WJEC GCSE BIOLOGY

BIOLOGY



EXAM QUESTION PACK

UNIT B3 FOUNDATION TIER 0243 PAPERS

STEMUP

These questions belong to WJEC, not to us.

The examination questions, mark schemes and examiner reports in this pack were written and published by WJEC. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with WJEC and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. WJEC has not endorsed, approved or been involved in the production of it. WJEC and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

WJEC publishes its past papers, mark schemes and examiner reports free of charge. Always check the current specification at wjec.co.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Surname	Centre Number	Candidate Number
Other Names		0

GCSE

0243/01

SCIENCE
FOUNDATION TIER
BIOLOGY 3

A.M. MONDAY, 28 January 2013

45 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**9**	
2.	**5**	
3.	**7**	
4.	**8**	
5.	**6**	
6.	**6**	
7.	**6**	
8.	**3**	
Total	**50**	

0243 010001

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.
Write your name, centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.
You are reminded of the necessity for good English and orderly presentation in your answers.

© WJEC CBAC Ltd.

STEMUP.CO.UK

BLANK PAGE

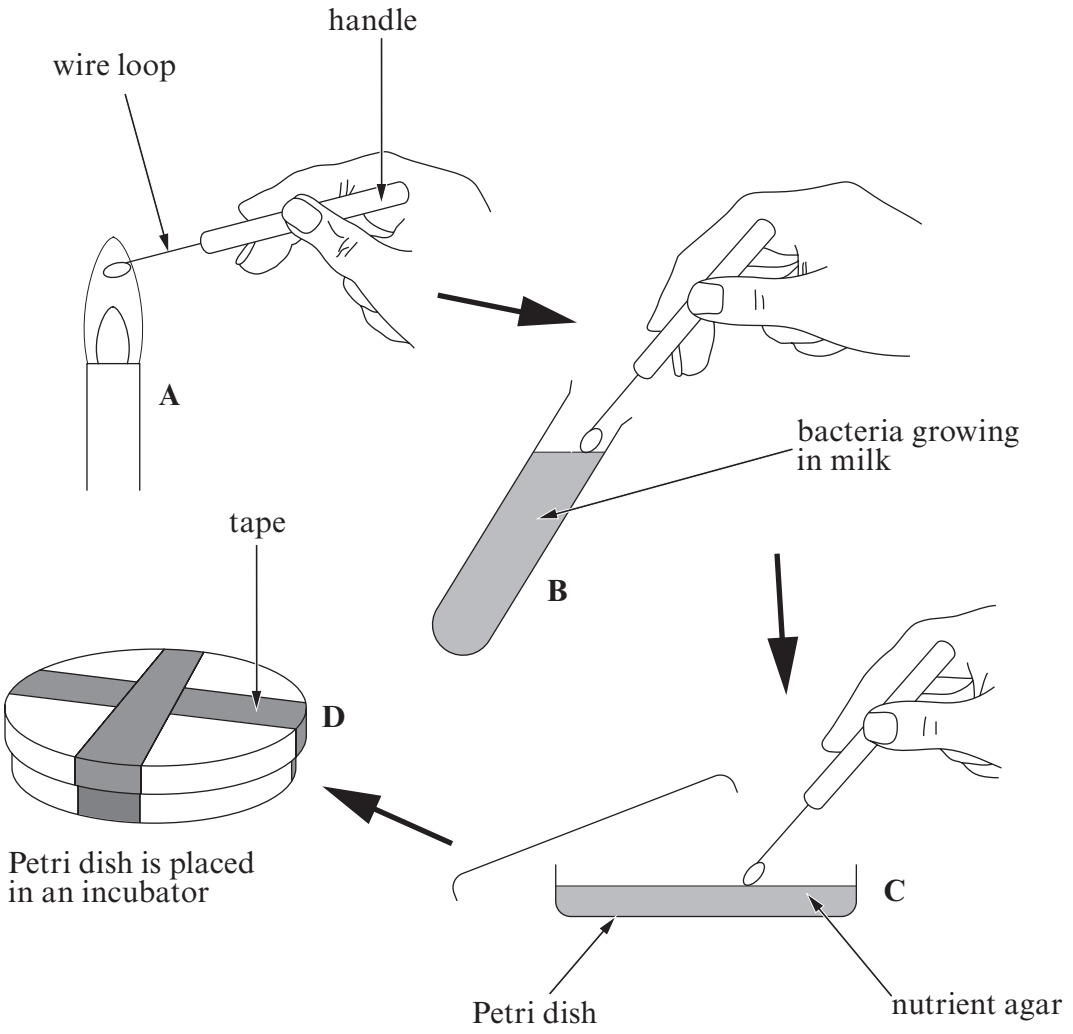
© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

Answer **all** *questions.*

1. The diagrams below show how scientists grow bacteria on nutrient agar in the laboratory. Care is needed as the air has many other microbes.



(a) State why the following actions are necessary.

(i) Strongly heating the wire loop in **A**. [1]

.....

(ii) Keeping the lid over most of the agar in **C**. [1]

.....

(iii) Sealing the dish with tape in **D**. [1]

.....

0243 010003

© WJEC CBAC Ltd.

Turn over.

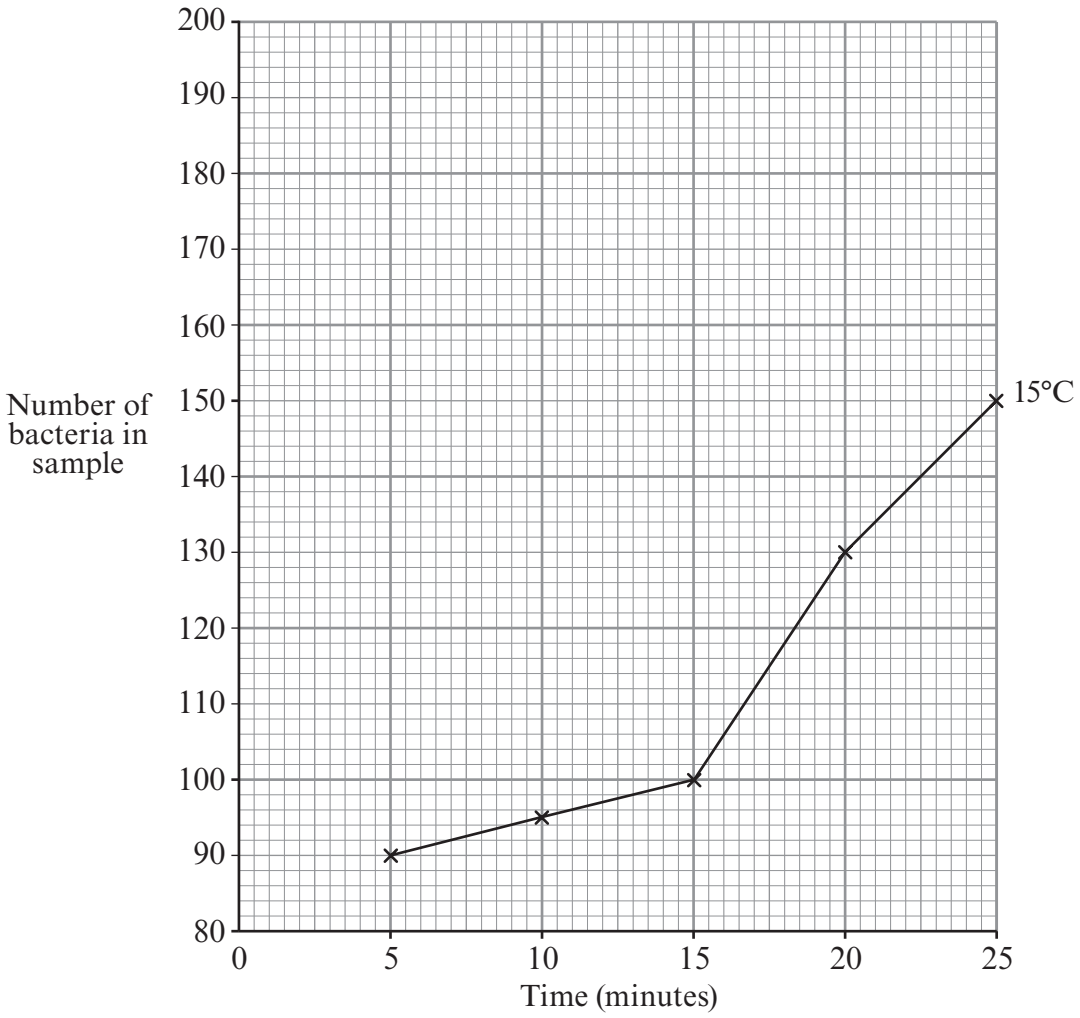
STEMUP.CO.UK

Examiner only

(b) Scientists grew bacteria at 15°C. They counted the bacteria every 5 minutes for 25 minutes. The investigation was repeated at 25°C and the results shown in the table below.

Time (minutes)	Number of bacteria (in sample) at 25°C
5	90
10	100
15	130
20	150
25	200

(i) Plot the results for **25°C** on to the graph. Join the plots with a ruler. Label your line 25°C. The results for 15°C have been plotted for you. [3]



© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(ii) From the graph for 15°C, what is the number of bacteria at 22 minutes? [1]

.....

(iii) Using the information from the graph, underline the correct statement below: [1]

growth is faster at 15°C than at 25°C

growth is faster at 25°C than at 15°C

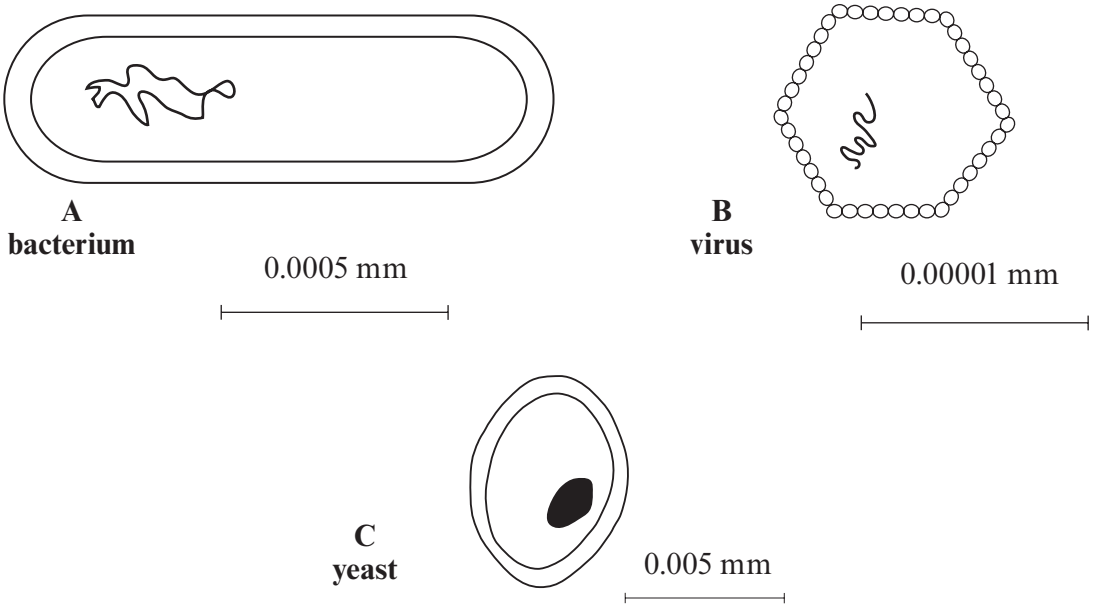
growth is equal at 15°C and 25°C

(c) Why is it important to keep fresh food in a refrigerator below 5°C? [1]

.....

9

2. The diagrams show three different microorganisms.



Give the correct letter from the diagrams above for each statement below. You may use letters more than once. [5]

(a) Reproduces by dividing into two. .....

(b) Reproduces by budding. .....

(c) The smallest microorganism. .....

(d) Has a nucleus. .....

