Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4483/01

S15-4483-01

BIOLOGY

BIOLOGY 3
FOUNDATION TIER

P.M. TUESDAY, 12 May 2015

1 hour

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

4483 010001

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**.

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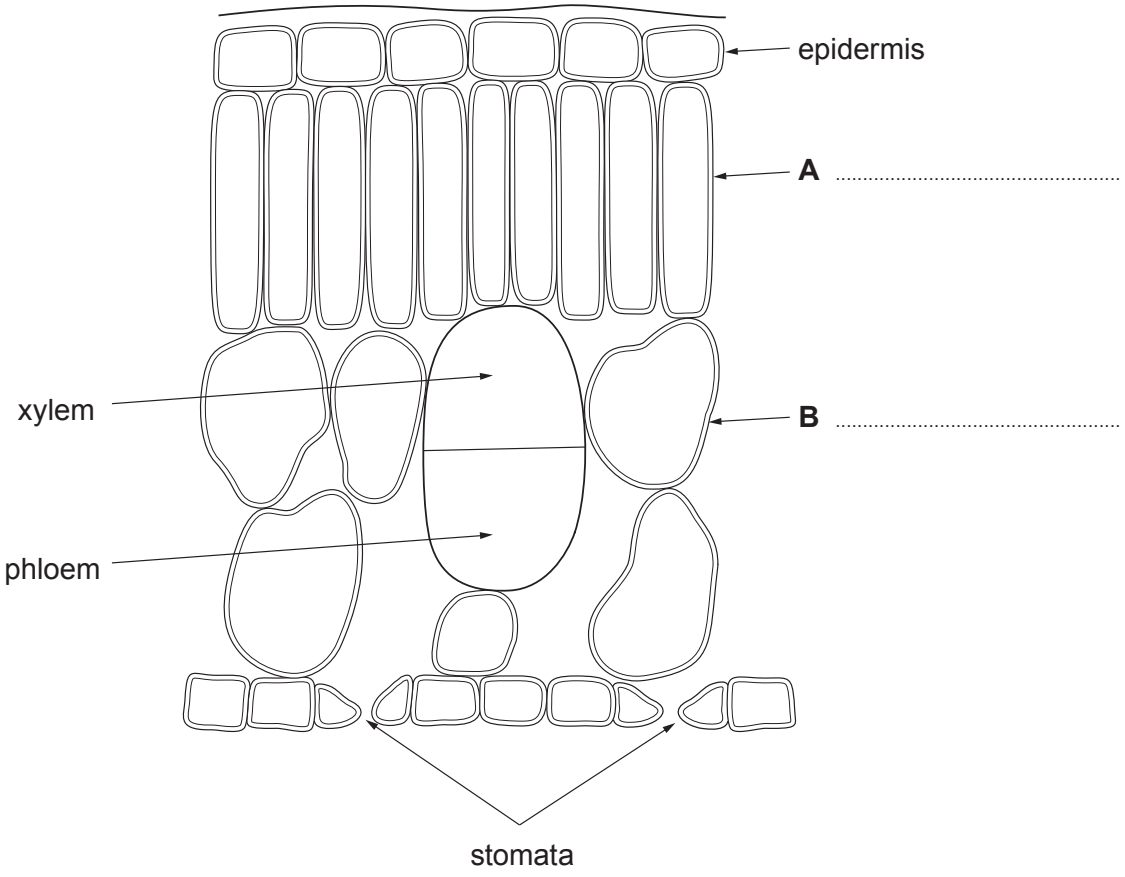
Answer **all** *questions.*

Examiner only

1. The diagram below shows a transverse section through a leaf.



(a) On the diagram above, name layers **A** and **B**. [2]

(b) (i) Name the process which occurs in layers **A** and **B** that produces sugars. [1]

.....

(ii) State the function of phloem. [1]

.....

.....

(iii) Complete the sentence. [1]

