WJEC GCSE BIOLOGY

BIOLOGY



EXAM QUESTION PACK

UNIT B3 HIGHER TIER 4483 PAPERS

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4483/02

S16-4483-02

BIOLOGY

BIOLOGY 3
HIGHER TIER

P.M. TUESDAY, 17 May 2016

1 hour

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

4483 020001

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

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

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

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

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

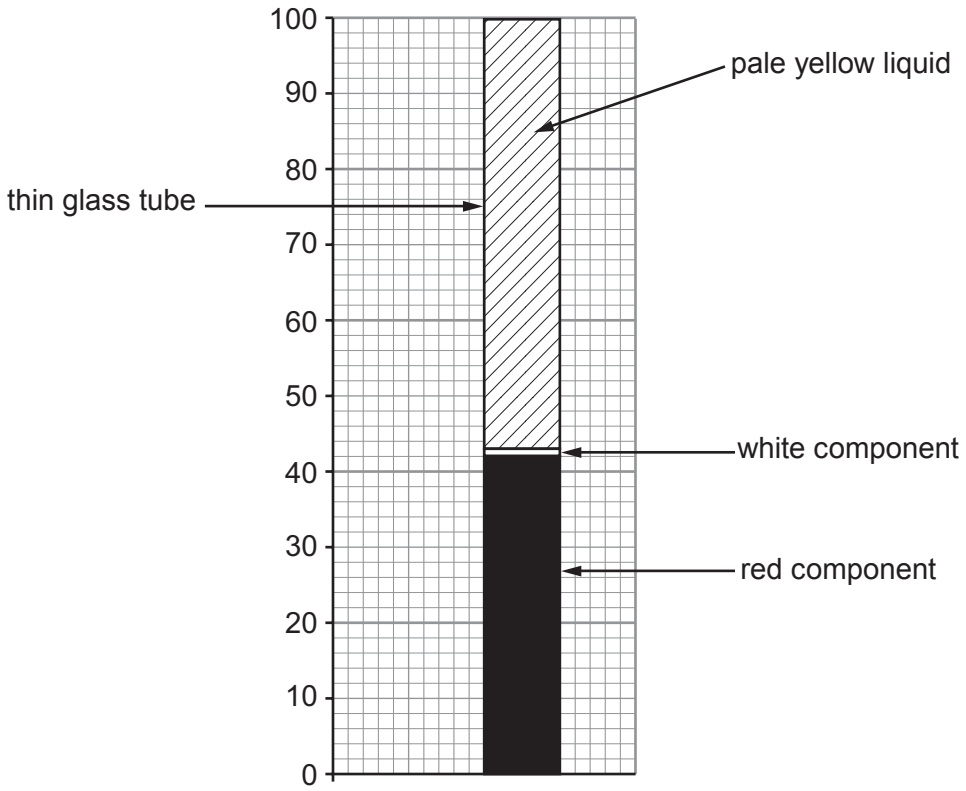
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Answer **all** *questions.*

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



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

.....

.....

(ii) Use the diagram 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]

.....

8

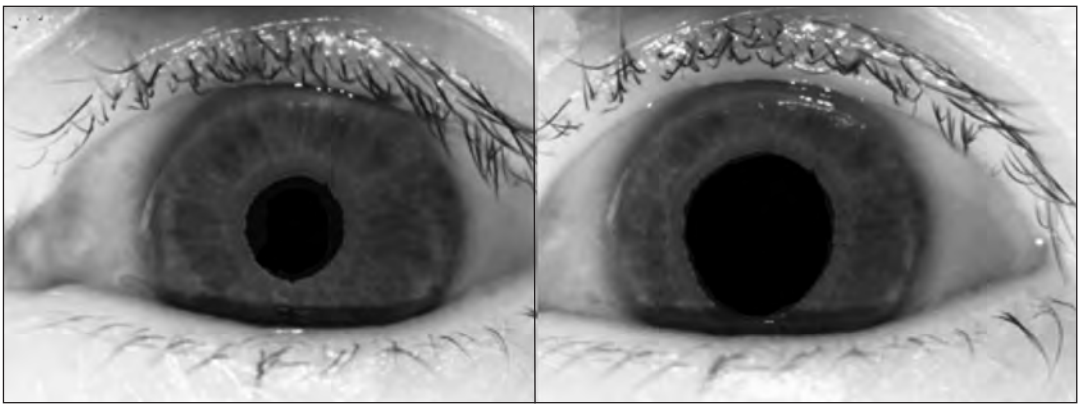
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2. The photograph below shows the eye of a volunteer who was taking part in a medical investigation into the effects of the drug LSD on the nervous system. One of the effects of LSD is that it causes dilation of the pupil of the eye. The pupil can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



Before taking LSD After taking LSD

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

Percentage increase in diameter = ... %

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

.....

.....

.....

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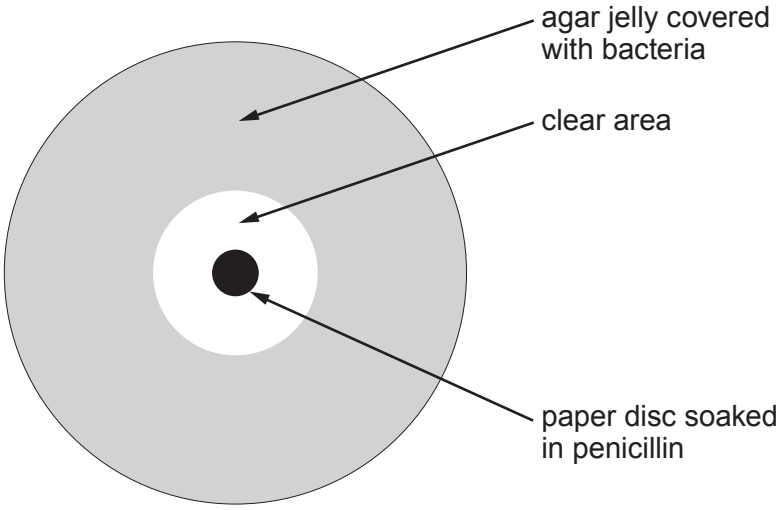
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3. The diagram below shows a Petri dish containing agar jelly. The agar jelly has a very large number of disease causing bacteria growing on it. A paper disc soaked in penicillin was placed in the centre of the agar jelly. After 3 days the Petri dish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



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

.....

.....

.....

(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

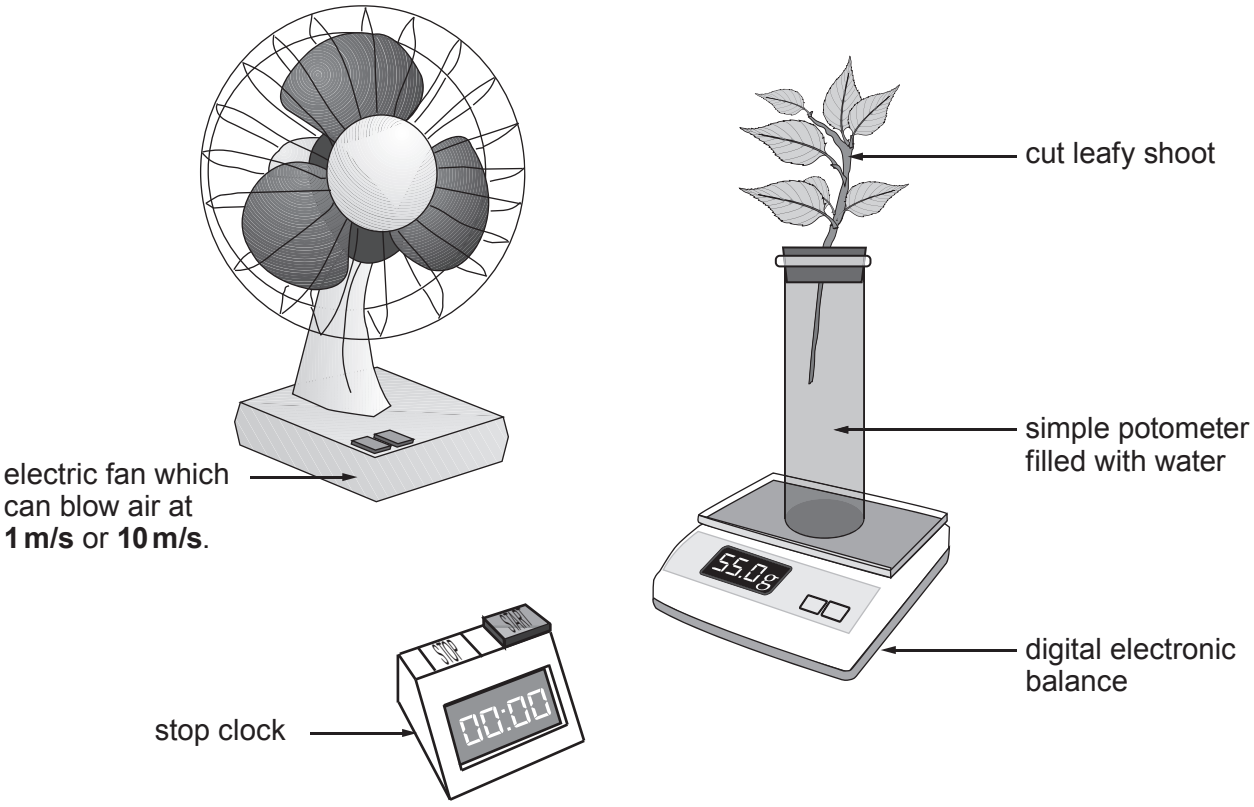
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4. Describe how you would investigate the effect of **two** different wind speeds on the rate of transpiration from a cut leafy shoot using the apparatus shown below.
In your account you must include reference to the results you would expect and the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



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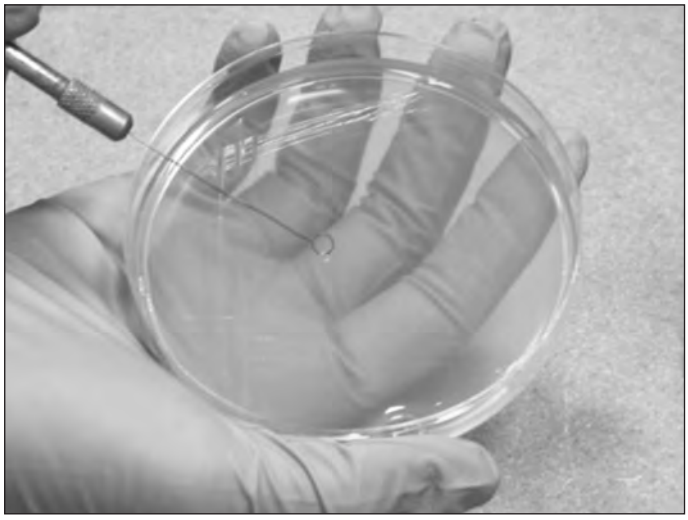
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5. Some fresh meat was cut into three 100 g pieces. Each 100 g piece of meat was stored at a different temperature for 14 days. The three temperatures used were:

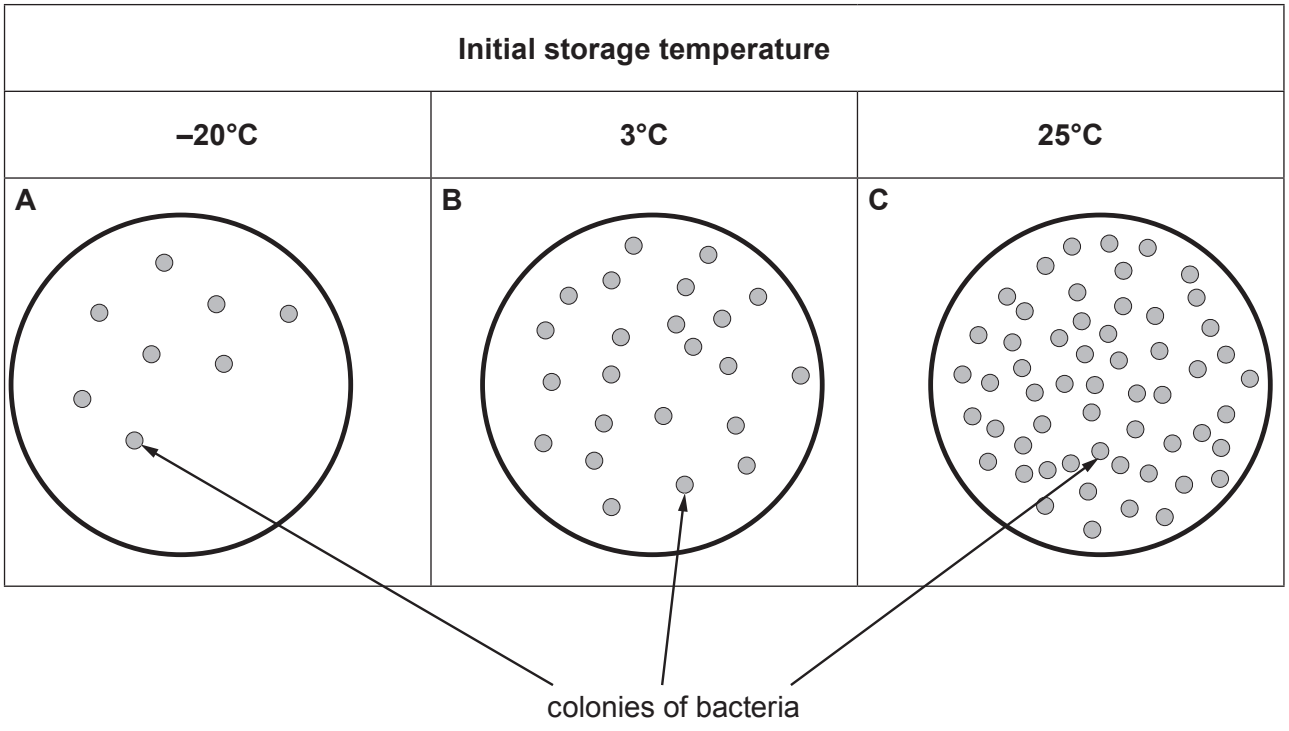
A –20°C (the temperature at which food is stored in a domestic deep freeze)
B 3°C (the temperature at which food is stored in a domestic refrigerator)
C 25°C

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



Inoculating agar

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



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

.....

.....

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

I. How many bacterial cells were spread onto the agar which was inoculated with meat stored at –20°C? [1]

.....

II. Explain the advantage of storing meat at –20°C. [2]

.....

.....

.....

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

.....

.....

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

.....

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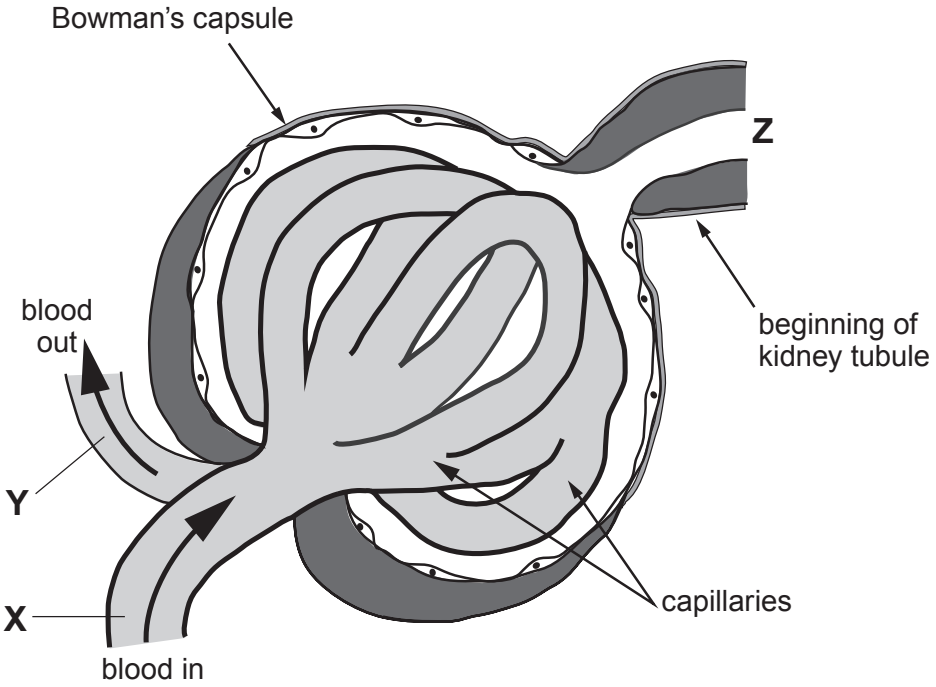
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6. Each minute 1200 cm^3 of blood passes into a healthy human kidney. This volume of blood contains 700 cm^3 of plasma. 125 cm^3 of plasma passes into the kidney tubules.

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

Percentage of plasma = ... %

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



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

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

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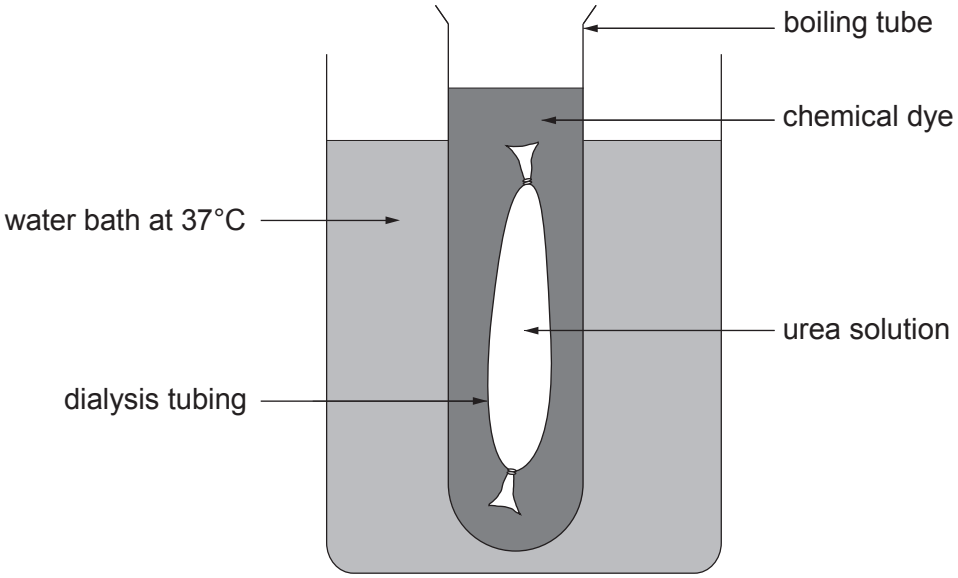
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7. The apparatus shown below was set up to investigate the permeability of a newly invented dialysis tubing to be used in a renal dialysis machine. A chemical dye was used which changes from colourless to blue in the presence of urea.



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

(i) dialysis fluid in a dialysis machine;

.....

(ii) blood in a dialysis machine?

.....

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

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

(i) .....

.....

(ii) .....

.....

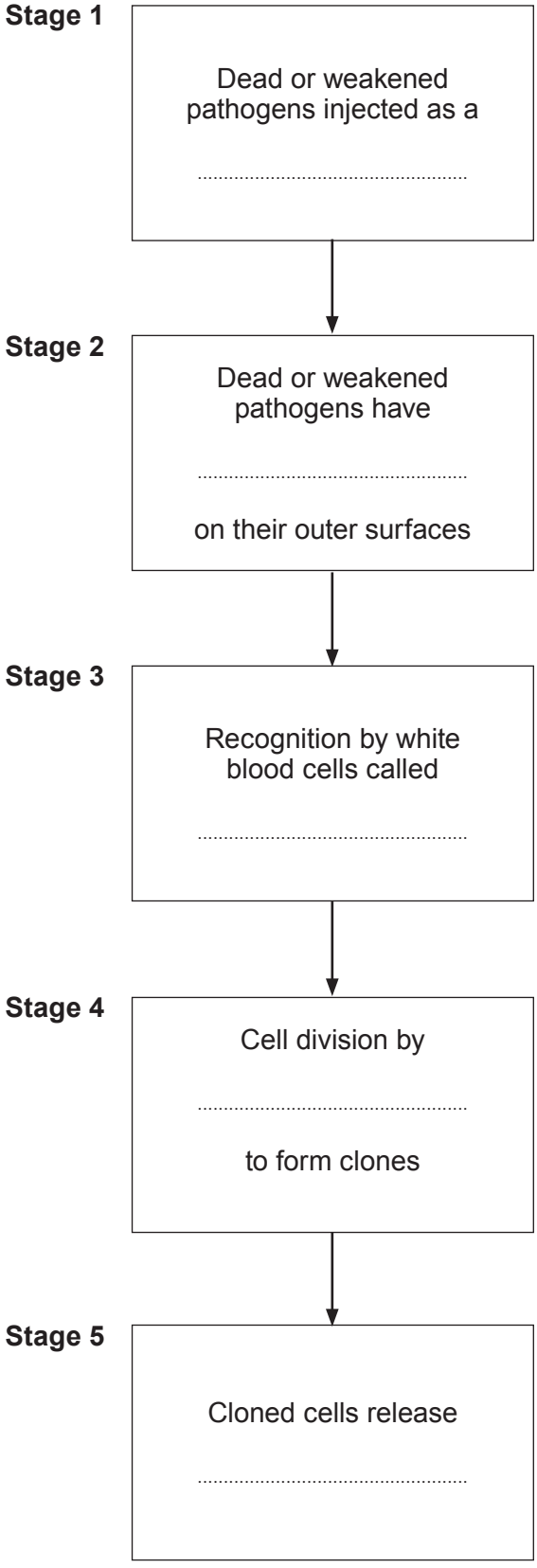
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8. The incomplete flow chart below shows the stages that occur after a person has been given an injection for protection against a disease caused by a pathogen.
Complete the flow chart by adding the most appropriate words. [5]



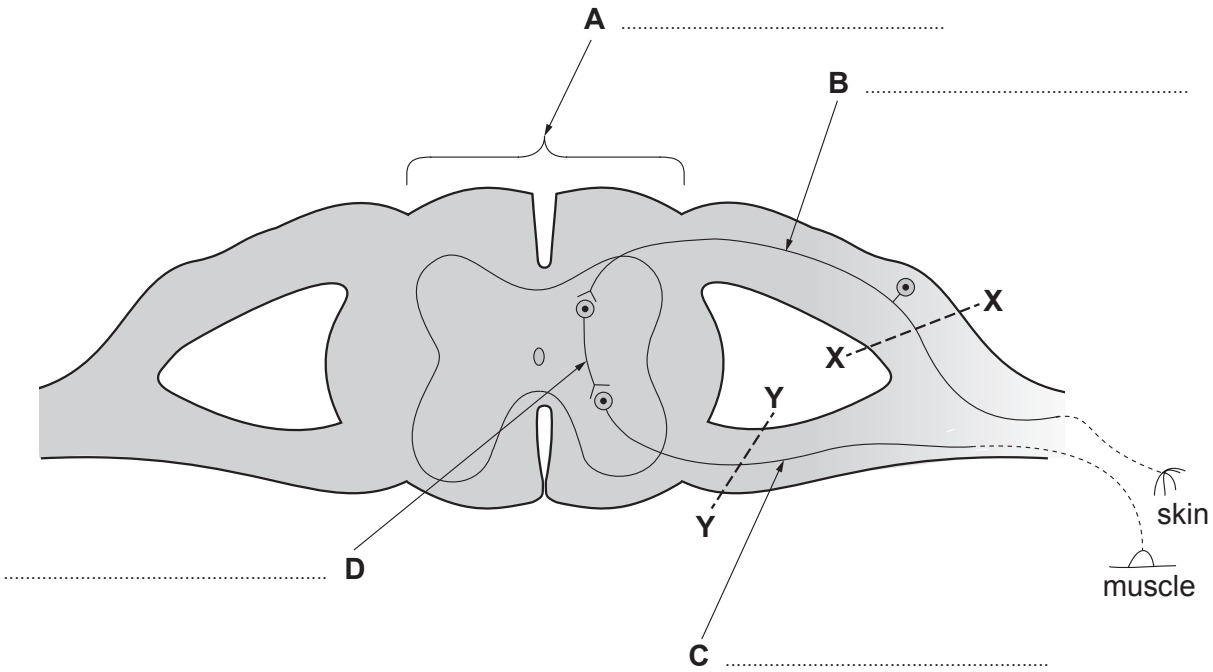
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9. The diagram shows part of a human nervous system involved in a withdrawal reflex.