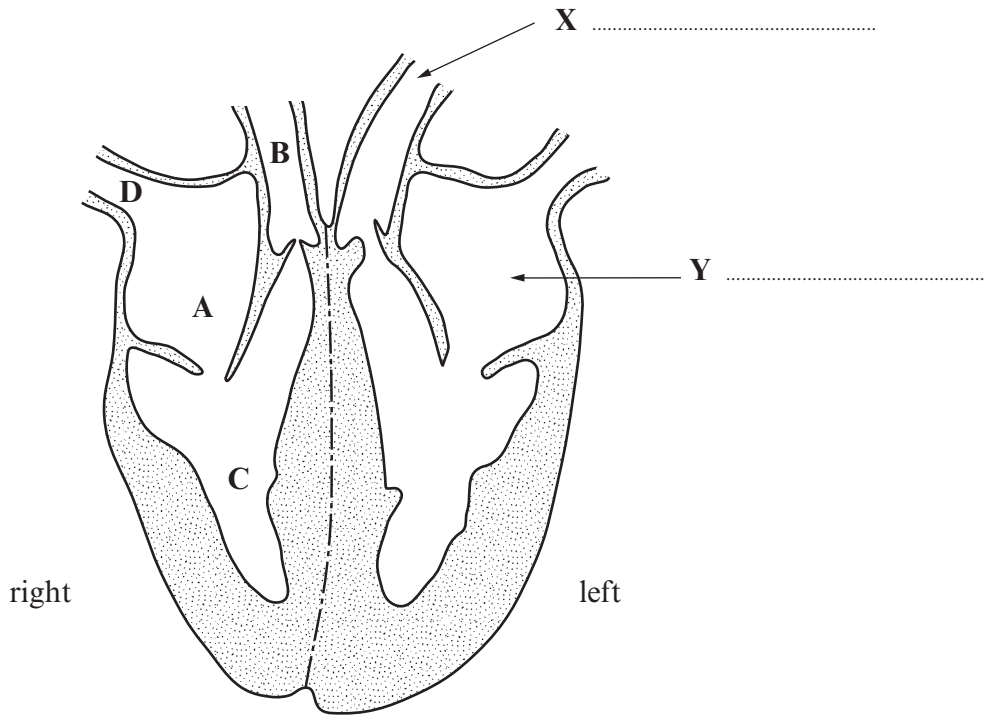
(e) Can only reproduce inside a host cell. .....

5

STEMUP.CO.UK

Examiner only

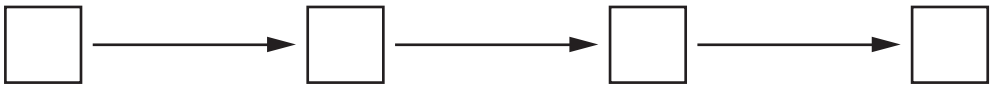
3. *(a)* The diagram below shows a section through the human heart.



(i) Label **X** and **Y** on the diagram using some of the words below. [2]

atrium ventricle valve aorta

(ii) From the diagram, write letters **A**, **B**, **C** and **D** in the boxes below, in the correct order to show the path of the blood as it flows through the right side of the heart. [1]

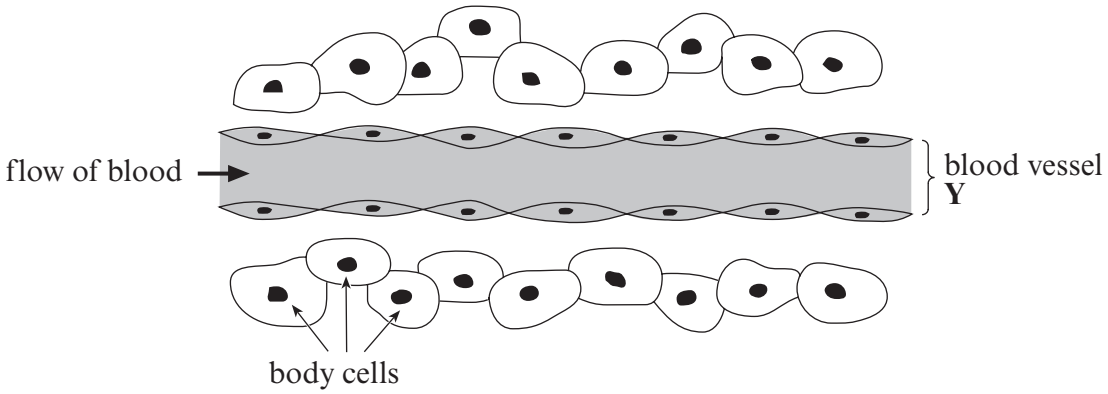


© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(b) The diagram below shows a small blood vessel found in the body.



(i) Name blood vessel **Y**. Underline the correct answer. [1]

artery capillary vein

(ii) Choose words from the list to complete the sentences below. [3]

carbon dioxide, oxygen, diffusion, protein.

As the blood flows through the body organs ..... which cells need, passes out of the blood and ....., which cells produce, passes into the blood. These substances enter and leave the blood by ..... .

0243 010007

7

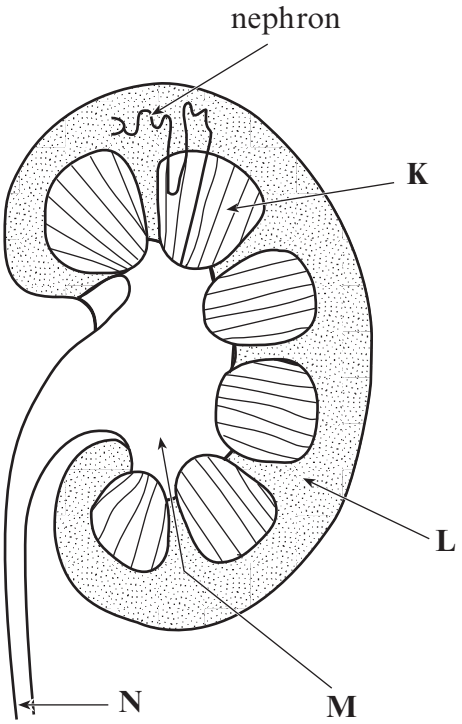
© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

4. The diagram shows the structure inside a human kidney.



(a) Give the letters which show [3]

(i) cortex; .....

(ii) medulla; .....

(iii) pelvis. .....

(b) Complete the following sentences about urine, the solution which leaves the kidney. Use some of the words from the list. [4]

urea, ureter, urethra, bladder protein.

(i) Urine contains the waste product .....

(ii) Urine leaves the kidney in the .....

(iii) Urine is stored in the .....

(iv) Urine leaves the body through the .....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(c) From the table below, name the substance *not* removed from the blood by the kidney. [1]

Substance	Blood entering kidney (arbitrary units)	Blood leaving kidney (arbitrary units)
water	230	174
glucose	168	168
mineral salts	325	302

.....

8

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

5. *(a)* Read the following information.

Pruteen
The wonder food?

- In 1980, scientists made a protein-rich food, quickly, in large quantities and at very low cost, to feed hungry people.
- The food, Pruteen, was made by growing bacteria on methanol, an industrial waste material.
- Tests showed that Pruteen was a high quality protein, although it was tasteless.
- Unfortunately, very few humans chose to eat Pruteen when it was offered. Later it was used successfully to feed farm animals.

ICI/Science Direct 2008

From **this** information:

(i) Which microbes were used to make Pruteen? [1]

.....

(ii) Name the nutrient which enabled the microbes to grow. [1]

.....

(iii) How were the scientists able to produce Pruteen so cheaply? [1]

.....

(iv) For what reason would Pruteen be suitable as a food for meat-producing farm animals? [1]

.....

(v) Suggest a reason why humans did not want to eat Pruteen. [1]

.....

(b) Microbes grow and multiply very rapidly. How is this an advantage to food producers? [1]

.....

6

© WJEC CBAC Ltd.

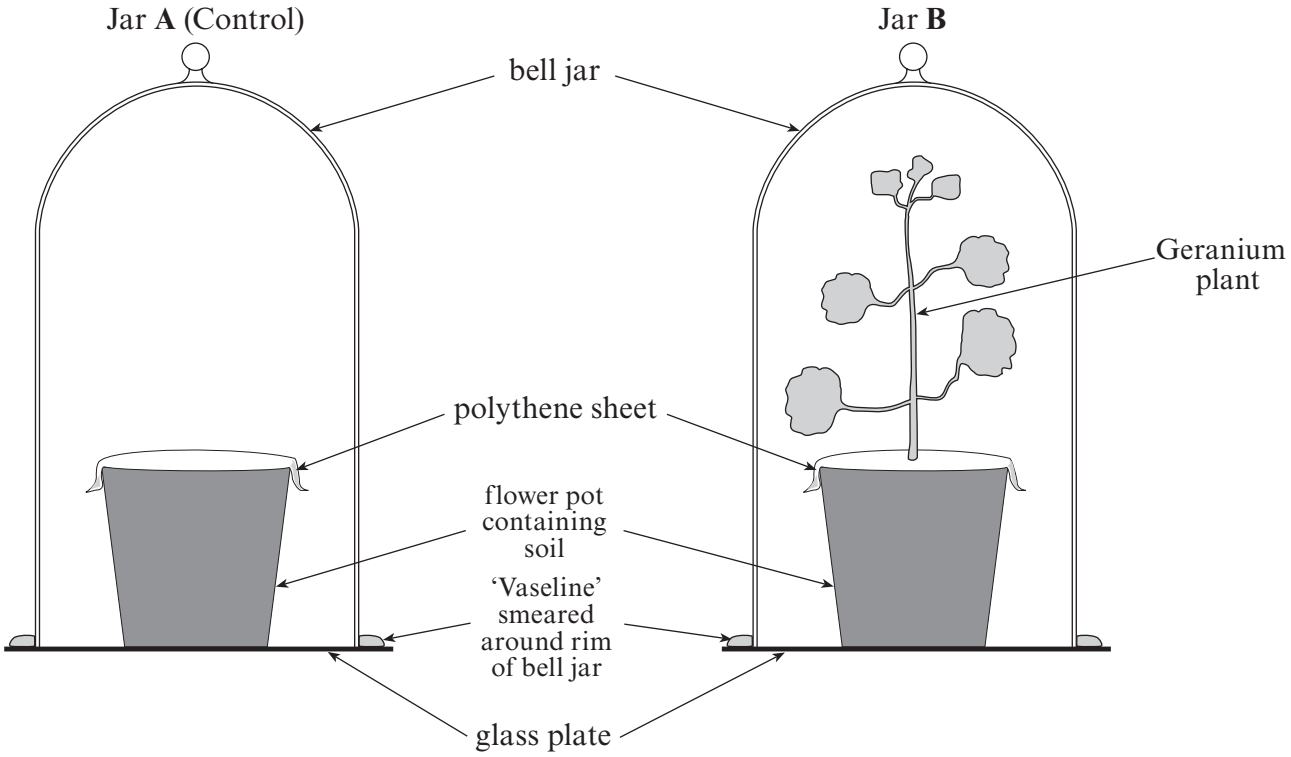
STEMUP.CO.UK

BLANK PAGE

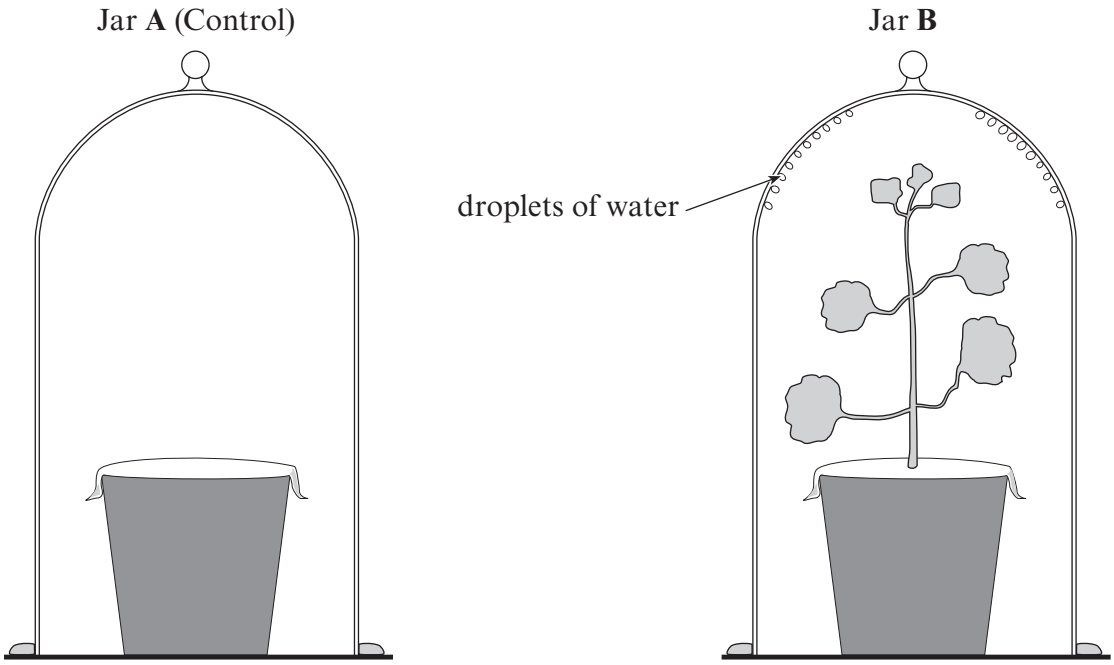
© WJEC CBAC Ltd.

