WJEC GCSE BIOLOGY

BIOLOGY



EXAM QUESTION PACK

UNIT B2 HIGHER TIER 0239 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

WJEC CBAC

GCSE

0239/02

ADDITIONAL SCIENCE
HIGHER TIER
BIOLOGY 2

A.M. MONDAY, 28 January 2013

45 minutes

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

0239
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 of the necessity for good English and orderly presentation in your answers.

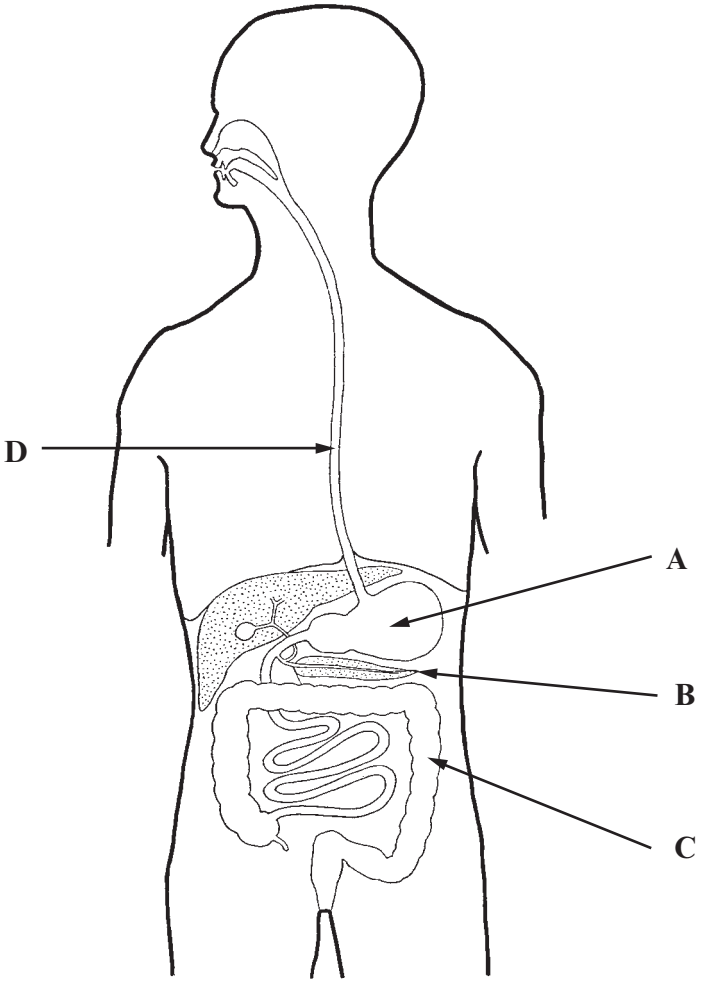
© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

Answer **all** *questions.*

1. The diagram shows the human digestive system.



(a) Name the structures labelled **A** to **D**. [4]

A .....

B .....

C .....

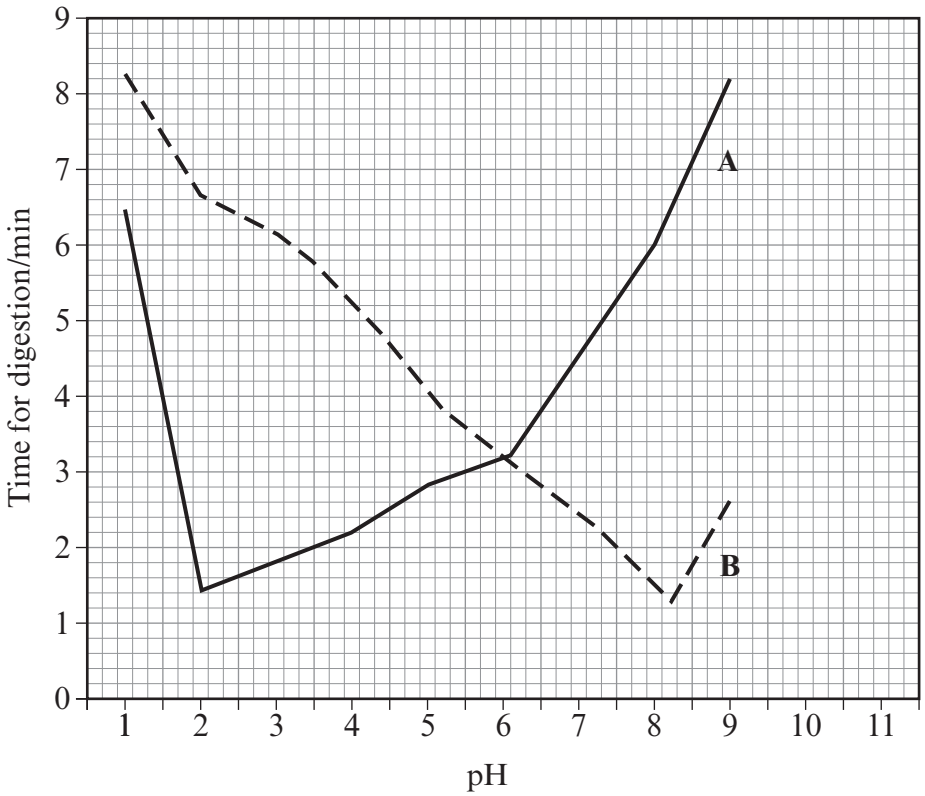
D .....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(b) The graph below shows the result of an investigation into the effect of pH on the action of two digestive enzymes labelled **A** and **B**.