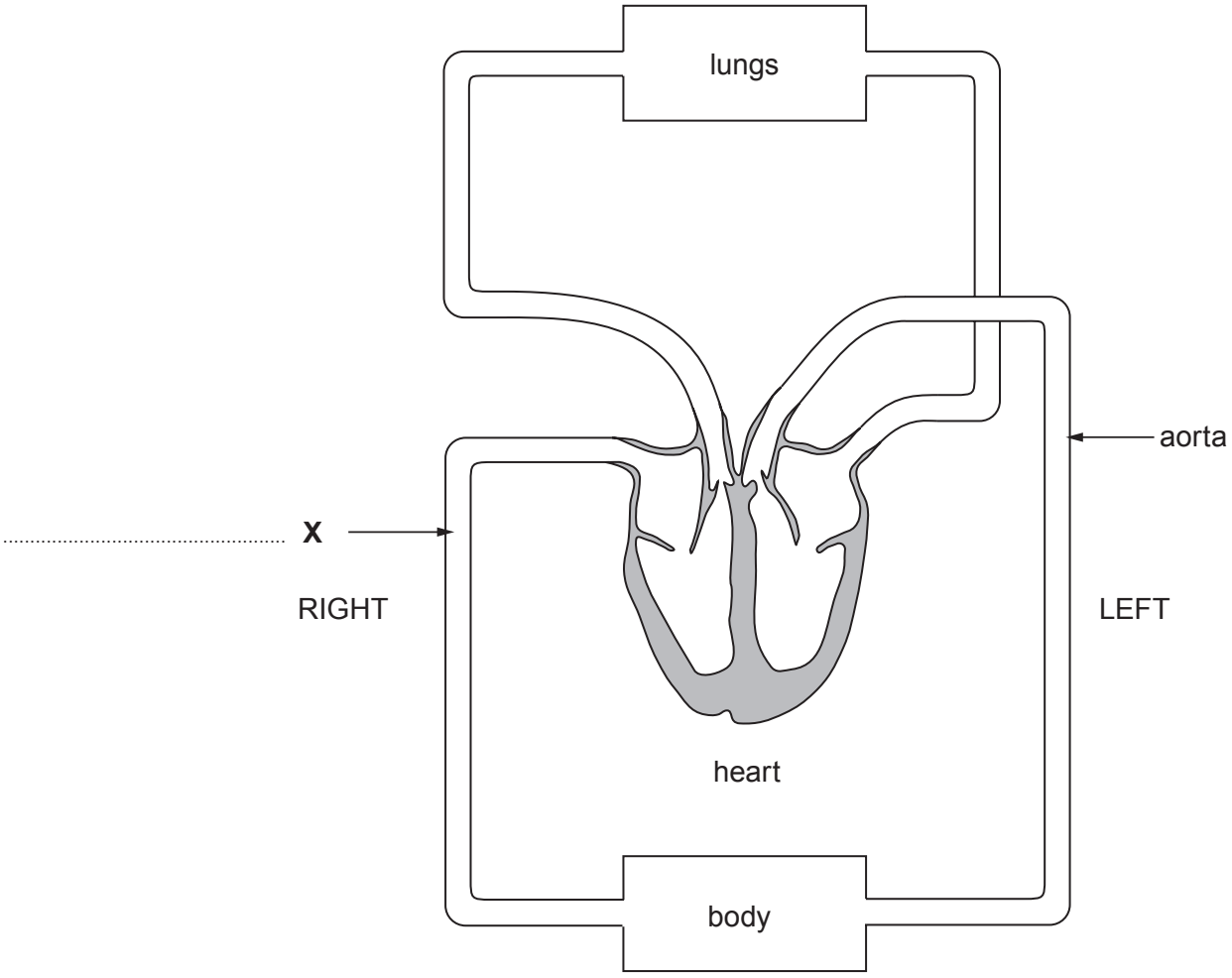
Sugar is used by plant cells in the process of ..... or it is converted to ..... for storage.

(c) State **one** function of the stomata. [1]

.....

Examiner only

2. *(a)* The diagram below shows the circulatory system of the human body. This is called a *double circulation*. Some structures have been labelled.



On the diagram above:

(i) label blood vessel **X**; [1]

(ii) draw arrows on the aorta and blood vessel **X** to show the direction of blood flow. [1]