STEMUP.CO.UK

6. Bethan and Alun set up the following experiment and left it for 24 hours.



After 24 hours the jars were examined. Droplets of water had developed on the inside of Jar **B**. No droplets of water were found on the inside of Jar **A**.



© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(a) (i) Explain why droplets of water appear on the inside of jar **B**. [2]

.....

.....

.....

.....

(ii) State the purpose of the control jar **A**. [1]

.....

(iii) Suggest why

I. the soil in both jars **A** and **B** was covered with polythene; [1]

.....

II. the rims of both jars **A** and **B** were smeared with 'Vaseline' petroleum jelly. [1]

.....

(b) Name the vessels which transport water in plants. [1]

.....

6

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

7. Bacteria cause milk to go sour. During the souring of milk, the concentration of oxygen in it decreases.

(a) Explain how bacteria affect the concentration of oxygen in milk. [1]

.....

(b) Cows' milk can be treated in two main ways to increase the length of time that it can be stored safely.

- Pasteurisation – milk is heated to 71.7°C for 15 seconds and cooled quickly.
- Ultra Heat Treated (UHT) – milk is heated to 135°C for at least 1 second and cooled quickly.

In an experiment to compare the freshness of different kinds of milk, tubes were set up as shown in the table.

- Equal volumes of milk were added to each tube.
- 1 cm^3 of a blue dye was also added to each tube. The dye changes from blue to pink to white as oxygen decreases in the milk.
- All tubes were kept at 30°C.
- The colour of the dye was recorded every 30 minutes.

	Type of milk in each tube			
Time (min)	UHT	1 day old pasteurised milk	3 day old pasteurised milk	untreated milk
0	blue	blue	blue	blue
30	blue	blue	blue	pink
60	blue	blue	pink	white
90	blue	pink	white	white
120	blue	pink	white	white

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(i) Why were all the tubes treated in the same way? [1]

.....

(ii) Which tube had the greatest number of bacteria after 30 minutes? [1]

.....

(iii) (I) Which milk was the freshest after 120 minutes? [1]

.....

(II) Explain your choice and why it remained freshest. [2]

.....

.....

6

TURN OVER

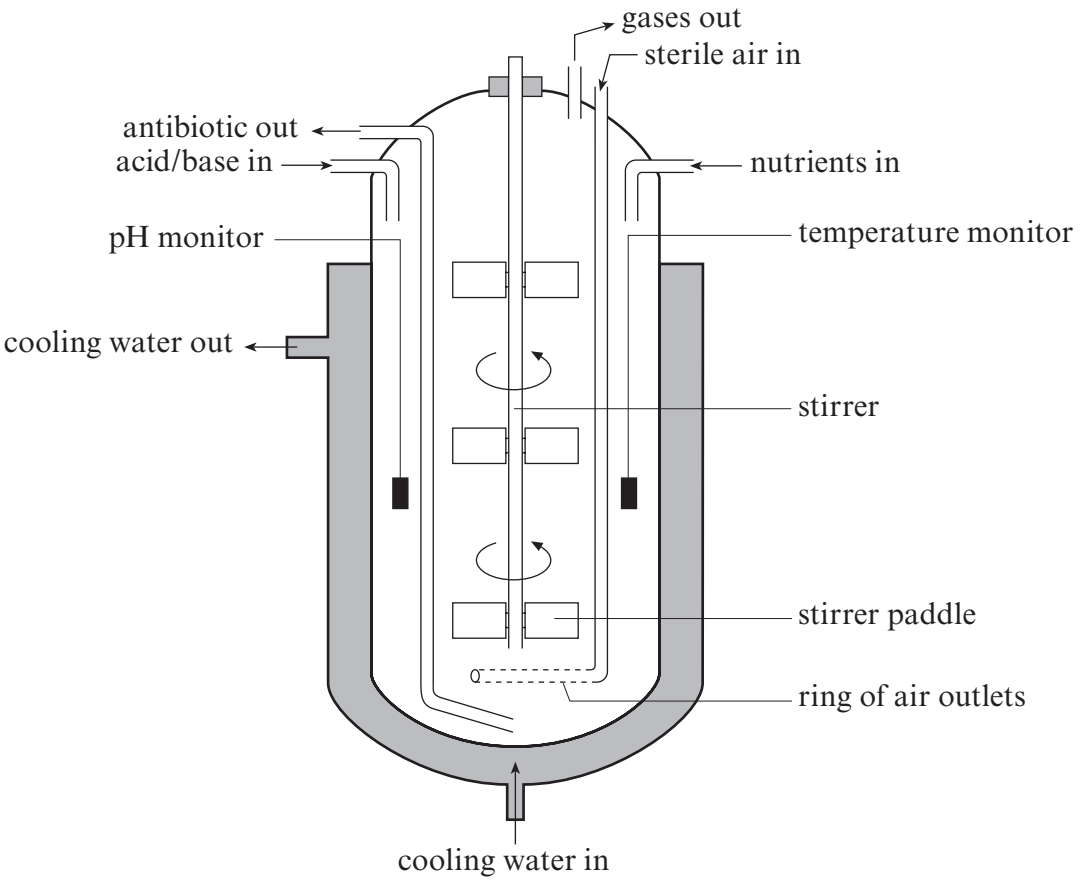
© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

8. The antibiotic penicillin is produced in large stainless steel fermenters containing a liquid nutrient culture medium in which *Penicillium* is grown.

The diagram below shows a fermenter.



(a) (i) Name a nutrient that should be added to the fermenter. [1]

.....

(ii) Why is air pumped into the fermenter? [1]

.....

.....

(b) To which group of living organisms does *Penicillium* belong? [1]

.....

3

END OF PAPER

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE MARKING SCHEME

SCIENCE - BIOLOGY (LEGACY)

JANUARY 2013

© WJEC CBAC Ltd.

STEMUP.CO.UK

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2013 examination in GCSE SCIENCE - BIOLOGY (LEGACY). 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.

Unit	Page
B1 (LEGACY) FOUNDATION TIER	1
B1 (LEGACY) FOUNDATION & HIGHER TIER	7
B1 (LEGACY) HIGHER TIER	11
B2 (LEGACY) FOUNDATION TIER	17
B2 (LEGACY) FOUNDATION & HIGHER TIER	21
BS (LEGACY) HIGHER TIER	23
B3 (LEGACY) FOUNDATION TIER	29
B3 (LEGACY) FOUNDATION & HIGHER TIER	35
B3 (LEGACY) HIGHER TIER	39

© WJEC CBAC Ltd.

STEMUP.CO.UK

B3 (LEGACY) MARK SCHEME - JANUARY 2013

FOUNDATION TIER

Question			Marking details	Marks Available
Q.1	(a)	(i)	Kills (unwanted) microbes/bacteria/sterilise the wire;	[1]
			(not: removes microbes/kills germs)	
		(ii)	Keeps microbes away from gel/out/prevent microbes entering;	[1]
		(iii)	Prevents lid being removed/stop dish being opened;	[1]
			(not: keeping microbes out)	
	(b)	(i)	Plotting correct (+/- 0.5 square) -1 per error;	[2]
			Line drawn with ruler joining centre of plots;	[1]
		(ii)	138 (not: if ^{o}C);	[1]
		(iii)	Grow faster at 25 ^{o}C than at 15 ^{o}C;	[1]
	(c)		Slows/prevents growth/multiplication of bacteria;	[1]
			(not: kills bacteria/less bacteria)	
			Question Total	**[9]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question		Marking details	Marks Available
Q.2 (a)	A;		1
	C;		1
	B;		1
	C;		1
	B;		1
		Question Total	**[5]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details		Marks Available
Q.3	(a)	(i)	**X** aorta;		[1]
			Y atrium;		[1]
		(ii)	**DACB**;		[1]
	(b)	(i)	Capillary;		[1]
		(ii)	Oxygen; Carbon dioxide; Diffusion;		[3]
				Question Total	**[7]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details			Marks Available
Q.4	(a)		Cortex	**L**;		[1]
			Medulla	**K**;		[1]
			Pelivis	**M**;		[1]
	(b)	(i)	Urea;			[1]
		(ii)	Ureter (correct spelling);			[1]
		(iii)	Bladder;			[1]
		(iv)	Urethra (correct spelling);			[1]
	(c)		Glucose;			[1]
					Question Total	**[8]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
Q.5	(a)	(i)	bacteria;	[1]
		(ii)	methanol (not: a waste material);	[1]
		(iii)	Use of waste material (not: industrial material);	[1]
		(iv)	(good) source of protein;	[1]
		(v)	tasteless / dislike of bacteria; (allow: grown on industrial waste)	[1]
	(b)		Food substance <u>produced quickly;</u> (not: fast food/ref. large amounts)	[1]
			Question Total	**[6]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

B3

FOUNDATION & HIGHER TIER

Question				Marking details	Marks Available
Q.6/1	(a)	(i)		water vapour lost from leaves (plant)/stomata/ water vapour lost by transpiration; not water; allow: water evaporates from leaves)	[1]
				(water vapour) condenses (on inside of bell jar);	[1]
		(ii)		to show the water (vapour) comes from the plant or converse; (not: to make it a fair test/ref. control/ref. soil/compare observations)	[1]
		(iii)	I	to prevent water evaporating/being lost from the soil/ to prevent soil water affecting the environment / evaporation;	[1] [1]
			II	to prevent air entering/leaving the bell jar/to prevent water vapour in the outside air affecting the environment.; (allow ref. airtight; not: seal the jar/ref. oxygen)	[1]
	(b)			xylem;	[1]
				Question Total	**[6]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question				Marking details	Marks Available
Q.7/2	(a)			Oxygen used by the bacteria for respiration/bacteria respire;	[1]
	(b)	(i)		Fair test;	[1]
		(ii)		Untreated (milk);	[1]
		(iii)	I	UHT;	[1]
			II	It had the <u>most</u> amount of oxygen/oxygen not used up;	[1]
				(not: ref colour)	
				therefore the least number of/no bacteria;	[1]
				(not: ref. enzymes)	
				Question Total	**[6]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
Q.8/3	(a)	(i)	glucose/sugar/amino acids/mineral salt/named salt/minerals;	[1]
		(ii)	to provide oxygen for respiration/mixing; (not: stirring/reference to fermentation)	[1]
	(b)		fungi/moulds;	[1]
			Question Total	**[3]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

B3

HIGHER TIER

Question			Marking details	Marks Available
Q.4	(a)	(i)	55 (^{o}C);	[1]
		(ii)	enzymes are denatured/destroyed/destroyed (not: killed);	[1]
		(iii)	{substrate/pulped} apple used up/all juice extracted/all pectin broken down/maximum working of pectinase; (not: reference to limiting factor unqualified)	[1]
		(iv)	pH/volume/concentration of enzyme/variety or type of apple; (not: amount/quality/temperature)	[1]
	(b)		pre-digestion of baby foods/biological washing powers/cheese making/soft centred chocolates/lactose free milk (not: beer making);	[1]
			Question Total	**[5]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
Q.5	(a)	(i)	**W** - pulmonary artery;	[1]
			X - aorta;	[1]
		(ii)	Both sides of table needed, matched statements per row;	[2]
			W deoxygenated/**X** is oxygenated	
			(allow: ref. CO_2/less or more O_2; not: no O_2)	
			W lower pressure/**X** higher pressure or ref. more/less	
			comparative statements (not: ref. colour)	
	(b)		contracting;	[2]
			Because valves between atria and ventricles closed / values	
			at start of arteries or semi-lunar values are open;	
			(not: valves are open) (linked marks)	
			Question Total	**[6]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
Q.6	(a)		**A** ureter (accurate spelling);	[1]
			B renal vein;	[1]
	(b)		Presence of protein ()not: ref. less);	[1]
			into the blood;	[1]
	(c)		Water has been reabsorbed/removed;	[1]
			into the blood;	[1]
	(d)	(i)	I 80;	2
			II 6;	
		(ii)	More people are able to work (full time)/ORA;	[1]
		(iii)	Relatives will have similar tissue types/ genes/DNA/less chance of rejection; (not: similar blood groups)	[1]
			Question Total	**[10]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question		Marking details	Marks Available
Q.7	(a)	$CO_{2;}$	[1]
	(b)	0.166/0.17 cm per min, units needed (not: $1/6^{th}$);	[1]
	(c)	Glucose/sugar used up; (not: yeast used up)	[1]
	(d)	Increase in temperature; causes increase in rate/speeds up/more gas produced; Boiling {destroys / denatures} enzyme / boiling kills yeast;	[2]
	(e)	pH/substrate conc/CO_2 conc/enzyme conc/type of yeast/type of sugar/O_2 present not: ref. pressure/ref. amount/conc yeast)	[1]
		Question Total	**[6]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details		Marks Available
Q.8	(a)	(i)	antigens on microorganism; cause antibody production (not: triggers immune system); by white cells;	2 from 3	[2]
		(ii)	protein;		[1]
	(b)		Memory cells (produced);		[1]
			Antibodies produced very quickly/rapid response/immediately;		[1]
	(c)		After 1st injection antibodies increase (then decrease);		[1]
			After 2nd injection antibodies increase longer/higher;		[1]
			go above level needed for full immunity		[1]
				Question Total	**[8]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Surname	Centre Number	Candidate Number
Other Names		0

GCSE

0243/01

SCIENCE
FOUNDATION TIER
BIOLOGY 3

A.M. TUESDAY, 15 May 2012

45 minutes

Suitable for Modified Language Candidates

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**7**	
2	**9**	
3	**9**	
4	**5**	
5	**5**	
6	**7**	
7	**5**	
8	**3**	
Total	**50**	

0243 010001

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

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

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

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

You are reminded of the necessity for good English and orderly presentation in your answers.