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

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

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

(i) **X–X** .....

.....

(ii) **Y–Y** .....

.....

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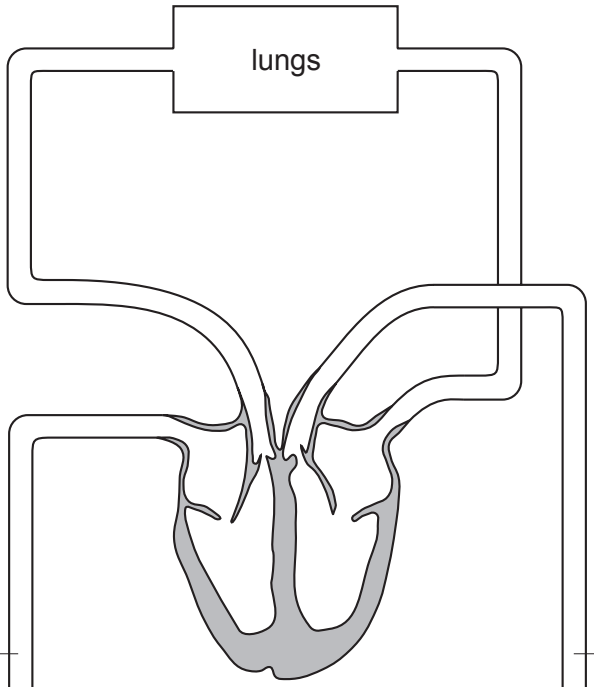
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10. The diagram illustrates the basic plan of the human circulatory system. The relative concentrations of oxygen and carbon dioxide are shown.



gas	relative concentration
oxygen	low
carbon dioxide	high

gas	relative concentration
oxygen	high
carbon dioxide	low

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

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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

4483/02

S15-4483-02

BIOLOGY

BIOLOGY 3
HIGHER TIER

P.M. TUESDAY, 12 May 2015

1 hour

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

4483 020001

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

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

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

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

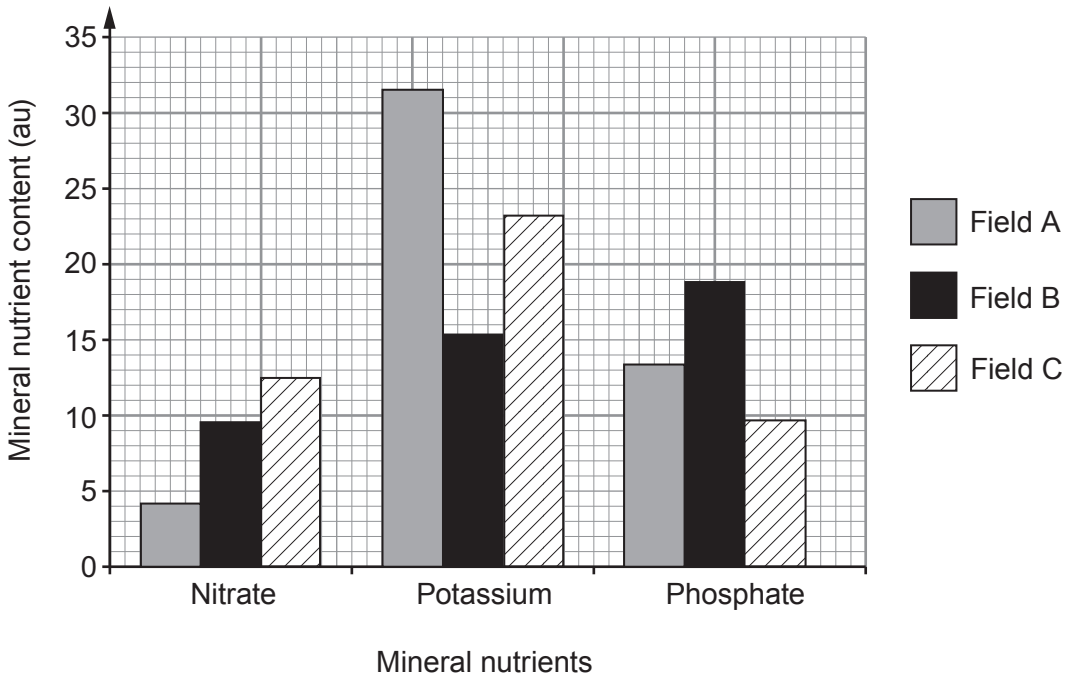
You are reminded that assessment will take into account the quality of written communication (QWC) used in your answer to questions **4** and **10**.

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Answer **all** *questions.*

1. 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]

.....

4483 020003

4

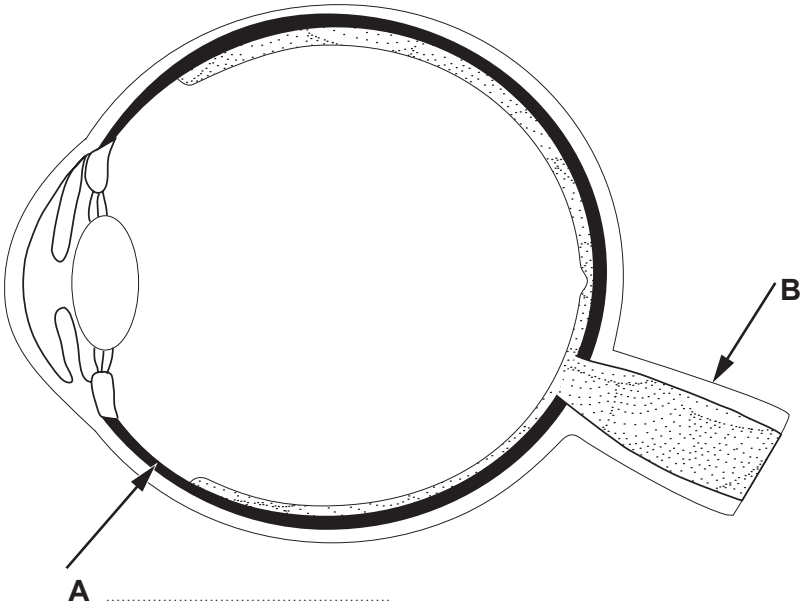
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Turn over.

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



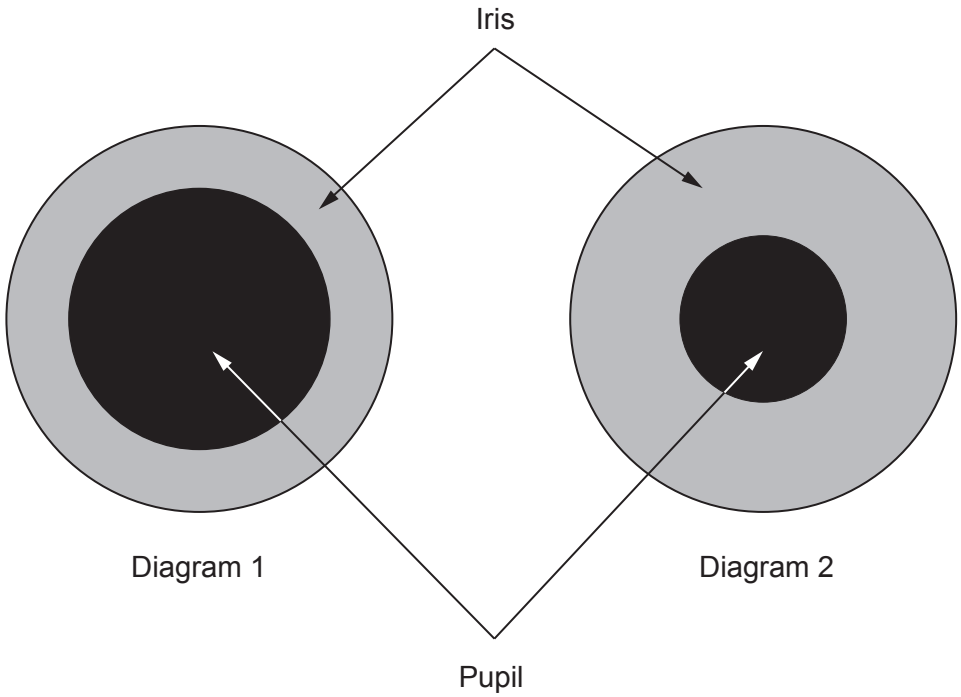
(a) Label parts **A** and **B** on the diagram. [2]

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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]

.....

.....

.....

.....

.....

.....

6

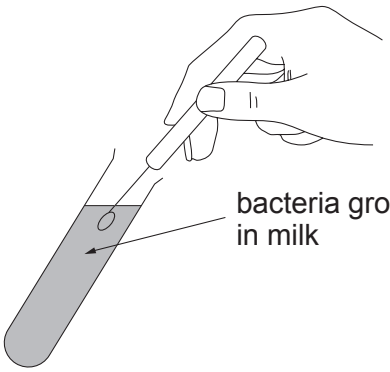
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4483 020005

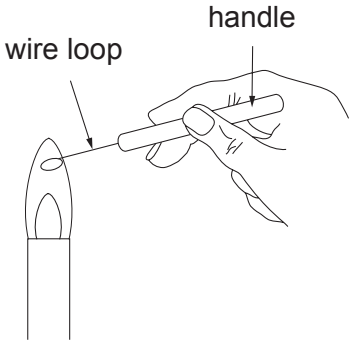
3. *(a)* The series of diagrams below, labelled A – D, show stages in the aseptic techniques involved in inoculating and plating bacteria from milk samples. The stages shown are not in the correct order.