(i) From the graph, state the time taken for the enzyme **B** to complete its digestion at pH 4.5. [1]

.....

(ii) At what pH is the rate of reaction the same for both enzymes [1]

.....

(iii) From the graph, describe the effect of pH on the action of enzyme **A**. [2]

.....

.....

.....

8

0239 020003

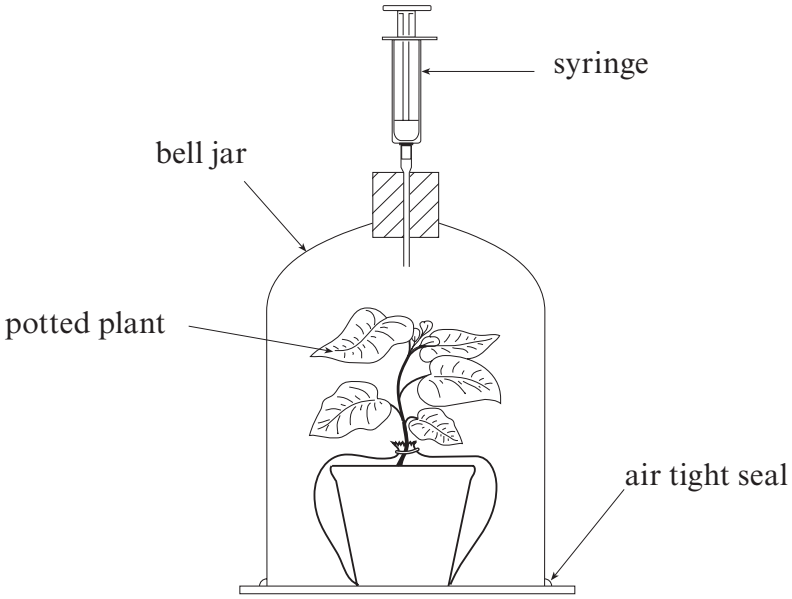
© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

2. The apparatus below was set up as shown and exposed to bright sunlight for 6 hours.



Before and after the exposure to light, samples of air in the bell jar were collected using the syringe.
The samples of air were analysed for carbon dioxide and oxygen content.

(a) Complete the table below to show whether the percentage of gas in the sample had changed using the words **increased** or **decreased**. [2]

Gas	% of gas before exposure to light	After 6 hours of exposure to bright sunlight
Carbon dioxide	0.03	
Oxygen	21	

(b) Explain your answer to *(a)*. [4]

.....

.....

.....

.....

.....

.....

(c) Suggest what could be done to the apparatus to reverse the exchange of gases. [1]

.....

7

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

3. *(a)* What are stem cells? [2]

