WJEC GCSE BIOLOGY

BIOLOGY



EXAM QUESTION PACK

UNIT B3 FOUNDATION TIER 4483 PAPERS

STEMUP

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4483/01

S16-4483-01

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**	

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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**.

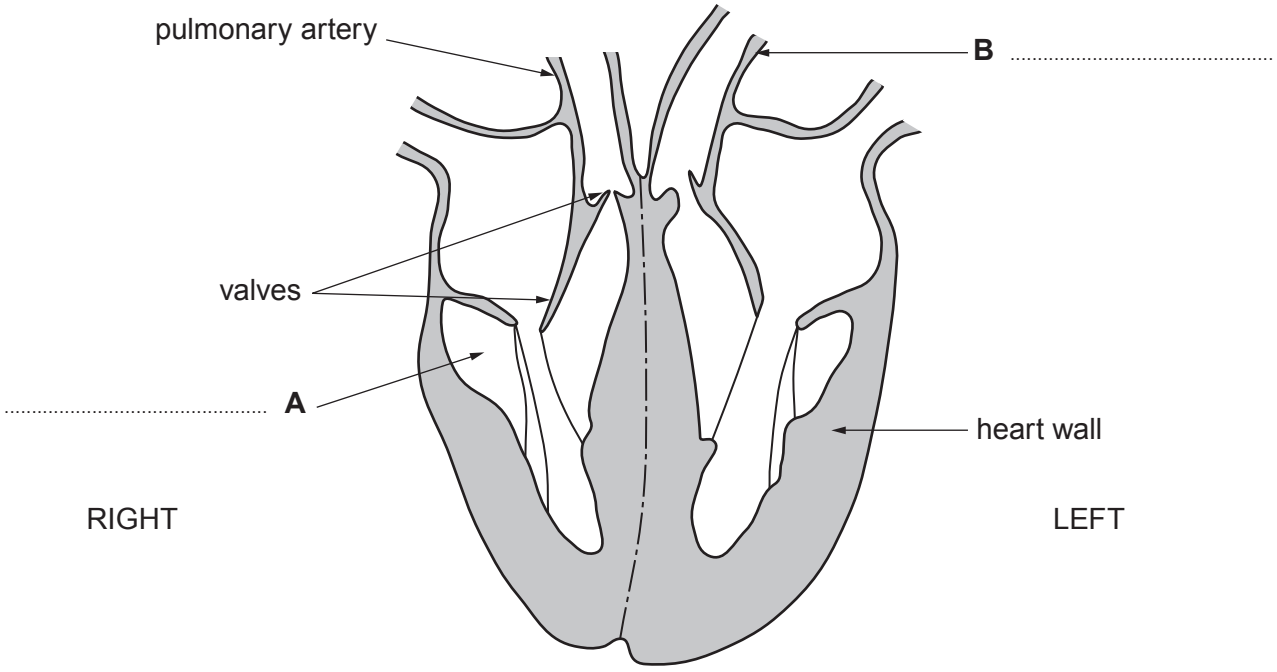
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Answer **all** *questions.*

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 .....

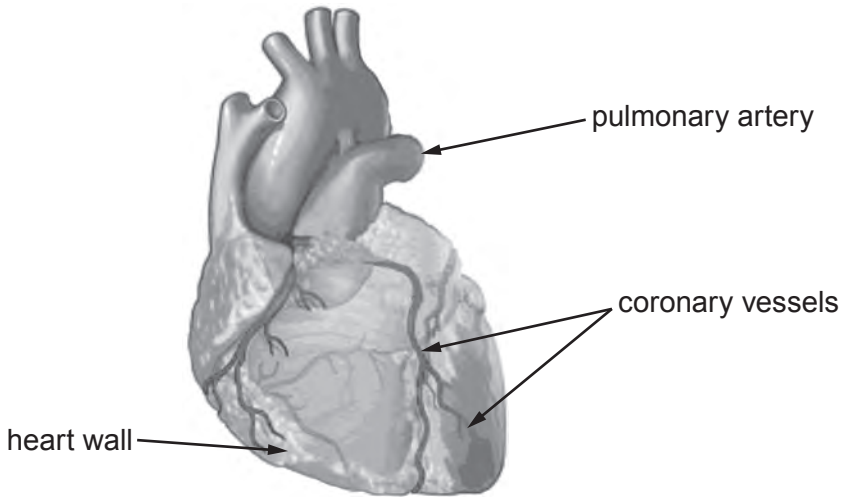
II. the valves .....

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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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7

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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 ..... .

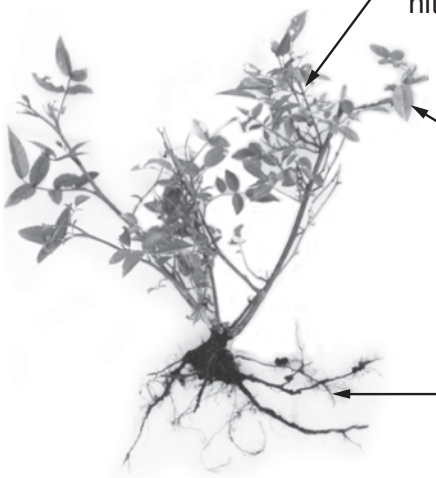
The photographs show two rose plants. Plant **A** is healthy but Plant **B** is deficient in some minerals. Otherwise they were grown in the same conditions.

Plant **A**



healthy growth of leaves, stem and roots

Plant **B**



poor growth of stem caused by lack of nitrates

yellowing leaves caused by lack of .....

poor root growth caused by lack of .....

(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]

.....

5

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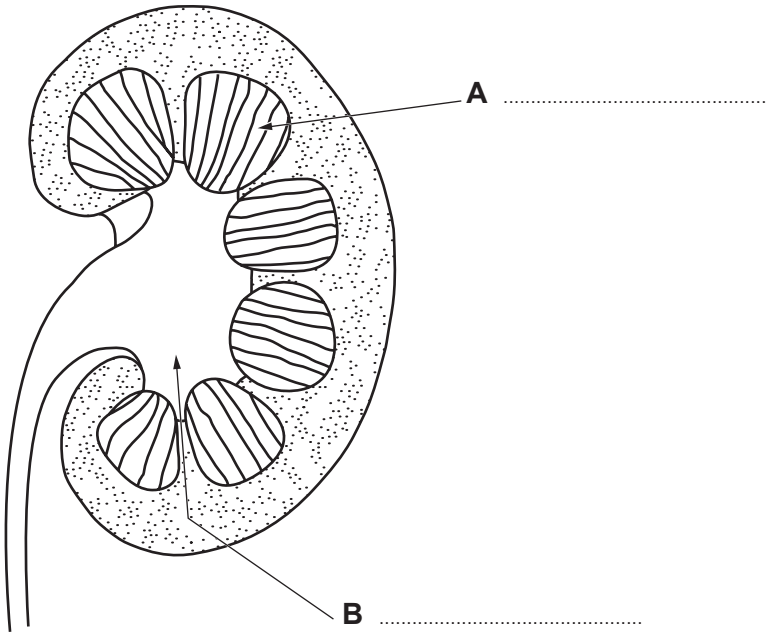
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3. The diagram shows a section through the human kidney. The kidneys remove waste substances from the blood.



(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]

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(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]

.....

.....

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

.....

.....

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9

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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

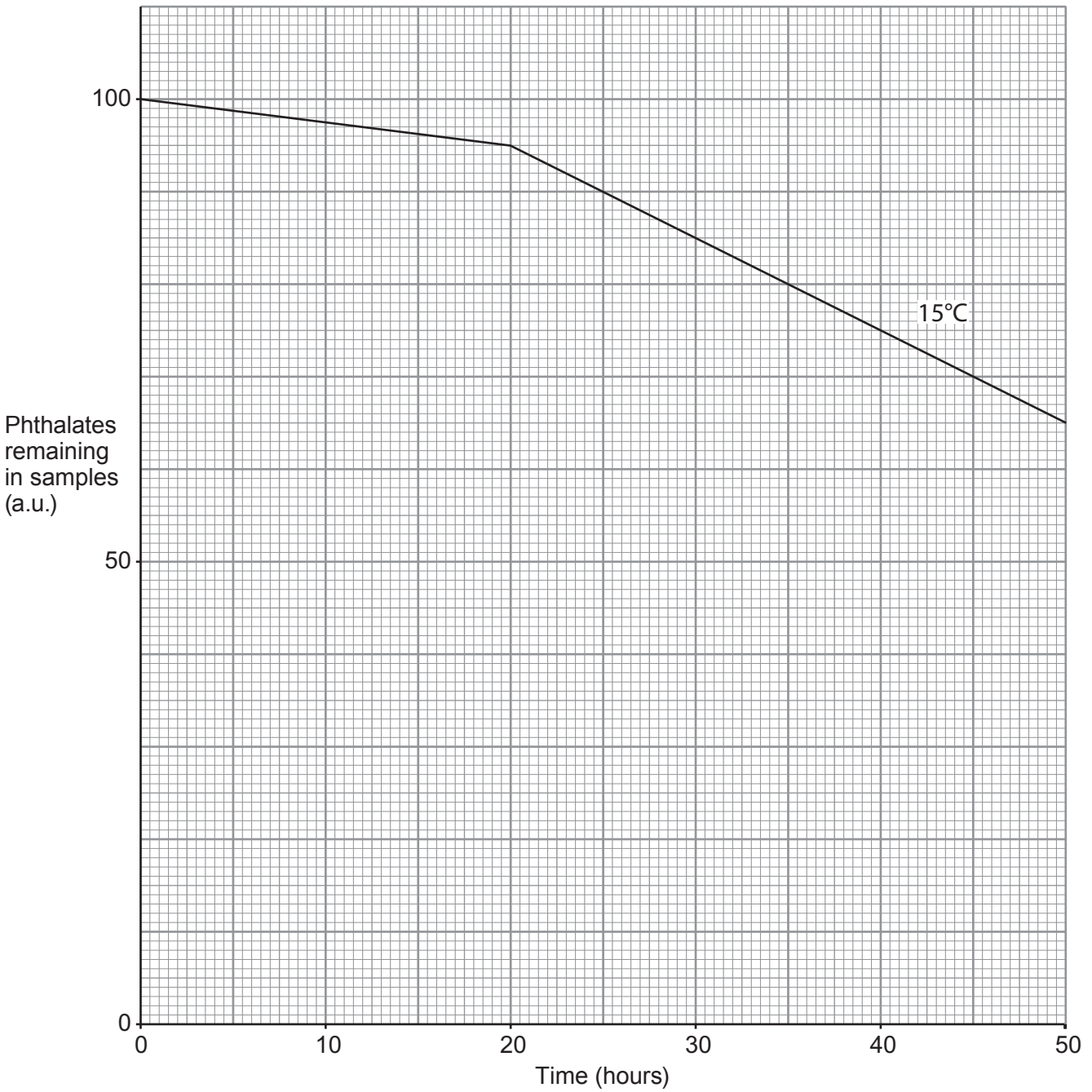
I. plotting the results for 25°C, [2]

II. drawing a line using a ruler to join your plots. [1]

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(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]

.....

.....

.....

(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]

.....

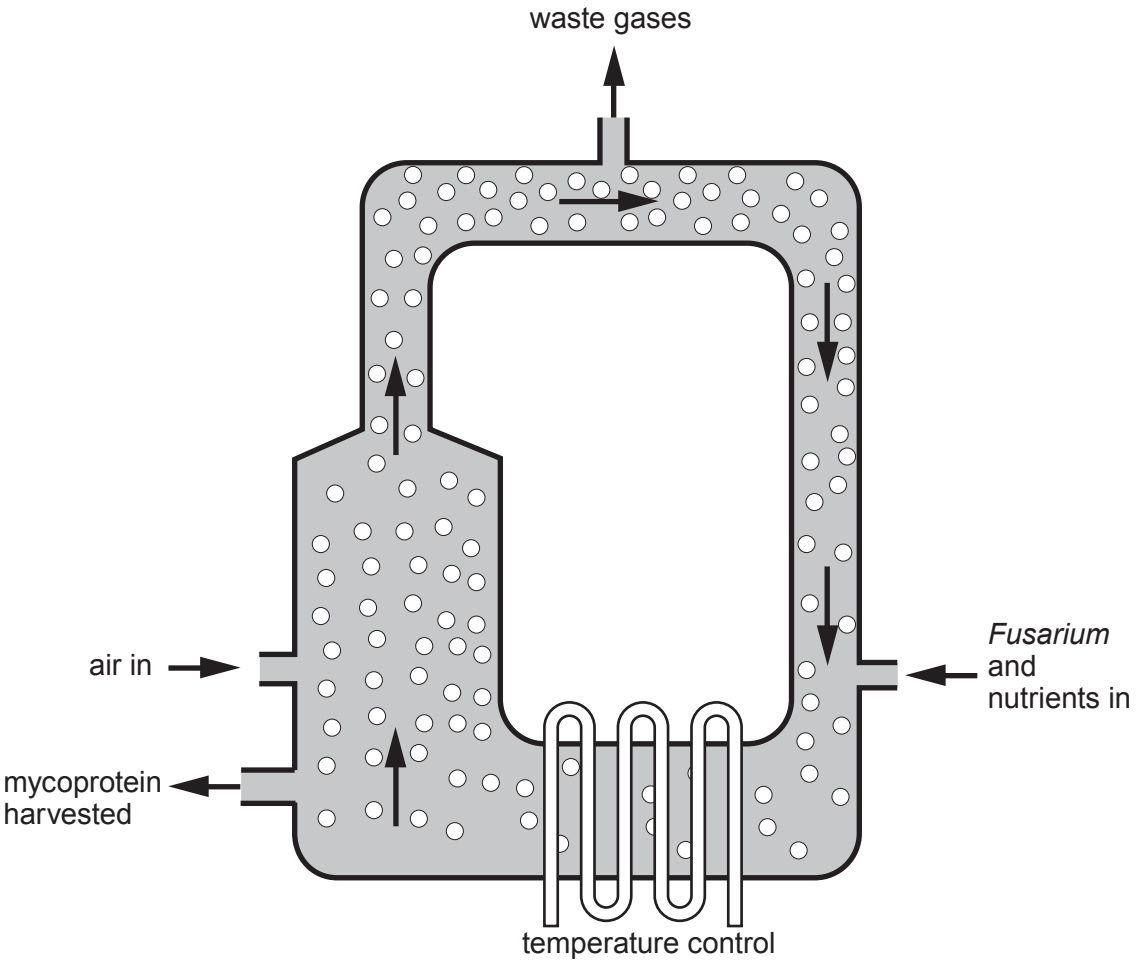
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5. In the 1960s scientists started to look for ways to obtain food from microorganisms to feed the world's growing human population.
They produced a mycoprotein by growing a microscopic fungus called *Fusarium*.
The diagram below shows a fermenter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

.....

.....

.....

(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 200 g mycoburger compared with a 200 g 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 200 g 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]

.....

.....

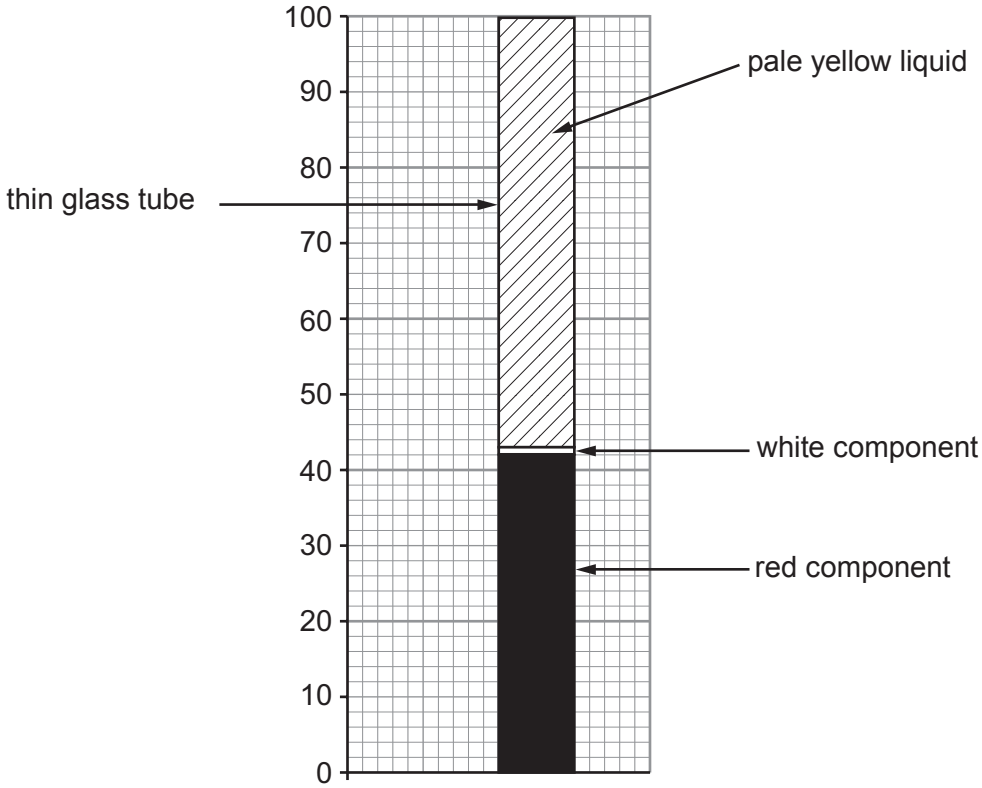
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6. A sample of blood was mixed with an anti-clotting agent. The blood sample was then placed in a thin glass tube and spun at high speed for 5 minutes to separate the blood into its component parts. The appearance of the tube after being spun is shown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



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

.....

.....