Stage

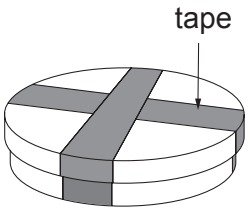
A



B

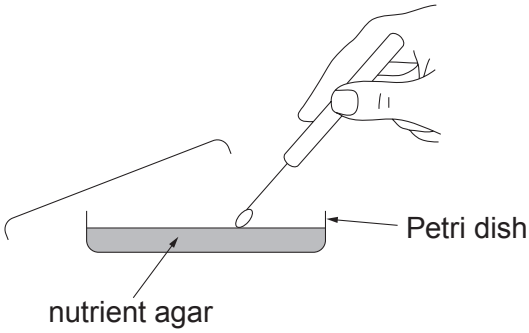


C



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

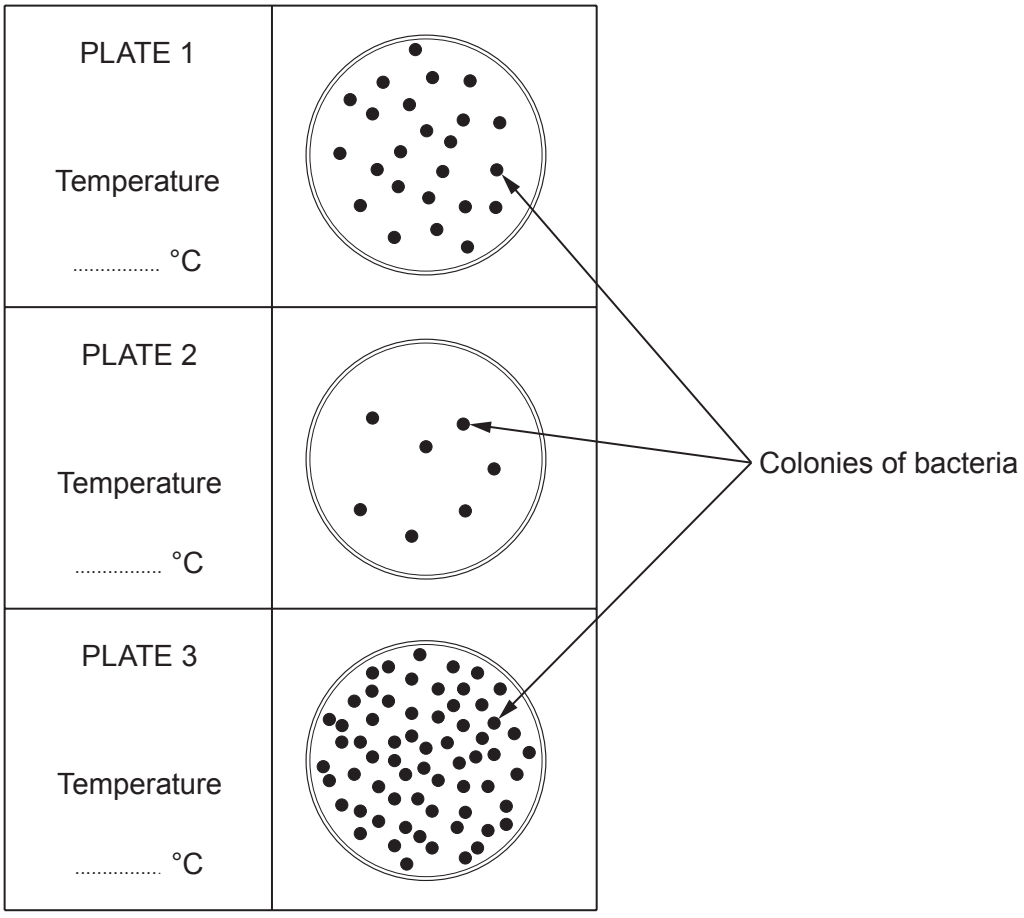
B C D A

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 7 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]

.....

.....

.....

.....

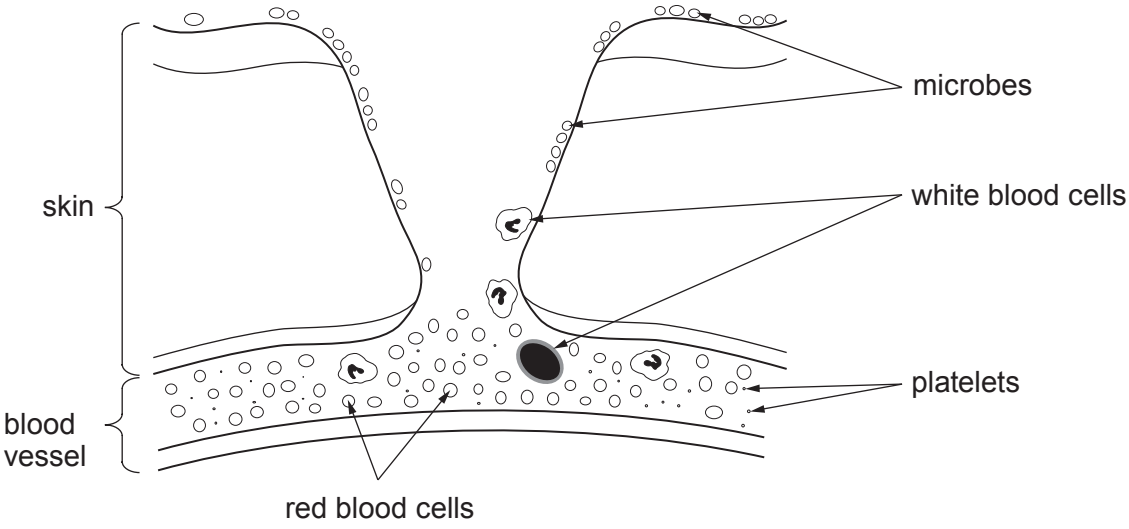
8

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4. 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]

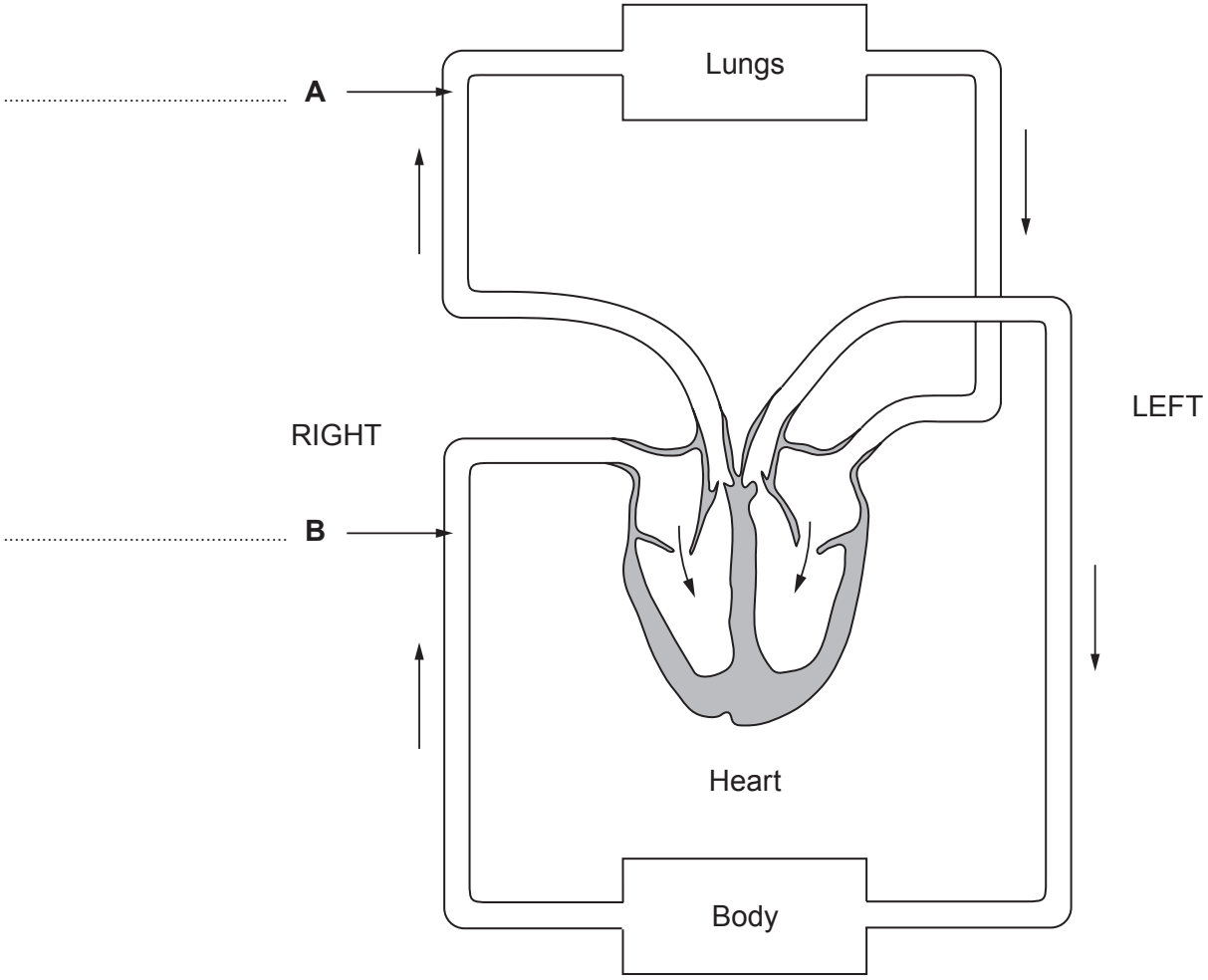
4483 020009

6

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5. The diagram below shows the double circulation of blood found in humans.



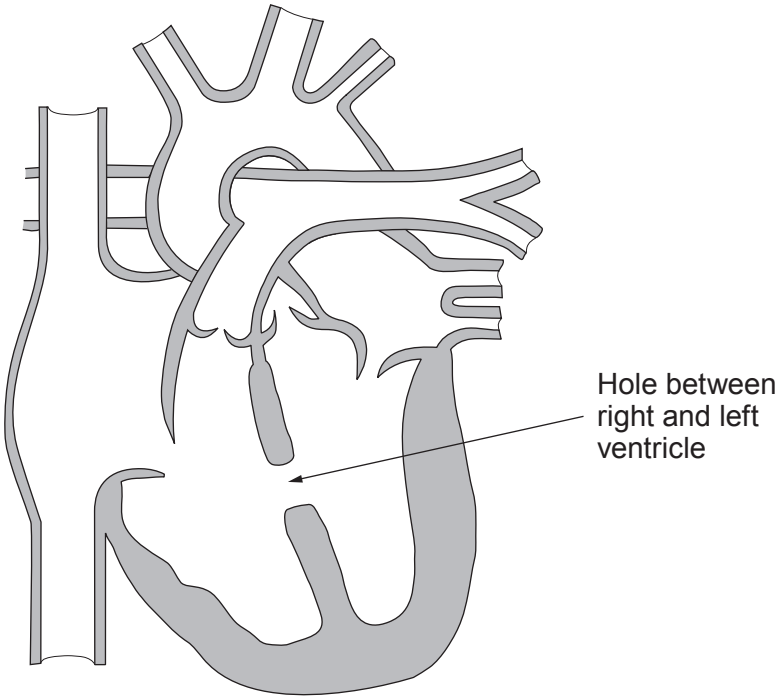
(a) Label blood vessels **A** and **B** on the diagram above. [2]

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(b) Occasionally a baby is born with a hole in the wall that separates the left and right sides of the heart. In the diagram below this hole is shown in the wall separating the right and left ventricles.



Using the diagram of the double circulation of blood shown opposite and your knowledge of blood circulation, explain the consequences to a person suffering from a hole between the right and left ventricles of the heart. [4]

.....

.....

.....

.....

.....

.....

6

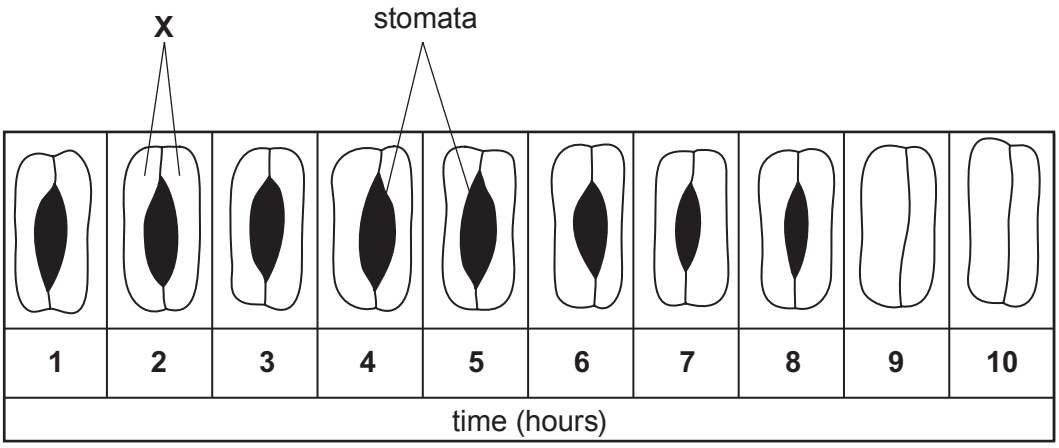
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Turn over.