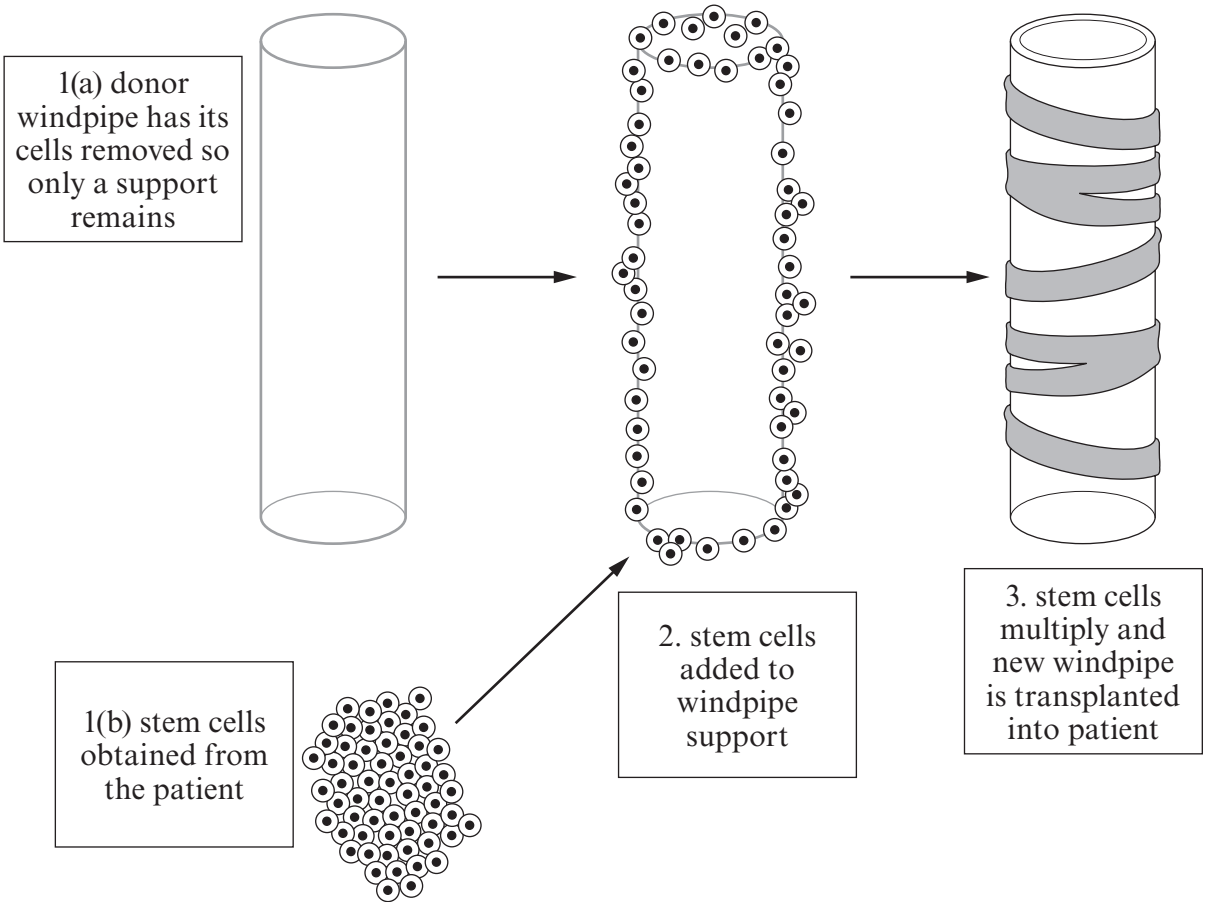
.....

.....

.....

(b) In 2008 scientists carried out the first successful windpipe transplant in humans using the patient's own stem cells.

The process involved the following stages:



State **two** advantages to the patient of using their own stem cells rather than using embryonic stem cells. [2]

(i) .....

.....

(ii) .....

.....

0239 020005

4

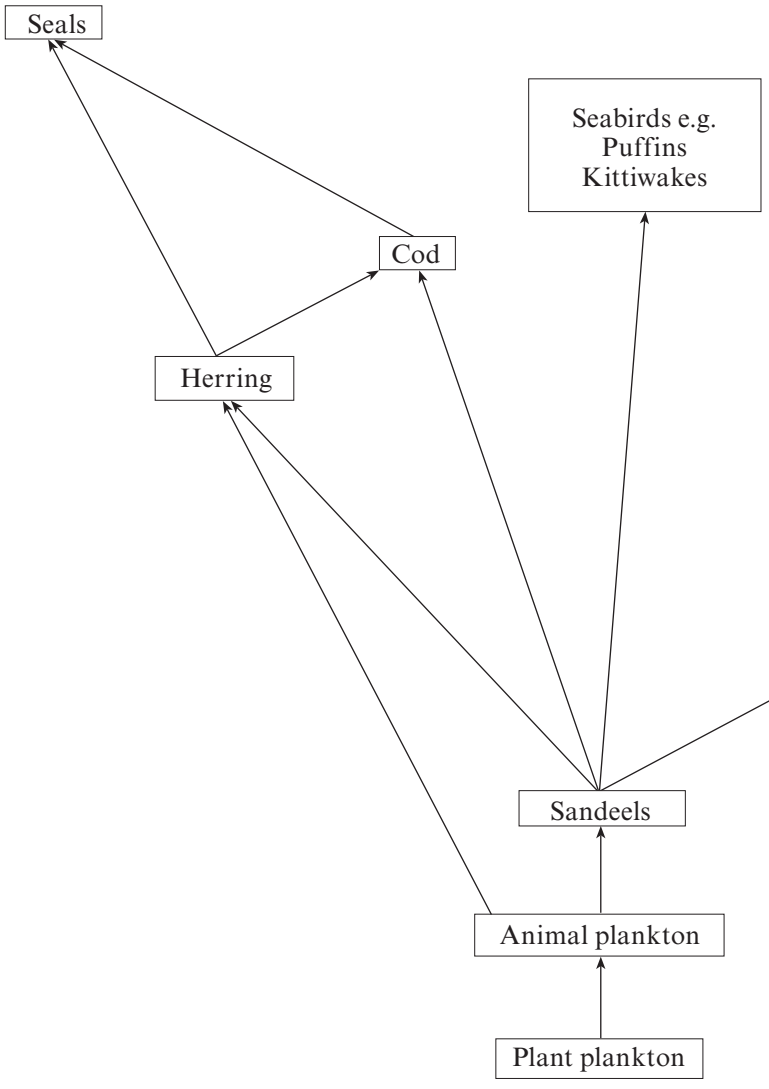
STEMUP.CO.UK

4. Many of the UK's 4 million seabirds of the North Sea are at risk because there are not enough sandeels for them to feed on.