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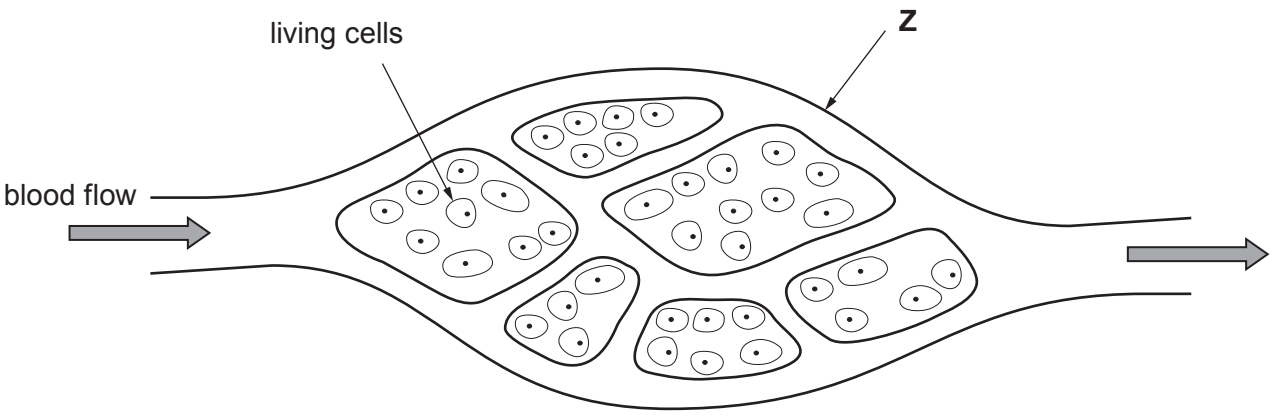
(iii) Complete the table below which shows features of the double circulatory system. [2]

Name of circulation	Pathway of blood flow
Pulmonary circulation	Blood leaves the heart and travels to the ..... .
..... circulation	Blood leaves the heart and travels to the body organs.

(b) Small blood vessels bring blood to the living cells in every organ of the body, as shown in the diagram below.



(i) Name the type of blood vessel labelled **Z**. [1]

.....

(ii) Explain how the structure of blood vessel **Z** allows substances to pass easily into and out of the living cells. [2]

.....

.....

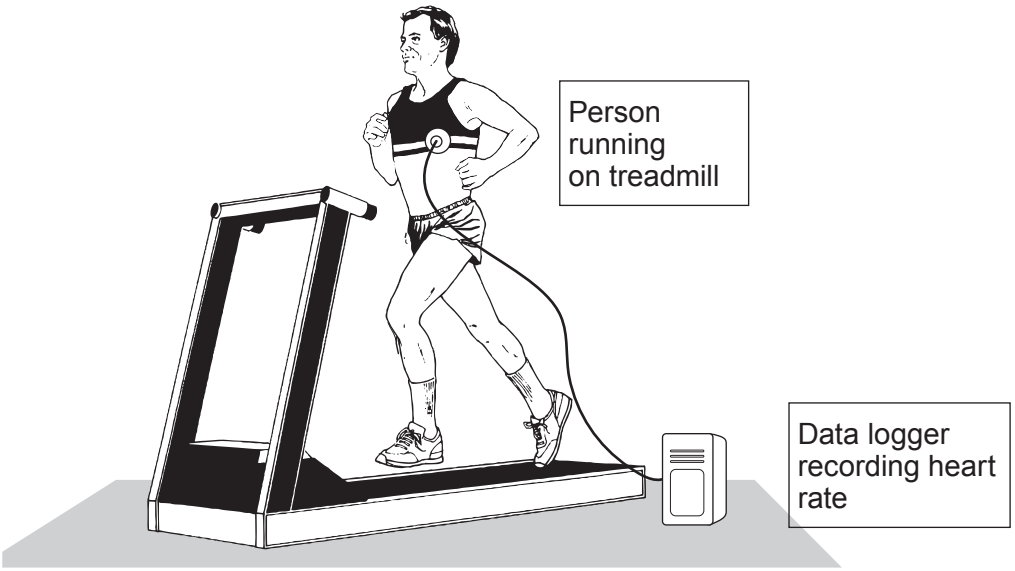
.....