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

Pale yellow liquid = ... %

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

(i) white component, [2]

.....

.....

(ii) red component. [2]

.....

.....

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

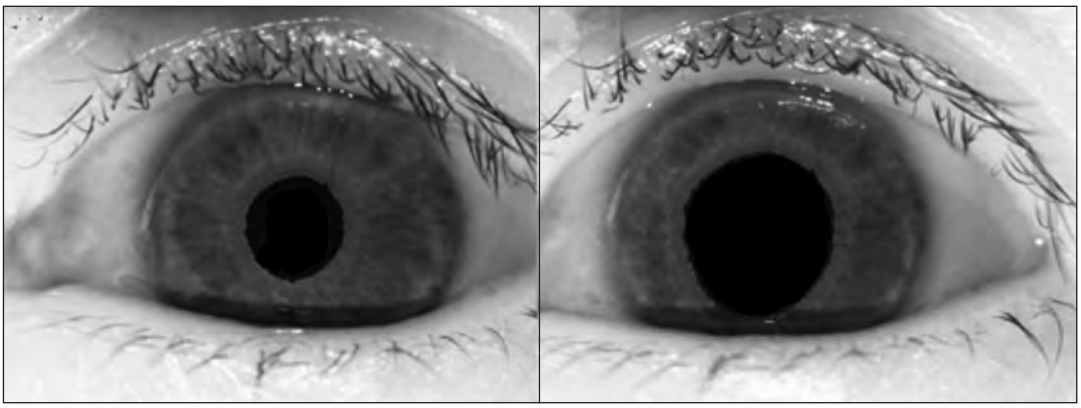
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7. The photograph below shows the eye of a volunteer who was taking part in a medical investigation into the effects of the drug LSD on the nervous system. One of the effects of LSD is that it causes dilation of the pupil of the eye. The pupil can 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]

.....

.....

.....

(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]

.....

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

.....

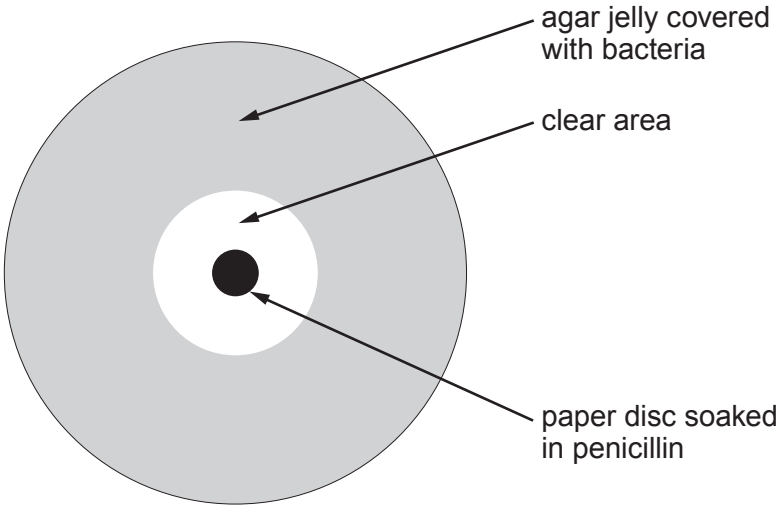
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8. The diagram below shows a Petri dish containing agar jelly. The agar jelly has a very large number of disease causing bacteria growing on it. A paper disc soaked in penicillin was placed in the centre of the agar jelly. After 3 days the Petri dish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



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

.....

.....

.....

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

.....

.....

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

.....

4

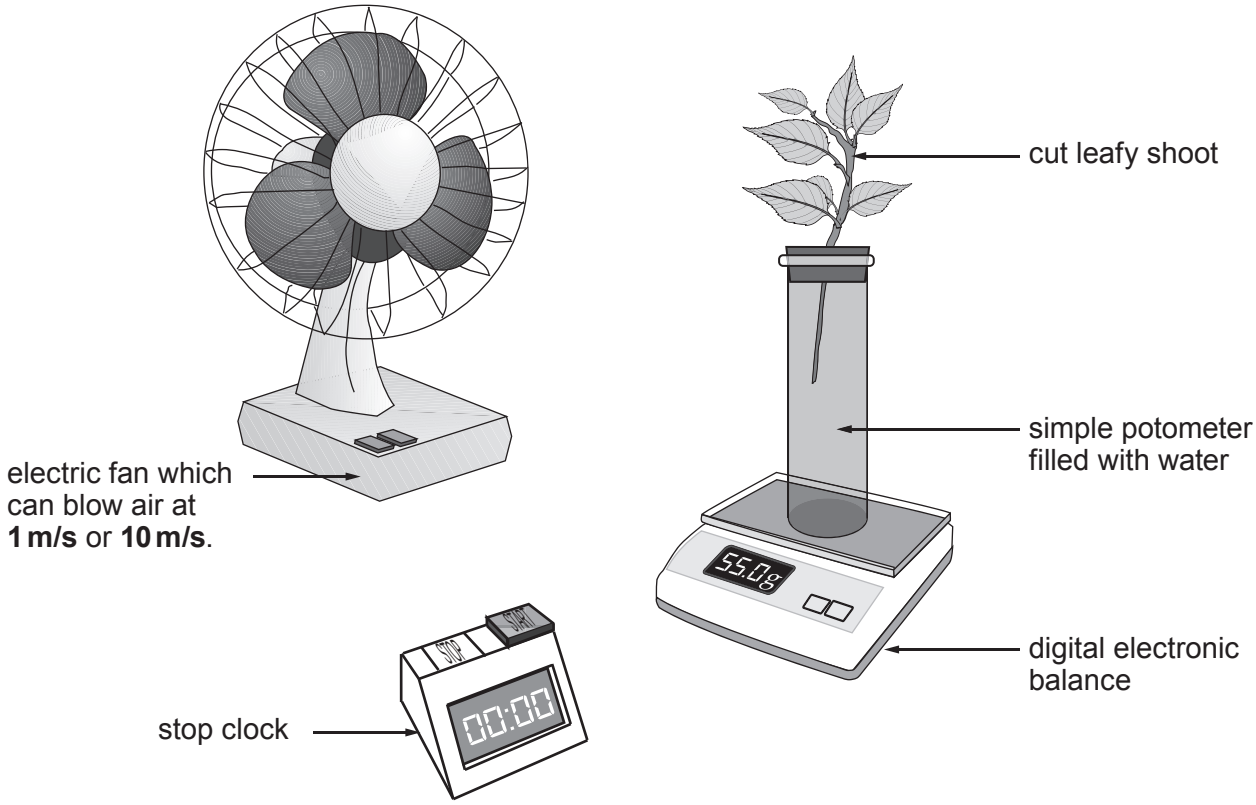
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9. Describe how you would investigate the effect of **two** different wind speeds on the rate of transpiration from a cut leafy shoot using the apparatus shown below.
In your account you must include reference to the results you would expect and the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



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END OF PAPER

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GCSE MARKING SCHEME

SUMMER 2016

SCIENCE – BIOLOGY B3
4483/01/02

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INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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GCSE Biology - B3 Foundation only questions

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
1		(a)	(i)		1 1	**A (**right) ventricle; **B** aorta;			Left ventricle
			(ii)		1	Line showing correct line from pulmonary vein, through atrium and ventricle and out of the aorta;	Arrow from left atrium to left ventricle **and** arrow from left ventricle to aorta	Arrow on right side	
			(iii)	I	1	{Carries/ takes/ pumps} blood(from heart)to lungs;			
				II	1	Prevent backflow (of blood)(or eq. wording);	Stops blood going backwards/ ensures one way flow/ example		
		(b)			2	heart {<u>muscle/ wall</u>}; Supplied with oxygen; OR Removes carbon dioxide; From heart {<u>muscle/wall</u>};	Cardiac muscle		
		Total Mark			7				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
2		(a)			2	Photosynthesis; Water/ soil;			
		(b)	(i)		2	Leaves - Potassium; Roots - phosphate ;			phosphorus
		(c)			1	Phloem;			
		Total Mark			5				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
3		(a)	(i)	I	2	A: Medulla; B: Pelvis;			
				II	1	Arrow touching ureter;	Arrow with no label		
			(ii)	I	1	Urine ;			urea
				II	1	Urea/ salt(s)/ water;	Sodium chloride		
		(b)	(i)		2	**Any two from :** • Permanent solution to problem; • Normal everyday activities/ work normally/; • normal diet; • fewer visits to hospital/ less time in hospital;		cure	Do not need to go to hospital
			(ii)	I	1	**Any one from :** • to increase availability of organs/ • because there is a shortage of organs/ • more people can have a transplant/ • more donors available;			
				II	1	religious /moral/ ethical objections;			Playing god
		Total Mark			9				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
4		(a)			2	32 x 0.75 / 32/4 x 3; <u>24 million</u> tonnes; Incorrect answer but suitable method =1 mark	Correct answer = 2 marks		24 alone if no working shown
		(b)	(i)	I	2	6 points correct = 2 marks 5 points correct = 1 mark 4 or less points correct = 0 marks Check the point plotted at 100 ±½ small square			
				II	1	Line quality;			
			(ii)		2	Higher temp/ at 25°C - faster breakdown/ more breakdown/ less remains; Reason – increased growth of bacteria/ more bacteria/ increased enzyme activity;		It works better at a higher temperature	Reference to heat
		(c)			1	**Any one from:** • More/ free <u>recycling</u> bins/ • Raising awareness/ education/ • refunds /rewards for recycling/ • charge for {landfill waste/ not recycling};			buying less plastic / use paper cups
		Total Mark			8				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
5		(a)	(i)		2	• No <u>other</u> microorganisms present; **Any one from:** • Which could {contaminate /change} the mycoprotein/ product}/ • prevent contamination;	Other microbes/ bacteria quorn	pathogens	
			(ii)		1	**Any one from:** • Predictable product/ • minimum space/ • {control/ monitor} conditions/ • other plausible reason- cheapness/ speed/ efficient;	Can make use of waste (materials)		
		(b)	(i)		1	75/25 = 3;			
			(ii)		2	36/200 x 100 or 18/100 x 100; 18%; Incorrect answer but suitable method =1 mark	Correct answer = 2 marks		
			(iii)		1	Low(er) salt **and** no cholesterol for **1 mark**		Reference to figures	
		Total Mark			7				

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Biology 3 Standard demand questions

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
6	**1**	(a)	(i)		1 1	Plasma; **Any one from:** transport of • carbon dioxide/ • soluble food/ soluble nutrients/ food molecules/ food particles/ vitamins/ minerals/ salt(s) • urea/ • hormones/ • heat;	Water/ named soluble nutrient	Food Waste Substances Blood cells	oxygen
			(ii)		1	57%;	57.0-57.5%		
		(b)	(i)		1 1	white blood cells; **Any one from:** • {defence/ protect} against {disease/ bacteria/ virus/ pathogen/ microbes} • produce antibodies/ • produce antitoxins/ • engulf bacteria/ virus/ pathogen • fight infection;	Named white blood cell Fight against disease	Provides immunity	Fight illness
			(ii)		1 1	red blood cells; transport of oxygen;		haemoglobin	
		(c)			1	Platelets;			
		Total Mark			8				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
7	**2**	(a)	(i)		2	<u>diameter of large pupil – diameter of small pupil</u> x 100 diameter of large pupil Accept any of the following for 2 marks 20 & 14 = 42.9 21 & 14 = 50.0 20 & 13 = 53.8 22 & 14 = 57.1 21 & 13 = 61.5 22 & 13 = 69.2 Incorrect answer but measurements of pupil correct = 1 mark	Correct answer = 2 marks		
			(ii)		1 1	(Nerve) impulses (from the brain); do not get to the {<u>iris</u> <u>muscles</u>/ <u>effector</u> in the <u>iris</u>}; 2nd mark linked to 1st mark	Electrical signals		Messages/ commands/ signals
		(b)	(i)		1	Retina;			
			(ii)		1	fast/automatic/ involuntary;	Not under conscious control/ do not have to think about it		Unconscious/ subconscious / instant
		Total Mark			6				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
8	**3**	(a)			1 1	Penicillin {diffused/spread / comes/ dispersed} out; it <u>killed/ destroyed</u> bacteria;			Inhibits growth
		(b)			1	{MRSA/it} is resistant to {penicillin/ antibiotics};			immune
		(c)			1	Antibiotics;			
		Total Mark			4				

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Question Number			
FT	HT	Mark	Answer
9	**4**	6 QWC	*Indicative content:* • Record initial mass/ weight of potometer • Blow air travelling at 1m/s onto cut leafy shoot • For set time eg 5 minutes • Record mass/ weight of potometer • Repeat for air speed at 10m/s • Expected result - potometer would lose more mass/ weight at 10m/s • Conclusion: greater the air/wind speed the greater the rate of transpiration **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.
Total Mark		6	

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Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
	5	(a)	(i)		1	The higher the temperature (the meat is stored at) the more {bacteria/(bacterial) colonies};	ORA Bacteria reproduce faster at higher temperatures		
			(ii)	I	1	8;			
				II	1 1	At -20°C bacteria do not multiply/reproduce/ grow; therefore meat is preserved/doesn't go off;	Meat remains fresh		Bacteria killed/ meat lasts longer
		(b)	(i)		1	Any one from: • To prevent contamination of the {agar/ jelly}/ • to make sure that the bacteria growing on the {agar/ jelly} came from the meat only (OWTTE);			Reference to 8 colonies
			(ii)		1	Any one from • Flaming of wire loop/ heat in Bunsen • sterilisation of agar/sterilisation of equipment/ autoclave equipment/ • correct sealing of Petri dish/ • disinfect the benches/ • any other relevant point;		Wire loop sterilised	
		Total Mark			6				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	6	(a)			2	$\frac{125}{700} \times \frac{100}{1}$; Answer = 18 = 2 marks Answer = 17.85/ 17.9 = 1 mark			
		(b)	(i)		2	Increases (blood) pressure; **Any one from:** For filtration/ ultrafiltration/ forcing molecules {through the membrane/ out of the blood} (or description of);			
			(ii)		4	1. <u>Increase</u> in ADH; 2. Causes an increase in (re)absorption of water; 3. From tubules/ from named part of nephron/ into the blood/ from Z; 4. Causes increase in concentration of urine/ less water excreted/ blood less concentrated/ small volume of urine/ conserve water/ less urine/ description of water regulation; 3rd mark linked to 2nd mark			
		Total Mark			8				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	7	(a)	(i)		1	The dye;			
			(ii)		1	Urea (solution);			
		(b)			2	Tubing is permeable to urea/ urea passed through tubing/ urea passed into the dye; dye does not pass through tubing;		Chemical does not pass through tubing	
		Total Mark			4				

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Question Number								
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	8				5	Stage 1 Vaccine/ vaccination; Stage 2 Antigens; Stage 3 lymphocyte/ memory cells; Stage 4 Mitosis; correct spelling Stage 5 Antibodies;			
		Total Mark			5				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	9	(a)			4	**A** coordinator / spinal cord; **B** sensory neurone/ sensory nerve cell; **C** motor neurone/ motor nerve cell; **D** relay neurone / interneurone / intermediate neurone / internuncial neurone/ interconnecting neurone/ connecting neurone;			CNS/ spinal column/ spine
		(b)			1	At **B** arrow points towards relay At **C** arrow points away from relay (**Both correct for 1 mark**)			
		(c)			2	**XX** cannot {feel/ detect} {stimulus / pain / heat}; **YY** cannot use {muscle / effector}/ {muscle/ effector} will not work/ muscle will not {contract/move};		Prevents impulse getting to the spinal cord/ muscle	Do not feel {anything/ it}
		Total Mark			7				

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Question Number			
FT	HT	Mark	Answer
	10	6 QWC	***Indicative Content*** **blood vessels entering the body organs** • high oxygen concentration from the lungs. • via the pulmonary vein, heart, aorta • carbon dioxide concentration is low • because most has left from the lungs. **blood vessels leaving the body organs** • low concentration of oxygen • because most has passed into the cells of the body organs • for respiration. • high concentration of carbon dioxide • due to it being produced by the cells and moving out during respiration **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.
Total Mark		6	

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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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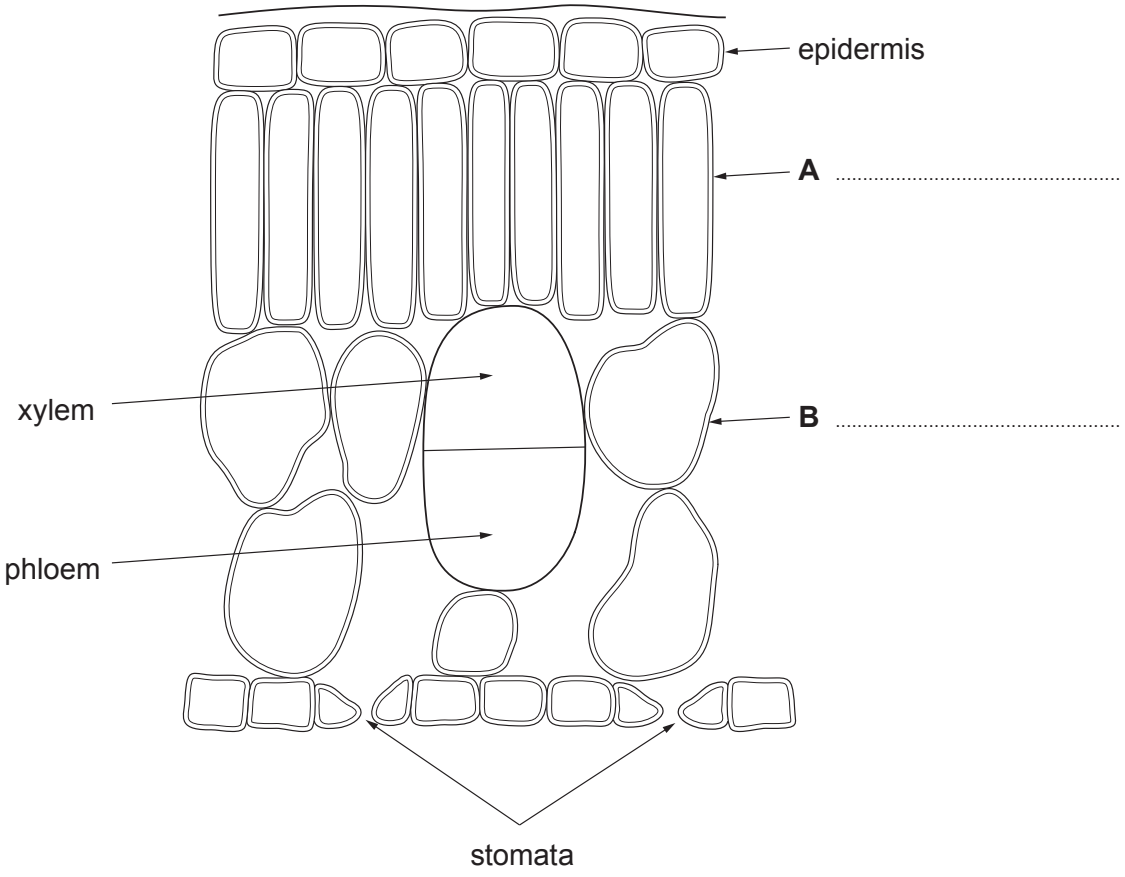
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Answer **all** *questions.*

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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]

.....