© WJEC CBAC Ltd.

STEMUP.CO.UK

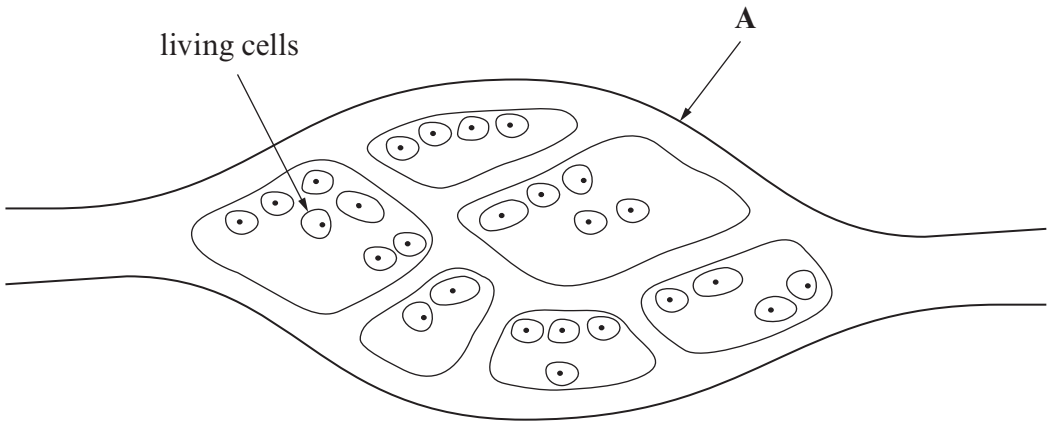
Answer **all** *questions.*

1. *(a)* Complete the table using some of the following words; [4]

platelet red blood cell hormone white blood cell plasma

Function	Part of the blood
Carries oxygen	.....
Defends the body against disease	.....
Important in blood clotting	.....
Carries carbon dioxide and other substances	.....

(b) The diagram below shows small blood vessels carrying blood through a body organ.



(i) Name the type of blood vessel shown as **A**. [1]

.....

(ii) Why is it important that the walls of blood vessel **A** are very thin? [1]

.....

(c) Name the type of blood vessels which take blood *to* the body organs *from* the heart. [1]

.....

7

© WJEC CBAC Ltd.

STEMUP.CO.UK

BLANK PAGE

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

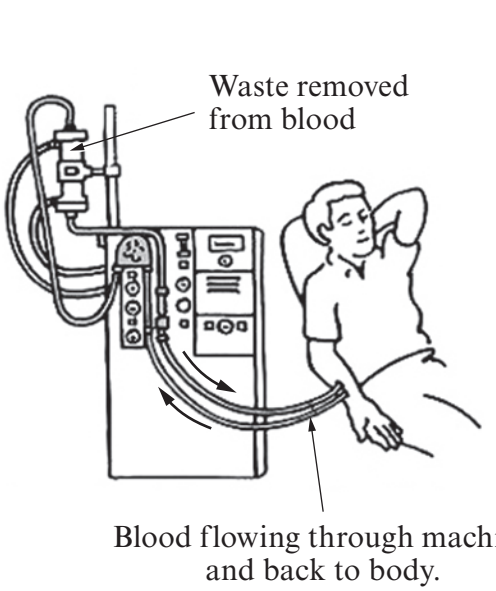
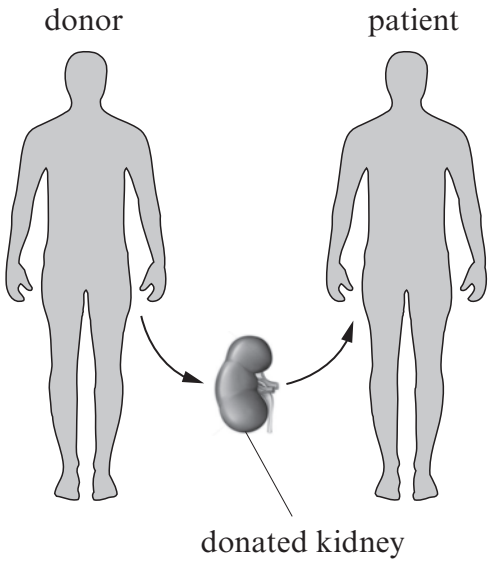
2. *(a)* Complete the sentences using some of the words below. [3]

urethra bladder urea blood ureter

The ..... carries the waste substance, urine, from the kidney to the ..... where it is stored. The waste leaves the body through the ..... .

(b) Read the information below.

Kidney failure can be treated by a kidney dialysis machine or by a kidney transplant. There is a shortage of kidney donors.

Kidney machine	**Kidney transplant**
	
Weekly treatments in hospital for life.	One operation in hospital.
Strict diet needed.	Can eat normally.
May cause vomiting, low blood pressure.	Transplanted kidney may be rejected.
No drugs needed.	Drugs needed to control rejection.

© WJEC CBAC Ltd.

STEMUP.CO.UK

Using **the information opposite** only:

(i) I. Give **one** *advantage* of a kidney transplant. [1]

.....

II. Give **one** *advantage* of a kidney machine. [1]

.....

(ii) State **one** possible health problem of each treatment. [2]

I. Machine .....

II. Transplant .....

(c) Suggest **one** way in which the number of kidney transplants could be increased. [1]

.....

(d) Name the waste substance which is removed from the blood by the kidneys. [1]

.....

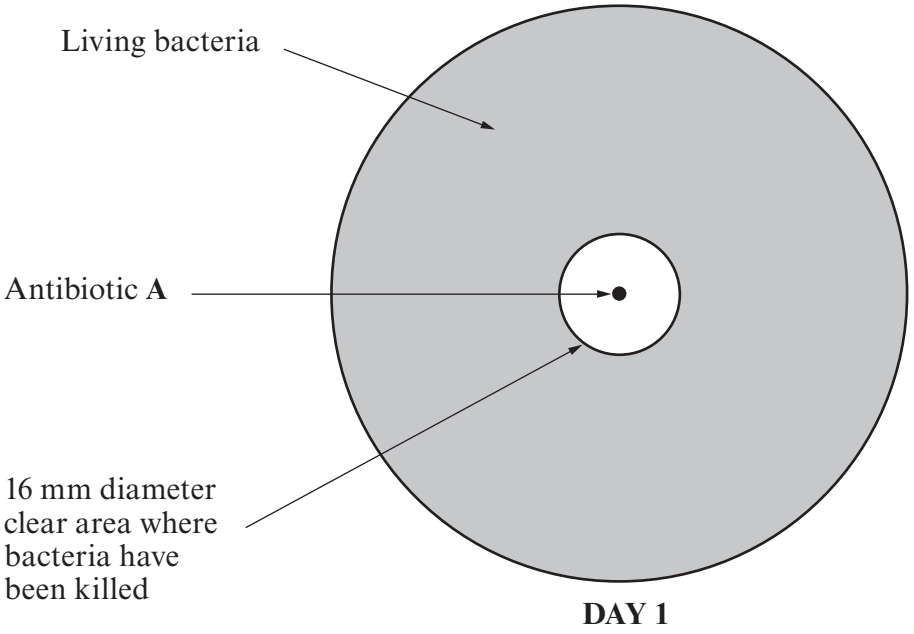
© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

3. A scientist investigated antibiotic **A**.
She grew bacteria on an agar plate and added antibiotic **A**.
The antibiotic spread through the agar killing bacteria and leaving a clear area. The clear area was measured on **Day 1**, **2** and **3**.

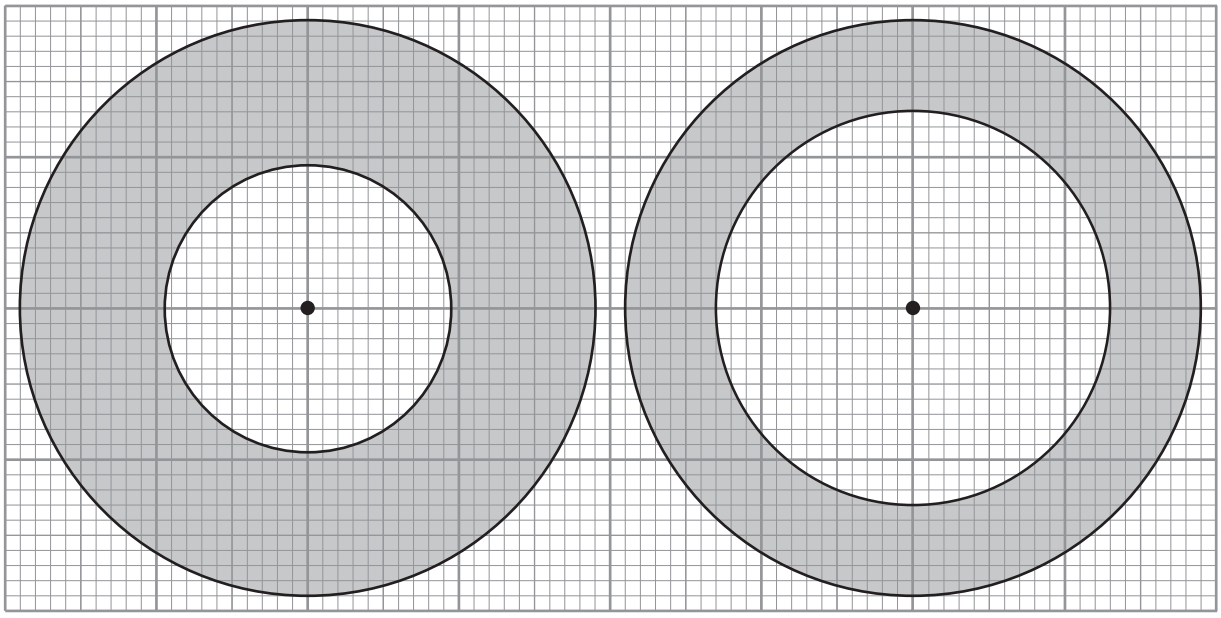
Results for antibiotic **A** on day 1



DAY 1

Results for antibiotic A on Days 2 and 3

10 mm



DAY 2 **DAY 3**

(a) From the results above, complete the table below. [1]