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6. A potted plant was left in a hot, brightly lit room for ten hours. The plant was not watered during this period. The drawings below show how the mean width of the stomata (pores) changed over the ten hour period.



(a) Give **two** functions of stomata. [1]

.....

.....

(b) Name the cells labelled **X** on the drawing above. [1]

.....

(c) The width of the stomata changed over the ten hour period. State the advantage to the plant of this change. [1]

.....

.....

(d) Suggest how the time taken for the change in width to occur would be affected by:

(i) an increase in airflow over the plant; [1]

.....

(ii) an increase in water vapour around the plant. [1]

.....

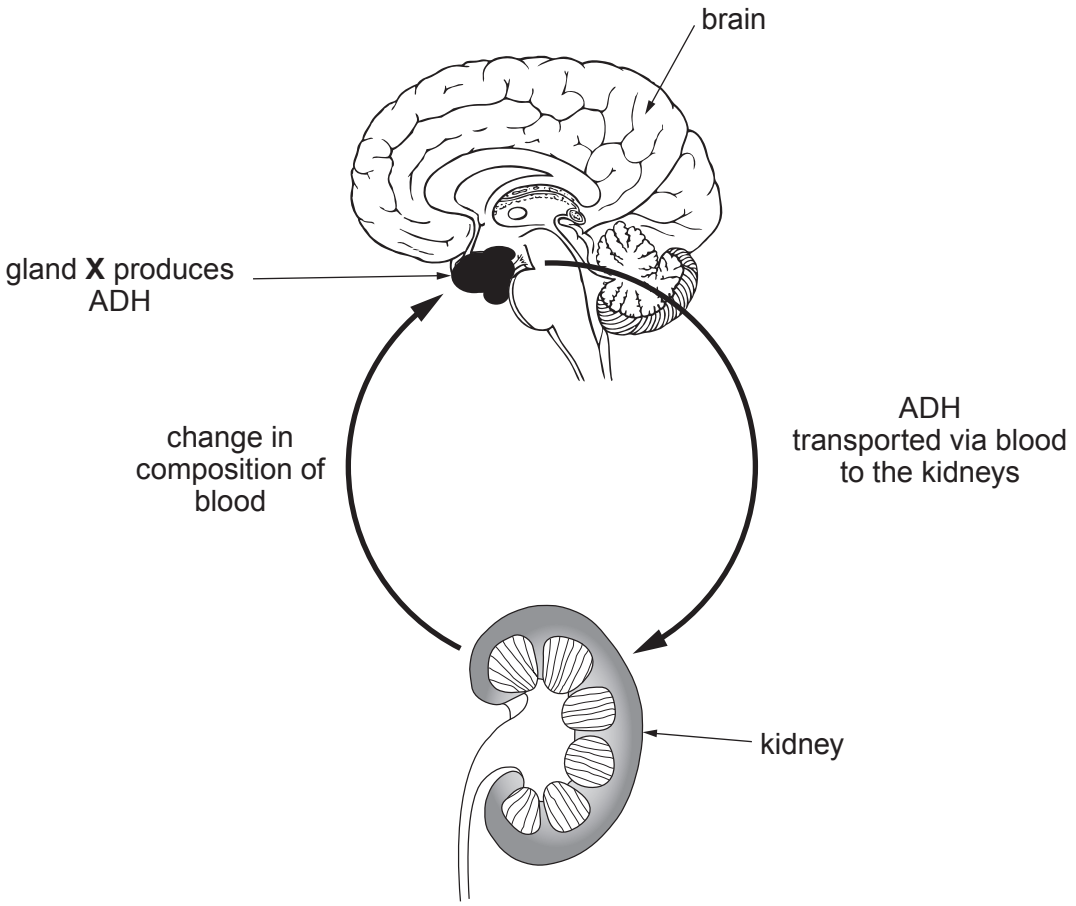
5

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7. The diagram below shows some of the processes which control the composition of blood and urine.



(a) Identify the stimulus which causes gland **X** to release ADH. [1]

.....

(b) Describe the effect of an increase in ADH production on the kidney and on the composition of urine. [3]

.....

.....

.....

.....

4

Turn over.

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8. When the kidneys fail to function, treatment may be necessary using a kidney dialysis machine. The flow diagram below outlines a procedure of kidney dialysis.

Stage 1

Blood from the body enters a dialysis machine from a tube **X** at high pressure as shown in the diagram below.

Stage 2

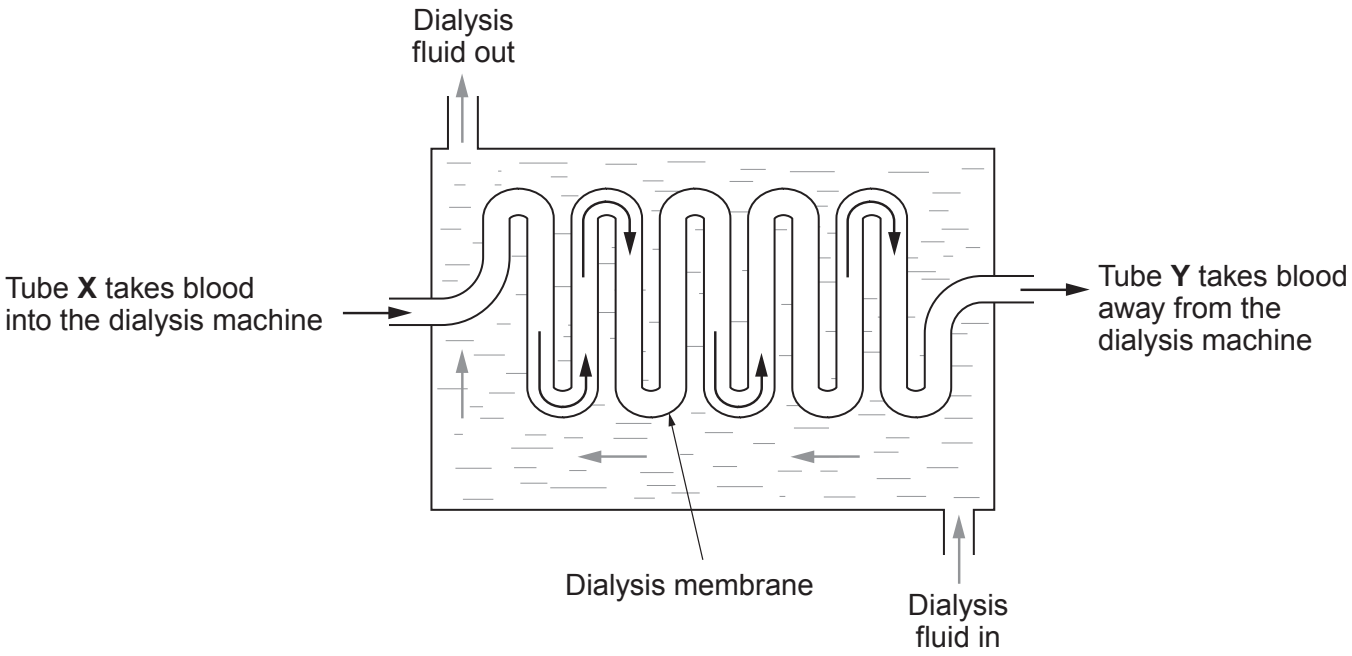
Blood flow in the machine is controlled by a pump and a substance is added to prevent blood clotting.

Stage 3

Blood is bathed in dialysis fluid as shown in the diagram below.

Stage 4

Blood returns to the body from the dialysis machine via tube **Y** as shown in the diagram below.



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(a) (i) What blood vessels in the body are equivalent to tubes **X** and **Y** shown in the diagram on page 14? [2]

X .....

Y .....

(ii) Suggest why it is necessary to prevent blood clotting in stage **2**. [1]

.....

.....

(iii) State the process by which molecules, other than water, will filter from the blood into the dialysis fluid. [1]

.....

(iv) Suggest why the blood and the dialysis fluid are flowing in opposite directions in stage **3**. [1]

.....

.....

(b) What other treatment might a person have if their kidneys fail to function? [1]

.....

6

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9. The World Health Organisation (WHO) collects data on the disease, tuberculosis (TB) which is caused by a bacterium. The WHO used the data shown in the table below to estimate:

- the total number of people with the disease in each region;
- the number of deaths from TB in each region.

Region	Number of people with TB per 100 000	Number of deaths from TB per 100 000
Africa	345	78
USA	43	6
Eastern Mediterranean	122	28
Europe	50	8
South East Asia	190	38
Western Pacific	112	19

(a) (i) Give **one** reason why it is necessary to express the number of people as per 100 000. [1]

.....

.....

(ii) Calculate the percentage of those with TB in Europe who survive the disease. Show your working. [2]

percentage who survive ..... %

(iii) How does the data show that Africa is less successful at treating TB than Europe? [1]

.....

.....

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(b) A vaccine against TB has existed since 1921. Explain how a vaccine can protect the body from a disease caused by a bacterium. [4]

.....

.....

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.....

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.....

.....

(c) The number of cases of TB decreased considerably in many countries during the 20th century. Over the past 15 years, the number of cases worldwide has greatly increased. Suggest why this has happened. [1]

.....

.....

9

TURN OVER FOR THE LAST QUESTION

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10. Define a reflex action. Describe the reflex arc involved in the blinking response to a flashing light. (Diagrams will not be credited.) [6 QWC]

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

4483/02

BIOLOGY

BIOLOGY 3
HIGHER TIER

A.M. TUESDAY, 13 May 2014

1 hour

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

4483
020001

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 **3***(b)* and **9**.

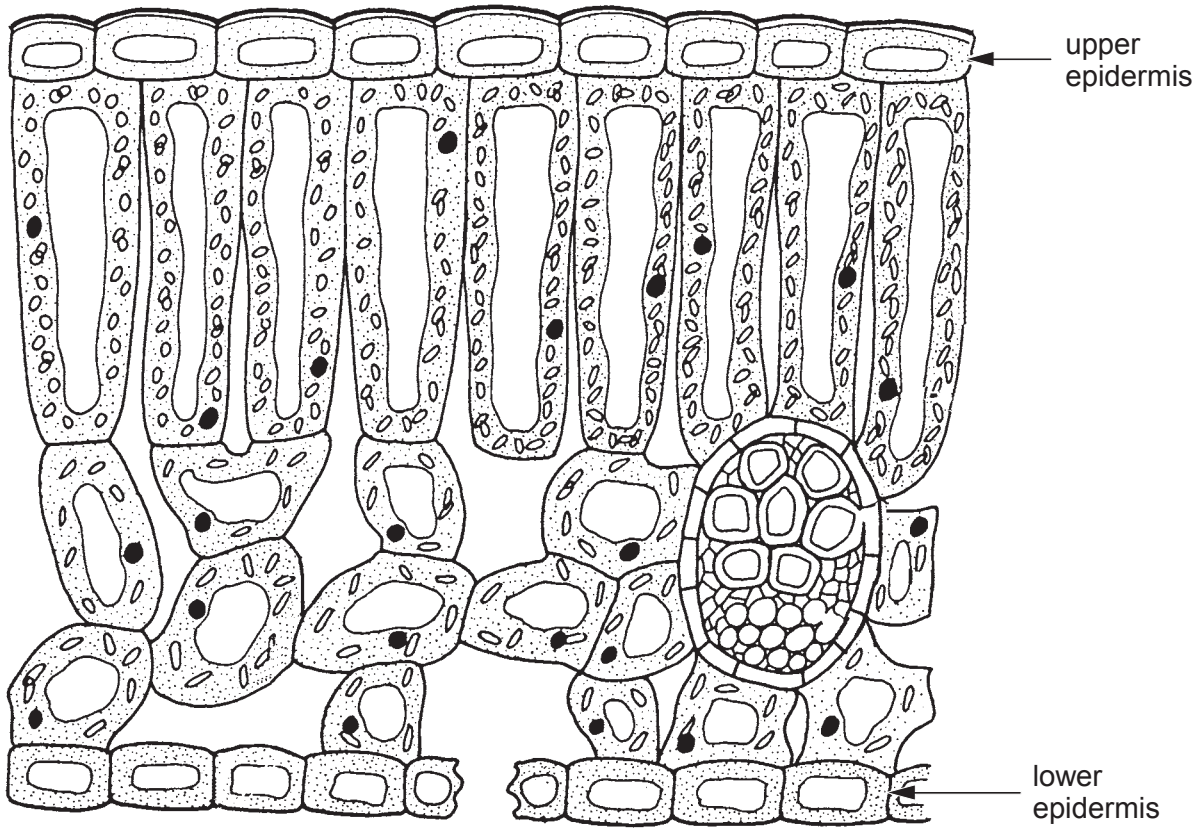
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Answer **all** *questions.*

1. *(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]

.....