4483 010003

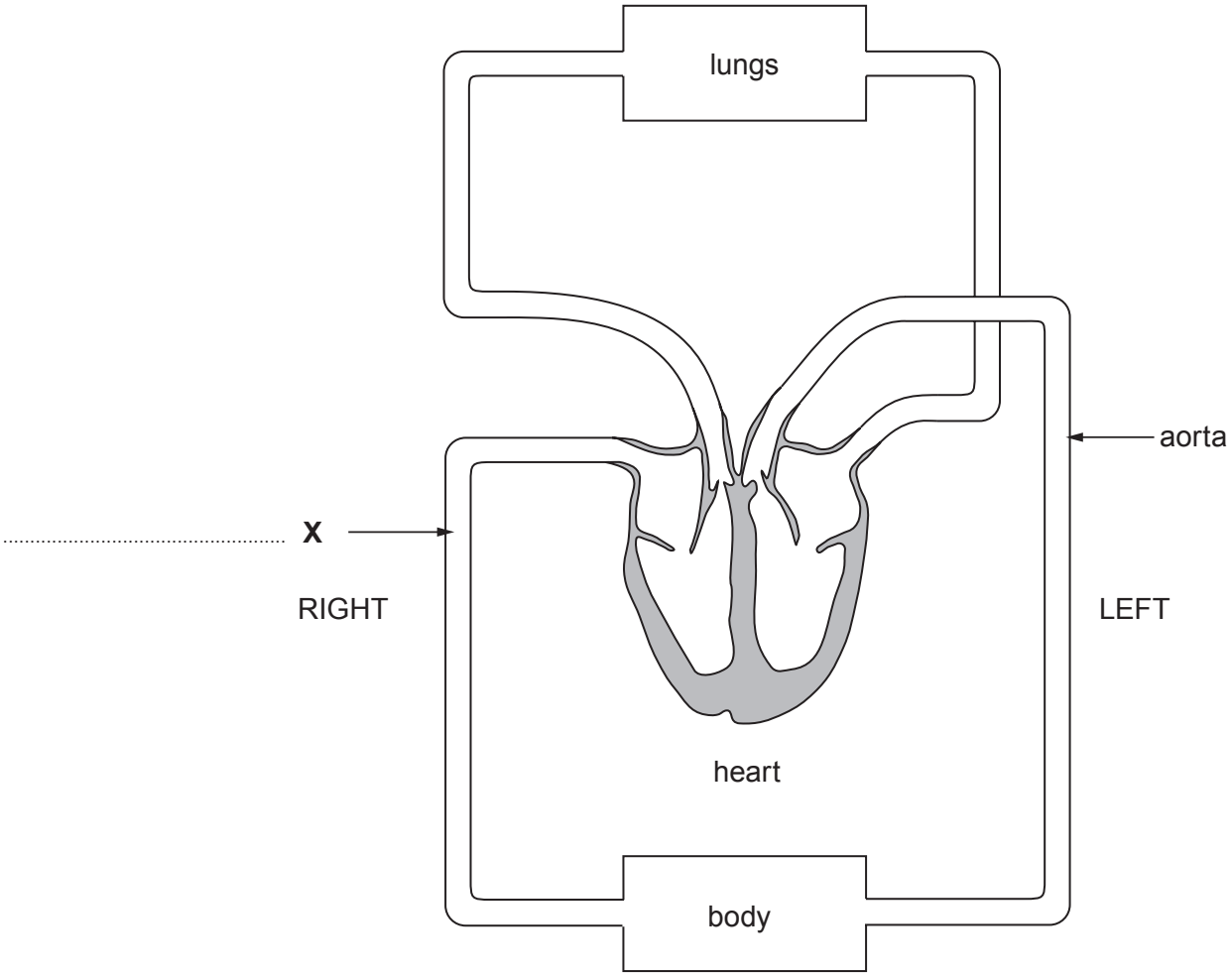
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2. *(a)* The diagram below shows the circulatory system of the human body. This is called a *double circulation*. Some structures have been labelled.



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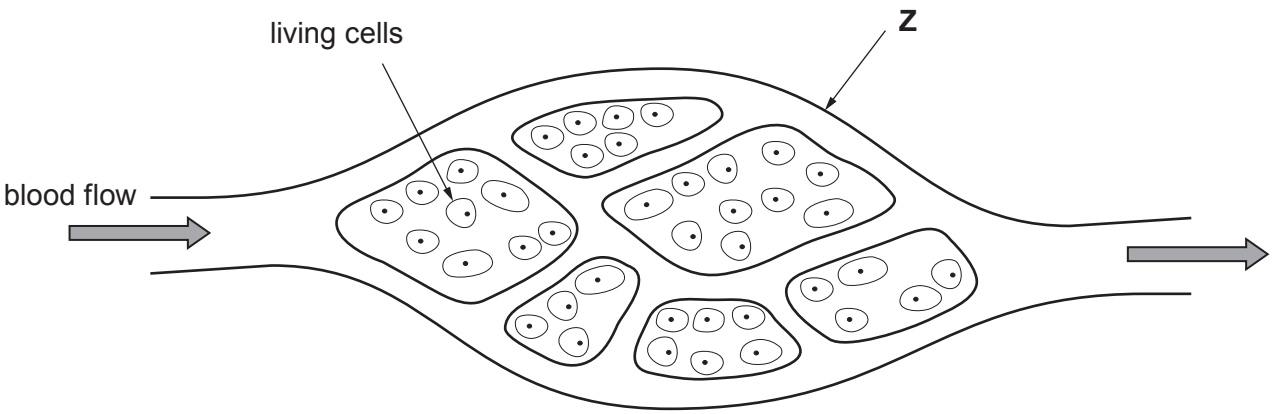
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(iii) Complete the table below which shows features of the double circulatory system. [2]

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]

.....

.....

.....

4483 010005

7

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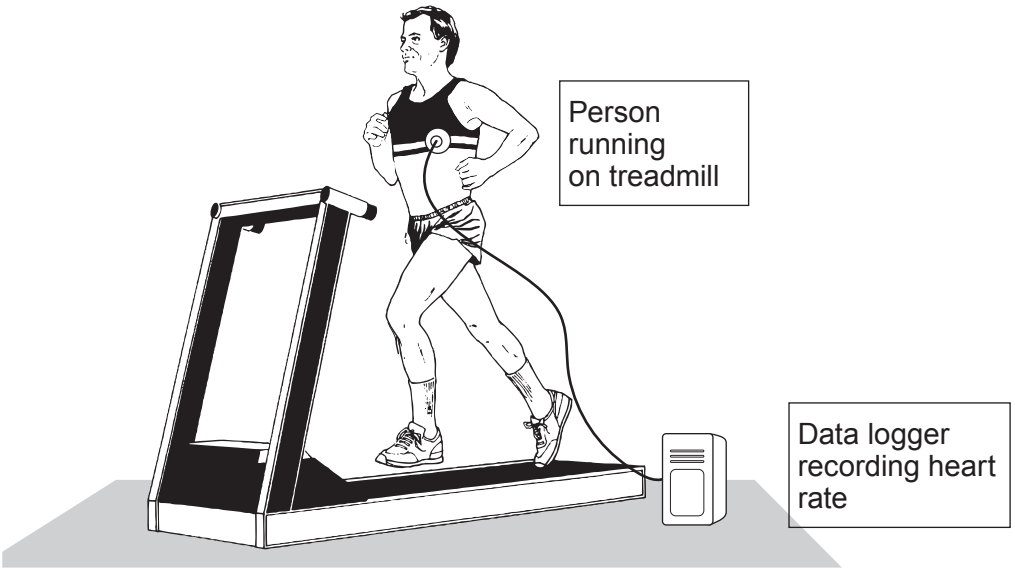
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3. Mair wanted to investigate the effect of exercise on the heart rate. She recorded the heart rates of two people.

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



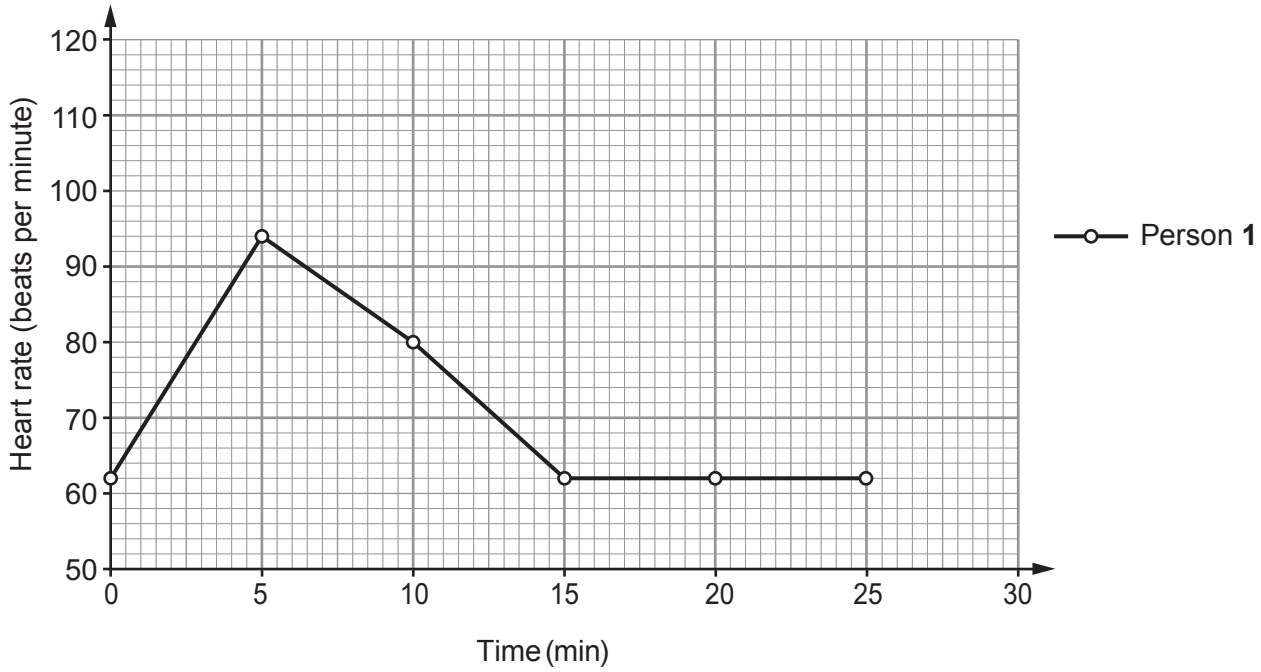
She recorded their heart rates before, during and after running. The two people ran for the first five minutes of the investigation. Here are her results.

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

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(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]

.....

.....

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(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]

.....

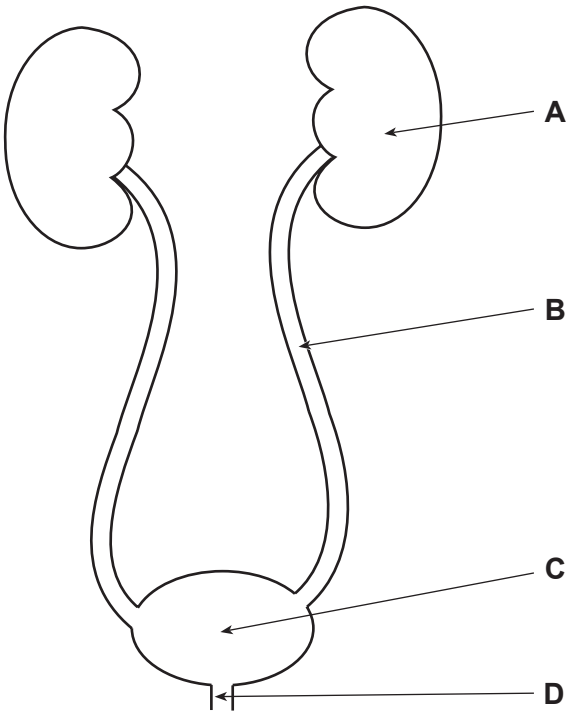
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4. The diagram below shows the excretory system of the human body.



(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]

.....

5

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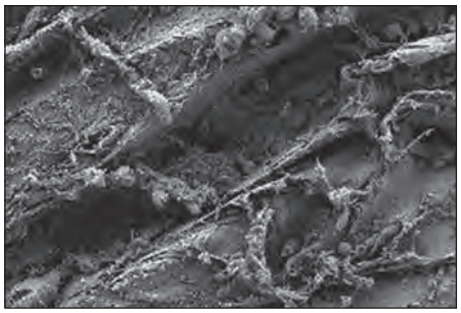
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4483 010009

Examiner only

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]

.....

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(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

..... .

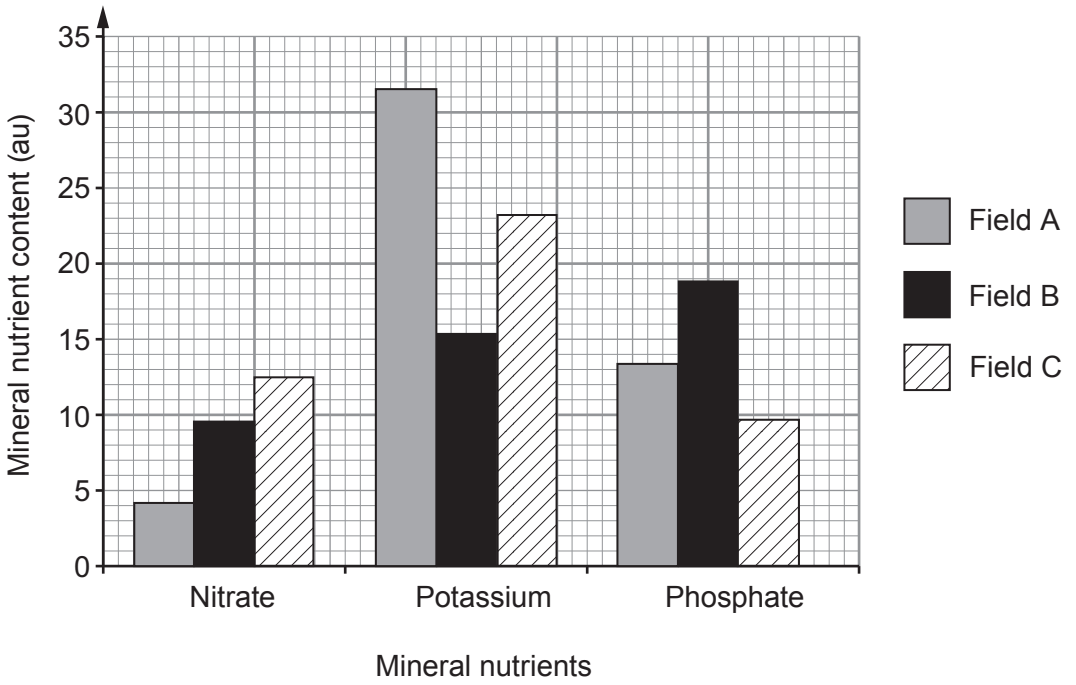
8

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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

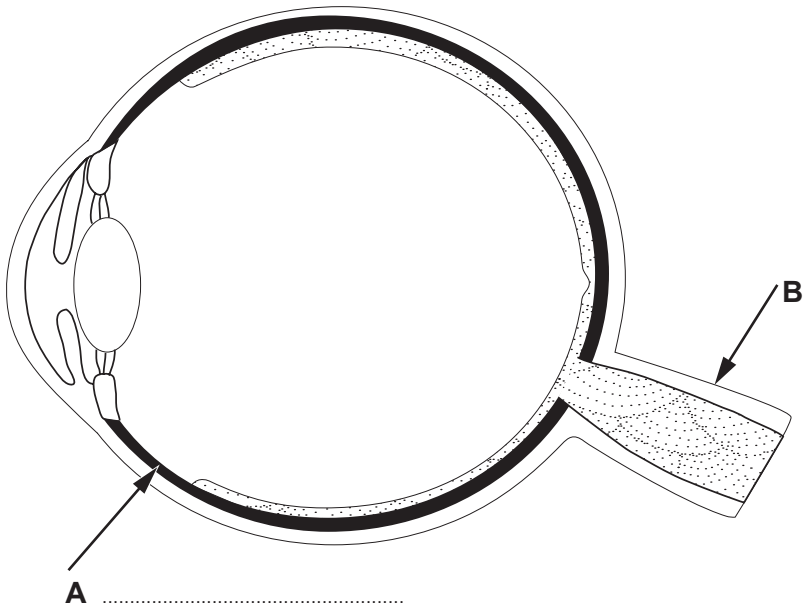
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7. The diagram below shows a section through the eye.