Here are some key facts about the North Sea;

- herring stocks are increasing after years of decline.
- many of the puffins and kittiwakes are feeding their young on thin, starving sandeels.
- in 2004, only 1 in 5 pairs of kittiwakes reared young successfully.
- there are many trawlers in the North Sea fishing for sandeels. Sandeels are turned into fishmeal which is used to feed livestock and farmed salmon.
- sea surface temperatures have risen by 2 °C in the last 25 years. This is causing a decrease in the quantity of plant plankton available.

The diagram below shows a small part of the North Sea food web.





Puffin with catch of sandeels
©Mark Medcalf/Shutterstock



Danish trawler catching sandeels
©Nikolojs Lunskijs/Shutterstock

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(a) Explain how the increase in the numbers of herring in the North Sea could affect the sandeel population. [3]

.....

.....

.....

.....

.....

.....

(b) (i) Using the information in the food web and key facts suggest why the North Sea puffin and kittiwake populations are falling dramatically. [3]

.....

.....

.....

.....

.....

.....

(ii) The UK Government uses the kittiwake as an indicator of the state of the sea. Suggest **one** way the Government could reverse the decline in seabirds. [1]

.....

.....

7

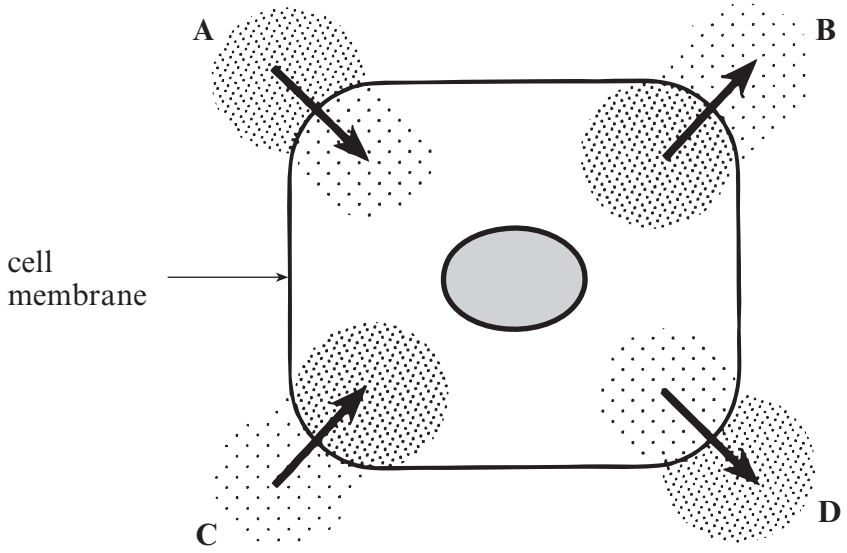
© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

5. The diagram shows four ways in which substances may enter and leave a cell in the small intestine.
The dots show the concentration of different substances.



Complete the following table to show which arrow represents the movement of oxygen, carbon dioxide and glucose. Name the process involved in the movement of each substance and give the reason for your answer. [9]

Substance	Letter	Process	Reason
carbon dioxide			
glucose			
oxygen			

9

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

6. During long-distance running or cycling, chemical changes take place in our bodies. Water is lost and is often replaced by drinking sports drinks.

(a) Sports drinks contain water and about 6% glucose which acts as a fuel for the body.

(i) Name the process which uses oxygen to help release energy from this fuel. [1]

.....

(ii) Name a chemical produced in this process. [1]

.....

(b) Long-distance runners may include "carbo-loading" in their training where they eat large amounts of starch-rich food.
Sprinters often eat glucose-rich sweets and drinks just before a race.
Explain why

(i) "carbo-loading" is useful to long distance runners. [1]

.....

.....

(ii) glucose-rich sweets and drinks are useful to sprinters. [1]

.....

.....

(c) During exercise a chemical can build up in the muscles causing pain.

(i) State the name of this chemical. [1]

.....

(ii) Explain why it is formed. [2]

.....

.....