7

Examiner only

3. Mair wanted to investigate the effect of exercise on the heart rate. She recorded the heart rates of two people.

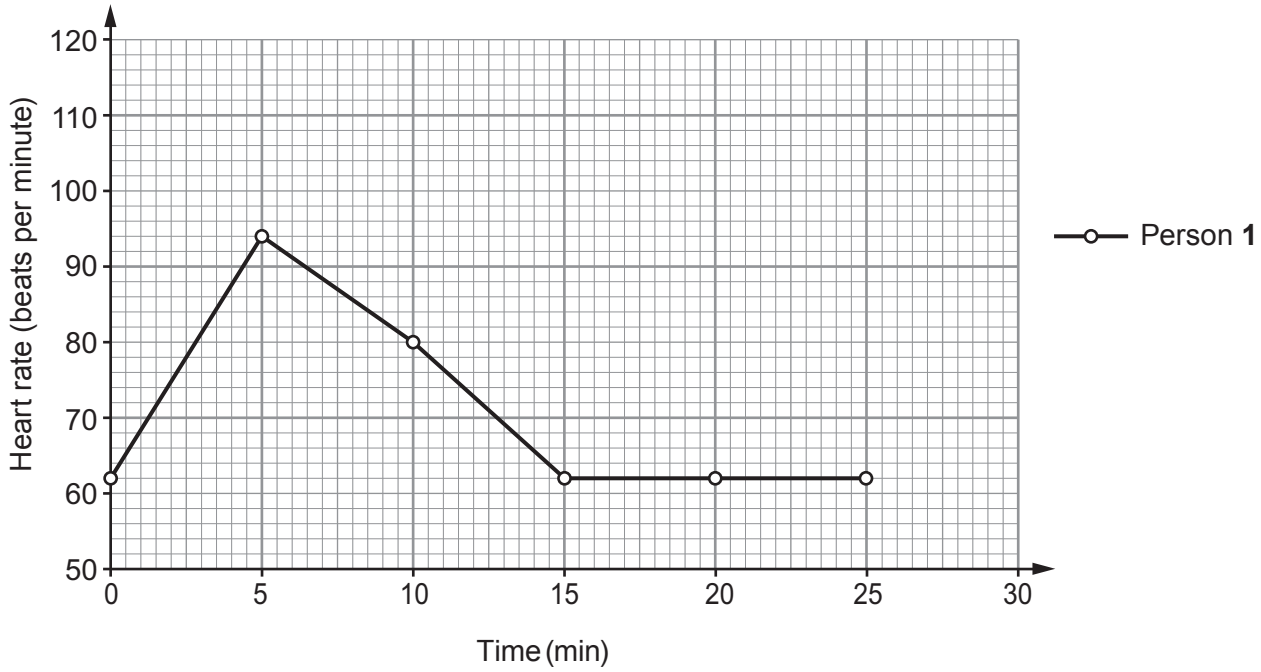
Person	Sex	Age	Sporting activity
1	female	16	regular sport
2	male	15	no sporting activity



She recorded their heart rates before, during and after running. The two people ran for the first five minutes of the investigation. Here are her results.

Time (minutes)	Running or resting	Heart rate (beats per minute – bpm)	
		Person 1	Person 2
0	resting	62	71
5	running	.....	116
10	resting	80	97
15	resting	62	85
20	resting	62	73
25	resting	62	71

Examiner only



(a) Complete the graph by:

(i) plotting the results for Person **2**; [2]

(ii) joining your plots using a ruler. [1]

(b) Using the graph, **complete** the missing value in the table opposite for Person **1**. [1]

(c) From the graph.

(i) Calculate the increase in the heart rate of Person **2** when he runs. [1]

increase in heart rate = ... bpm

(ii) Calculate the change of heart rate in Person **1** between 8 and 12 minutes. [2]

change of heart rate = ... bpm

(iii) State **one** difference between Person **1** and Person **2** in the way their heart rates changed during the investigation. [1]

.....

.....

Examiner only

(d) Mair said that she would use her results to compare the changes in heart rate for males and females. She was told however, that she could not have confidence in her results and that her investigation was not a fair test.

Describe improvements she could make to:

(i) increase confidence; [1]

.....

(ii) make the investigation a fair test. [1]

.....

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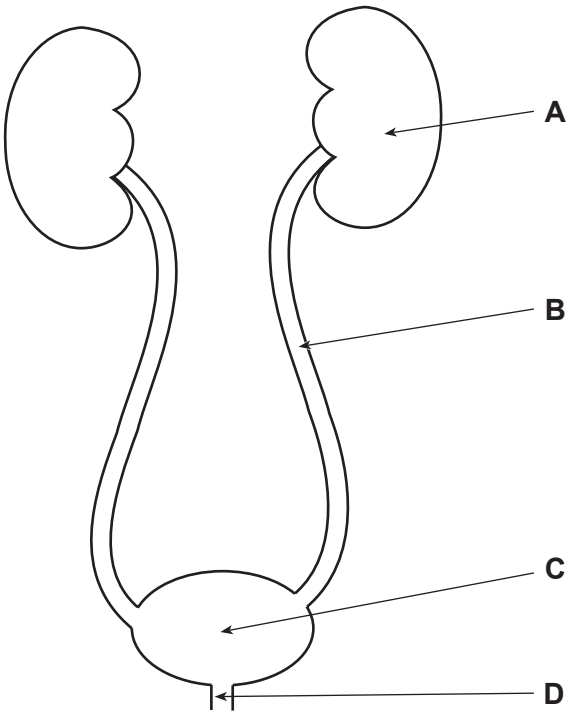
4. The diagram below shows the excretory system of the human body.