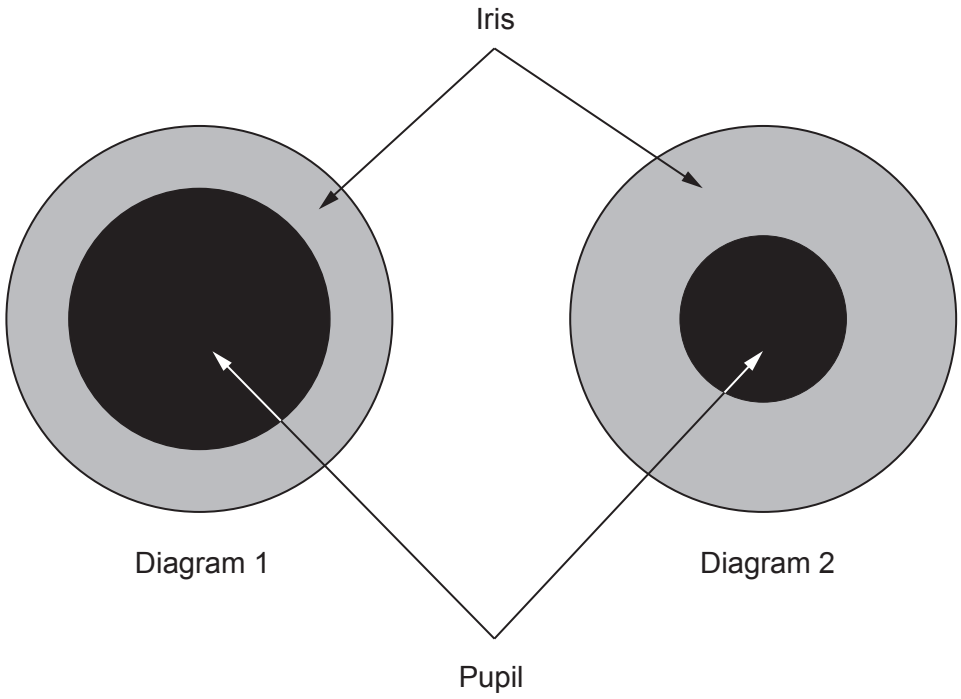
(a) Label parts **A** and **B** on the diagram. [2]

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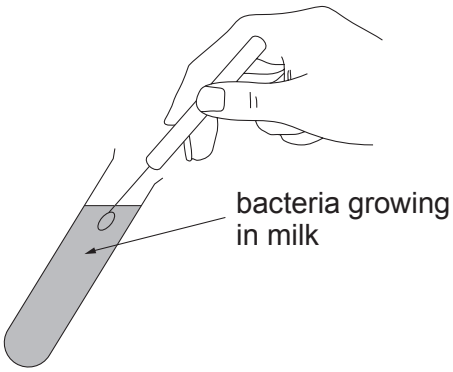
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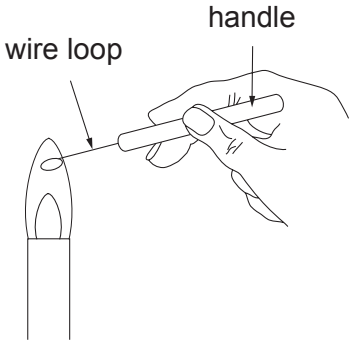
8. *(a)* The series of diagrams below, labelled A – D, show stages in the aseptic techniques involved in inoculating and plating bacteria from milk samples. The stages shown are not in the correct order.

Stage

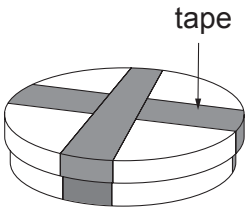
A



B

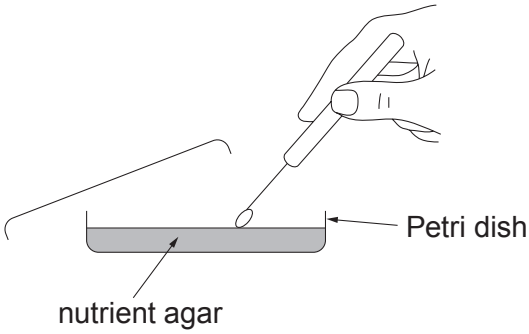


C



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

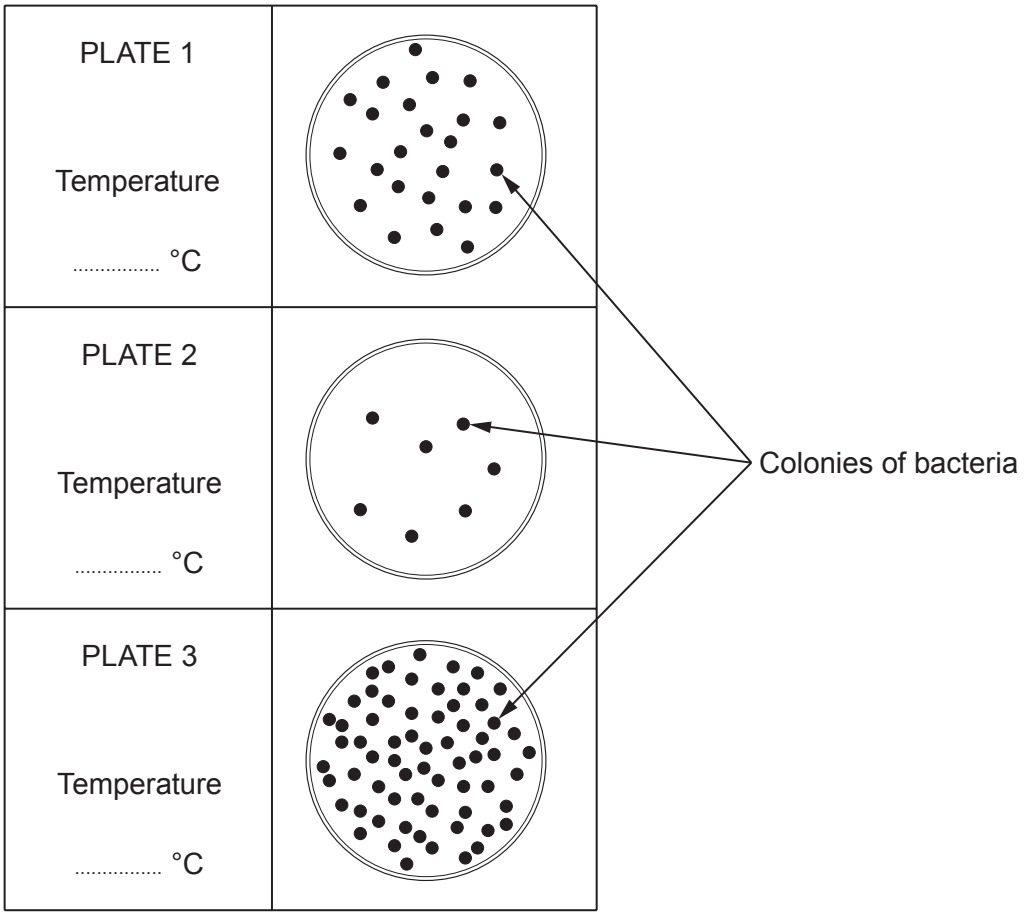
B C D A

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

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(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]

.....

.....

.....

.....

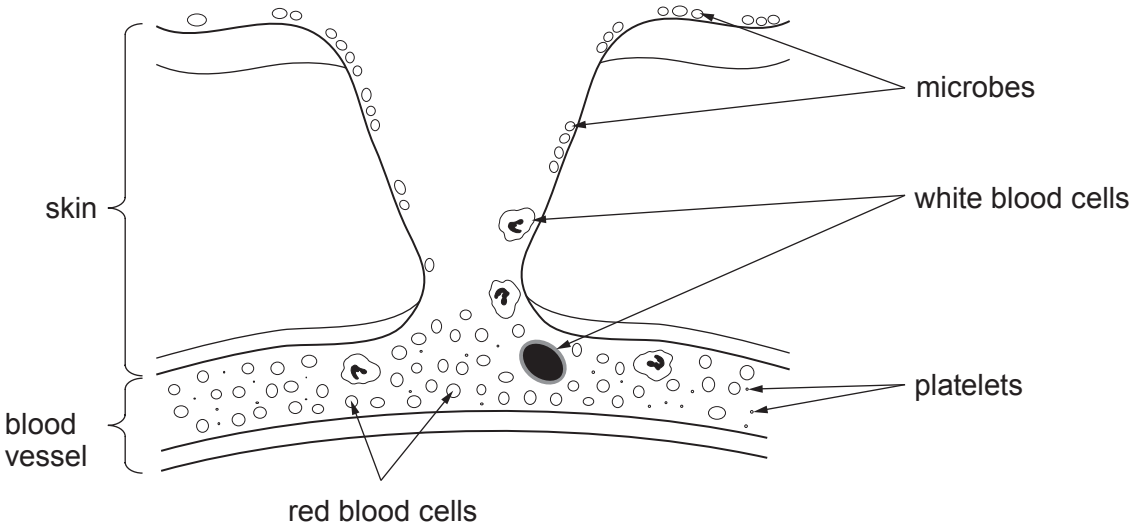
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9. The diagram below shows a section through the skin after it has just been cut by a sharp object.



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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6

END OF PAPER

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GCSE MARKING SCHEME

SCIENCE - BIOLOGY

SUMMER 2015

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2015 examination in GCSE SCIENCE - BIOLOGY. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

	Page
B1	1
B2	19
B3	34

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
1		(a)			2	palisade; spongy;			sponge
		(b)	i		1	photosynthesis;			
			ii		1	carries sugar(s);	carries sucrose		carries glucose
			iii		1	respiration, starch;			
		(c)			1	<u>controls</u> {loss of water /transpiration}/ allows {gases/correctly named gas} to pass in or out/ allows gas exchange;	CO_2		Air CO^2
		Total Mark			6				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
2		*(a)*	i		1	vena cava;	caval vein		
			ii		1	**two** correct arrows drawn; aorta arrow points to the body **X** arrow points to the heart;			
			iii		2	lungs; systemic;			systematic
		(b)	i		1	capillary;	capillaries		
			ii		2	walls are thin; so allow for diffusion;	walls one cell thick		
		Total Mark			7				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
3		(a)	i ii		2 1	plots correct ½ small square tolerance all correct = 2 marks 1 error = 1 mark >1 error = 0 marks Line;			
		(b)			1	94;			
		(c)	i		1	45 [bpm];			
			ii		2	(86/ 85) – (73/ 72) = 14/ 13/ 12; Correct answer = 2 marks Correct readings = 1 mark			
			iii		1	Person1 – returns to normal in shorter time/ Person 2 – shows a greater increase (after running);	Reverse arguments		
		(d)	i		1	More people/ repeats;			Fair testing
			ii		1	same age/ same level of {sporting activity/ fitness level}/ OWTTE;			Same sex
		Total Mark			10				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
4		(a)			3	B and <u>urine</u> out of kidney/ to bladder ; D and urethra (1) correct spelling only Bladder and {stores/holds} urine;	Keeps urine		
		(b)	i		1	Any **2** for **1** mark (excess) water, salt(s) and urea;	One correctly named salt		
			ii		1	Increased/ becomes stronger/ gets higher;			
		Total Mark			5				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
5		(a)	i		1	There were 800 tonnes 2001 and 1100 tonnes in 2011/ there is an increase from 2001 to 2011;			
			ii		2	(1 100 – 800)/10; 30 [tonnes per year]; Correct answer = 2 marks Incorrect answer but correct method = 1 mark			
			iii	I	1	break down plastic;		Feeding on plastic/ destroys plastic	
				II	1	pathogen / cause disease;		Releasing harmful chemicals	
			iv		2	phthalates/ organic toxins; could be taken up {by organisms/ in feeding/ in food chains} / bioaccumulation;		Poisons organisms	
		(b)			1	ethanol/ alcohol;	Carbon dioxide		
		Total Mark			8				

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<table>
<tr><th colspan="2">Question Number</th><th colspan="3" rowspan="2">Sub-section</th><th rowspan="2">Mark</th><th rowspan="2">Answer</th><th rowspan="2">Accept</th><th rowspan="2">Neutral answer</th><th rowspan="2">Do not accept</th></tr>
<tr><th>FT</th><th>HT</th></tr>
<tr><td>6</td><td>1</td><td>(a)</td><td></td><td></td><td>3</td><td>
<table>
<tr><th>Field</th><th>Signs of mineral nutrient deficiencies shown by the wheat plants</th></tr>
<tr><td>A</td><td>poor growth/ reduces growth;</td></tr>
<tr><td>B</td><td>yellowing of leaves;</td></tr>
<tr><td>C</td><td>poor root growth;</td></tr>
</table>
</td><td>Stunted growth/ reduces growth of stems and roots</td><td></td><td>Reduces growth of stems/ reduces growth of roots</td></tr>
<tr><td></td><td></td><td>(b)</td><td></td><td></td><td>1</td><td>{Spread/ spray/use/ add} {<u>NPK/</u> <u>fertilizer/ slurry/ manure</u>};</td><td>Green manure/ clover/ legume crops being ploughed in</td><td></td><td>Fertilising the plant</td></tr>
<tr><td></td><td></td><td colspan="3">Total Mark</td><td>4</td><td></td><td></td><td></td><td></td></tr>
</table>

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
7	**2**	(a)			2	A choroid; B optic nerve;	Phonetic spelling B: sclera/ sclerotic		
		(b)			Max 4	• In Diagram I the eye is in dim light; • iris (muscle) makes pupil larger; • to allow more light into the eye; • (In Diagram 2) the eye is in bright light and the reverse has happened (OWTTE); OR • In Diagram 2 the eye is in bright light; • iris (muscle) makes pupil smaller ; • to reduce the amount of light entering the eye; • In Diagram I the eye is in dim light and the reverse has happened (OWTTE);			
		Total Mark			6				

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Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
8	**3**	(a)	i		1	**B** **A** **D** **C**	B in the top row, A in the second, D in the third C in the fourth		
			ii		1	To prevent {entry / exit} of bacteria/ contamination by bacteria;	micro-organisms/ fungi/ microbes as alternative to bacteria		
		(b)	i		3	PLATE 1 10 °C; PLATE 2 4 °C; PLATE 3 35 °C;			
			ii		1	7;			7 colonies
			iii		2	bacteria on the inoculating loop would not have been killed/ loop would not have been sterilised; therefore the agar would have {bacteria/ micro-organisms} growing on it which would have <u>not come from the milk</u>/ contaminated with bacteria <u>not from the milk</u>; OR the loop is flamed to ensure all micro-organisms on it are killed; only bacteria from the milk are grown;	micro-organisms/ fungi/ microbes as alternative to bacteria		Loop not clean
		Total Mark			8				

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Question Number			
FT	HT	Mark	Answer
9	**4**	6 QWC	*Indicative content:* • platelets form a blood clot • which seals the wound/ stops the bleeding • to prevent entry of microbes/bacteria • white blood cells/phagocytes {ingest/engulf} microbes/bacteria NOT destroy • white blood cells/lymphocytes produce antibodies* • which inactivate certain bacteria/microbes/viruses • white blood cells/lymphocytes produce antitoxins* • which inactivate/counteract toxins released by bacteria/microbes *Needed for top band **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.
Total Mark		6	

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	5	(a)			2	A pulmonary artery; B vena cava;		anterior/ posterior/ inferior/superior	
		(b)			4	• blood flows between left and right ventricles; • {both sides of heart/both ventricles} contain a mixture of oxygenated and deoxygenated blood (OWTTE)/left ventricle will contain partially oxygenated blood; • blood {sent to body/ in the aorta} will {be partially oxygenated/ have less oxygen than it should have}; • resulting in not enough oxygen supplied to cells/tissues/organs/muscles;			Blood leaving left ventricle/ going to the body is deoxygenated
		Total Mark			6				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	6	(a)			1	<u>controls</u>{loss of water /transpiration} **and** allows {gases/correctly named gas} to pass in or out ;			
		(b)			1	Guard cells;			
		(c)			1	To prevent loss of too much water/ reduces loss of water;			Stops loss of water
		(d)	i		1	Decrease/ less time;			
			ii		1	Increase/ more time;			
		Total Mark			5				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	7	(a)			1	<u>Decrease</u> in water (in blood) / low water content (of blood)/ increase in concentration of blood;			Lack of water
		(b)			3	More water (re)absorb<u>ed</u>; Into the {blood/ capillaries}; Urine {becomes more concentrated/ contains less water};		Smaller volume	
		Total Mark			4				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	8	(a)	i		2	X = <u>Renal</u> artery; Y = <u>Renal</u> vein;	Afferent/ efferent		
			ii		1	Clots would clog the pump/ stop blood flow/ prevent blockage;			
			iii		1	Diffusion/ ultrafiltration;			
			iv		1	{maintains/ increases} concentration gradient/ allows {<u>maximum/greatest</u>} rate of diffusion or removal of waste;			
		(b)			1	Have a kidney transplant;	peritoneal dialysis		
		Total Mark			6				

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Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	9	(a)	i		1	For comparison/ some regions have higher populations than others;			
			ii		2	50 – 8 = 42; 42/50 x 100 = 84%; Correct answer = 2 marks			
			iii		1	{Higher number of <u>deaths per 100 000/</u> higher percentage die} (in Africa);	ORA		
		(b)			4	Vaccine contains the antigen; Causes memory cells to be produced; For future invasions of bacteria; by {<u>rapid</u> production/ production of <u>large numbers</u>} of antibodies;			
		(c)			1	<u>Bacteria</u> develop <u>resistance</u> to <u>antibiotics</u>/ fewer people vaccinated;		overuse of antibiotics/ not completing course of antibiotics	Bacteria resistant to vaccine/ Bacteria are immune to antibiotics
		Total Mark			9				

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Question Number		Mark	Answer
FT	HT		
	10	6 QWC	Indicative content • rapid involuntary protective response (to a stimulus) • light is the stimulus • retina is the receptor • sensory neurone sends the impulse to the relay neurone (Spinal cord = neutral) • via a synapse • impulse passes along the motor neurone • to the <u>muscle of the eyelid</u> which is the effector **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.
Total Mark		6	

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4483/01

BIOLOGY

BIOLOGY 3
FOUNDATION TIER

A.M. TUESDAY, 13 May 2014

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**9**	
2.	**6**	
3.	**5**	
4.	**8**	
5.	**8**	
6.	**6**	
7.	**9**	
8.	**9**	
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 used in your answer to question **8***(b)*.