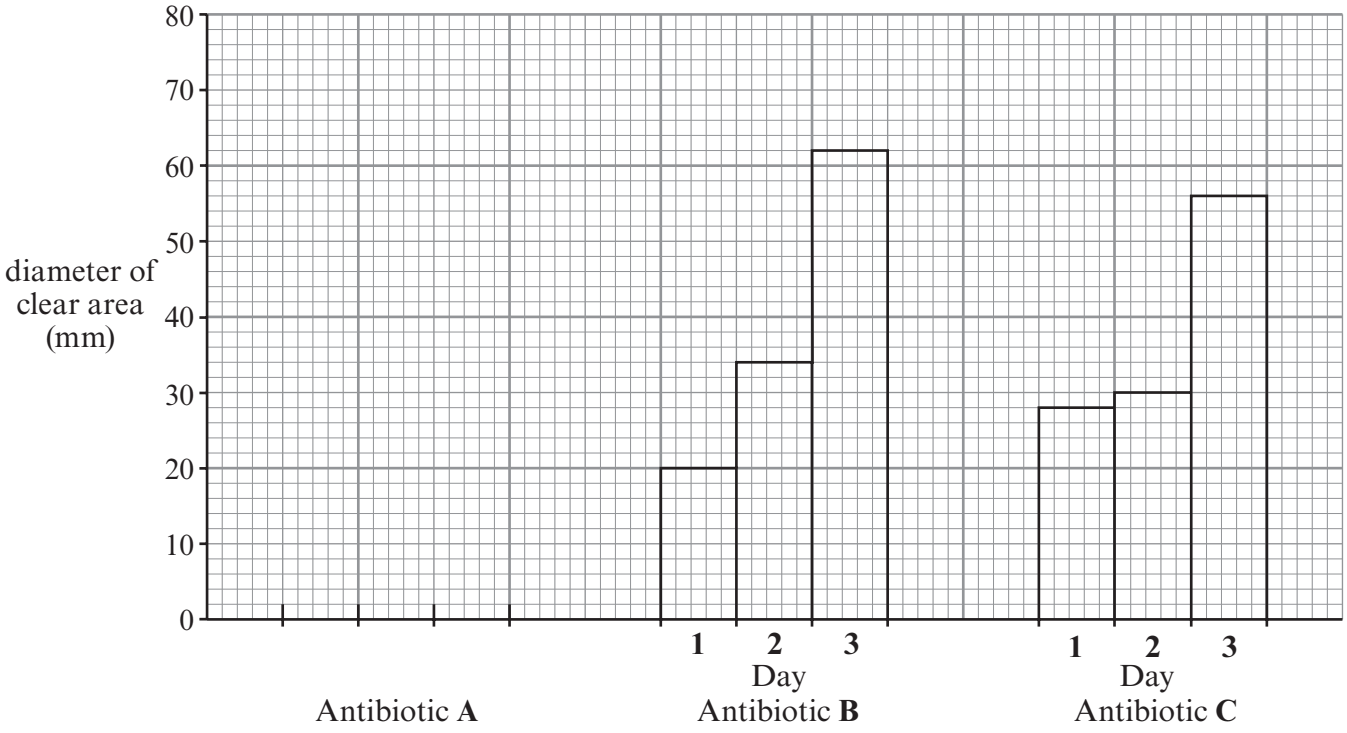
	Diameter of clear area (mm)		
Antibiotic	**Day 1**	**Day 2**	**Day 3**
A	16	.....	.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(b) Use the table opposite to plot the bar chart for antibiotic **A**. Label your bars. The results for two *other* antibiotics, **B** and **C** are already shown on the bar chart. [2]



(c) Antibiotics **B** and **C** were investigated in the same way as antibiotic **A**. Use the bar chart to answer the following:

(i) Which antibiotic is most effective after 3 days? [1]

.....

(ii) Which antibiotic acted most quickly? Give a reason for your answer. [2]

Antibiotic .....

Reason .....

(d) The agar plates were covered with a lid during the investigation. Why was this necessary? [1]

.....

(e) (i) State why antibiotics cannot be used to treat a disease caused by a virus. [1]

.....

(ii) Give **one** problem caused by the over-use of antibiotics in hospitals. [1]

.....

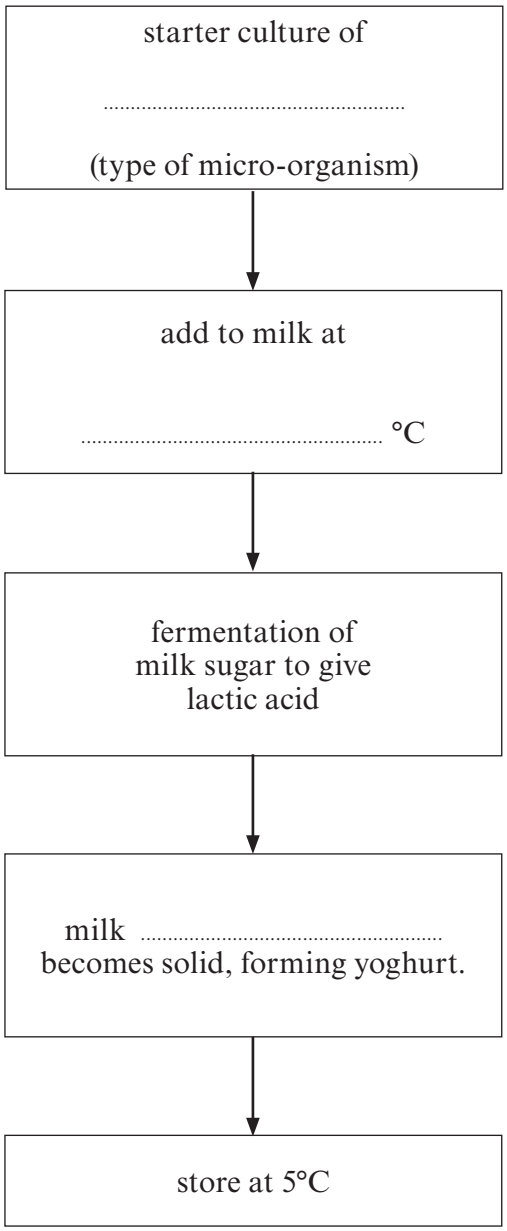
© WJEC CBAC Ltd.

STEMUP.CO.UK

0243 010007

Examiner only

4. *(a)* The flow diagram below shows the steps in making yoghurt using micro-organisms. Complete the flow diagram by writing your answers on the dotted lines. [3]





(b) Why is it important to store yoghurt at 5°C? [1]

.....

(c) Give **one** example of a food *other than yoghurt* which is produced using micro-organisms. Name the micro-organism needed.

[1]

Food ..... micro-organism .....

5

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

5. *(a)* Draw lines to join the descriptions to the correct scientific terms. One has been done for you. [3]

Description	Scientific term
evaporation of water from leaves	stomata
small pores in leaves	phloem
structure which carries food materials	transpiration
structure which takes in water from soil	mineral
substance carried in water	root hairs

(b) Plants obtain minerals from water.

(i) Name **one** mineral which plants need for healthy growth. [1]

.....

(ii) State **one** *other* function of water in plants. [1]

.....

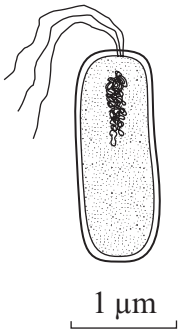
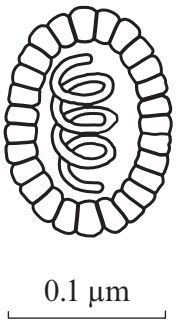
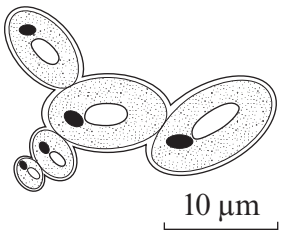
© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

6. The table below shows diagrams of three different types of micro-organisms **A**, **B** and **C**.

(a) Complete the table. Write in the name and features of each type of micro-organism. [3]

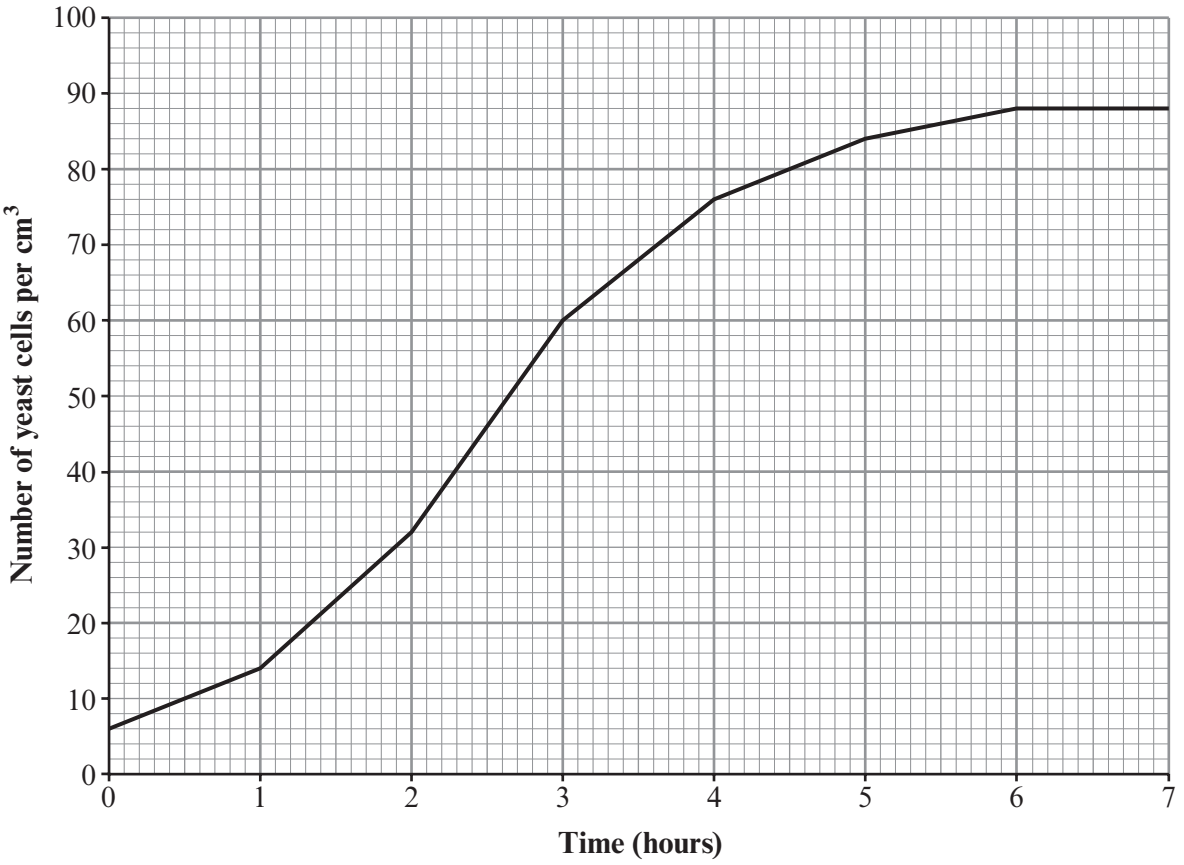
	Micro-organism		
	A	**B**	**C**
Drawing of micro-organism			
Name of type of micro-organism	.....	.....	.....
Outer coat	cell wall	.....	cell wall
Reproduction	.....	inside other cells	by budding
Nucleus	no distinct nucleus	no nucleus	.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(b) The graph below shows the growth of yeast cells over a 7 hour period. The yeast cells were grown in a sugar solution and kept at 35°C throughout the experiment. At the end of each hour 1 cm^3 of test solution was extracted (taken out) and the number of yeast cells were counted using a microscope.



(i) Between which times was the yeast growing at its fastest rate? [1]
Circle the correct answer.

0 - 1 hours 2 - 3 hours 5 - 6 hours

(ii) Suggest **one** reason why the growth of yeast cells slows down. [1]

.....

.....

(iii) Why was the temperature kept at 35°C? [1]

.....

(c) State **one** use of yeast in the food industry. [1]

.....

7

STEMUP.CO.UK

Examiner only

7. Biological washing powders contain enzymes. A student carried out an investigation using both biological and non-biological washing powders.

Four white T-shirts were stained with egg yolk which is mainly fat. Each of the T-shirts were treated as follows:

A



Wash with biological washing powder at 35°C

B



Wash with biological washing powder at 60°C

C



Wash with non-biological washing powder at 35°C

D



Wash with non-biological washing powder at 60°C

After the wash the percentage of stain remaining on each of the T-shirts is shown in the table below:

T-shirt	Percentage of stain remaining (%)
A	0
B	68
C	79
D	0

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(a) State **two** factors, which should be kept constant in this investigation. Do not use time. [2]

(i) .....

(ii) .....

(b) From this investigation, what conclusion can be drawn about the effectiveness of **biological** washing powders? [1]

.....

.....

(c) Give **one** advantage of using biological washing powder over a non-biological one. [1]

.....

.....

(d) The enzyme found in the **biological** washing powder, digested the egg yolk. Which type of enzyme is this? [1]

.....