(a) From the diagram above, complete the table below. [3]

Letter on diagram	Name of structure	Function
.....	ureter	.....
.....	.....	carries urine out of the body
C	.....	.....

(b) (i) Name **two** waste substances excreted in urine. [1]

....

(ii) State how the concentration of the urine changes when there is too little water in the blood. [1]

.....

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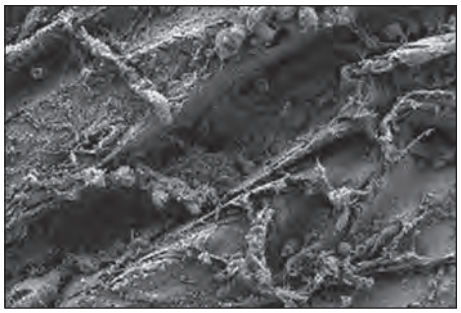
5. Read the following information about pollution.



Bacteria feeding on plastic

The oceans of the world are accumulating large quantities of plastic which cause pollution. In 2001 the North Atlantic Ocean was estimated to have 800 tonnes of plastic. By 2011 the total was 1100 tonnes.

Marine scientists have discovered bacteria which feed on the plastic and break it down. These bacteria belong to the genus *Vibrio*. Bacteria of this genus are usually pathogens.

Other scientists are worried that when bacteria break down plastic, they release harmful chemicals such as phthalates and organic toxins.

(a) Use this information to answer the following questions.

(i) What is the evidence that plastic pollution in the North Atlantic Ocean is increasing? [1]

.....

(ii) Calculate the change in the quantity of plastic, **per year** in the North Atlantic Ocean from 2001 to 2011. (Assume the rate of change is the same each year.) [2]

change in quantity of plastic ..... tonnes per year

(iii) I. Why would *Vibrio* bacteria be of possible use in reducing pollution? [1]

.....

II. State why many *Vibrio* bacteria are dangerous to humans. [1]

.....

Examiner only

(iv) Name a chemical substance produced when bacteria feed on plastic and suggest how this could be harmful to sea life. [2]

.....

.....

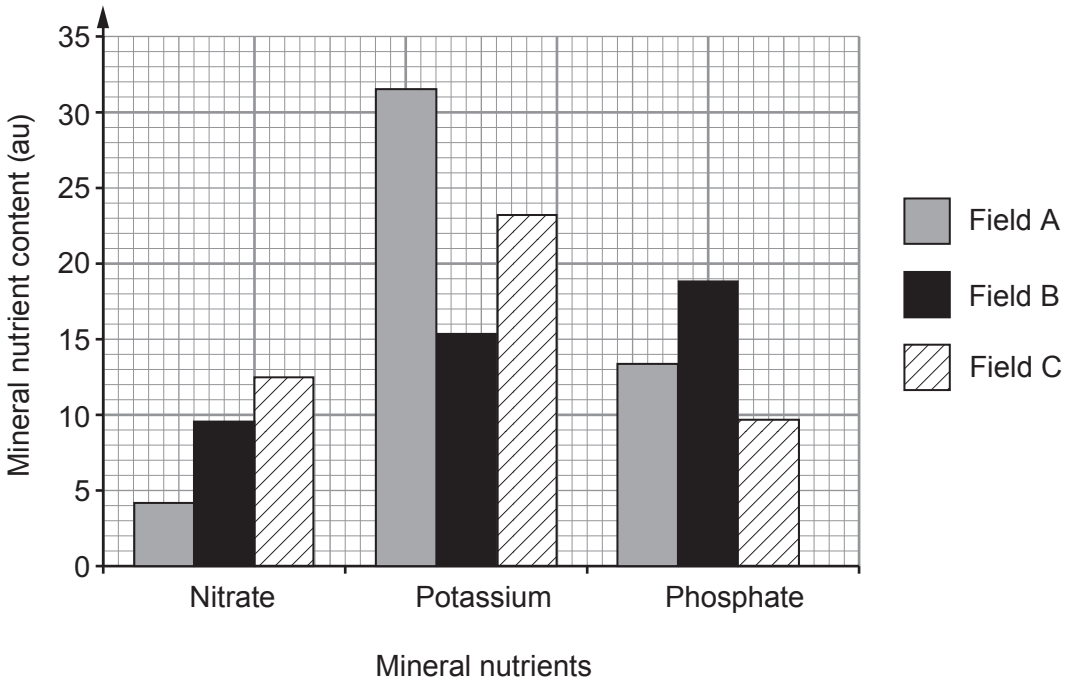
(b) Complete the following sentence about the use of microorganisms. [1]

In the production of biofuels microorganisms ferment sugar to produce

..... .