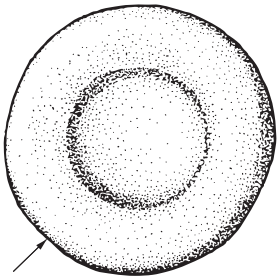
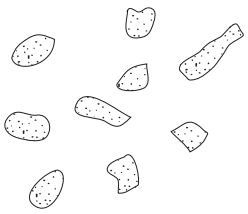
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Answer **all** *questions.*

1. *(a)* The table below has information on some of the parts of blood.

part of blood	structure	function
red blood cell	 cell membrane	.....
white blood cell		defence against disease
platelets		.....

Complete the table above by

(i) drawing a diagram of a white blood cell and labelling the cell membrane and nucleus; [2]

(ii) giving the functions of a red blood cell and platelets. [2]

(b) The liquid part of the blood is called plasma. State **two** substances which are transported in blood plasma. [2]

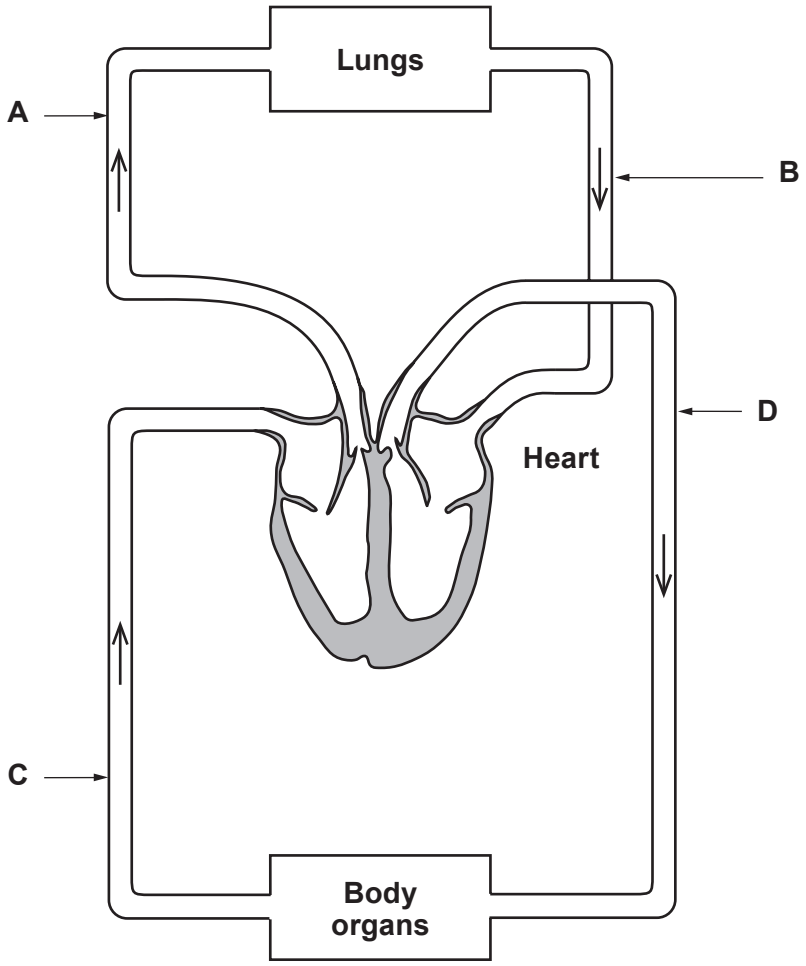
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(c) The diagram below shows the human circulatory system.



(i) From the diagram above, state the letter which shows [2]

I. the pulmonary artery .....

II. the aorta .....

(ii) Name the doctor, working in the 17th century, who discovered how blood circulated around the human body.
Underline your answer. [1]

Harvey Fleming Mendel

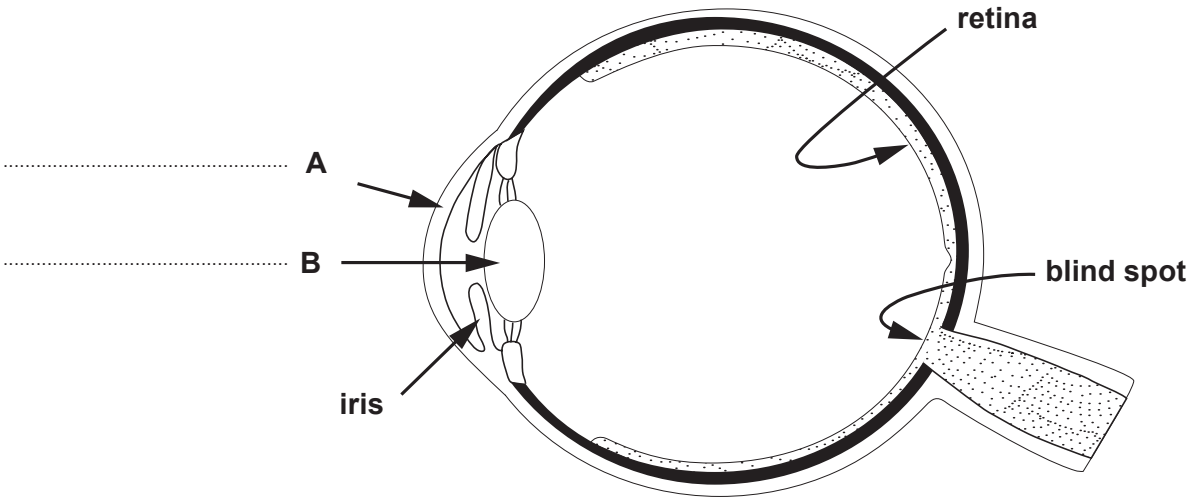


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2. The diagram below shows a section through the human eye, with some parts labelled.



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

(ii) The retina is the light sensitive layer of the eye where images are formed. Explain why no image is detected at the blind spot. [2]

.....

.....

(b) Name the parts of the eye described below. [2]

Description	**Part of the eye**
tough, protective coating	.....
layer containing blood vessels	.....

6

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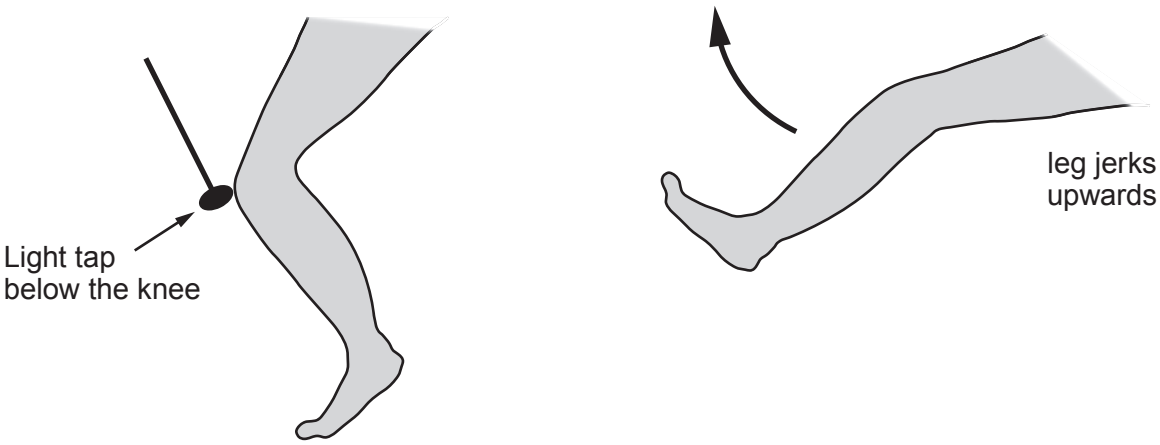
Examiner only

3. *(a)* Complete the sentence about the human nervous system. [2]

The central nervous system consists of the ..... and

..... .

(b) The diagram below shows the knee jerk response, which is a reflex action.



(i) Apart from being very fast, state **one** *other* feature of **all** reflex actions. [1]

.....

(ii) Give **one** *other* reflex action which occurs in the human body and state its purpose. [2]

.....

.....

.....

5

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4. *(a)* Complete the sentence. [1]

The kidneys remove waste products in a process called ..... .

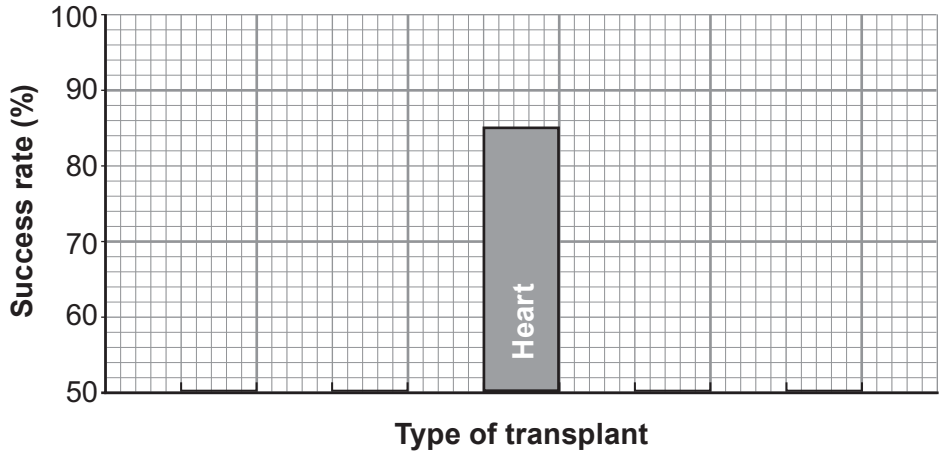
(b) When a human organ fails to function doctors can carry out a transplant operation using an organ from a donor. The transplant is said to be successful if the transplanted organ functions normally for at least one year.

The table below compares the success rates of some transplant operations.

type of transplant	success rate (%)	year when doctors first started transplants	number of years doctors have been doing transplants (up to 2014)
kidney (family donor)	98	1960	54
kidney (non-family donor)	87	1960	54
lung	77	1986	.....
heart	85	1975	.....
liver	84	1983	31

(i) Complete the table by writing your answers on the dotted lines. [1]

(ii) Complete the bar chart below by adding the bars for kidneys, liver and lung. Place the bars in order from the **most** to the **least** successful and label them. *The bar for heart has been completed for you.* [3]



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(iii) Use only information in the table and the bar chart to suggest a reason why the success rates for the various transplant operations are different. [1]

.....

.....

(iv) From your own knowledge, explain why a kidney transplant is more likely to be successful when the donor is a family member. [2]

.....

.....

.....

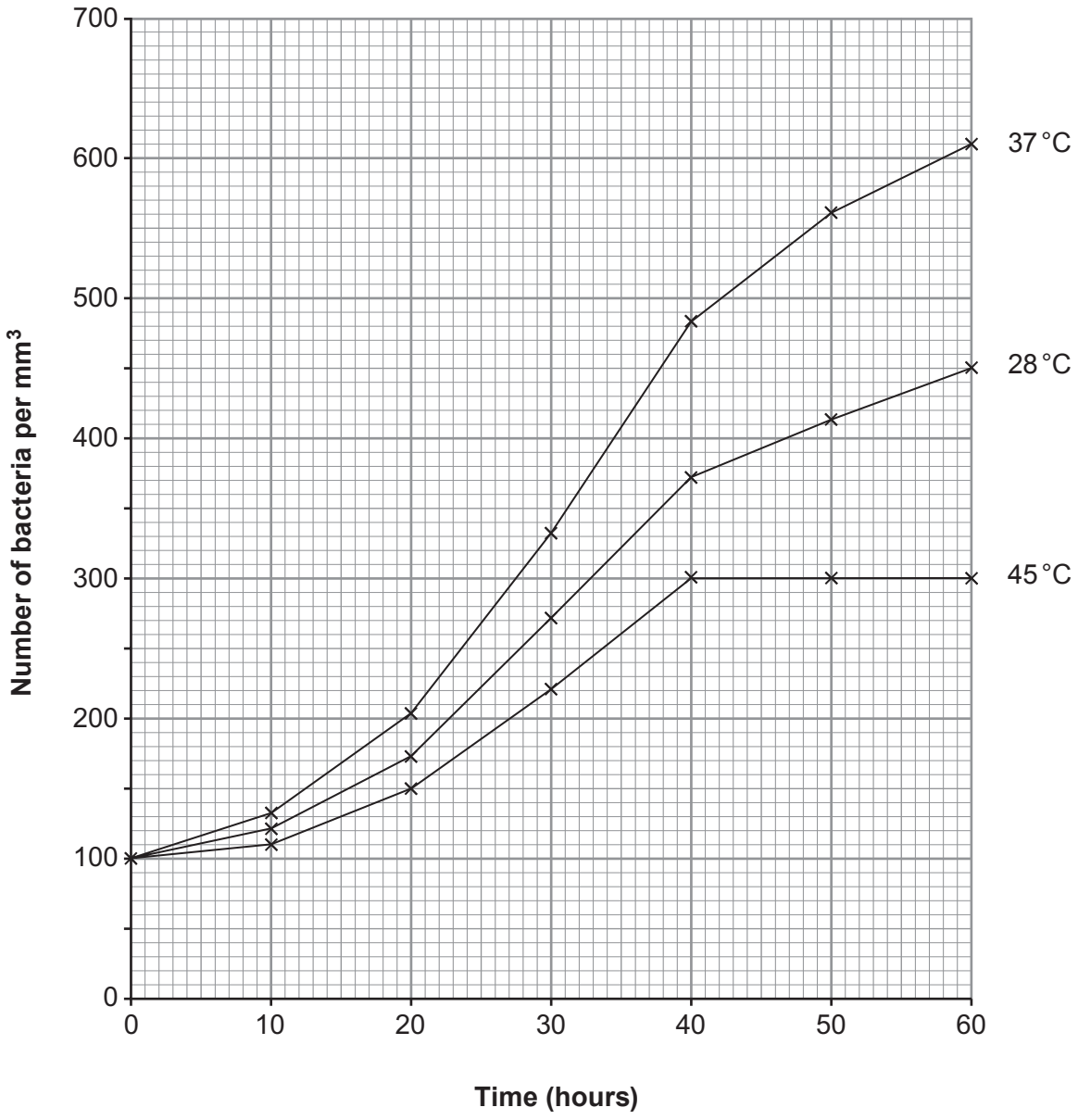
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5. A scientist investigated the growth of the bacterium *E.coli* at different temperatures. The results are shown in the graph below.



(a) From the graph

(i) Describe the change in numbers of bacteria from 20 – 60 hours at 45°C. [2]

.....

.....

.....

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(ii) Calculate the difference in numbers of bacteria between 28°C and 37°C at 25 hours.
Show your working. [2]

..... per mm^3

(iii) How did increasing the **temperature** affect the numbers of bacteria present? [2]

.....

.....

.....

(b) After the investigation, another scientist was asked to carry out the same investigation using exactly the same methods and apparatus as the first scientist. Why was this necessary? [1]

.....

.....

(c) *E.coli* in food can cause illness in humans. State why meat must be kept in a refrigerator. [1]

.....