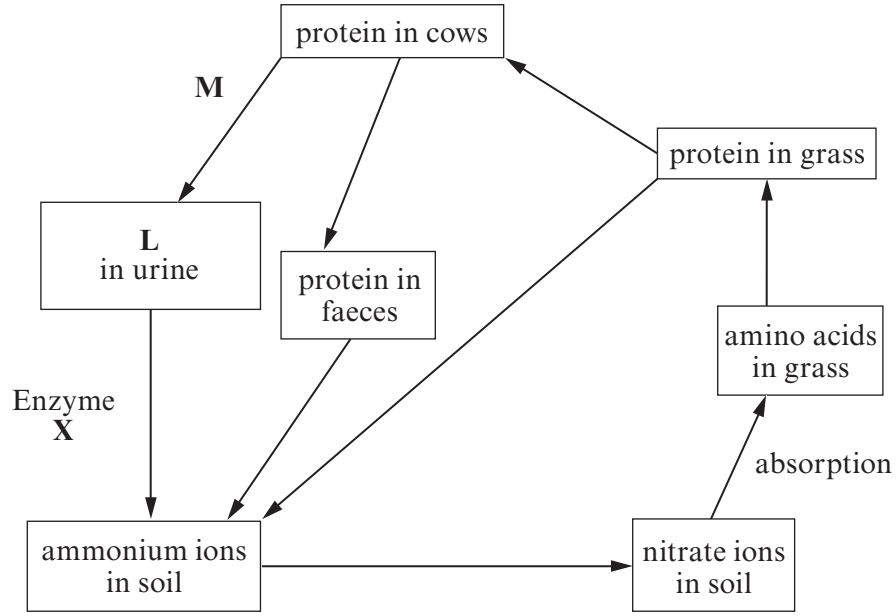
7

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

7. The flow diagram shows part of the nitrogen cycle in a field grazed by cows.



(a) Name the process **M**. [1]

M .....

(b) Name the chemical **L** and the enzyme **X**. [2]

L .....

X .....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(c) There are internationally recognised areas where the use of chemical fertiliser is restricted. In 2009, the Welsh Assembly Government designated such an area around a lake, Llyn Caron, in Anglesey. This was because the lake had an algal bloom (overgrowth of water plants).

(i) Name a **non-chemical** factor which affects the rate of growth of the algal bloom. [1]

.....

(ii) Describe and explain the possible effect on the fish in Llyn Caron if the algal bloom was allowed to increase. [4]

.....

.....

.....

.....

.....

.....

.....

.....

8

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

B2 (LEGACY) MARK SCHEME - JANUARY 2013

FOUNDATION TIER

Question			Marking details	Marks Available
Q.1	(a)		All 3 bars correct, labelled; and correct height; Quality of drawing – same width as those given	[3]
	(b)	(i)	jellyfish;	[3]
		(ii)	eat them / wrapped in it;	
		(iii)	produces poisonous gases;	
	(c)		Reuse bags/refill bottles/ charge for bags; Recycle; Reduce or no packaging /alternative packaging; Biodegradable; (Any 2 from 4)	[2]
			Question Total	**[8 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
Q.2	(a)		A - Cytoplasm; B - nucleus; C - (cell) membrane; D - cell wall; E- vacuole	[5]
	(b)	(i)	B;	
		(ii)	D/E;	
		(iii)	C;	[3]
			Question Total	**[8 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details		Marks Available
Q.3	(a)		*Fox* *Sparrows, Hedgehogs, Thrushes* *Snails* *4/5 correct = 4 marks* *3 correct = 3 marks* *2 correct = 2 marks* *1 correct = 1 mark*		[4]
	(b)	(i)	Leaves /(oak) tree; (allow: green plant)		[1]
		(ii)	Snail/caterpillar;		[1]
		(iii)	Caterpillar, hedgehog, fox;		[1]
				Question Total	**[7 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
Q.4	(a)		Energy; enzymes; aerobic;	[3]
	(b)	(i)	Correct plots (+/- 0.5 small square); (-1 per error) line (joined with ruler through centre of plots	[2] [1]
		(ii)	Correct reading from candidates graph (41^{o}C);	[1]
		(iii)	9 (allow error carried forward from (ii));	[1]
		(iv)	(Heat from) respiration;	[1]
		(v)	Repeat (with other individuals)/do more experiments; (not: ref. to thermometer/measure more frequently)	[1]
	(c)		Carbon dioxide; water;	 [2]
			Question Total	**[12 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details				Marks Available
Q.5/1	(a)		A stomach;	B	pancreas;		
			C large intestine;	D	oesophagus/gullet;		[4]
	(b)	(i)	4.7 mins/ 4 mins 42 secs;				[1]
		(ii)	6;				[1]
		(iii)	As the pH rises up to pH2 the time taken becomes less;				[1]
			Above pH2 the time taken increases (ref. to pH2 once only);				[1]
						Question Total	**[8 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question		Marking details	Marks Available
Q.6/2	(a)	Decreased;	[1]
		Increased;	[1]
		In the light;	[1]
	(b)	photosynthesis occurs;	[1]
		carbon dioxide is absorbed/taken in;	[1]
		oxygen produced;	[1]
		(not:equation)	
	(c)	Place apparatus in dark/cover in light-proof paper;	[1]
		(not switch off light – unless total darkness indicated)	
		Question Total	**[7 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

