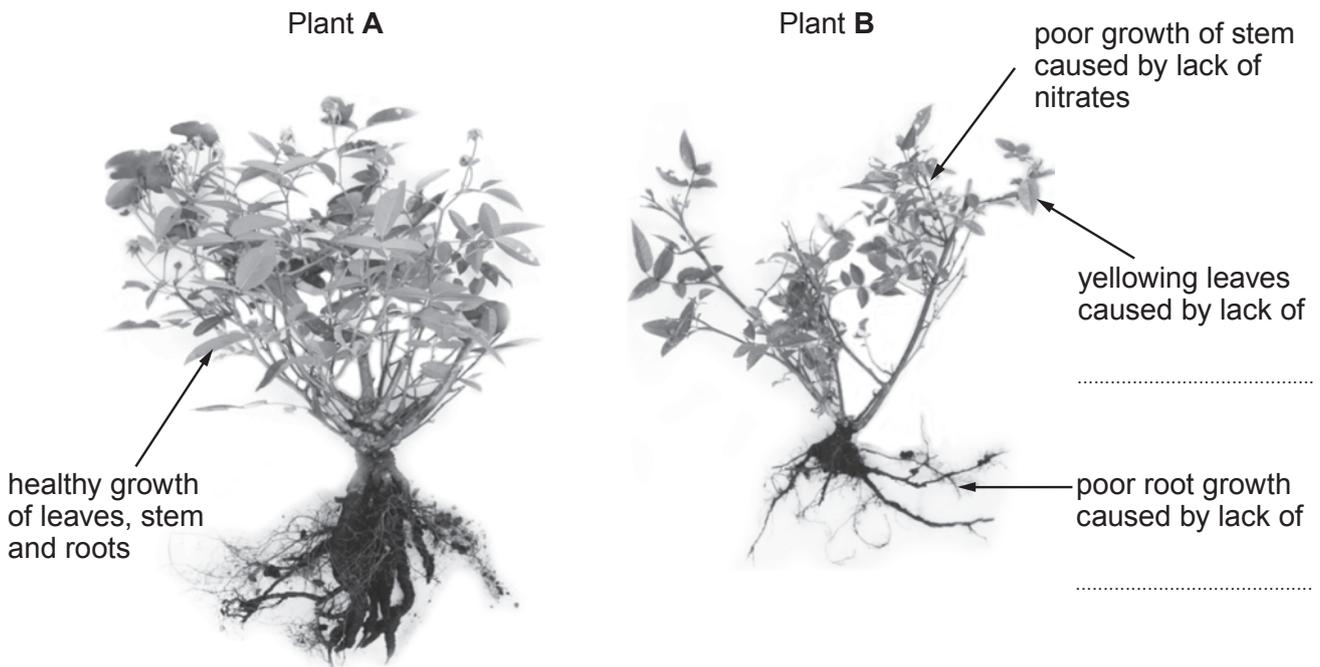
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2. (a) Complete the sentences about plant nutrition. [2]

Plants obtain the sugar they need through the process of which occurs in their leaves.

Plants obtain the mineral salts they need from the

The photographs show two rose plants. Plant **A** is healthy but Plant **B** is deficient in some minerals. Otherwise they were grown in the same conditions.



(b) Complete the labels on the photograph above to show the minerals which are lacking in plant **B**, using some of the words below. [2]

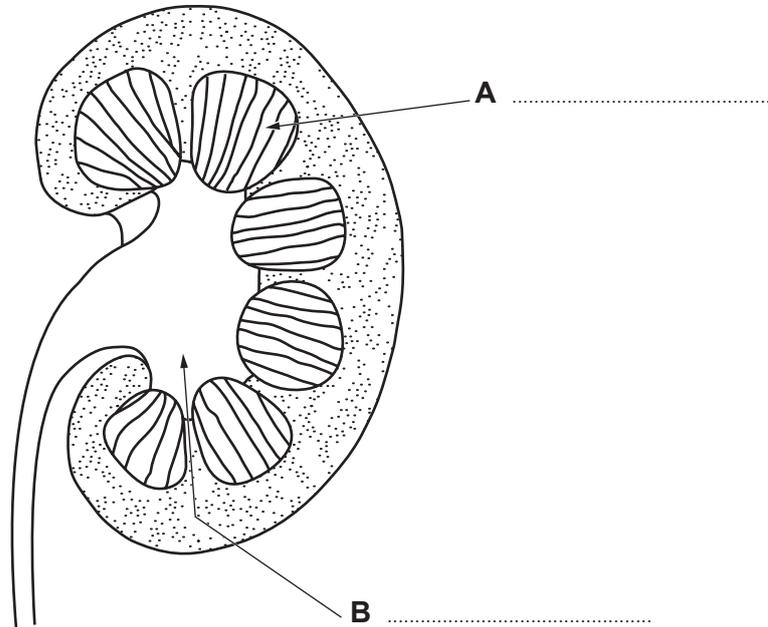
- calcium
- phosphate
- potassium
- sodium