8

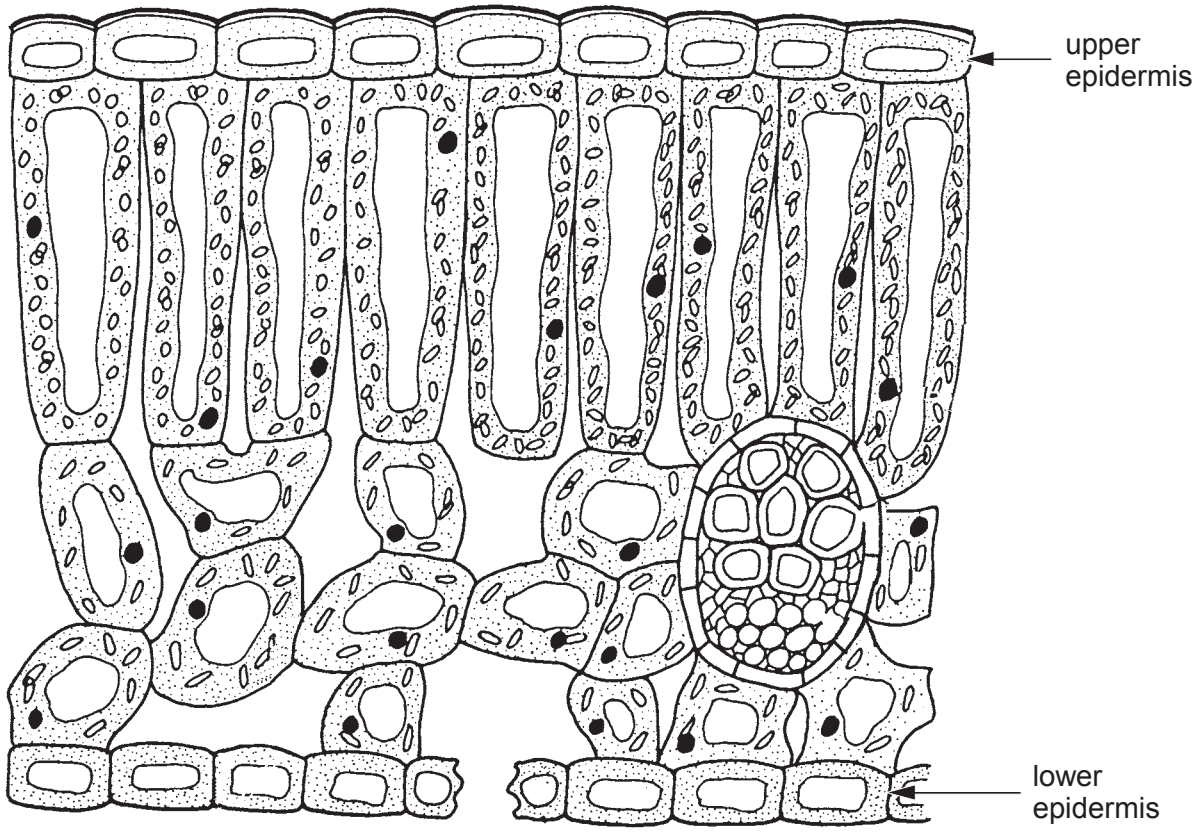
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6. *(a)* The diagram below shows a leaf in section.



(i) State the name of the tissue in a leaf that transports sugar. [1]

.....

(ii) On the diagram above, label this tissue with the letter **A**. [1]

(b) Complete the following sentence. [1]

Sugar cannot be stored in a plant, it has to be converted into ..... for storage.

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(c) (i) Ethanol can be made by reacting sugar with yeast.
State the name of the reaction between sugar and yeast that produces ethanol. [1]

.....

(ii) Ethanol is a biofuel. The area of farmland used only to grow crops for the production of biofuel could double over the next 15 years.

Suggest **two** reasons why many people have concerns about using so much farmland for this purpose. [2]

.....

.....

.....

.....

6

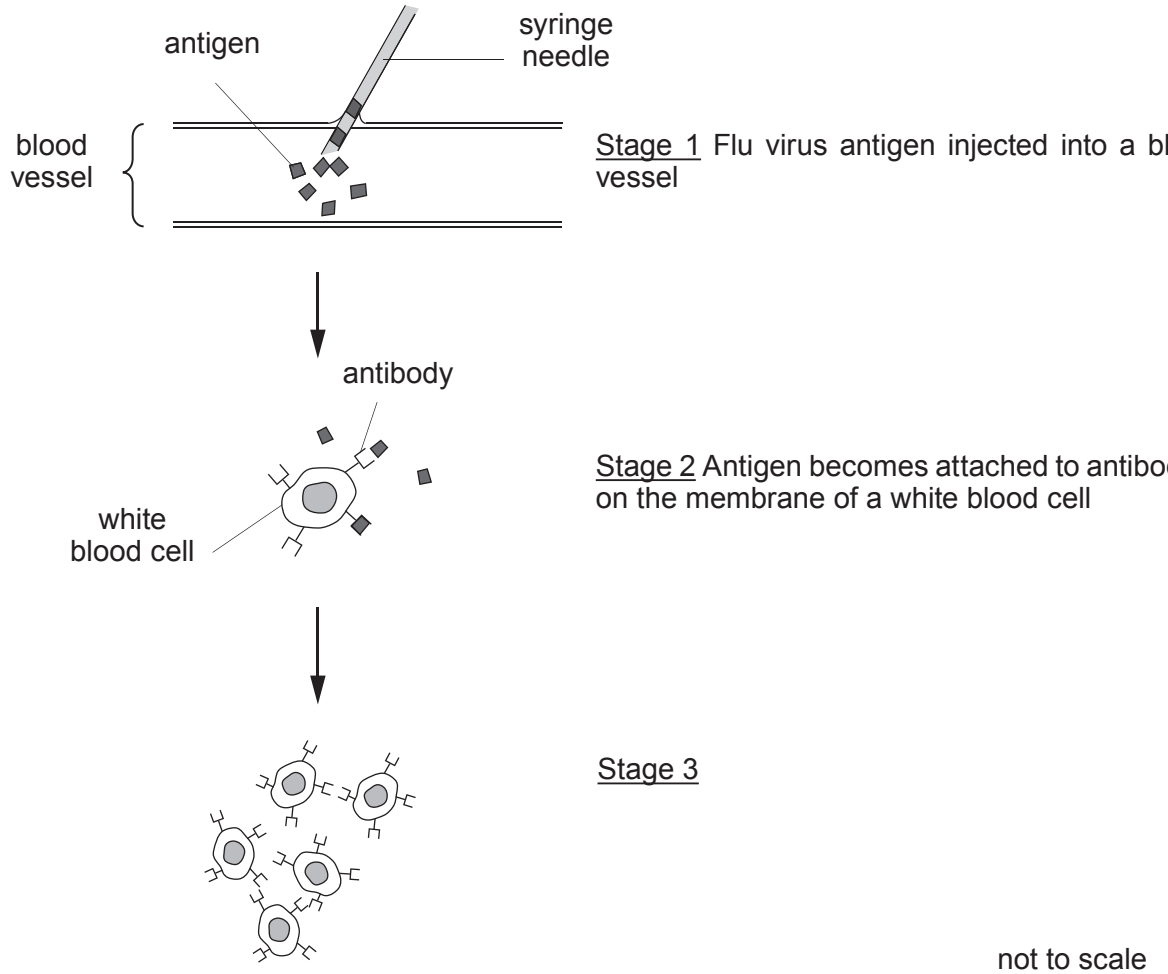
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7. The diagram below shows stages in the response by one type of white blood cell to a flu virus vaccination.



(a) (i) Name the type of white blood cell that produces antibodies. [1]

.....

(ii) Describe the process that has taken place between stages 2 and 3. [2]

.....

.....

.....

(iii) State the importance of stage 3 in protecting the body from the flu virus. [1]

.....

.....

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(b) New forms of flu virus appear almost every year in the UK.
Suggest why a government report recommends that flu vaccines should be given every year. [2]

.....

.....

.....

.....

(c) Name the English doctor who first used vaccination to treat a patient in the UK. [1]

.....

(d) After an injection, blood clots at the site of the wound.
Suggest why it is important for blood to clot at the site of a wound. [2]

.....

.....

.....

.....

9

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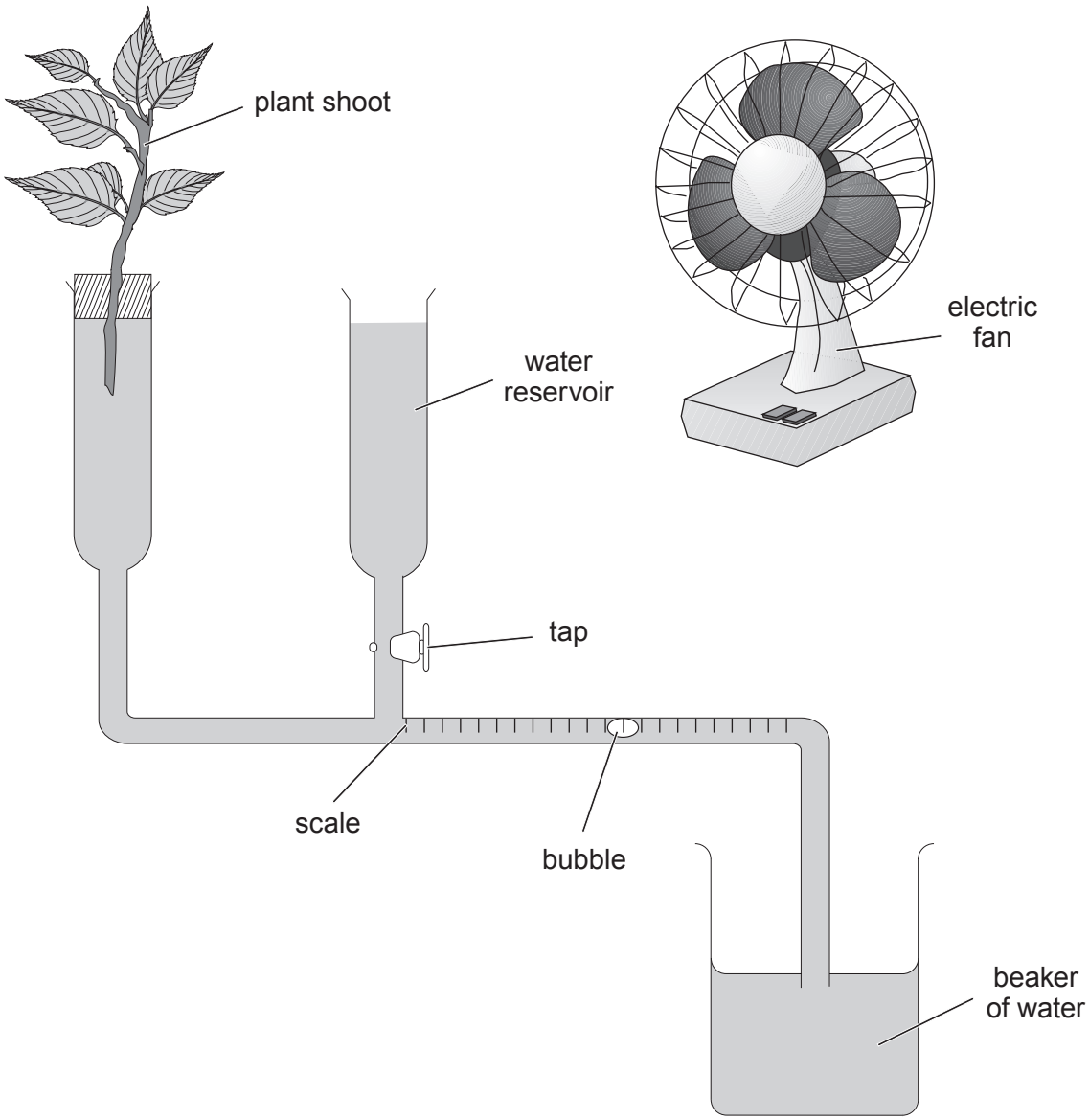
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8. *(a)* What word is used to describe water loss from the leaves of a plant? [1]

.....

The diagram below shows a plant shoot in a simple potometer and an electric fan.



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(b) Describe how you would investigate the effect of moving air on the rate of water loss from the shoot using the apparatus shown opposite. [6 QWC]

(c) Apart from air movement, give **two** *other* environmental factors that affect the rate of water loss from a plant. [2]

1. .....

2. .....

9

END OF PAPER

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GCSE MARKING SCHEME

SCIENCE-BIOLOGY

SUMMER 2014

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2014 examination in GCSE Science-Biology. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

	Page
B1	1
B2	18
B3	32

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GCSE SCIENCE - BIOLOGY

B3

MARK SCHEME - SUMMER 2014

Question			Marking details	Marks Available
1	(a)	(i)	Cell drawn , irregular outline with inclusion; Nucleus and cell membrane correctly labelled;	2
		(ii)	(For red blood cell) carries oxygen; (For platelets) clotting;	2
	(b)		Any **two** from urea; carbon dioxide; soluble foods/ glucose/ amino acids/ sugar; protein; salts; hormones; antibodies; *(reject- references to heat distribution)* *NOT waste/ drugs/ named drugs/nutrients*	2
	(c)	(i)	I A; II D;	2
		(ii)	Harvey;	1
			Question 1 total	**[9]**

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Question			Marking details	Marks Available
2	(a)	(i)	A Cornea; B Lens;	2
		(ii)	This is where the optic nerve {leaves the eye/is} /there are no {light sensitive/receptor} cells here (so no image); *NOT attached to optic nerve* No impulse {generated/made}; *NOT retina* 2nd mark only awarded if 1st mark awarded	Max 2
	(b)		Sclera; Choroid;	2
			Question 2 total	**[6]**

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Question			Marking details	Marks Available
3	(a)		**Either order** Brain; Spinal cord; NOT spine	2
	(b)	(i)	Automatic/ involuntary/ without thought; *NOT choose to do it/ protective*	1
		(ii)	<table><tr><th>**Name**</th><th>**Purpose**</th></tr><tr><td>Blink;</td><td>protection of eye;</td></tr><tr><td>Pupil diameter change;</td><td>Regulating/admitting (appropriate level) of light to the eye;</td></tr><tr><td>Withdrawal/ pulling away (in context);</td><td>prevents damage/ harm to body part;</td></tr><tr><td>Sneezing;</td><td>Expel/ remove substances from nose</td></tr></table> NOT cough/ choke	2
			Question 3 Total	**[5]**

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Question			Marking details	Marks Available
4	(a)	(i)	Excretion ; NOT filtration	1
	(b)	(i)	28 **and** 39;	1
		(ii)	4 bars each correct height with label – 3 marks 3bars each correct height with label – 2 marks 2 bars each correct height with label – 1 mark ½ small square tolerance in plotting height *Correct order (either way)* Kidney (family donor) Kidney (non-family donor) Lung Heart Liver Allow <u>all</u> bars correct height and **in sequence** but <u>no</u> labels = 1 mark	3
		(iii)	They have been done for different lengths of time/ some have been done for longer (time than others);	1
		(iv)	Less likely to be rejected; NOT fail Because same/ similar/compatible <u>tissue type</u>; NOT same cells	2
			Question 4 Total	**[8]**

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Question			Marking details	Marks Available
5	(a)	(i)	Increase then {plateau/steady/ OWTTE};	2
			NOT stops	
			Doubles up to 40 hrs/ 300 per mm^3;	
		(ii)	270 - 220;	2
			(allow ecf)	
			50;	
			(2 correct readings but incorrect subtraction – allow 1mark)	
			Correct answer = 2 marks	
		(iii)	{Initial increase in temperature / at 37} gives greater numbers;	2
			{Further increase in temperature /at 45} gives decreased numbers;	
			Accept suitable alternative wording if clearly expressed	
			NOT 'increase' unqualified	
	(b)		Reproducibility;	1
			Accept to have increased confidence in results	
			NOT fair test	
	(c)	(i)	Slows {bacterial/*E.coli}* {growth/reproduction};	1
			NOT bacteria cannot grow	
			Question 5 Total	**[8]**

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Question			Marking details	Marks Available
6/1	(a)	(i)	Phloem; (accept phonetic spelling)	1
		(ii)	phloem clearly identified on the diagram (letter A);	1
	(b)		Starch;	1
	(c)	(i)	Fermentation/ fermenting;	1
		(ii)	Less food crops/OWTTE; More chemicals/ fertilisers/ pesticides needed; Habitat destruction/ reduce biodiversity; *NOT deforestation/ disrupts {ecosystems/ environment}/ destroys wildlife*	2
			Question 6/1 Total	**[6]**

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Question			Marking details	Marks Available
7/2	(a)	(i)	Lymphocyte/ B cells;	1
		(ii)	{Lymphocyte/cell} has {reproduced/cloned/produced/ divided into} (identical) copies; Many times;	2
		(iii)	{Lots of/more}antibodies produced/ memory cells produced/ so there will be a rapid response;	1
	(b)		Different antigens; So different antibodies needed;	2
	(c)		Jenner;	1
	(d)		Prevent {blood loss/bleeding}; Prevents {pathogens/microbes} entering/ prevents bacterial infection;	2
			Question 7/2 total	**[9]**

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Question		Marking details	Marks Available
8/3	(a)	Transpiration;	1
	(b)	**Indicative content** Set bubble to zero/start Reference to use of tap Correct ref to time (i.e. time taken or set period of time) Correct ref to distance (i.e. set distance or distance travelled) Record results Repeat but now with the fan Repeat experiment for both conditions Compare results 5 – 6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. 3 – 4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. 1 – 2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. 0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.	6
	(c)	Any two from: (air) temperature; NOT heat humidity; light intensity; water availability; NOT amount	2
		Question 8/3 Total	**[9]**

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Question			Marking details	Marks Available
4	(a)		Removal of waste;	1
	(b)	(i)	68;	1
		(ii)	I The salts enter urine/ excreted/ some are reabsorbed;	1
			II Concentration increases; Because water intake lower **and** percentage of intake that passes into urine is lower'/ because the volume of urine is lower;	2
		(iii)	Restore (normal) levels/ return to normal/ replenish salts;	1
			Question 4 Total	**[6]**

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Question			Marking details	Marks Available
5	(a)	(i)	To show that the presence of protein is due to nephrotic syndrome/ to show that healthy rats do not have protein in their urine/ as a fair test/ comparison;	1
		(ii)	Protein (molecules) too big to pass through {filter/capillaries/ glomerulus/ Bowmans capsule};	1
	(b)		Any **three** from: number in <u>each group</u>; age; gender; period of time of treatment; diet (food or water); NOT amount species; type; {dose/mass/volume} of {endaravone/drug}	3
	(c)		Repeat/ larger sample;	1
	(d)		Endaravone reduces protein in urine; Some protein in urine after treatment;	2
			Question 5 Total	**[8]**

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Question			Marking details	Marks Available
6	(a)	(i)	B; D;	2
	(b)	(i)	B knee jerk/ withdrawal/OWTTE;	1
		(ii)	D blinking/opening and closing the eyelid quickly;	1
			Question 6 total	**[4]**

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Question			Marking details	Marks Available
7	(a)	(i)	Coronary <u>artery</u> ;	1
		(ii)	Clotting; {Stopping/ blocking/ reducing} blood flow to heart muscle;	2
		(iii)	Capillaries;	1
	(b)	(i)	14 (au);	1
		(ii)	Glucose/ oxygen;	1
			Question 7 total	**[6]**

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Question			Marking details	Marks Available
8	(a)		(An overall trend of) increasing bacterial resistance with increasing use;	1
	(b)		If the antibiotics enter the human food chain; they may cause bacteria to become resistant;	2
	(c)	(i)	Tetracycline; correct spelling	1
		(ii)	$\frac{150}{250} \times 100 = 60$ (%) Method; Answer; Correct answer = 2 marks	2
			Question 8 Total	**[6]**

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Question	Marking details	Marks Available
9	Indicative content Aseptic collection of milk samples. Flame loop. Inoculating and plating samples on separate plates. Sealing Petri dishes. Incubation at stated correct temperature (20-25°C) Stated time (12-24 hours). Count colonies on plate with stale milk. {No/fewer} {colonies/bacteria} in boiled milk. 5 – 6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. 3 – 4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. 1 – 2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. 0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.	6
	Question 9 Total	**[6]**

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4483/01

BIOLOGY

BIOLOGY 3
FOUNDATION TIER

A.M. TUESDAY, 14 May 2013

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**6**	
3.	**8**	
4.	**5**	
5.	**10**	
6.	**9**	
7.	**6**	
8.	**3**	
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 used in your answer to question **9**.