B2

HIGHER TIER

Question		Marking details	Marks Available
Q.3	(a)	undifferentiated / unspecialised cell; Not: specialised cells	[1]
		which can change/develop into other types of cells or other types of tissues; accept: turn into other cells/ to become any other cells not: new cells/ take place of other cells	[1]
	(b)	(Any 2) no rejection issues/ body will accept cells/ the cells will be compatible; no <u>moral/ethical</u> issues (relating to the stem cells used); no need for tissue typing/ no need to check tissues match; no need for a donor/ to find a donor/wait for a donor; NOT: ethnic/ killing embryos / reference to religion	[2]
		Question Total	**[4 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
Q.4	(a)		decrease the numbers (of sandeels);	[1]
			sandeels are eaten by herring;	[1]
			herring compete with sandeels for (animal) plankton/feed on plankton;	[1]
	(b)	(i)	Any 3 herring compete with birds for sandeels/reduce number of sandeels; sandeels do not have enough food / (animal) plankton; rise in sea temp (global warming) affect plankton distribution or numbers; fishing for sandeels; Not enough food for birds as numbers of sandeels dropping; (not: ref. bird breeding rate unqual./ref. herring killing sandeels)	[3]
		(ii)	quotas for <u>sandeel</u> fisheries / <u>sandeel</u> fishing ban or protected species/ marine or nature reserves; (not: captive breeding/increase number of seals/fishing ban unqual.)	[1]
			Question Total	**[7 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Q.5 (a) [9]

Carbon dioxide	B;	diffusion;	down a gradient;
Glucose	C;	active transport;	against a gradient;
Oxygen	A;	diffusion;	down a gradient;

Question total [9]

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
Q.6	(a)	(i)	Aerobic respiration;	[1]
		(ii)	CO_2 / water;	[1]
	(b)	(i)	Slow release of / store of energy;	[1]
		(ii)	Rapid / immediate release of energy;	[1]
	(c)	(i)	Lactic acid;	[1]
		(ii)	Lack of/little oxygen; oxygen debt; anaerobic respiration; (any 2)	[2]
			Question Total	**[7 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
Q.7	(a)		M = excretion (not: urination);	
	(b)		L = urea (correct spelling);	[1]
			X = urease (correct spelling);	[1]
	(c)	(i)	light/temperature;	[1]
		(ii)	plants die; because light is blocked out; decay (not: broken down); by <u>bacteria</u> (not: decomposers); use oxygen; for respiration; fish decrease/die from lack of oxygen (allow: suffocate); Any 4 x 1	[4]
			Question Total	**[8 Marks]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Surname	Centre Number	Candidate Number
Other Names		0

GCSE

0239/02

ADDITIONAL SCIENCE
HIGHER TIER
BIOLOGY 2

A.M. TUESDAY, 15 May 2012

45 minutes

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

0239
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 of the necessity for good English and orderly presentation in your answers.

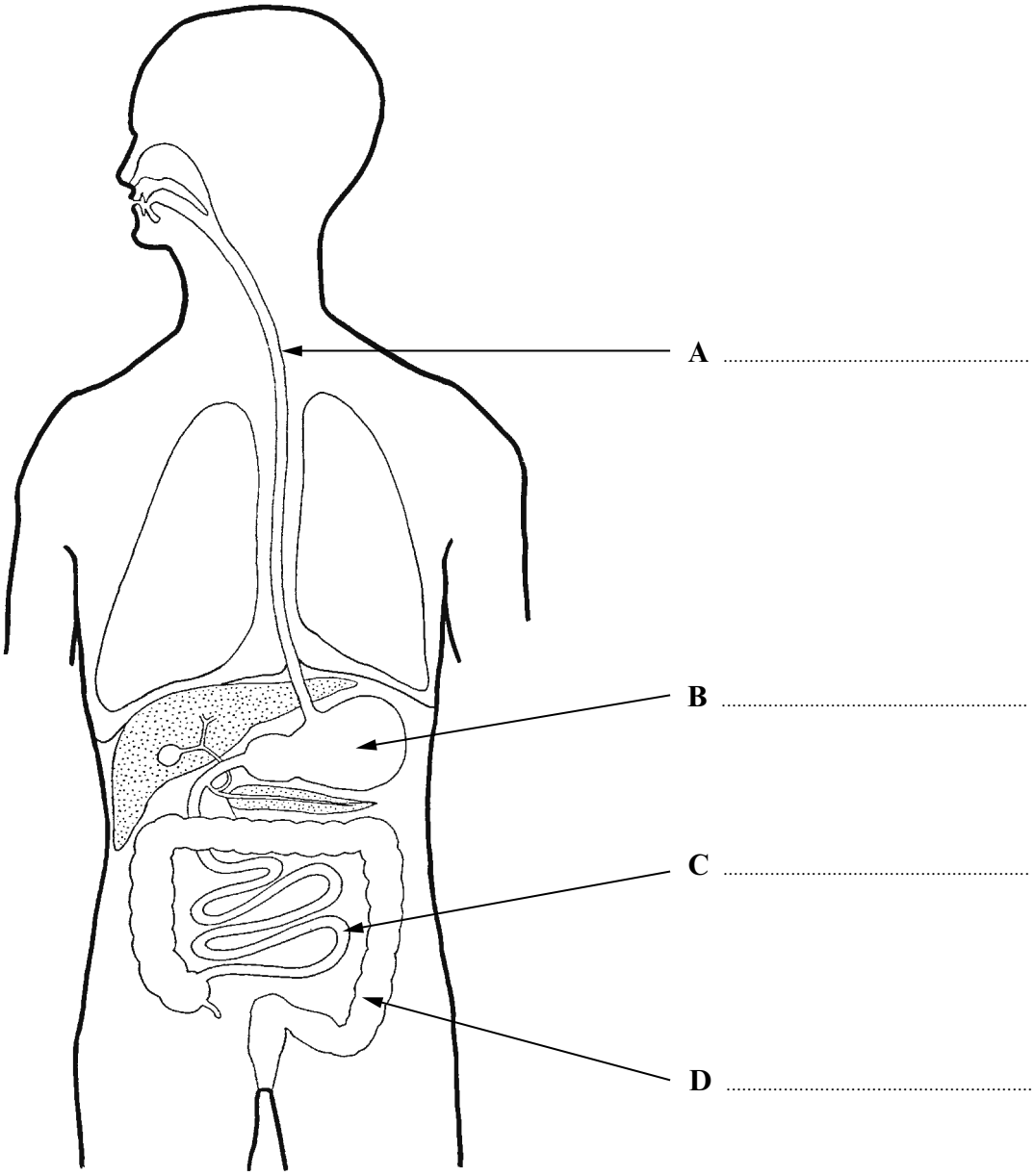
© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