8

6. A farmer wanted to grow a wheat crop on three of his fields. Before doing so he took soil samples and analysed them for the content of the three mineral nutrients: nitrate, potassium and phosphate. The results he obtained are shown below.



In wheat crops the threshold soil values for nitrate, potassium and phosphate are shown below.

Mineral nutrient	Threshold value (au)
Nitrate	6.0
Potassium	17.0
Phosphate	12.0

Above the threshold value the wheat plants will show healthy growth. Below the value the plants will show signs of mineral nutrient deficiencies.

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(a) Complete the table below to show the **symptoms** of mineral nutrient deficiencies that will be shown by the wheat plants in each of the three fields, A, B and C. [3]

Field	Symptoms of mineral nutrient deficiencies shown by the wheat plants
A	.....
B	.....
C	.....

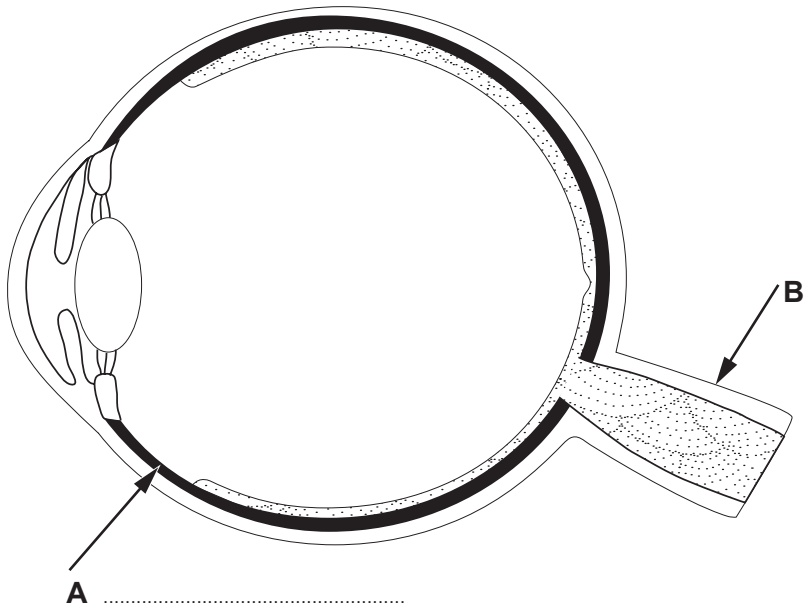
(b) How could the farmer ensure that his wheat plants do not suffer from mineral nutrient deficiencies? [1]

.....

4

Examiner only

7. The diagram below shows a section through the eye.



(a) Label parts **A** and **B** on the diagram. [2]

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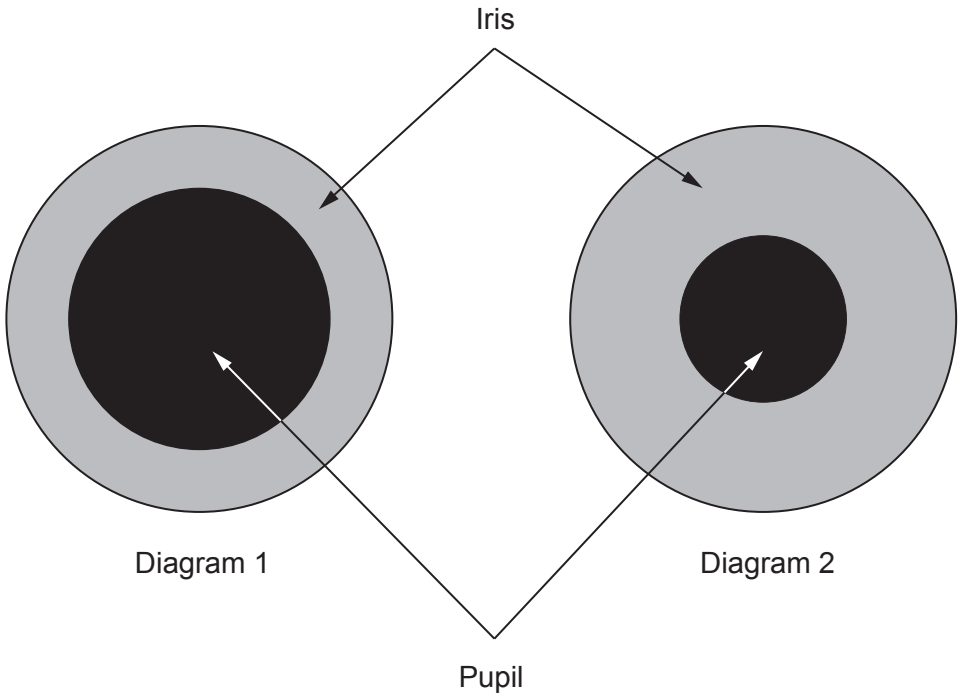
(b) The diagrams below show a front view of the iris in different light intensities.