5

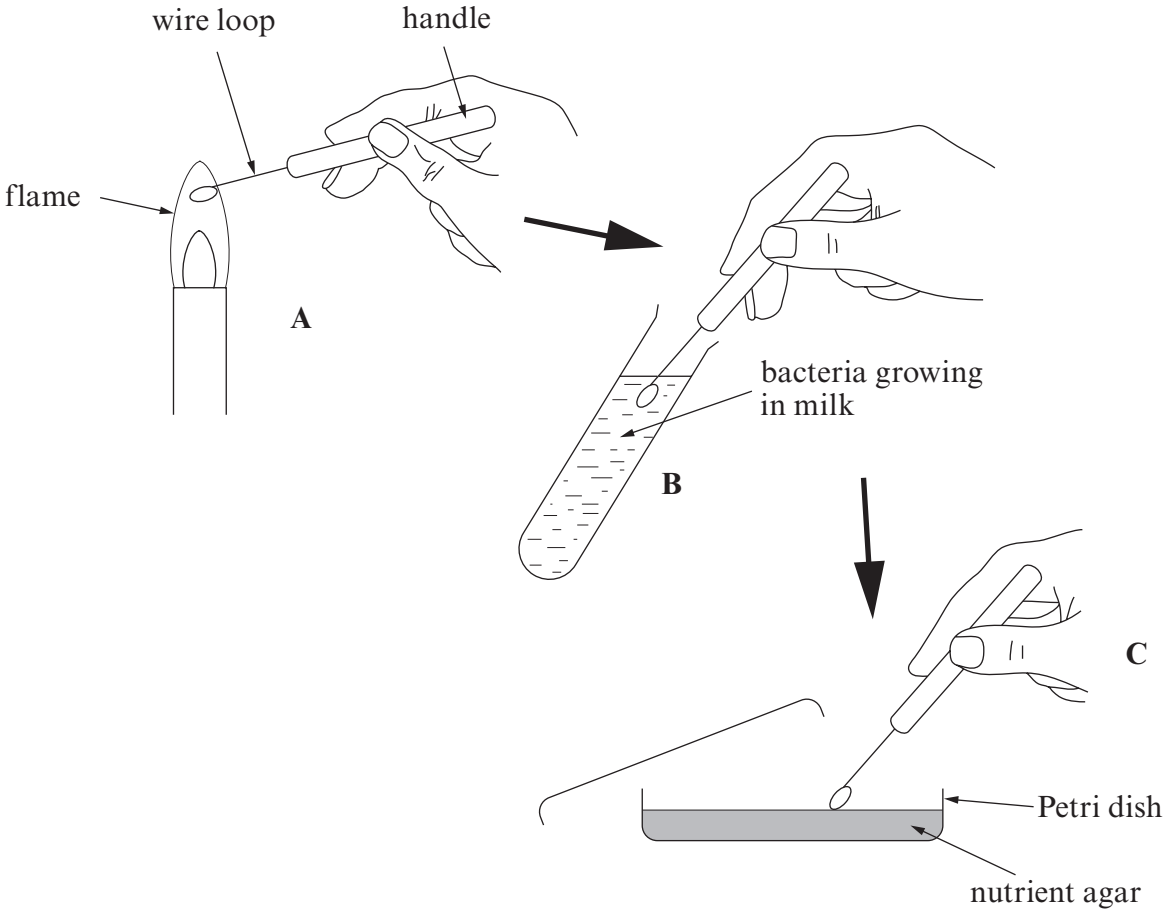
© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

8. The diagrams below show some of the steps used when growing bacteria in a laboratory.



(a) Why is the wire loop placed in the flame? [1]

.....

(b) For safety reasons, what must happen to the Petri dish immediately after the lid is replaced in stage **C**? Explain why this is done. [2]

.....

.....

.....

.....

THERE ARE NO MORE QUESTIONS IN THIS EXAMINATION.

3

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE MARKING SCHEME

SCIENCE - BIOLOGY (LEGACY)

SUMMER 2012

© WJEC CBAC Ltd.

STEMUP.CO.UK

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2012 examination in GCSE SCIENCE - BIOLOGY (LEGACY). 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.

© WJEC CBAC Ltd.

UNIT B3 (LEGACY)

FOUNDATION TIER

Question			Marking details	Marks Available
1.	(a)		Red (blood) cell; White (blood) cell; Platelet; Plasma;	4
	(b)	(i)	Capillary;	1
		(ii)	{Named substances/ substances} {diffuse/ pass} {through/ in/ out} OR less distance for diffusion; Allow reference to white blood cells passing through Allow exchange of materials NOT diffusion unqualified or Blood passing through If use named substance must be in correct direction	1
	(c)		Artery/ arteries;	1
			Question total	**[7]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question				Marking details	Marks Available
2.	(a)			Ureter; Bladder; Urethra; SPELLING correct	3
	(b)	(i)	I	Eat normally/ not a strict diet / <u>only</u> one hospital visit/ fewer hospital visits; NOT you can have a operation	1
			II	No drugs;	1
		(ii)	I	Low blood pressure / vomiting;	1
			II	Rejection;	1
	(c)			(Measures to encourage) <u>more</u> donors/ make donation compulsory;	1
	(d)			Urea/ <u>excess</u> water/ <u>excess</u> salt;	1
				Question total	**[9]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
3.	(a)		Day 2 = 37/38/39 Day 3 = 52 (both correct for 1 mark);	1
	(b)		Three correct bars (height and position and labelled 1,2,3);;	2
			3 bars correct = 2 marks	
			2 bars correct = 1 marks	
			0/1 bars correct = 0 marks	
	(c)	(i)	Consistent with bar chart (allow e.c.f.) (should be B);	1
		(ii)	C;	1
			Largest/ Highest at day 1;	1
			OR first bar is the highest	
	(d)		Prevents entry of {unwanted/ other} {micro-organisms/ bacteria/ microbes/ fungi/ viruses} (from the air)/ prevent exit of bacteria; NOT to prevent contamination unqualified NOT reference to germs/ pathogens	1
	(e)	(i)	Cannot kill viruses;	1
		(ii)	Resistance/ Bacteria become immune (accept MRSA); NOT disease or patient becomes {immune/ resistant}/ the bacteria start to fight it/ germs becoming resistant	1
			Question total	**[9]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

FOUNDATION / HIGHER TIER

Question		Marking details	Marks Available
4.	(a)	Bacteria;	1
		27-33(^{o}C);	1
		Protein;	1
	(b)	{Prevents / slows} {bacterial growth/ reproduction}. NOT kills bacteria	1
	(c)	Any one from Bread and yeast; {Mycoprotein/ Quorn} and fungus; {Single Cell Protein/ Pruteen} and bacteria; Cheese and fungus; Cheese and bacteria;	1
		Question total	**[5]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
5.	(a)		3/ 4 correct = 3 marks;;; 2 correct = 2 marks 1 correct = 1 mark	3 max
	(b)	(i)	Nitrate / potassium / phosphate/ calcium/ magnesium; NOT nitrogen/ phosphorus	1
		(ii)	Support / prevent wilting/ keeps cells turgid/ photosynthesis NOT carries minerals	1
			Question total	**[5]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question	Marking details	Marks Available

6/1 (a) (i)

	A	B	C
Drawing of micro-organism			
Name of type of micro-organism	**Bacterium/ Bacteria**	**Virus**	**Yeast/ Fungi**
Outer Coat		**Protein**	
Reproduction	**Divide/ split in two NOT asexual reproduction / mitosis**		
Nucleus			**Yes/ nucleus**

3

1 mark is awarded for **each correct column**;;;

(b) (i) 2-3 hours; 1

(ii) Sugar being {used up/ decreases}/ less sugar available/ sugar solution is becoming less concentrated; 1
NOT sugar has run out/ no sugar left

(iii) Optimum or best temperature {<u>for yeast growth</u>/ <u>for yeast to work/ for fermentation</u>}; 1

(iv) Bread making / brewing / winemaking or any other correct answer; 1
NOT bread alone or baking unqualified

Question total **[7]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question		Marking details	Marks Available
7/2	(a)	Any **two** from: (Same) {amount/ size/ volume/ area} of {egg stain/ egg/ stain}; (Same) {size/ material / brand/ type} of T-shirts/ use 4 identical t shirts; (Same) {volume/ concentration} of washing powder used/ same pairs of washing powder; NOT amount (Same) washing machine used/ same program/ same time. NOT pH	2
	(b)	Biological washing powders work {better/ best / are more effective} {at 35^{o}C / lower temperatures} (ORA); Biological washing powders work better than non-biological powders at 35^{o}C or lower temperature/ ORA; Credit can be given for any other correct conclusion/ must imply comparison.	1
	(c)	reference to: less {energy / electricity} used /financial {cost / savings/ more economical/ more cost effective};	1
	(d)	Lipase;	1
		Question total	**[5]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question		Marking details	Marks Available
8/3	(a)	{Destroy or kill} {bacteria / micro-organisms}/ to sterilise it; NOT denature/ get rid of bacteria/ sanitise	1
	(b)	Lid must be {sealed/ secured (with tape)};	1
		To prevent entry of other micro-organisms / prevent exit of {micro-organisms/ pathogens};	1
		Question total	**[3]**
		Foundation tier total	**50**

© WJEC CBAC Ltd.

STEMUP.CO.UK

HIGHER TIER

Question			Marking details	Marks Available
4.	(a)		To prevent the entry of {micro-organisms or named micro-organims}(which could kill the yeast / contaminate Penicillin / culture.);	1
	(b)		Temperature monitor {measures/ takes temperature}; And {controls / adjusts} the {rate of movement/ flow of / temperature of }cooling water;	2
	(c)	(i)	84 hours;	1
		(ii)	Penicillium; Correct spelling, (allow lower case p)	1
			Question total	**[5]**
5.	(a)		Single arrow (or many small arrows) starting at the soil, through root hair and passing out the stomatal pore.	1
	(b)		Any **four** of the following points. Water enters root hair by osmosis; Water vapour lost through transpiration/ through stomata; Creates a pull/ draws water up; moves water up the xylem.	Max 4
			Question total	**[5]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
6.	(a)	(i)	**A** Bowman's capsule; Allow Bowmens **D** Collecting duct; NOT collection duct	2
		(ii)	The pressure of blood is increased/ builds up pressure/ causes high pressure; NOT for pressure for ultrafiltration/ to increase filtration/ forces out small molecules or named molecules;	2
		(iii)	Urine;	1
		(iv)	{Molecules/ particles} too big {to pass through filter or capillary knot/ to be filtered/ to pass into Bowman's capsule};	1
	(b)		B; C;	2
			Question total	**[8]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
7.	(a)		Correct labels ;;	2
	(b)		Both arrows leaving heart;;	2
	(c)	(i)	I;	2
		(ii)	III;	
			Question total	**[6]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details		Marks Available
8.	(a)		Presence of antibodies; NOT memory cells (not neutral)		1
	(b)	(i)	Antigen;		1
		(ii)	White <u>blood</u> cells / lymphocytes; NOT phagocytes		1
	(c)		Memory Cells;		1
				Question total	**[4]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
9.	(a)	(i)	Carbon dioxide is produced by respiration; Forms carbonic acid; Lowers pH/ makes it more acid; NOT becomes 5	3
		(ii)	(At 40%) yeast is killed (Not denatured)/ enzymes are denatured by alcohol; No {carbon dioxide/ carbonic acid} produced / no respiration; NOT less respiration pH does not change; ref to lactic acid - negates any marks	3
	(b)		As concentration increases {more yeast is killed/ less respiration/ less carbon dioxide produced/ less carbonic acid produced};	1
			Question total	**[7]**
			PAPER TOTAL	**50**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Candidate Name	Centre Number	Candidate Number
		0

WJEC CBAC

GCSE

243/01

SCIENCE BIOLOGY
FOUNDATION TIER
BIOLOGY 3

P.M. THURSDAY, 19 May 2011

45 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**5**	
2	**5**	
3	**7**	
4	**7**	
5	**3**	
6	**8**	
7	**5**	
8	**4**	
9	**6**	
Total	**50**	

0243 010001

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

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

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

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

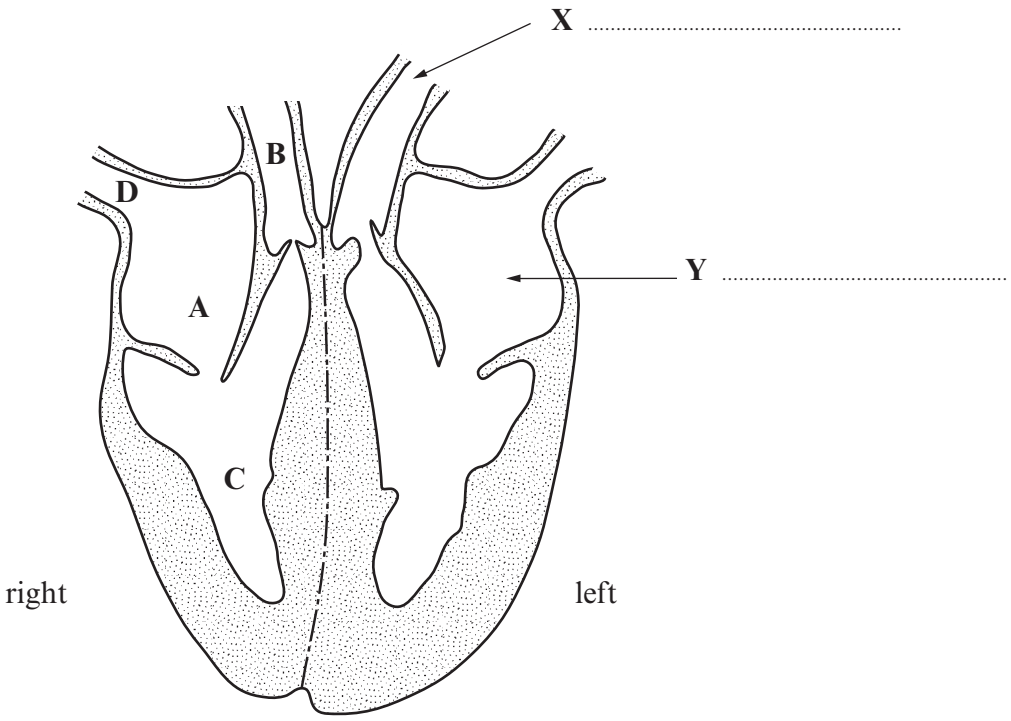
You are reminded of the necessity for good English and orderly presentation in your answers.