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.....

6

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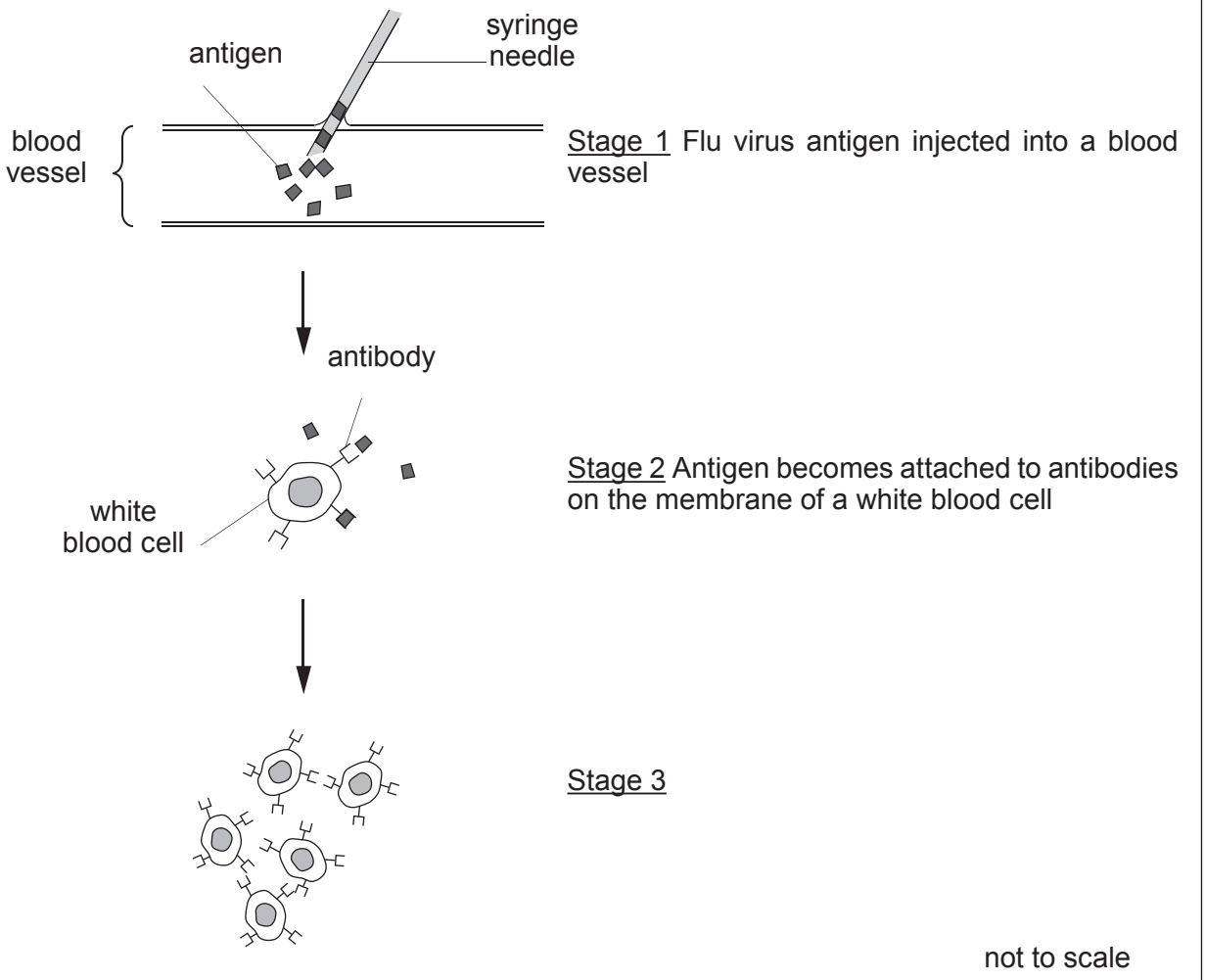
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Turn over.

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2. 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]

.....

.....

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9

Turn over.

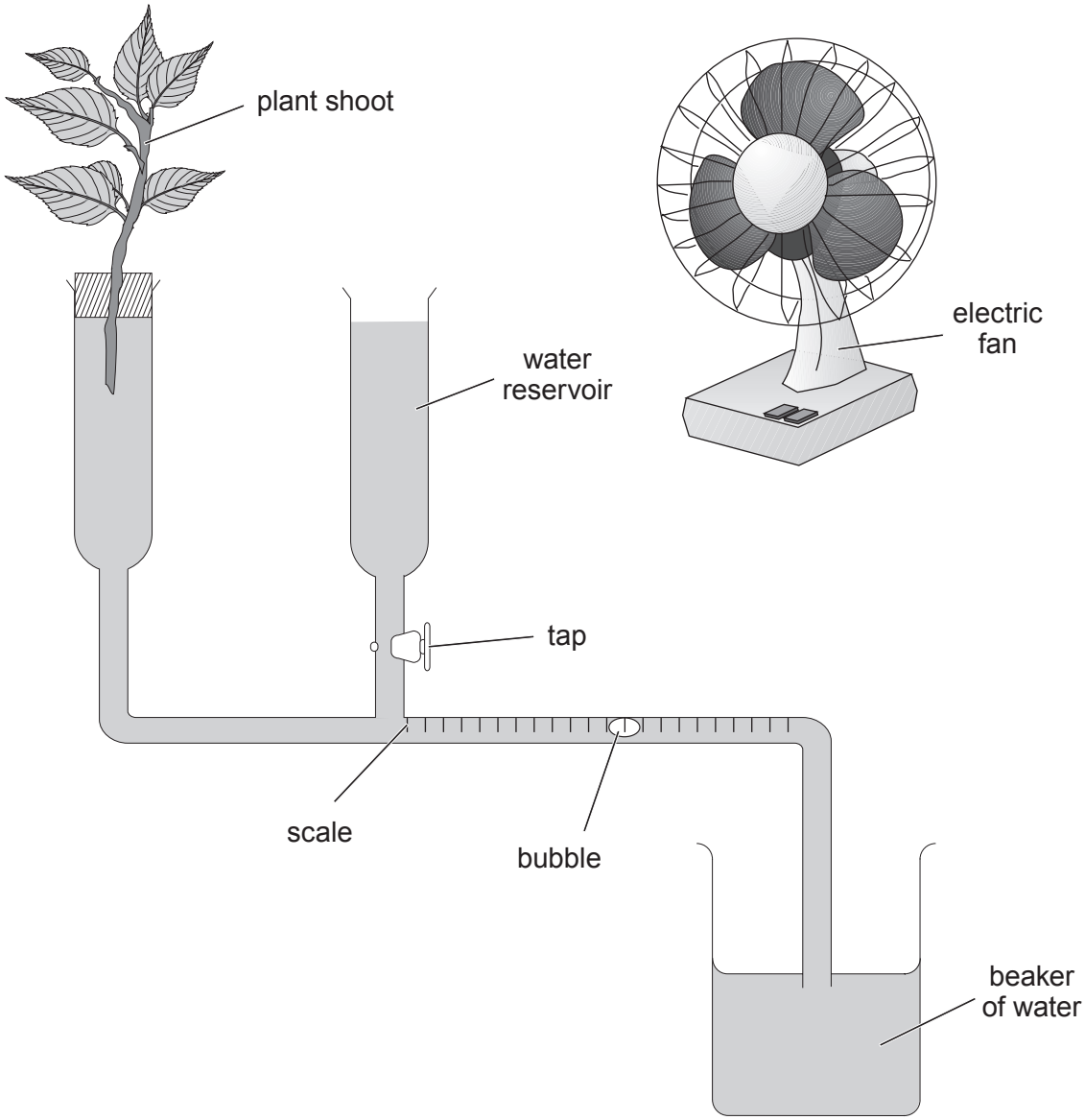
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3. *(a)* What word is used to describe water loss from the leaves of a plant? [1]

.....

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]

.....

.....

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.....

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

1. .....

2. .....

9

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Examiner only

4. *(a)* What is meant by the term excretion? [1]

.....

.....

(b) The table below shows mean fluid intake and urine produced in astronauts studied before and during space flights.

sampling period	mean water intake (cm^3)	mean urine produced (cm^3)	percentage of mean water intake that passes into the urine (%)
day before flight	3800	2700	71.0
during flight	2500	1700	.....

(i) Calculate the percentage of mean water intake that passes into the urine during a flight. Write your answer in the table above. Use the space below for your working out. [1]

(ii) During space flights, the kidneys remove unusually high levels of salts from the blood.

I. What happens to salts removed from the blood by the kidneys? [1]

.....

II. Use data in the table and the information above to describe and explain how the concentration of urine changes during a space flight. [2]

.....

.....

.....

.....

(iii) Suggest why astronauts are given drinks containing high levels of salts when they return to Earth. [1]

.....

.....

6

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5. The presence of protein in the urine is a symptom of a kidney disease called nephrotic syndrome. The drug endaravone is used as a treatment for this disease. Rats with nephrotic syndrome were used to investigate the effects of endaravone. A control group of healthy rats was also used in the investigation.

The results are shown in the table:

group of rats	protein in urine (mg/day/rat)
control	0
with nephrotic syndrome	350
after treatment with endaravone	0.5

(a) (i) What was the purpose of the control group? [1]

.....

(ii) Give a reason for the absence of protein in the urine of rats which do not show nephrotic syndrome (control group). [1]

.....

.....

(b) State **three** factors which must be kept the same in this investigation. [3]

(i) .....

(ii) .....

(iii) .....

(c) How would you increase the strength of evidence in this investigation? [1]

.....

(d) How does this evidence suggest that endaravone might be useful in the treatment of nephrotic syndrome in humans but is not a **cure**? [2]

.....

.....

.....

8

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6. *(a)* In the list below, which **two** letters represent pathways taken by nerve impulses in reflex actions? [2]

A motor neurone ⟶ brain ⟶ sensory neurone

B sensory neurone ⟶ spinal cord ⟶ motor neurone

C sensory neurone ⟶ spinal cord ⟶ receptor

D retina ⟶ brain ⟶ eyelid

Letters ..... and .....

(b) Name an example of each of the two reflex actions given as your answer to *(a)*. [2]

(i) Letter .....

Example .....

(ii) Letter .....

Example .....