(c) Name the tissue in plants which transports sugars. [1]

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3. The diagram shows a section through the human kidney. The kidneys remove waste substances from the blood.



- (a) (i) I. **Complete labels A and B** on the diagram. [2]
 II. **Use an arrow to label** the ureter on the diagram above. [1]
- (ii) I. Name the solution which passes through the ureter [1]
 II. State **one** waste substance which the solution passing through the ureter contains.
 [1]

- (b) If the kidneys fail to function, a person can be treated by dialysis or have a healthy kidney transplanted from a donor.



The photograph shows a dialysis machine in use in a hospital. Patients must visit a hospital every few days for treatment. In addition, they need to restrict their everyday activities, eat a special diet and take certain drugs.

- (i) Describe **two** advantages of a kidney transplant compared with dialysis. [2]

I.

II.

- (ii) Since 2015, a law in Wales has assumed that everyone is willing to donate his or her organs after death. Individuals are allowed to opt out of the donation scheme.

- I. Give a reason for the introduction of this law. [1]

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- II. Suggest why some people may object to donating their organs. [1]

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4. Read the information below and use it to answer the following questions.

In 2012 approximately 32 million tonnes of waste plastic was discarded in the UK. Most went to landfill but 25% was recycled.



Plastic waste dumped at a landfill site

Waste plastics at landfill sites produce chemicals called phthalates which are toxic.

Scientists have discovered bacteria which can break phthalates down into useful substances.

- (a) Calculate the mass of waste plastic which was **not** recycled in the UK in 2012. [2]

Mass of plastic = tonnes

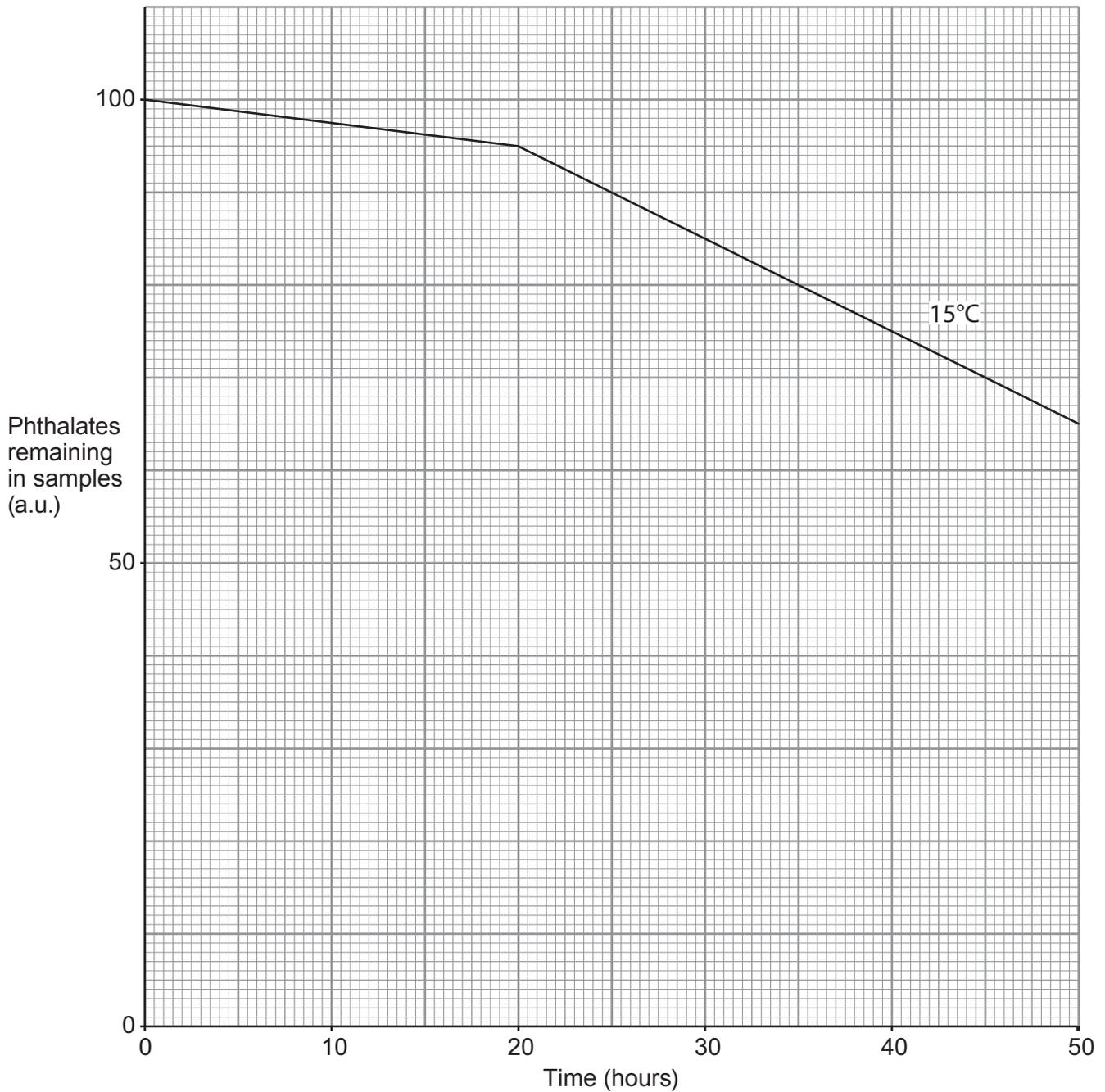
- (b) Scientists investigated how quickly bacteria broke down samples of phthalates at 15°C and 25°C.