STEMUP.CO.UK

Examiner only

Answer **all** *questions.*

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



(i) Label **X** and **Y** on the diagram using some of the words below. [2]

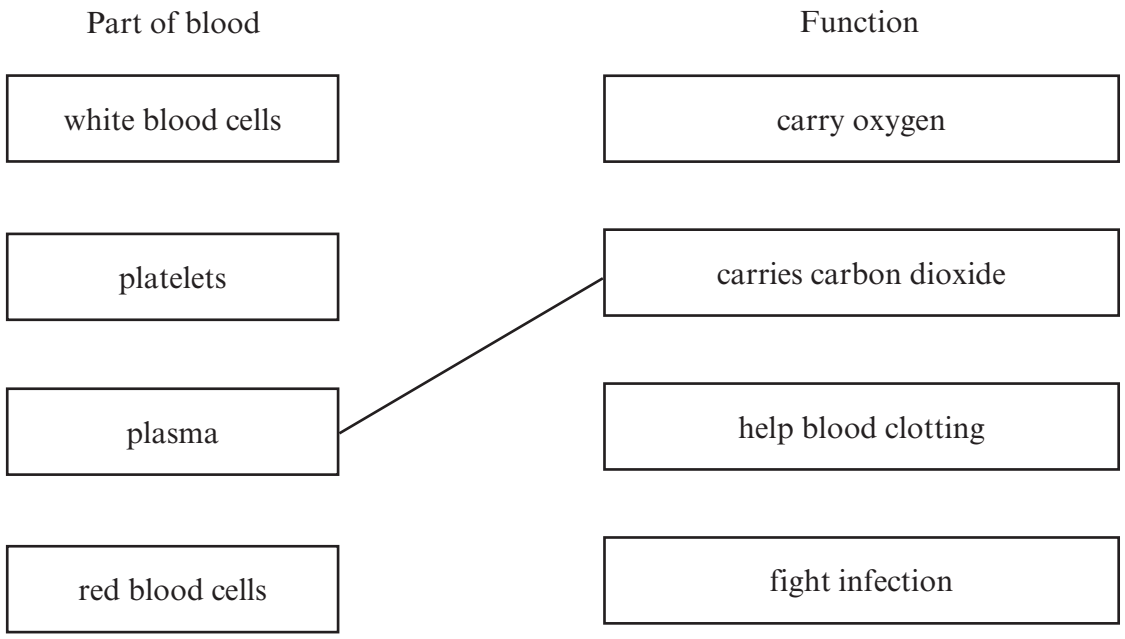
atrium ventricle valve aorta

(ii) From the diagram, write letters A, B, C and D in the boxes below, in the correct order to show the path of the blood as it flows through the right side of the heart. [1]



STEMUP.CO.UK

(b) Draw lines, using a ruler, to join the parts of the blood with their functions. One has been done for you. [2]



STEMUP.CO.UK

Examiner only

2. Read the following information.

Mycoprotein 'burgers'



- In the 1960s scientists made a food from microbes.
- They grew the fungus *Fusarium* on sugar from cheap corn-starch to make a food called Mycoprotein.
- The fungus was grown in a fermenter with potassium and phosphate added.
- It only took a few days for a very large quantity of Mycoprotein to be made.

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

(i) Which type of microbe was used to make Mycoprotein? [1]

.....

(ii) Give **one** reason why the scientists used corn-starch to grow *Fusarium.* [1]

.....

(iii) Name **one** mineral which this microbe needed for growth. [1]

.....

(iv) Suggest **one** advantage of using a fermenter to grow Mycoprotein. [1]

.....

(b) State **one** example, *other than Mycoprotein,* where a microbe is used in making a food. [1]

Food .....

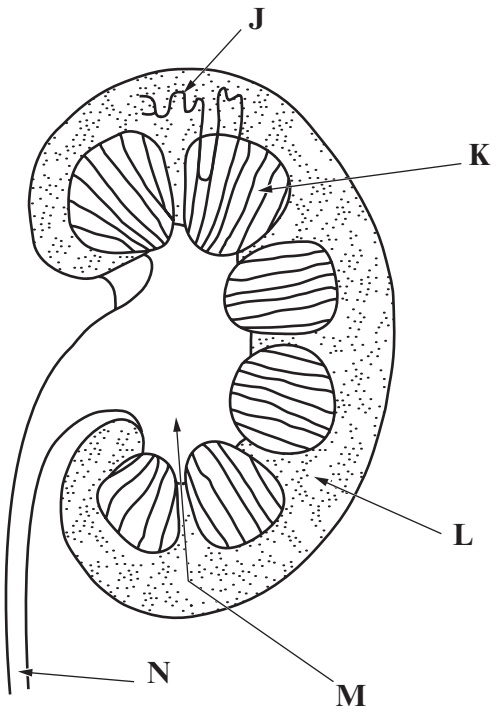
Microbe .....

5

STEMUP.CO.UK

Examiner only

3. The diagram shows a section through a human kidney.



(a) From the diagram, give the letters which show [3]

(i) a nephron; .....

(ii) the medulla; .....

(iii) the ureter. .....

(b) Use some of the following words to complete the sentences below. [4]

protein urea urine urethra bladder

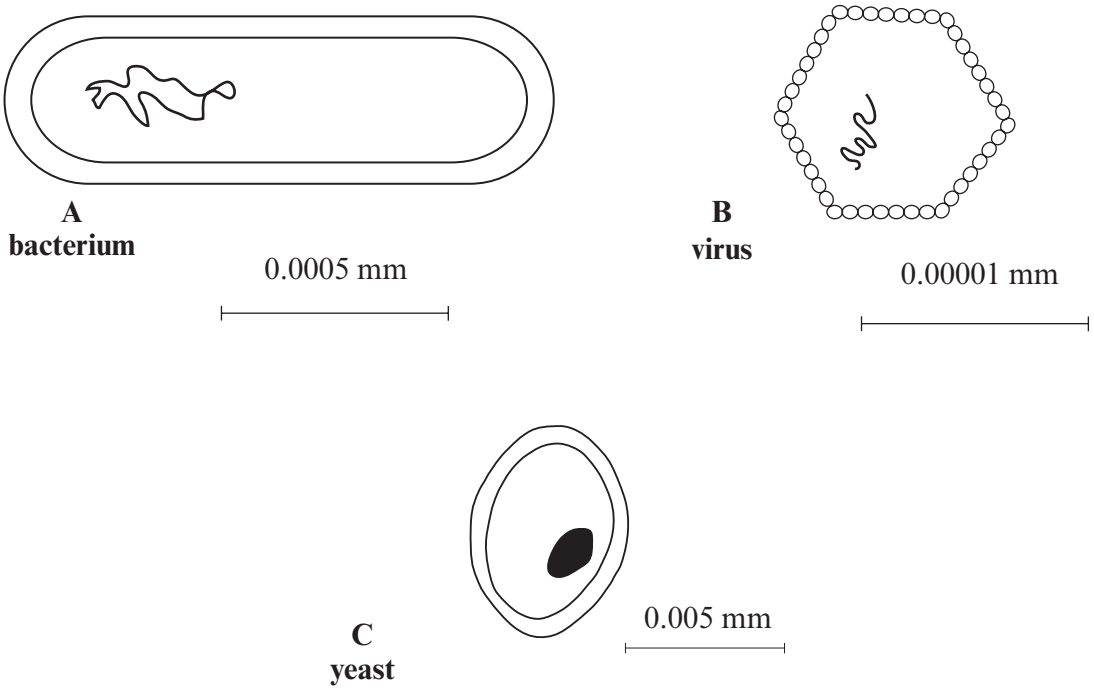
The kidney produces a fluid called ..... , which is stored in the ..... before leaving the body through the ..... . The fluid contains the waste substance ..... .

0243 010005

STEMUP.CO.UK

Examiner only

4. *(a)* The diagrams show three different microorganisms.



Give the correct letter from the diagrams above for each statement below. You may use letters more than once. [4]

(i) Reproduces by dividing into two. .....

(ii) Reproduces by budding. .....

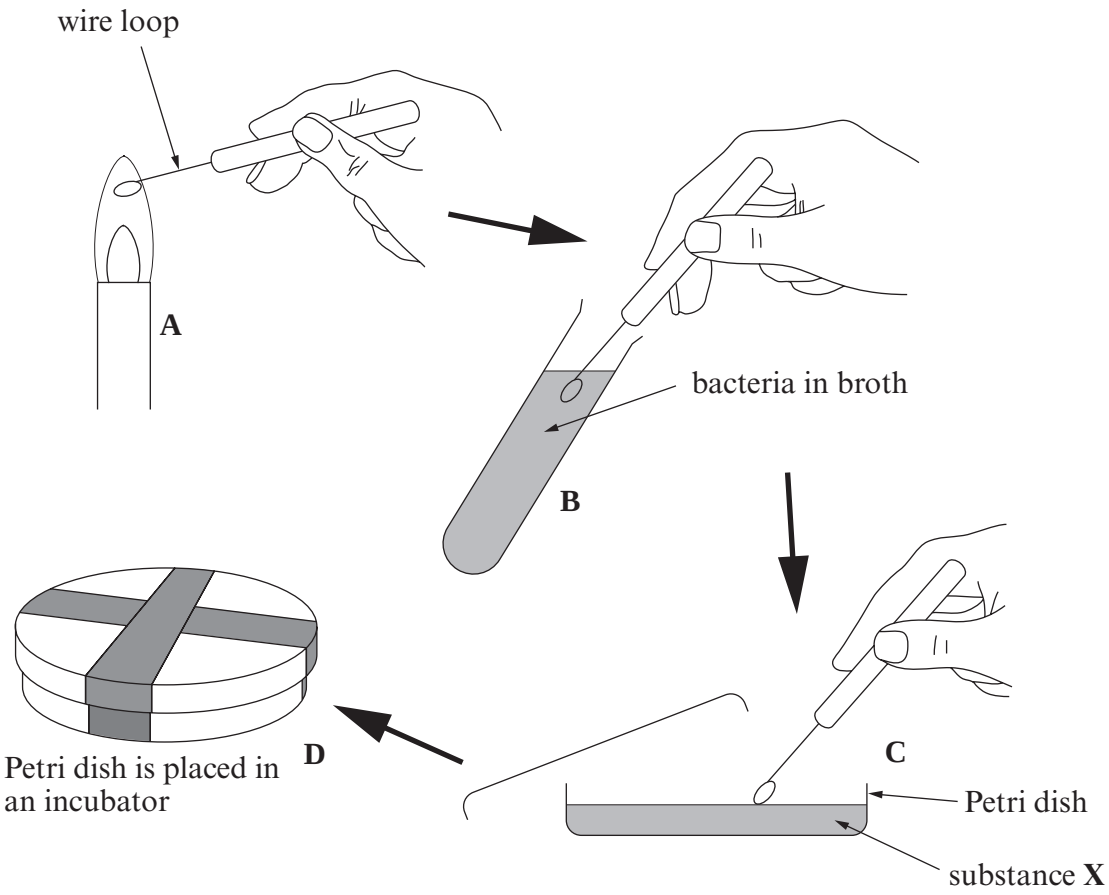
(iii) The smallest microorganism. .....

(iv) Has a nucleus. .....

STEMUP.CO.UK

Examiner only

(b) The diagrams show how bacteria can be grown in a laboratory.



(i) State why the following actions are necessary. [2]

I. Heating the wire loop in **A**.

.....