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Answer **all** *questions.*

1. *(a)* (i) The following information relates to the kidney.
Draw lines to join the scientific terms with the correct descriptions. [2]

scientific term	**description**
ureter	fluid leaving the kidney
urethra	tube carrying waste solution out of the body
urine	tube carrying waste solution to the bladder

(ii) Name the process by which waste substances are removed from the blood by the kidneys.
Underline your answer. [1]

excretion elimination egestion

(b) Kidney failure can be treated by a transplant.
State what can be done to reduce the risk of rejection of a transplanted kidney.

(i) **Before** the transplant operation. [1]

.....

(ii) **After** the transplant operation. [1]

.....

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(c) Kidney failure can also be treated using a machine, which removes waste from the blood.



(i) Name the process carried out by this machine. [1]

.....

(ii) Give one **disadvantage** of this treatment, compared with a kidney transplant. [1]

.....

.....

7

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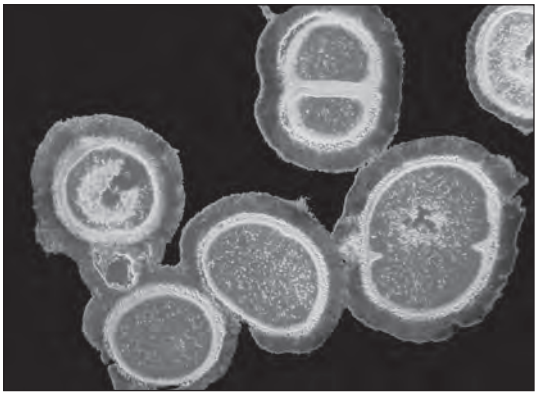
2. Read the following information about treating human diseases with antibiotics.

Problems with antibiotics

From 1944, the antibiotic Tetracyclin was used to treat the disease cholera. In 1952 doctors noticed that it no longer killed all cholera bacteria.

The bacterium *E.coli* often infects humans and can cause blood poisoning. Doctors recorded 18 000 cases in 2000 but in 2008, the number rose to 23 000 because the bacterium became more difficult to kill with antibiotics.

In 2010, a scientific investigation found that many bacteria, such as MRSA could not be killed by antibiotics.



MRSA

(a) Use this information to answer the questions.

(i) Which disease was treated with Tetracyclin and for how long was it fully effective? [1]

disease .....

fully effective for ..... years

(ii) I. How many extra cases of blood poisoning were reported in 2008 compared to 2000? [1]

.....

II. Suggest why doctors are particularly worried that antibiotics are becoming less effective in controlling the bacterium, *E.coli*. [1]

.....

.....

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(b) (i) What term is used to describe bacteria which cannot be killed by antibiotics? [1]

.....

(ii) How may doctors have made the problem of MRSA worse over past years? [1]

.....

.....

(c) Influenza ('flu') is caused by a virus. Why is it not possible to treat this illness with antibiotics? [1]

.....

.....

6

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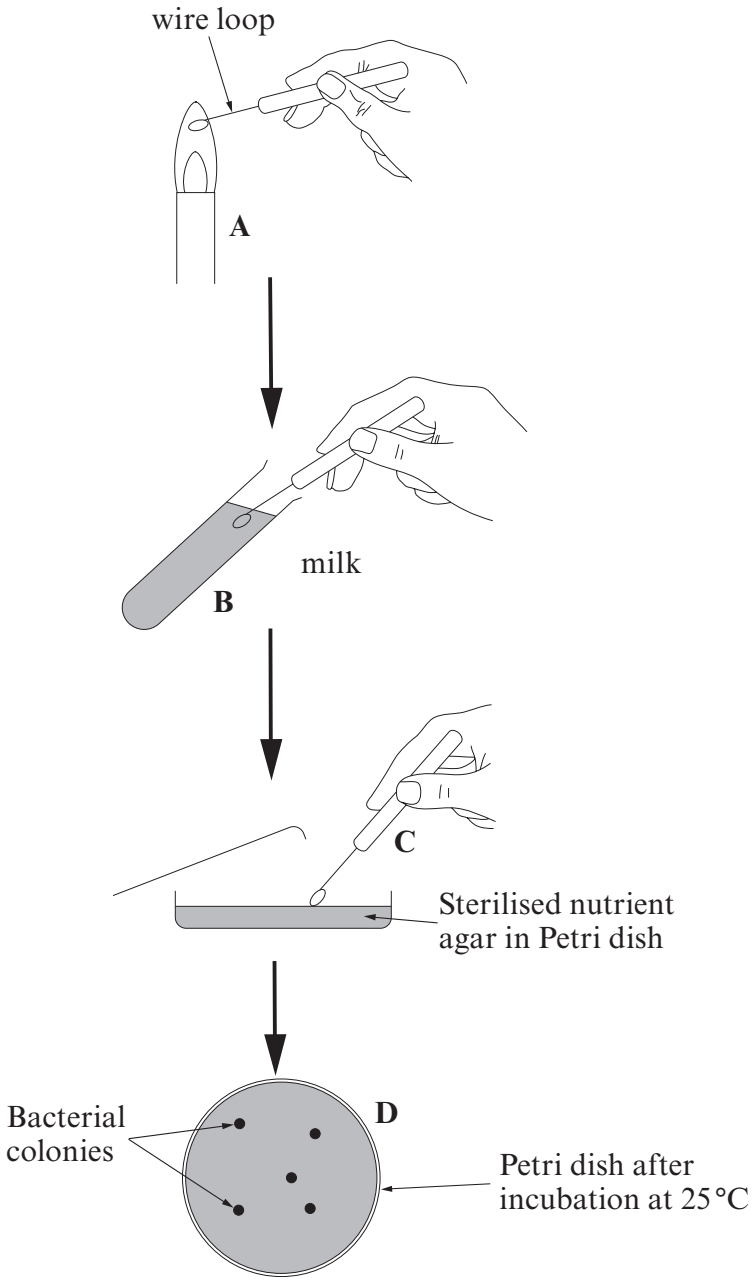
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3. The flow diagram below shows how a student tested milk to find how many bacteria were present.



Use the flow diagram and your own knowledge to answer the following questions.

(a) (i) How did the student know when to stop heating the wire loop in **A** above? [1]

.....

(ii) Why was the agar in **C** sterilised? [1]

.....

(iii) How would the student know how many bacteria were put onto the nutrient agar in **C**? [1]

.....

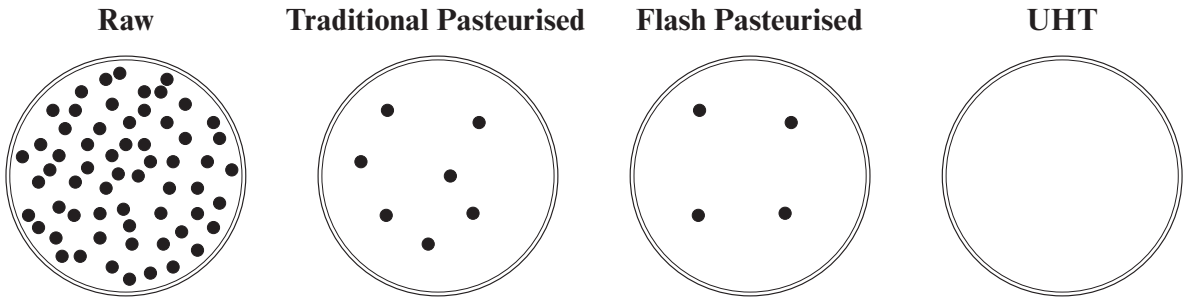
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(b) Scientists investigated the number of bacterial colonies in samples of milk which had been treated differently. The results are shown in the diagrams and table below.

Agar plates with bacterial colonies from 0.1 cm^3 milk samples



type of milk	heat treatment	number of bacterial colonies in a 0.1 cm^3 sample	number of bacterial colonies in a 30 cm^3 serving
raw	none	60	18 000
traditional pasteurised	63°C for 30 min	.....	.....
flash pasteurised	77°C for 35 seconds	4	1 200
UHT	135°C for 2 seconds	0	0

(i) Use the diagrams above to complete the table by adding the results for traditional pasteurised milk. [2]

(ii) State the type of milk treated [1]

I. at the highest temperature, ...

II. for the longest time. .....

(iii) Which type of milk has the greatest number of bacteria in a given volume? [1]

.....

(iv) UHT milk is stacked on supermarket shelves at room temperature but pasteurised milk must be kept in a refrigerator below 5 °C.
What is the reason for this difference? [1]

.....

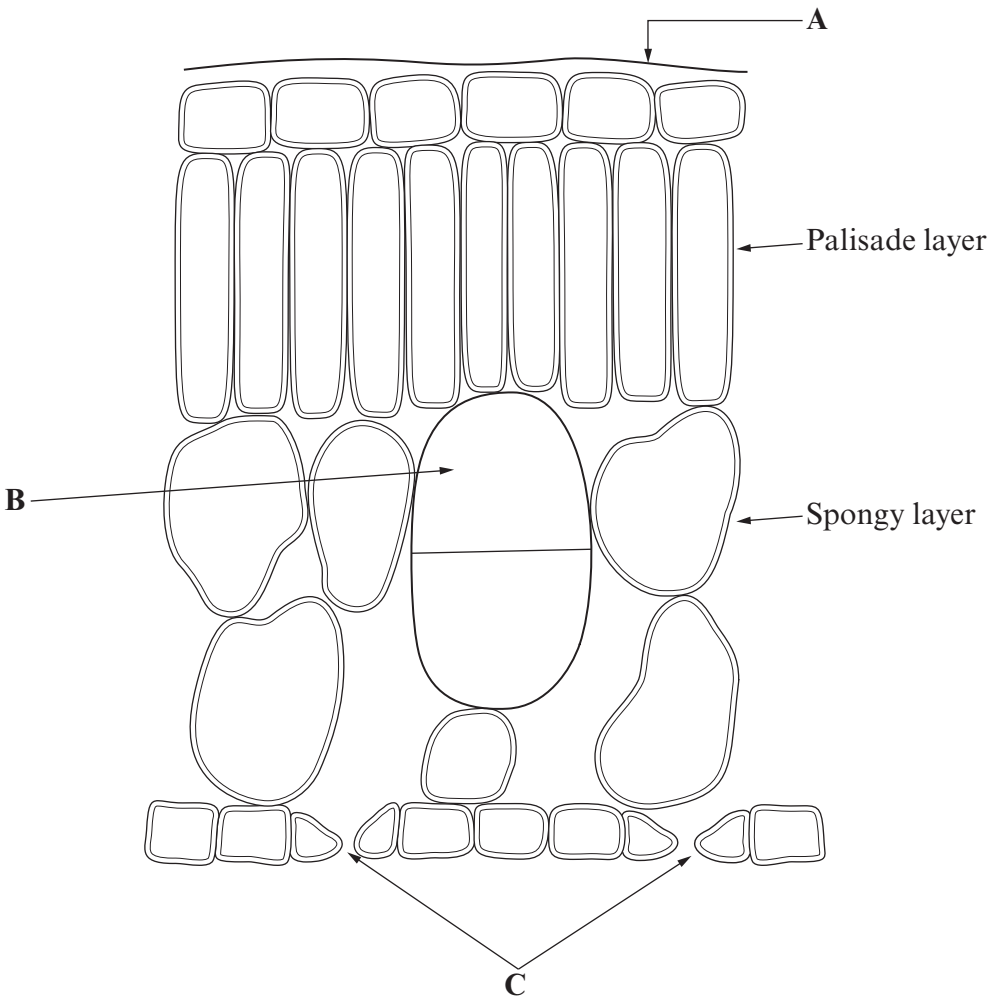
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4. The diagram below shows a transverse section through a leaf.



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

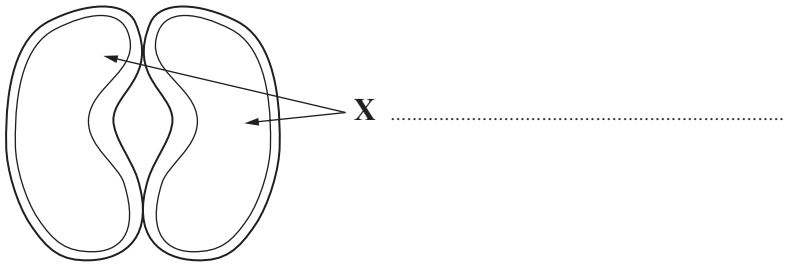
Label	Name of structure	Function
A	.....	prevents water loss from the leaf
B	.....	transports water to all parts of the plant
C	.....	allows water vapour to pass out of the leaf

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(b) The diagram below shows a surface view of structure **C** at high magnification.



(i) Label cells **X** on the diagram above. [1]

(ii) State the function of cells **X**. [1]

.....

5

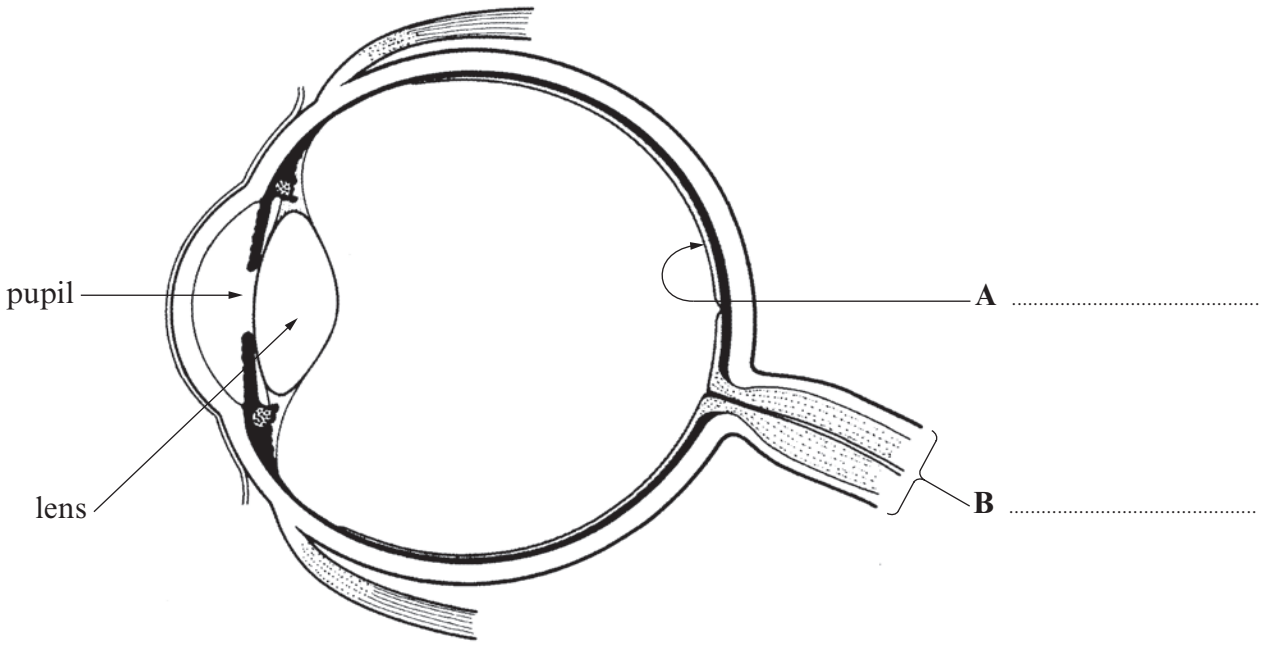
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5. *(a)* The diagram below shows the structure of the eye.
Complete labels **A** and **B**. [2]



(b) Scientists investigated how the diameter of the pupil of the eye changed in different light intensities. The results are shown below.

light intensity (a.u.)	pupil diameter (mm)
0	8.0
5	8.0
10	7.1
15	6.3
20	5.4
25	4.5

(i) Complete the line graph opposite for these results by:

I. choosing the scale on the axis for light intensity; [1]

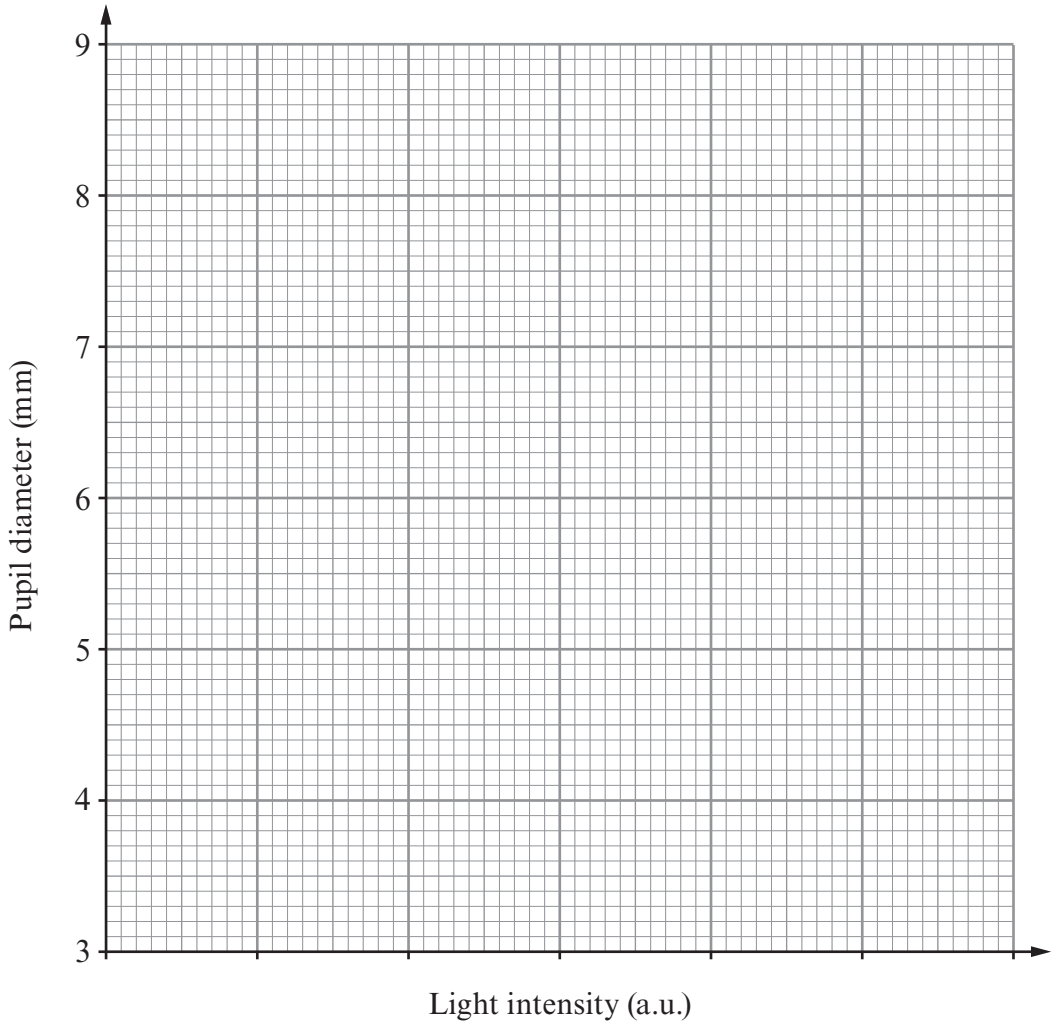
II. plotting the points; [2]

III. drawing a line, with a ruler, to join the plots. [1]

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(ii) From this graph

I. Describe what happens to the diameter of the pupil as the intensity of light increases. [1]

.....

II. State the pupil diameter at a light intensity of 17 units. [1]

..... mm

(c) The pupil changes in diameter because of a nervous response which happens very quickly and automatically.

(i) Name this type of response. [1]

.....

(ii) What is the purpose of this type of response? [1]

.....

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6. The photograph below shows a tomato plant.



(a) Some of the sugar made in photosynthesis is transported to the tomato fruits.

State the name of the tissue in plants that transports sugar. [1]

.....

(b) (i) Siân grows tomato plants. She decides to use a fertiliser called Topgrow. The label from a bottle of Topgrow is shown below.

TOPGROW FERTILISER
CONCENTRATED NUTRIENT SOLUTION
Dilution: 1 part Topgrow: 200 parts water
Contents of bottle: 500 cm^3

Using the instructions for use shown on the label, calculate the volume of diluted Topgrow that can be made from the contents of one bottle.

..... [2]

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(ii) Siân carried out a trial to find out the effect of using Topgrow on the tomato plants.
She used tap water only on half the plants and diluted Topgrow on the rest.

What else should Siân have done to make sure that the trial was a fair test? [2]
Give **two** suggestions.

I. .....

II. .....

(iii) The table shows some of the results of the trial.

treatment	**mean yield (mean mass of tomatoes per plant) (kg)**	**mean number of tomatoes per plant**	**mean mass per tomato (g)**
tap water	4.8	40	120
Topgrow	5.2	65	.....

I. Complete the table above by calculating the mean mass per tomato (in g) for Topgrow. [1]

II. Siân was pleased with the effect of Topgrow on yield. Suggest why Siân was still disappointed with the results. [1]

.....

(c) Apart from nitrates, give the names of **two** *other* nutrients required for healthy plant growth.

..... and ..... [2]

9

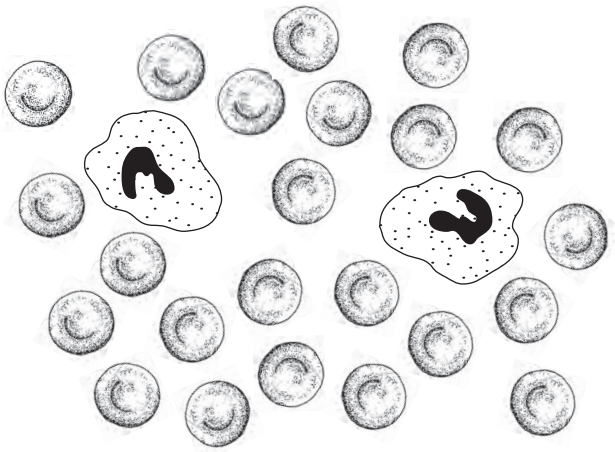
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7. The diagram shows a blood smear as seen through a light microscope.



(a) Complete the table below about the different parts of the blood. [4]

name of part	**function**
red cell	.....
.....	produce antibodies
phagocyte	.....
platelets	.....

(b) Explain why the centre of a red blood cell appears paler than the surrounding cytoplasm when seen through a light microscope. [2]

.....

.....

6

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8. The photograph shows part of a factory used for the large scale production of a protein called mycoprotein.



The production of protein in a factory has several advantages over traditional methods such as farming cattle. For example:

- production is relatively rapid
- over a long period of time, production may be cheaper

State **three** *other* advantages of producing protein in a factory over the farming of cattle. [3]

I. .....

.....

II. .....

.....

III. .....

.....

3

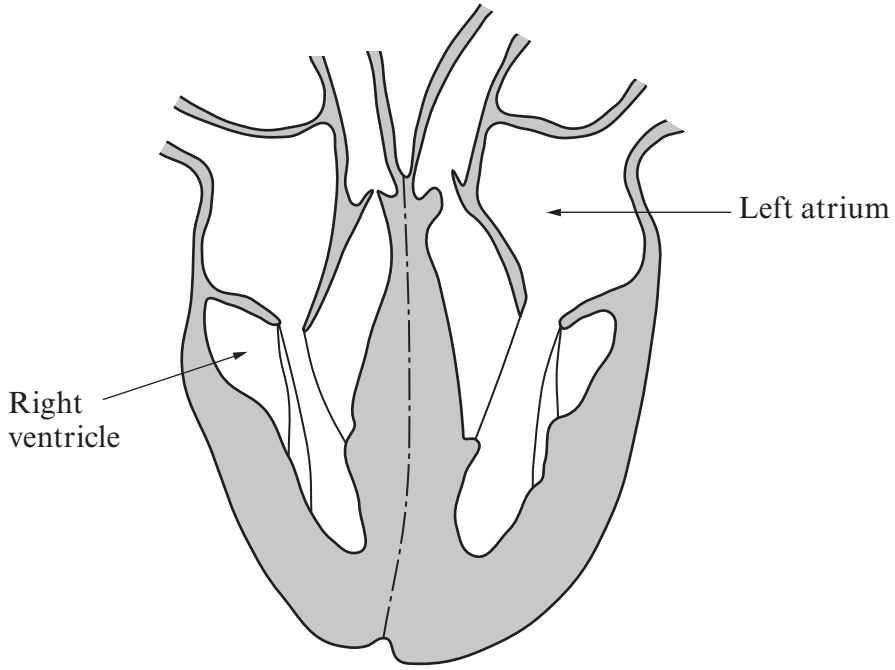
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9. The diagram shows the human heart in section.



Describe and explain how blood in the right ventricle travels to the left atrium. [6 QWC]

END OF PAPER

6

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GCSE MARKING SCHEME

BIOLOGY

SUMMER 2013

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2013 examination in GCSE BIOLOGY. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

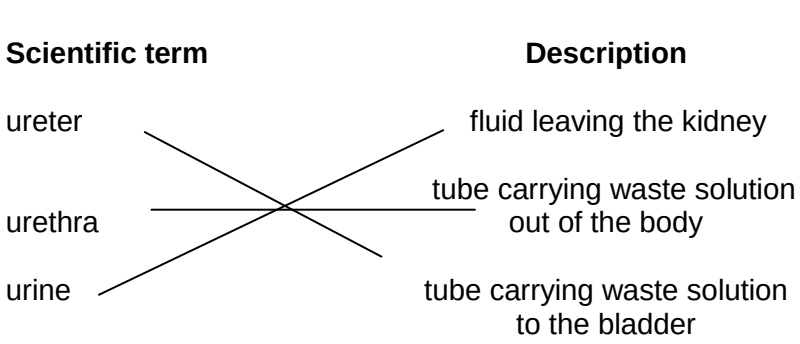
WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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GCSE Science - Biology

B3

Question			Marking details	Marks Available
1	*(a)*	(i)	 2 (3) correct lines;; 1 correct = 1 mark, 2 correct = 2 marks	2
		(ii)	Excretion;	1
	(b)	(i)	Ref to same tissue types/ blood types/ family {donor/ member} relative/ same tissue; NOT kidney that is similar	1
		(ii)	(Immune suppressant) drugs/ OWTTE; NOT drugs unqualified/ anti suppressant	1
	(c)	(i)	Dialysis;	1
		(ii)	Regular {hospitalisation/treatment} / diet restrictions/ temporary/ every time they have {dialysis/ treatment} several times a week/ not a cure;	1
			Question 1 total	**[7]**

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Question			Marking details	Marks Available
2	*(a)*	(i)	Cholera **+** 8 years;	1
		(ii)	I 5 000; II (*E coli)* (very) common in humans/ causes serious {illness/ death};	2
	(b)	(i)	Resistant/ resistance; NOT immune	1
		(ii)	Over prescription/ overuse/ giving too many antibiotics/ doctors transferring from patient to patient;	1
	(c)		(Antibiotics) do not kill viruses/ only kill bacteria/ to kill an antiviral drug; Accept destroy for kill NOT do not effect/ do not work on bacteria	1
			Question 2 total	**[6]**

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Question			Marking details	Marks Available
3	*(a)*	(i)	(seen to be) red (hot)/ glows red; NOT hot unqualified/ orange/ white	1
		(ii)	(Sterilisation) kills all bacteria/ no bacteria in agar; NOT stops other bacteria getting in	1
		(iii)	Count colonies (in D);	1
	(b)	(i)	7; 2100; (ecf)	2
		(ii)	I UHT II Traditional pasteurised	1
		(iii)	Raw;	1
		(iv)	Prevent bacterial growth in pasteurised/ UHT contains no bacteria; must refer to one or other of the milks	1
			Question 3 Total	**[8]**

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Question			Marking details	Marks Available
4	*(a)*		Cuticle; Xylem; Stoma(ta);	3
	(b)	(i)	Guard (cells);	1
		(ii)	Open and close/ change pore size/ control how much water passes out;	1
			Question 4 Total	**[5]**

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Question			Marking details	Marks Available
5	*(a)*		Retina;	2
			Optic nerve;	
	(b)	(i)	I suitable scale;	1
			0 at origin, linear scale	
			II all plots correct;	2
			½ small square tolerance	
			1 error = 1 mark, 2 errors = 0 marks	
			Extrapolation (treat as plotting error – 1)	
			III line quality;	1
			Must use a ruler through centre of plots	
		(ii)	I (level then steady) decrease/ gets smaller;	1
			II 5.9 (from graph);	1
			allow ecf from graph	
	(c)	(i)	Reflex;	1
		(ii)	Protective/ protection/ prevents damage/ prevent hurting the body;	1
			Question 5 Total	**[10]**

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Question			Marking details	Marks Available
6/1	*(a)*		Phloem;	1
	(b)	(i)	100/ 100.5;	2
			Litres/l/dm^3;	
			Allow	
			100 000/ 100 500/ 1 x 10^5;	
			cm^3/ ml;	
			Unit mark can only be given if value mark given	
		(ii)	any two from;	2
			same	
			• volumes {water/ Topgrow} • light intensity/duration • temperature NOT heat • length of growing time • harvest time • {variety/ type} of tomato • type of soil • pH • height/ mass/age/ stage of growth of plant NOT size	
			NOT 'amount'/ same {place/ environment}/ CO_2/ 'level'	
		(iii)	I 80;	1
			II {lower /smaller} mean mass/{smaller/ lighter} tomatoes;	1
	(c)		any two from;	2
			phosphate; NOT phosphorus potassium; magnesium; calcium; iron; named trace element	
			Question 6/1 Total	**[9]**

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Question			Marking details	Marks Available

7/2 *(a)* (i)

name of cell	**function**
given	carry oxygen;
lymphocyte; NOT white blood cell	given
given	• Ingest/ take in/ digest/ engulf; NOT eat/ destroy • bacteria/microorganisms/ pathogen/ microbes; NOT disease
given	(blood) clotting;

4

(ii) no nucleus/thin in centre/ (bi)concave; NOT doughnut

more light passes through (centre);

accept less stain

NOT less haemoglobin in the middle

2

Question 7/2 Total **[6]**

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Question	Marking details	Marks Available
8/3	Any 3 from:	3

- Less space required (for a given mass of product);
- The product is more predictable;
- The product is more reliable;
- it is made under controlled conditions (cf farming);
- It uses waste from other processes;
- It produces less waste/methane;
- Not {weather/ climate} dependent;
- Continuous production/ produced on demand;
- Disease free;

Responses must refer to production, not consumption, eg.

Suitable for vegetarians

NOT quick/ cheap

Question 8/3 Total **[3]**

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Question	Marking details	Marks Available
9/4	**Indicative content** The muscle of the right ventricle contracts and pumps blood through the valves of the pulmonary artery into the lungs. Blood then leaves the lungs, passing into the pulmonary vein, re-entering the heart in the left atrium. **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit	6
	Question 9/4 Total	**[6]**

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Question			Marking details	Marks Available
5	*(a)*		Conclusion 1: No bacteria next to [Penicillium/fungus}/ clear area {by/ around} fungus/ bacteria only grow around edges; Conclusion 2: Effect decreases with distance from source/ effect decreases towards the edges/ clear area is circular;	2
	(b)	(i)	antibiotic;	1
		(ii)	Overuse/ Over prescription/ giving too many antibiotics; become resistant; NOT immune/ bacteria adapt (unqualified)	2
	(c)		any sensible aseptic method; • wash hands (a lot/regularly…..) • use of sterilising fluids/cloths • single use instruments/materials • use gloves • antibacterial gels • clean hospitals thoroughly • description of nurses uniform remaining in hospital NOT aseptic techniques unqualified	1
			Question 5 Total	**[6]**

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Question			Marking details	Marks Available
6	*(a)*		Correct position of label;	1
	(b)	(i)	Light;	1
		(ii)	Retina;	1
		(iii)	Iris (muscle); NOT ciliary muscle	1
	(c)		Speed/ fast / rapid/ quick/ owtte; Protection/ owtte; Automatic/ owtte;	3
			Question 6 total	**[7]**

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Question			Marking details	Marks Available
7	*(a)*		To keep the volumes the same/ so volume of 1cm^3 cubes is the same as the 8cm^3 cube;	1
	(b)	(i)	Osmosis;	1
		(ii)	Water passed in; From where it was in high concentration to low concentration/ down a gradient; Via a semi/ selectively/ partially permeable membrane;	3
		(iii)	{% increase in mass was faster/ more water was taken in} in cubes of side 1cm; Because there is a greater surface area; Root hairs increase surface area/ have a large surface area;	3
	(c)		Active transport;	1
			Question 7 total	**[9]**

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Question			Marking details	Marks Available
8	*(a)*	(i)	0-1 years;	1
		(ii)	memory cells; antigens; trigger {white blood cells/ lymphocytes}; to form clones/ reproduce/ multiply / undergo mitosis; {to increase production of/ more} antibodies/ produce antibodies more quickly;	5
	(b)	(i)	(Edward) Jenner (correct spelling);	1
		(ii)	Flu virus mutates rapidly/ antigens keep changing/ protein coat keeps changing; NOT evolve	1
			Question 8 total	**[8]**

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Question	Marking details	Marks Available
9	**Indicative content** The brain monitors whether there is too much water in the blood, and so little ADH is released. Dilute urine is excreted because the kidney tubules do not absorb much water to pass it back to the blood. If there is too little water in the blood, then more ADH is released causing concentrated urine to be excreted because the kidney tubules absorb a lot of water and pass it into the blood. **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit	6
	Question 9 Total	**[6]**

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