The results for 25°C are shown in the table below and the results for 15°C are on the graph opposite.

Results for 25°C

| time (hours) | phthalates remaining in sample (a.u.) |
|--------------|---------------------------------------|
| 0 | 100 |
| 10 | 96 |
| 20 | 92 |
| 30 | 60 |
| 40 | 33 |
| 50 | 5 |

- (i) Complete the graph opposite by
- I. plotting the results for 25°C, [2]
 - II. drawing a line using a ruler to join your plots. [1]



(ii) From this graph, describe how temperature affects the breakdown of phthalates by bacteria and suggest a reason for the difference in the results seen at 15°C and 25°C. [2]

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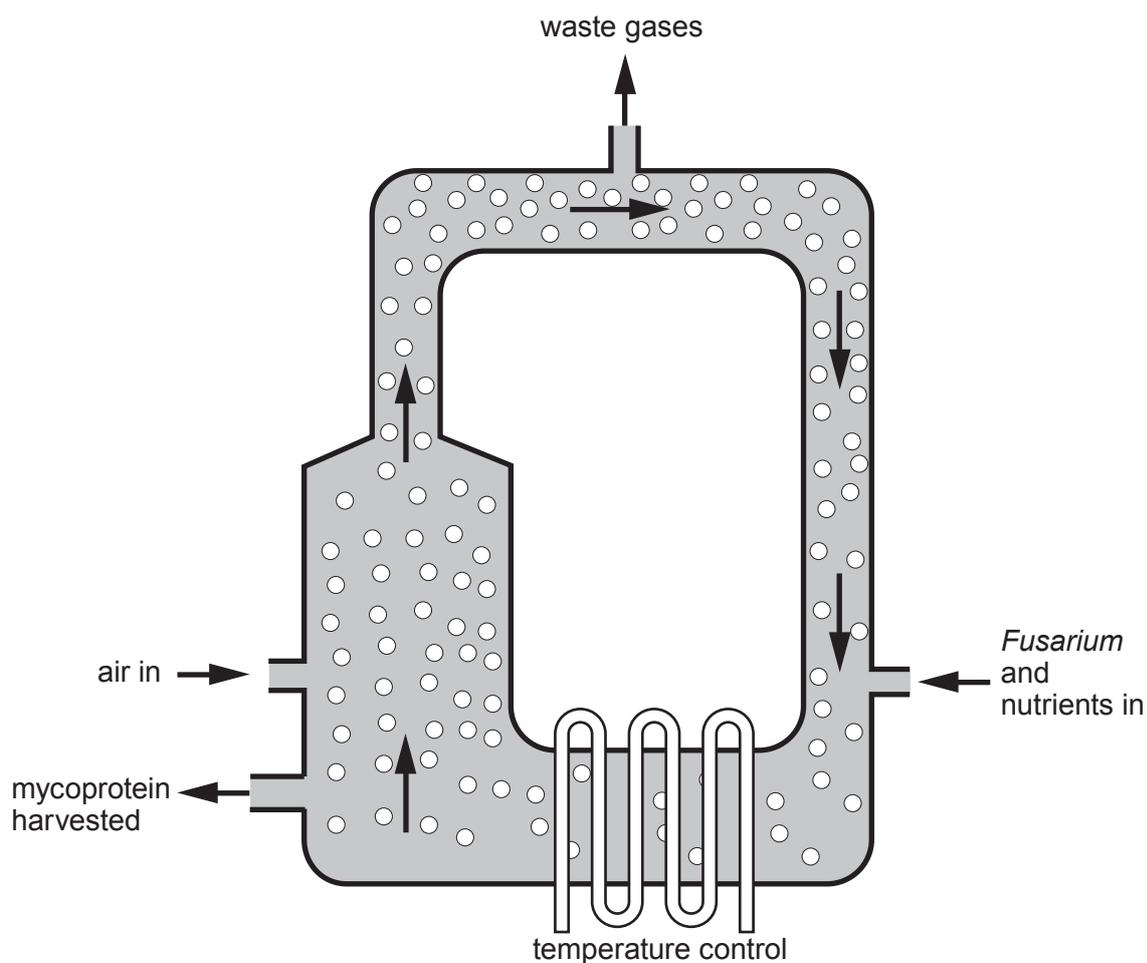
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(c) Much of the plastic waste at landfill sites is made up of items such as drinks bottles and coffee cups. Suggest **one** way in which people could be encouraged to recycle more waste plastic. [1]