Explain how the appearance of the iris and pupil change in different light intensities. [4]

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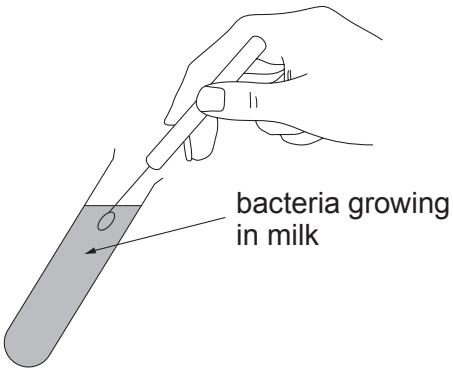
6

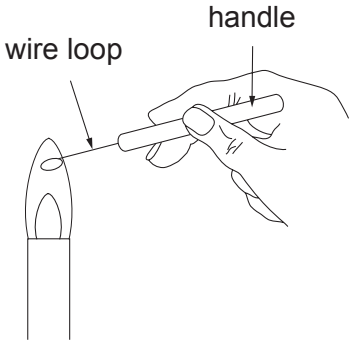
8. *(a)* The series of diagrams below, labelled A – D, show stages in the aseptic techniques involved in inoculating and plating bacteria from milk samples. The stages shown are not in the correct order.

Stage

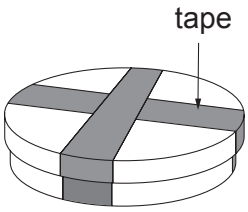
A



B

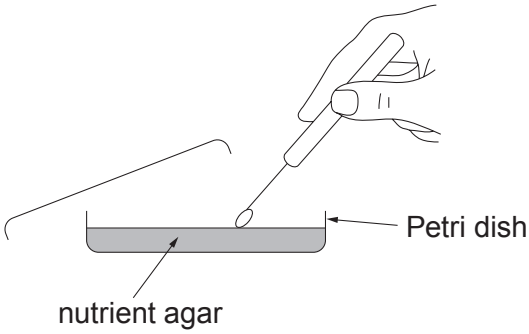


C



Petri dish is placed in an incubator

D



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(i) Place the stages in order by underlining the correct sequence of events. [1]