4

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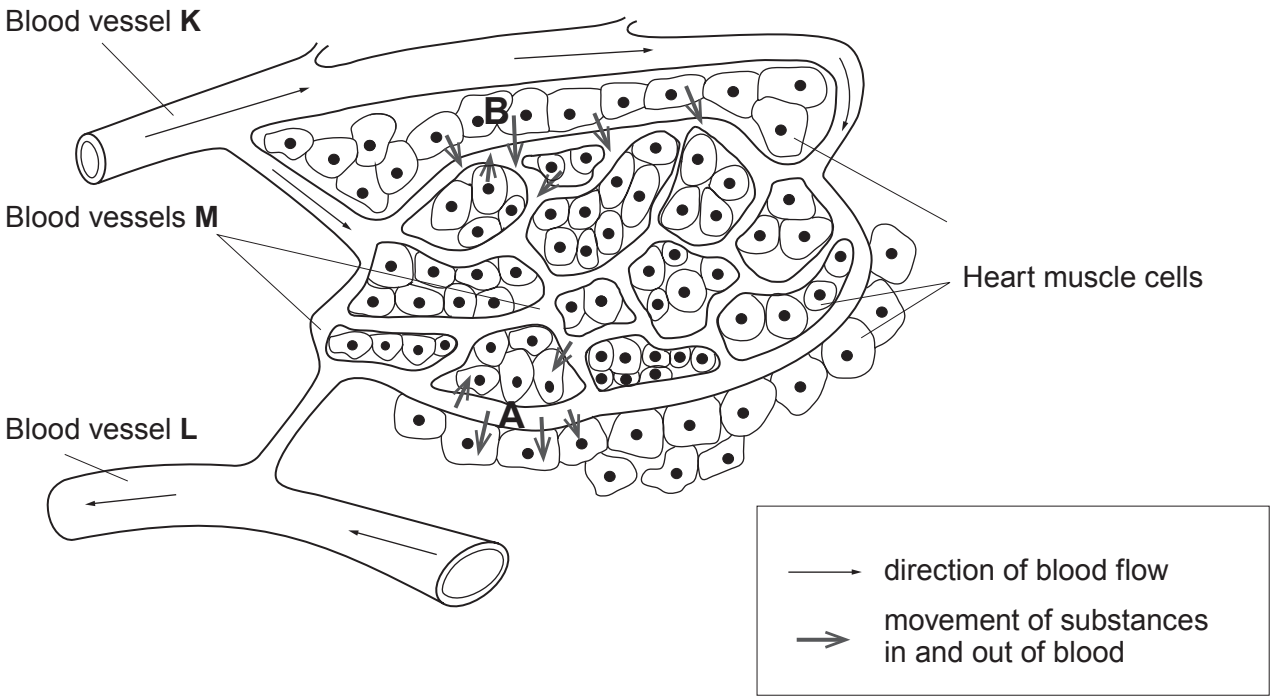
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7. *(a)* The diagram below shows a small part of the blood system supplying the muscle cells of the heart. The direction of blood flow is shown by the arrows on the blood vessels.



(i) Name the blood vessel which supplies the heart muscle with blood. [1]

.....

(ii) Explain why the action of platelets in this blood vessel could be a problem. [2]

.....

.....

.....

.....

(iii) Name the type of blood vessels labelled **M**. [1]

.....

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(b) The table below compares the contents of the blood in blood vessels **K** and **L**.

contents	vessel **K** (a.u.)	vessel **L** (a.u.)
glucose	120	90
oxygen	100	40
carbon dioxide	30	44

(i) Use the data in the table to calculate how much carbon dioxide will pass from the muscle cells into the blood shown by the arrows **B**. [1]

..... a.u.

(ii) Choose **one** substance from the table above which will pass from blood vessel **M** to the muscle cells in the direction shown by the arrows **A**. [1]

.....

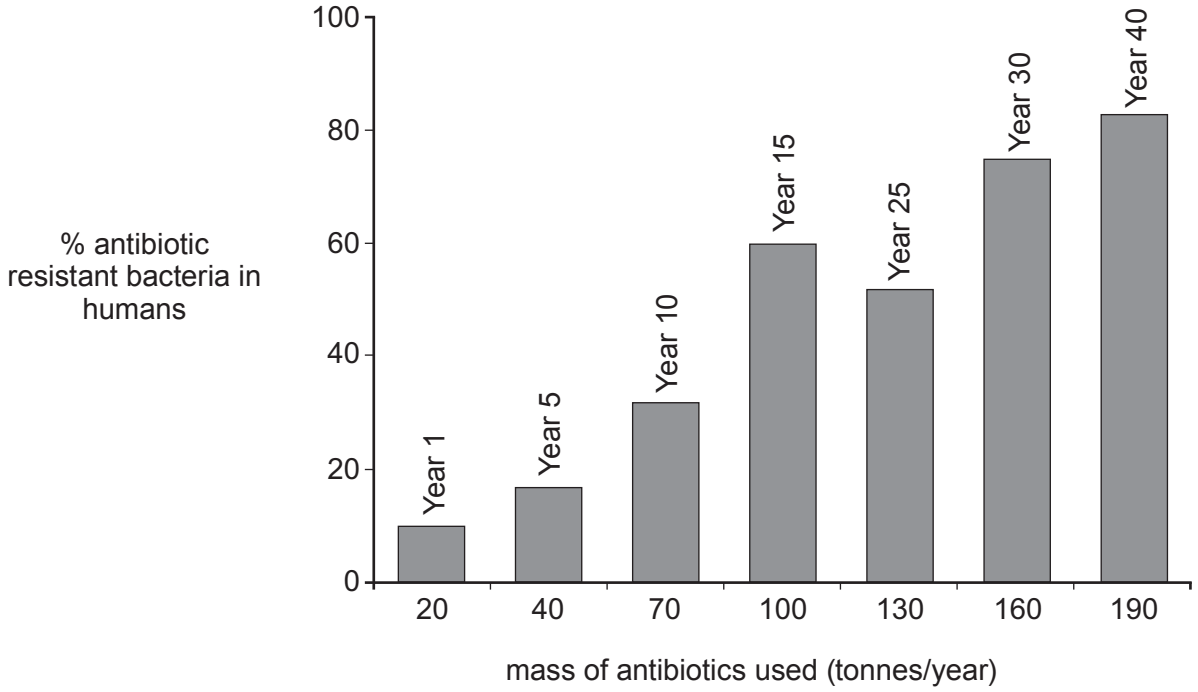
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8. The bar chart below shows the percentage of antibiotic resistant bacteria found in humans. The bar chart also shows the mass of antibiotics used during a period of 40 years in Britain.



(a) Describe the relationship between the percentage of antibiotic resistant bacteria in humans and the mass of antibiotics used. [1]

.....

.....

(b) During the 20th century, antibiotics were often added to cattle food to increase the production of meat.
Explain why this practice has now been banned in most countries. [2]

.....

.....

.....

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(c) Bacteria from humans were grown on nutrient agar in four Petri dishes labelled **A, B, C** and **D**. These bacteria were tested for antibiotic resistance. Dish **A** was a control, **B, C** and **D** had different antibiotics added. The Petri dishes were incubated for equal times. The results are shown in the table below.

	Petri dish			
	A	**B**	**C**	**D**
name of antibiotic	no antibiotic present	ampicillin	tetracycline	ampicillin + tetracycline
number of bacterial colonies	250	157	203	150

(i) Name the antibiotic which is least effective. [1]

.....

(ii) Calculate the percentage of bacteria resistant to **both** ampicillin and tetracycline when they are used together. Show **clearly** your working and answer. [2]

Answer ..... %

6

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Turn over for Question 9.

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9. Describe how you would carry out an investigation into the number of bacteria present in boiled milk **and** milk that had been left at room temperature for five days using a basic aseptic technique and agar plates. In your description, state the expected results. [6 QWC]

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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

4483/02

BIOLOGY

BIOLOGY 3
HIGHER TIER

A.M. TUESDAY, 14 May 2013

1 hour

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

4483
020001

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 **4** and question **9**.

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Answer **all** *questions.*

1. 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]

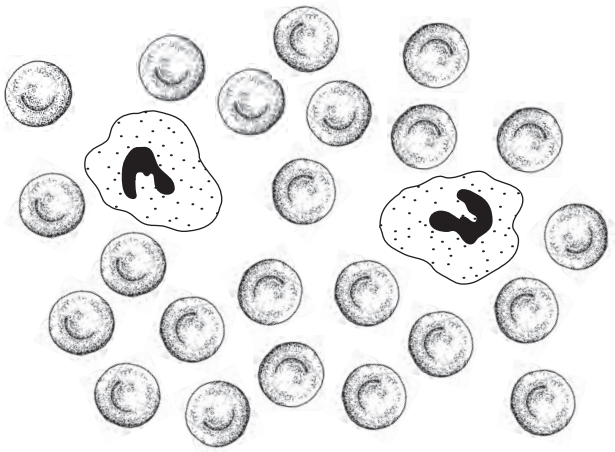
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2. The diagram shows a blood smear as seen through a light microscope.



(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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3. 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

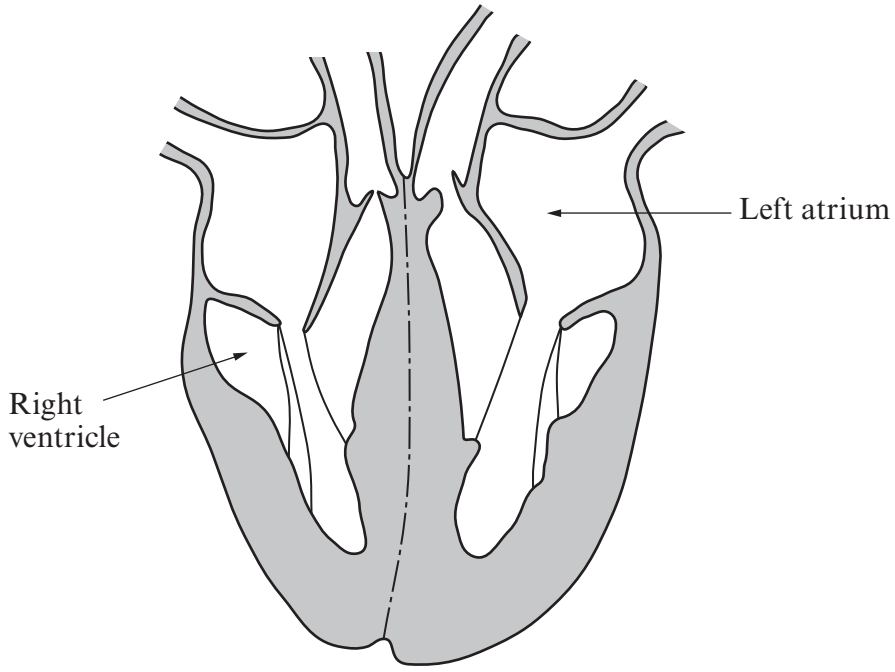
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4. The diagram shows the human heart in section.



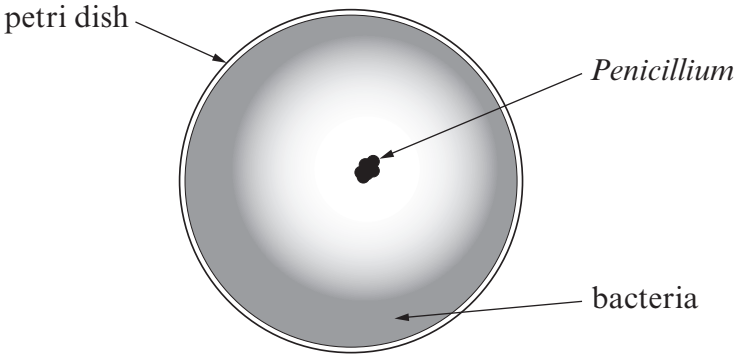
Describe and explain how blood in the right ventricle travels to the left atrium. [6 QWC]

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5. In 1928, Alexander Fleming found a fungus called *Penicillium* in a petri dish containing a culture of bacteria growing on agar jelly.
The diagram shows what he observed.



Fleming made two conclusions.

1. A chemical released from *Penicillium* was harming the bacteria.
2. The chemical was diffusing through the jelly.

(a) What is the evidence in the diagram for each conclusion? [2]

Conclusion **1**

.....

.....

Conclusion **2**

.....

.....

(b) The chemical found in *Penicillium* was extracted and is known as penicillin.

(i) What name is given to types of drugs such as penicillin? [1]

.....

(ii) Why has penicillin become less effective at killing bacteria in recent years? [2]

.....

.....

.....

.....

(c) MRSA has become a serious problem in hospitals.
Describe **one** effective control measure used in hospital against MRSA. [1]

.....