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5. In the 1960s scientists started to look for ways to obtain food from microorganisms to feed the world's growing human population. They produced a mycoprotein by growing a microscopic fungus called *Fusarium*. The diagram below shows a fermenter which is used to make mycoprotein on a large scale.



- (a) (i) Explain why it would be necessary to maintain aseptic conditions in the fermenter. [2]

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- (ii) Give **one** advantage of growing foods from microorganisms in a fermenter. [1]

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- (b) Many people now eat mycoprotein as a meat substitute. The table shows some of the nutrients in a 200g mycoburger compared with a 200g beefburger.

| Nutrient | Mass of nutrient in 200 g burger | |
|------------------|----------------------------------|------------|
| | mycoburger | beefburger |
| protein (g) | 25.0 | 75.0 |
| fat (g) | 1.0 | 36.0 |
| salt (g) | 1.0 | 2.4 |
| cholesterol (mg) | 0.0 | 150.0 |

- (i) How many of these mycoburgers would a person need to eat in order to obtain the same mass of protein as a 200g beefburger? [1]

Number of mycoburgers =

- (ii) Calculate the percentage of fat in a beefburger. [2]

Percentage of fat = %

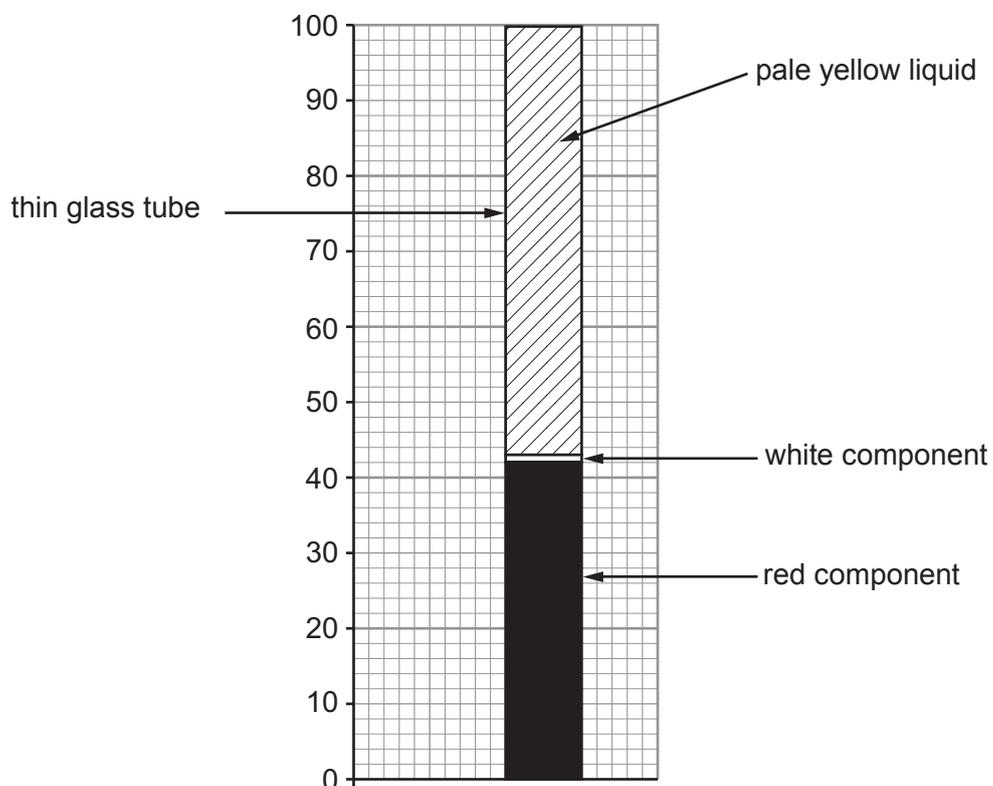
- (iii) Mycoprotein is often described as a “Healthy Option” food. From the table, suggest **two** reasons, other than low fat content, which support this idea. [1]