Answer **all** *questions.*

1. The diagram below shows the human digestive system.



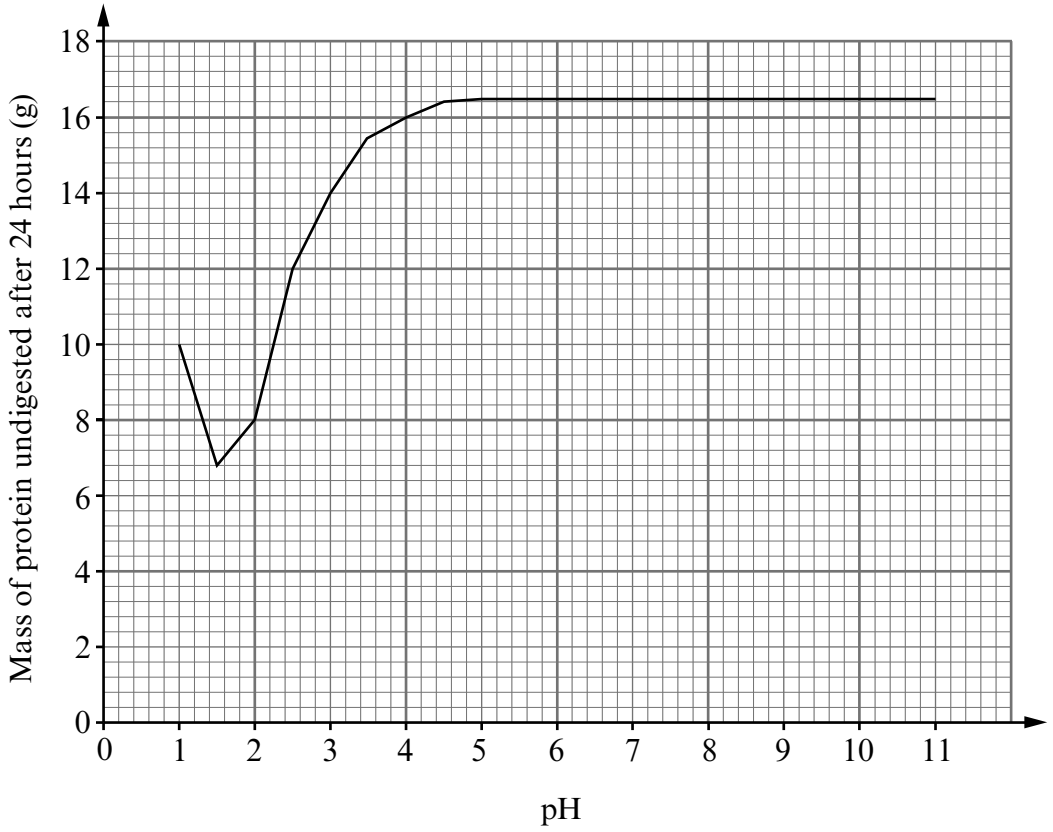
(a) Name the parts labelled **A** – **D** on the diagram. [4]

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(b) An investigation was carried out to find the mass of protein digested by a protease enzyme.
The mass of protein remaining undigested after 24 hours was recorded.
The experiment was repeated at different pH levels.
The results are shown in the graph.



(i) What is the optimum pH of this enzyme? [1]

.....

(ii) Name the organ where this enzyme can be found in the body. [1]

.....

(iii) Apart from time, state **one** *other* feature which should have been kept constant during this investigation. [1]

.....

0239 020003

7

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

2. Japanese Knotweed is an alien species in the UK. The UK government spend many millions of pounds every year trying to eradicate the plant.

In Japan a small insect, *Aphalara itadoria*, eats Japanese Knotweed and therefore controls the spread of the plant. This insect has now been imported into the UK from Japan to control Japanese Knotweed. This is the first time that an insect has been licensed for the control of a pest species by the European Union.