A C D B

B A D C

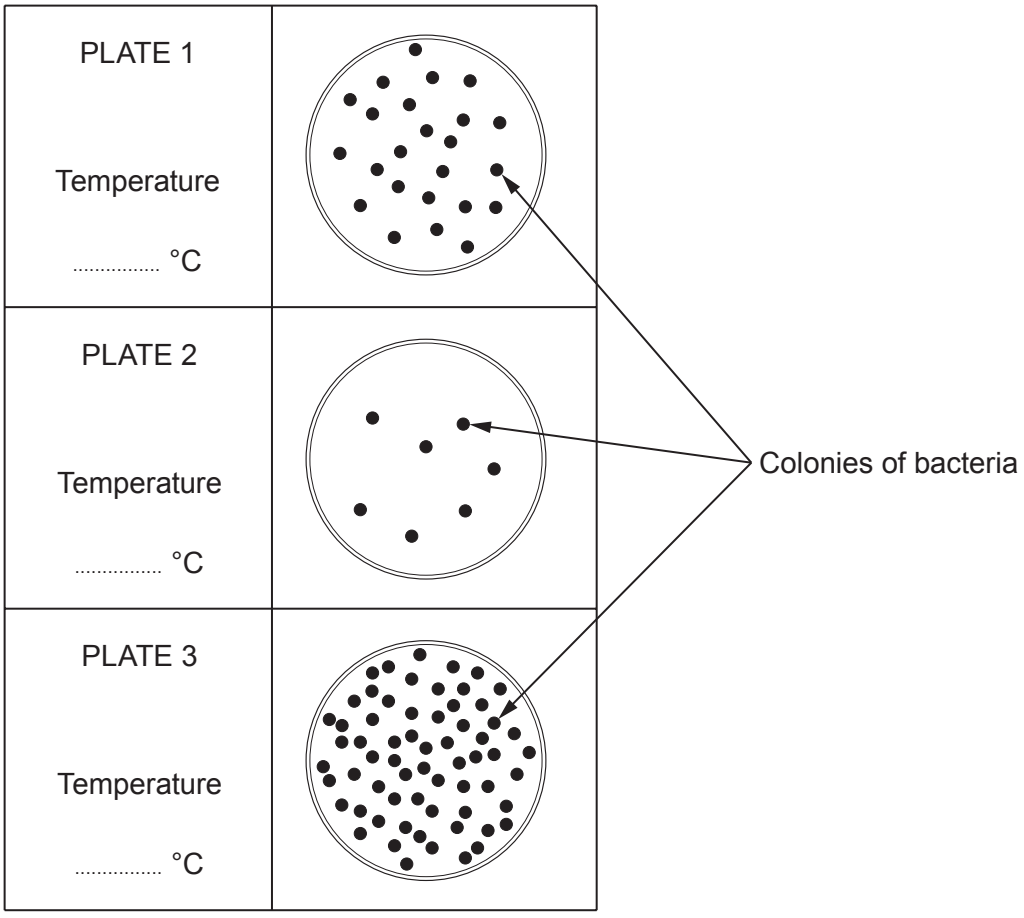
B C D A

D A B C

(ii) Give a reason why the Petri dish is sealed in stage **C**. [1]

.....

(b) Students kept fresh pasteurised milk at three **different** temperatures for five days. At the end of this time they spread milk samples onto sterile agar plates, which were then incubated at 25 °C. After three days incubation the agar plates were examined. The results obtained are shown below.



(i) Using temperatures from the list below. Complete the table above by inserting the most likely temperature at which the milk was kept for the five days **before** the milk samples were spread onto the agar. [3]

10 °C –10 °C 35 °C 4 °C 150 °C

Examiner only

(ii) Each of the colonies of bacteria on the agar plates on page 17 is made up of many thousands of bacteria. How many bacteria were in the original milk sample spread onto plate **2**? [1]

.....

(iii) Explain the possible consequences to this investigation if Stage **B** shown in part *(a)* of this question had not been carried out. [2]

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8

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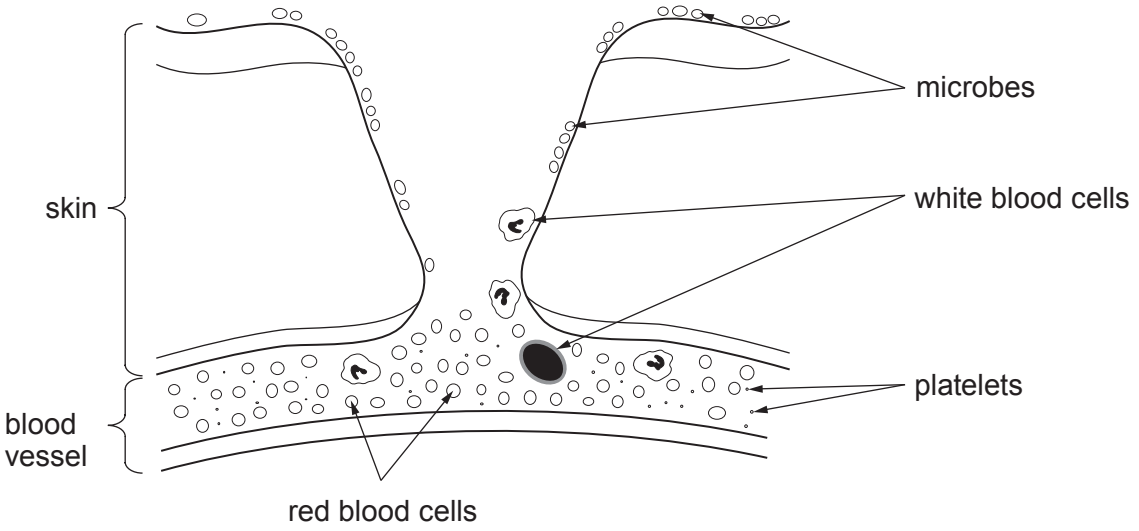
9. The diagram below shows a section through the skin after it has just been cut by a sharp object.



Not drawn to scale

Explain how some of the parts of the blood shown in the diagram can help to protect the body from **infection** at the site of the cut. [6 QWC]

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END OF PAPER

6