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6. 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 above 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]

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(ii) red component.

[2]

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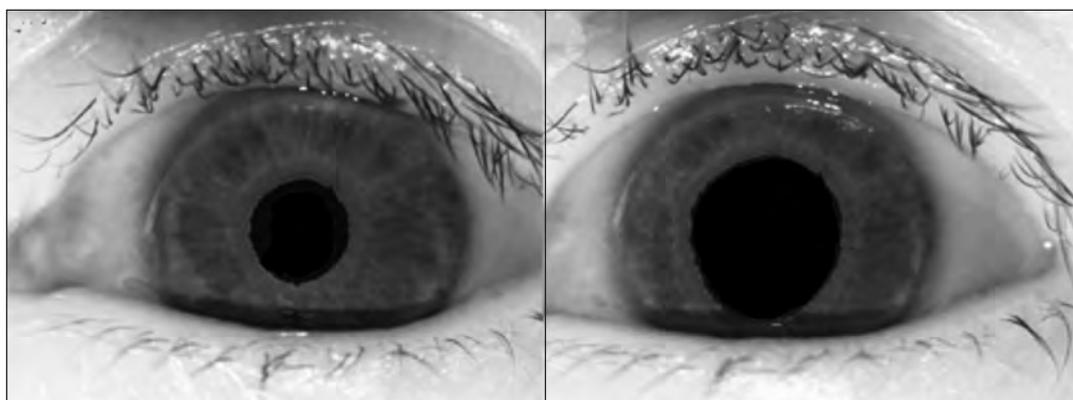
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(c) Name the part of the blood, not shown on the diagram, which was stopped from working by the anti-clotting agent. [1]

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7. 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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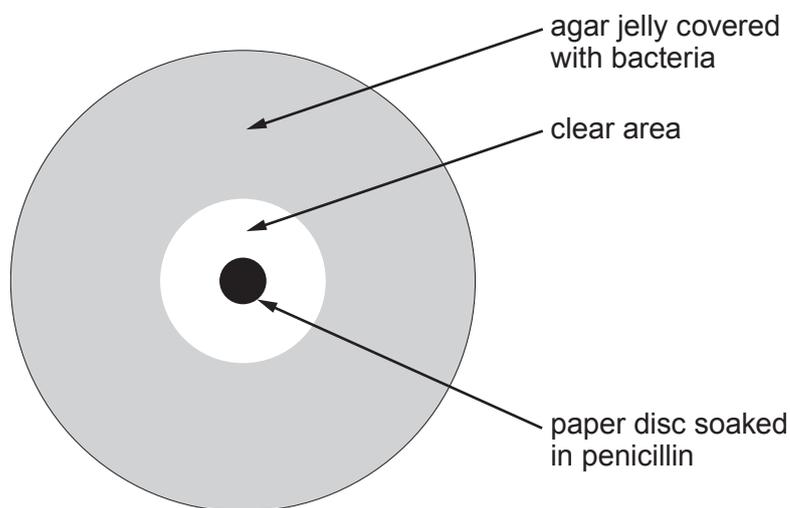
- (b) (i) Control of pupil size is a reflex action. One of the functions of reflex actions is that they protect the body from damage. Name the part of the eye which could be damaged in bright light if the pupil size could not be altered. [1]

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

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8. 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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