II. Keeping the lid of the dish closed in **D**.

.....

(ii) Name substance **X** in the dish in **C**. [1]

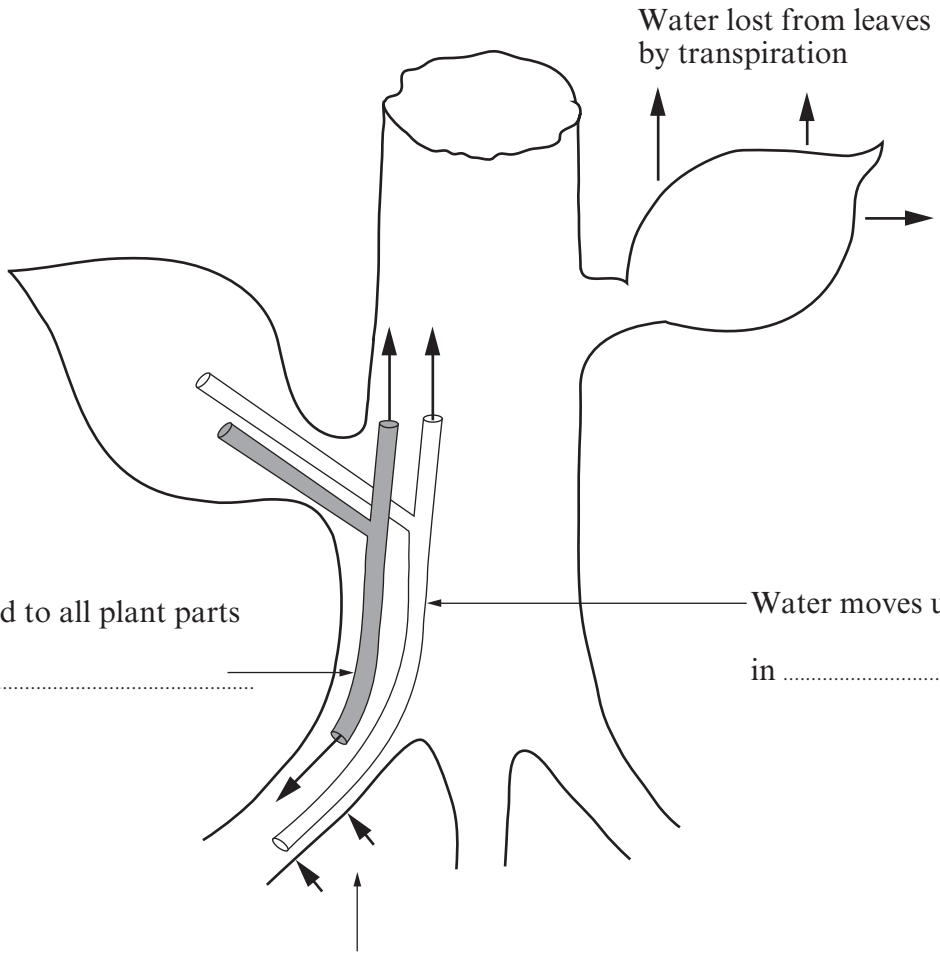
.....

STEMUP.CO.UK

Examiner only

5. The diagram shows water passing through a leafy plant.
Complete the labels using some of the words below. [3]

xylem osmosis photosynthesis phloem



3

STEMUP.CO.UK

BLANK PAGE

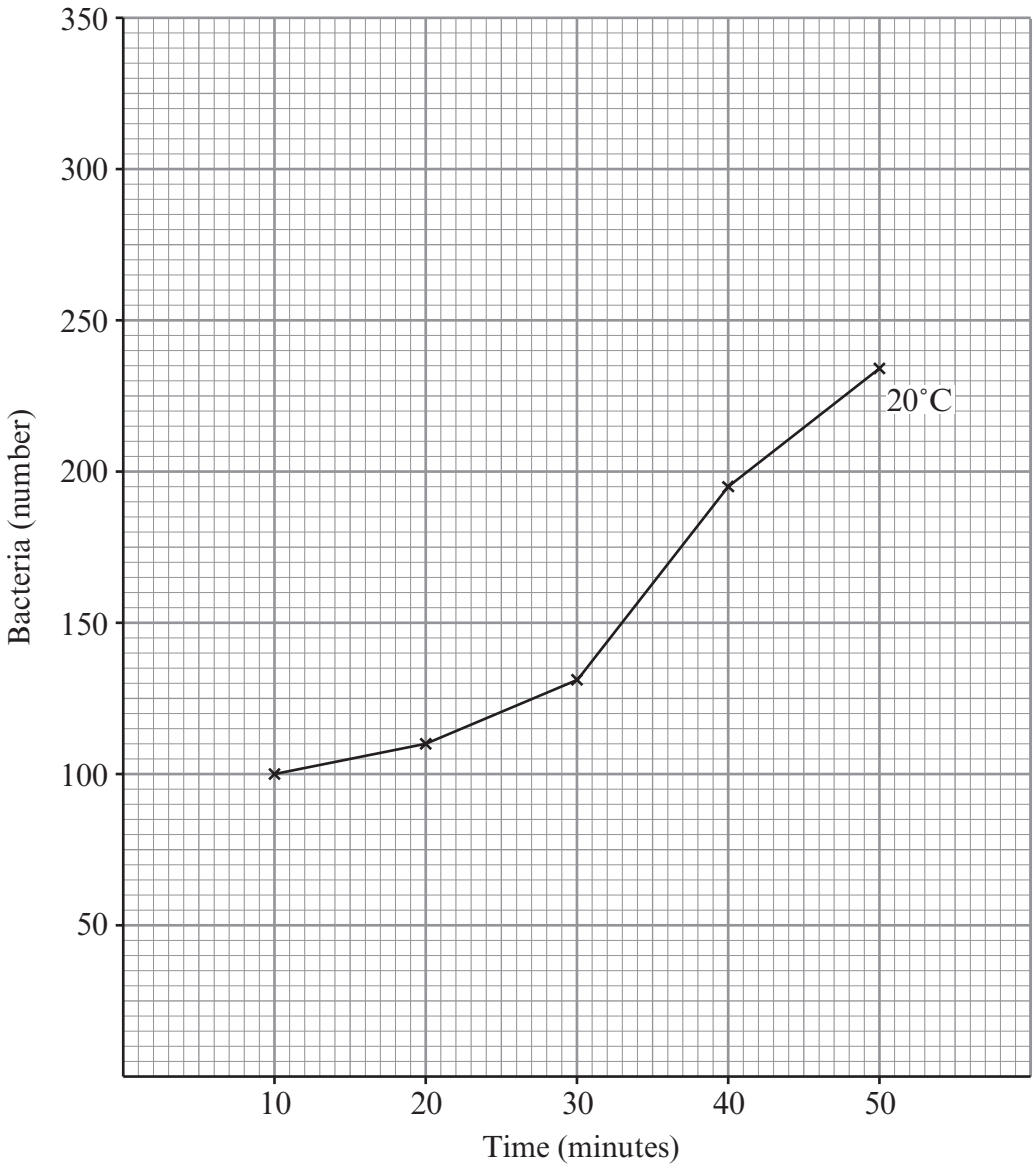
STEMUP.CO.UK

Examiner only

6. Scientists grew bacteria at 20°C.
They counted the number of bacteria every 10 minutes for 50 minutes.
They repeated the investigation at 30°C and the results are shown in the table.

Time (minutes)	Number of bacteria in sample	
	20°C	30°C
10	100	110
20	110	125
30	132	185
40	195	273
50	234	335

(a) Plot the results for 30°C onto the graph. Use a ruler to join the plots. Label your line 30°C. The results for 20°C have been done for you. [3]



STEMUP.CO.UK

Examiner only

(b) From the graphs

(i) Calculate the increase in the number of bacteria at 20°C between 25 minutes and 35 minutes. Show your working. [2]

Answer .....

(ii) How did raising the temperature affect the growth of these bacteria? [1]

.....

(iii) At what time did the scientists find the greatest difference between the two temperatures? [1]

.....

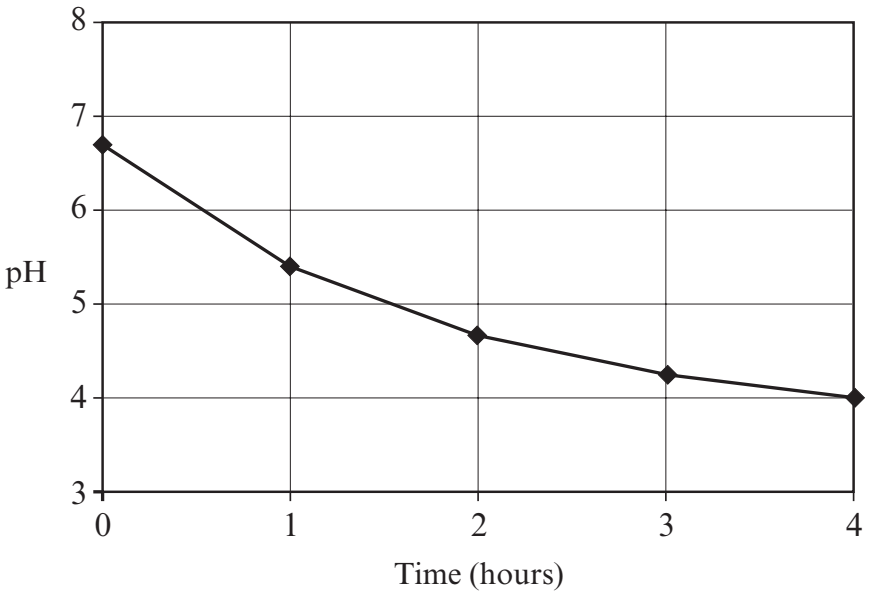
(c) Why is it important to keep fresh food in a refrigerator at 4°C? [1]

.....

STEMUP.CO.UK

Examiner only

7. During yoghurt making the pH of the milk used in the process changes. The graph below shows these changes over a 4 hour period.



(a) **Describe** the change shown in the graph. [1]

.....

.....

(b) **Explain** how the change in pH is brought about during the yoghurt making process. [3]

.....

.....

.....

.....

(c) State **one** factor that must remain constant during this phase of the yoghurt making process. [1]

.....

STEMUP.CO.UK

Examiner only

8. Megan was concerned about the high cost of running her washing machine.
She washed some of her baby's egg stained clothes in two different washing powders at 30°C and at 80°C.
Megan's results are shown in the table below.

	Washing powder	
Temperature / °C	*Sudsbright* (non biological)	*SuperBIO* (biological)
30	Egg stains remaining	No egg stains
80	No egg stains	Egg stains remaining

(a) Explain the results for *SuperBIO* at

(i) 30°C; [2]

.....

.....

.....

(ii) 80°C. [1]

.....

.....

(b) Which washing powder would you recommend that Megan uses? Explain your answer. [1]

.....

.....

STEMUP.CO.UK

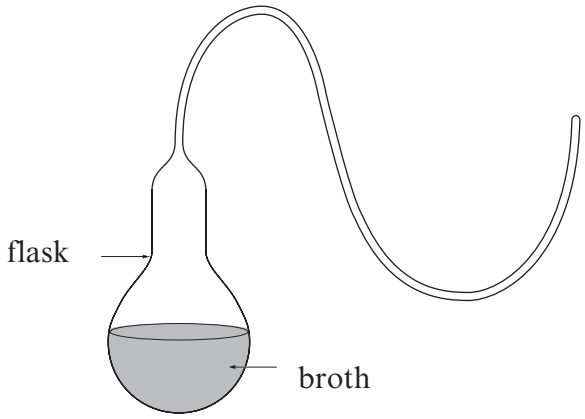
Examiner only

9. The diagram shows the apparatus used by a famous scientist in the 19th Century to disprove the theory of spontaneous generation.

(a) What is meant by the term *spontaneous generation*? [1]

.....

.....



(b) (i) Name the flask shown above. [1]

.....

(ii) Name the famous scientist, who used the apparatus above, to disprove the theory of spontaneous generation. [1]

.....

(c) When the above apparatus was used, the contents of the flask were boiled and the neck of the flask was sealed.

(i) State why the contents of the flask were boiled. [1]

.....

(ii) State why the neck of the flask was sealed. [1]

.....

(d) Some of the sealed flasks were opened in a room full of people and were left there for 8 hours. Other sealed flasks were opened on the top of a mountain and left for the same amount of time. Both sets of flasks were then sealed and returned to the laboratory. After 3 days the contents of the flasks were examined.
State **one** difference you would expect to see between the two sets of flasks. [1]

.....

.....

STEMUP.CO.UK