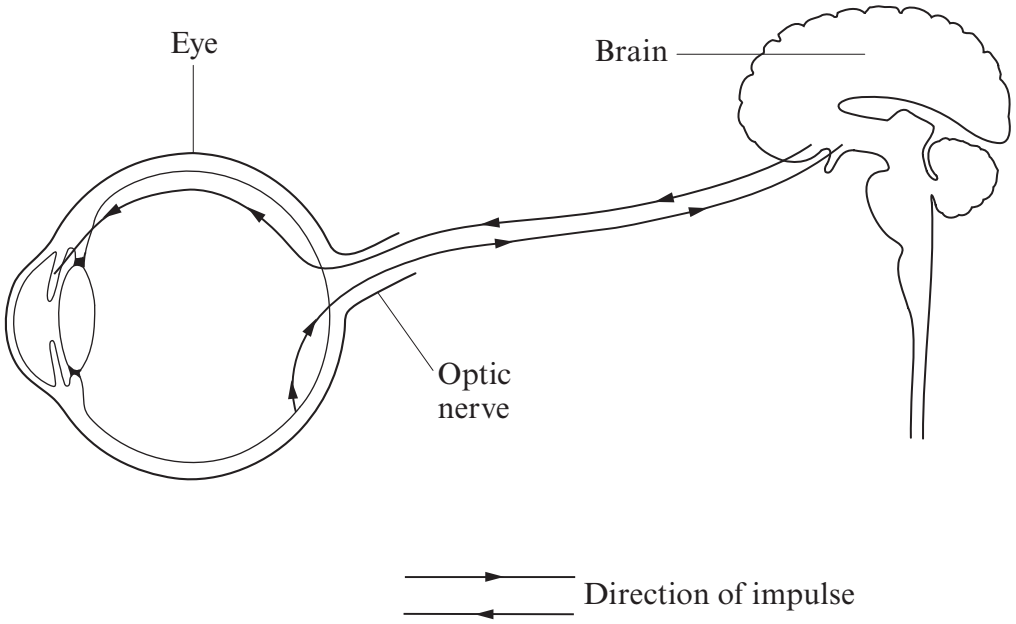
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6. The diagram shows the pathway taken by nerve impulses which help to bring about changes in the diameter of the pupil.



(a) On the diagram above, use an arrow to label the motor neurone. [1]

(b) Name [3]

(i) the stimulus which causes a change in the diameter of the pupil,

.....

(ii) the receptor which receives the stimulus,

.....

(iii) the effector which causes the decrease in the diameter of the pupil.

.....

(c) Describe how the decrease in diameter of the pupil demonstrates the three most important features of a reflex action. [3]

.....

.....

.....

.....

7

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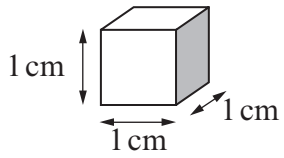
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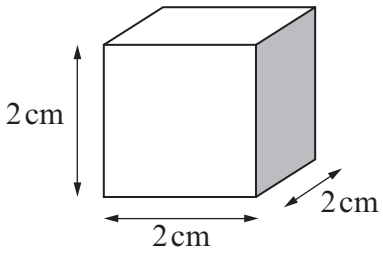
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7. An investigation was carried out to find the effect of surface area: volume ratio on the rate of absorption in plants.
Cubes of potato were cut to the following sizes.



Surface area = $6\,cm^2$
Volume = $1\,cm^3$



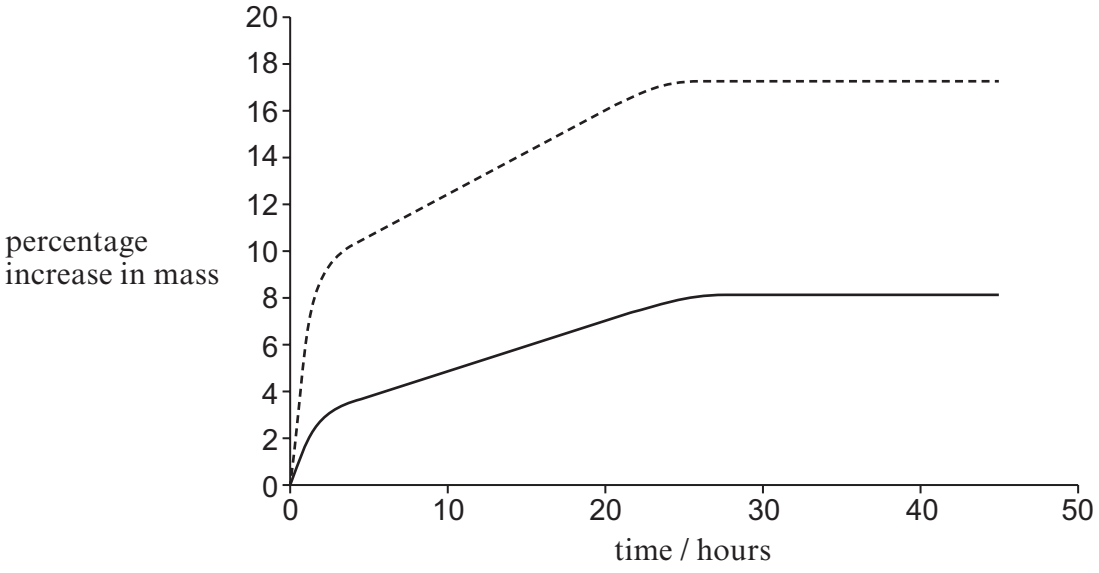
Surface area = $24\,cm^2$
Volume = $8\,cm^3$

The cubes were carefully blotted dry, weighed and their masses recorded.

One cube, 2 cm × 2 cm × 2 cm, was put into a beaker and completely covered with distilled water.

Eight cubes, each measuring 1 cm × 1 cm × 1 cm, were put into another beaker and completely covered with distilled water.

At regular intervals for a period of 45 hours, the cubes were removed from the beakers, blotted dry, reweighed and then replaced into fresh distilled water. The percentage increase in mass was measured for the eight cubes of side 1 cm and the one cube of side 2 cm. The results are shown in the graphs below.



key
---------- 8 cubes of side 1 cm × 1 cm × 1 cm

——————— 1 cube of side 2 cm × 2 cm × 2 cm

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(a) State why **eight** cubes of sides, 1 cm × 1 cm × 1 cm were used in this investigation. [1]

.....

.....

(b) (i) Name the process which caused the cubes to gain mass. [1]

.....

(ii) Describe the process by which the cubes of potato gained mass. [3]

.....

.....

.....

.....

(iii) Use the evidence gained by the investigation to describe the importance of root hairs in the absorption of water from the soil. [3]

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.....

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.....

(c) Name the process by which mineral salts are absorbed into the roots of plants. [1]

.....

9

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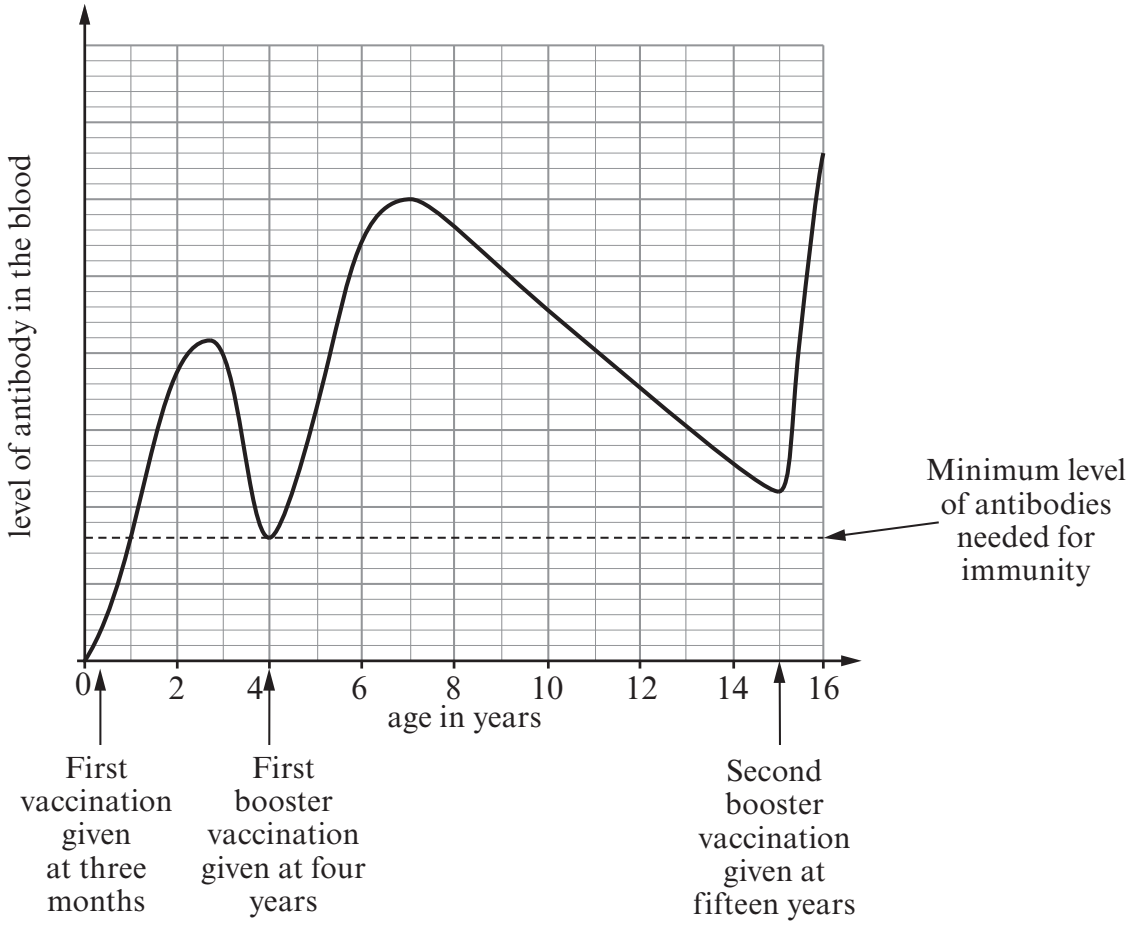
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8. Immunity against Polio is created by a series of vaccinations. The first is given at age 3 months and it is followed by a series of 'booster' vaccinations.

The following graph gives information about these vaccinations.



(a) Use the graph and your knowledge to

(i) State the age range during which a person is most likely to suffer from Polio. [1]

.....

(ii) Describe how the immune system reacts to 'booster' vaccinations. [5]

.....

.....

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(b) Smallpox is caused by a virus. Due to worldwide vaccination it is now considered to be extinct.

(i) Name the 18th century English doctor who was the first to use vaccination to prevent smallpox in Britain. [1]

.....

(ii) Suggest why the flu virus has not become extinct even though vaccines are used to prevent it. [1]

.....

.....

8

TURN OVER FOR QUESTION 9

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9. Explain how anti-diuretic hormone (ADH) helps the kidneys regulate the water content of the blood. [6 QWC]

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END OF PAPER

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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.

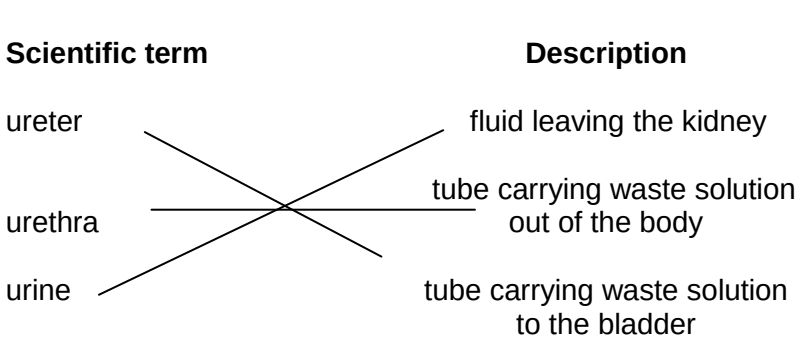
WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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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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