Japanese Knotweed



Google Images

(a) What is meant by an alien species? [1]

.....

.....

(b) What term is used to describe the use of a living organism to control a pest species? [1]

.....

(c) Japanese Knotweed has caused serious damage to underground drainage, roads and buildings in the UK and Europe for over 50 years. Suggest why it took such a long time to approve the use of *Aphalara itadoria* for the control of Japanese Knotweed in the UK and Europe. [2]

.....

.....

.....

.....

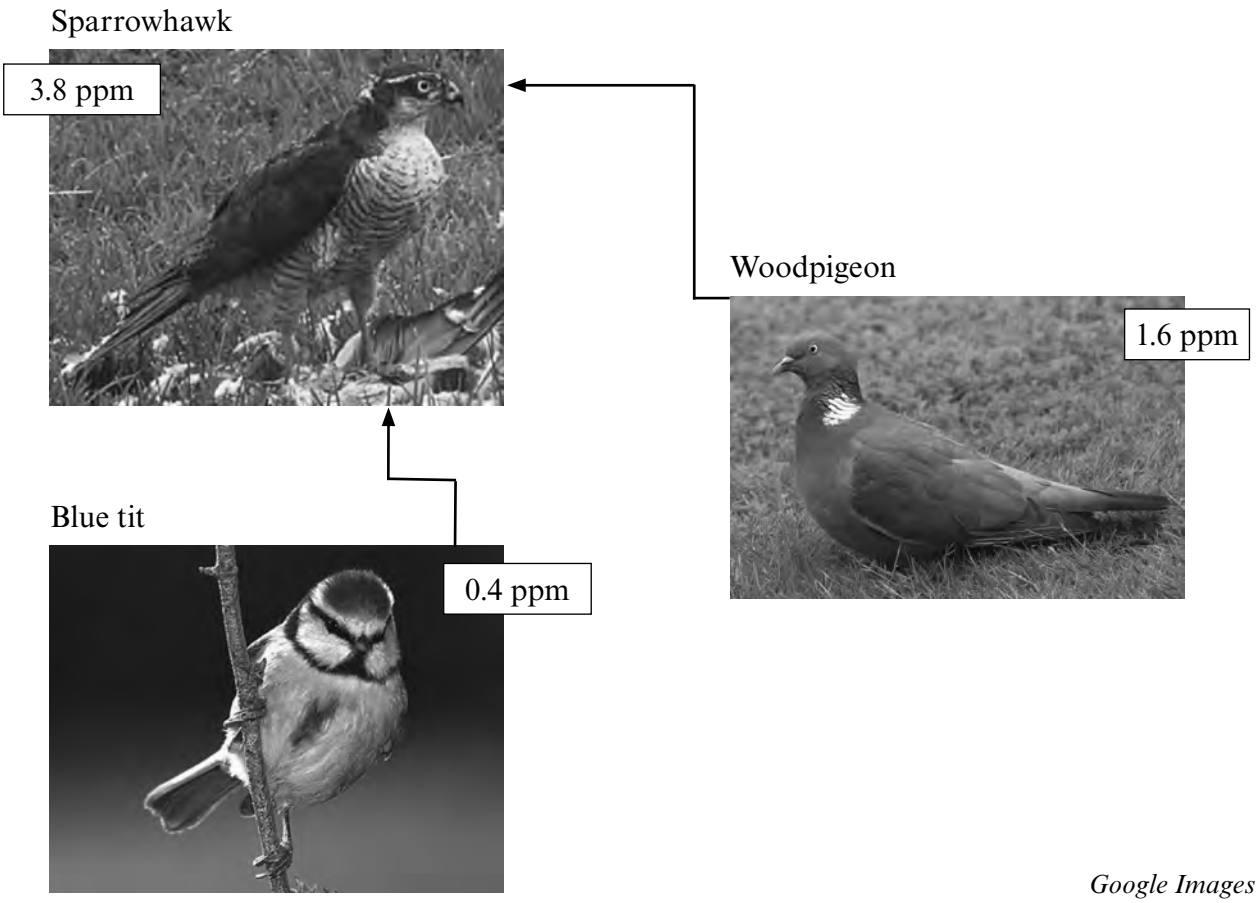
4

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

3. The sparrowhawk feeds on woodpigeons and blue tits. Blue tits eat insects. Each photo includes the concentration of insecticide found in the flesh of each bird in parts per million (ppm) in Britain in 1965.



Google Images

(a) The woodpigeon eats only plants. Suggest how it has insecticide in its body. [1]

.....

.....

(b) The sparrowhawk feeds on woodpigeons and blue tits.

(i) Why does the sparrowhawk have a higher concentration of insecticide in its body than either the woodpigeon or the blue tit? [2]

.....

.....

.....

(ii) Sparrowhawks were often killed by the concentration of insecticide in their bodies but woodpigeons and blue tits were not. Explain the reason for this. [1]

.....

.....

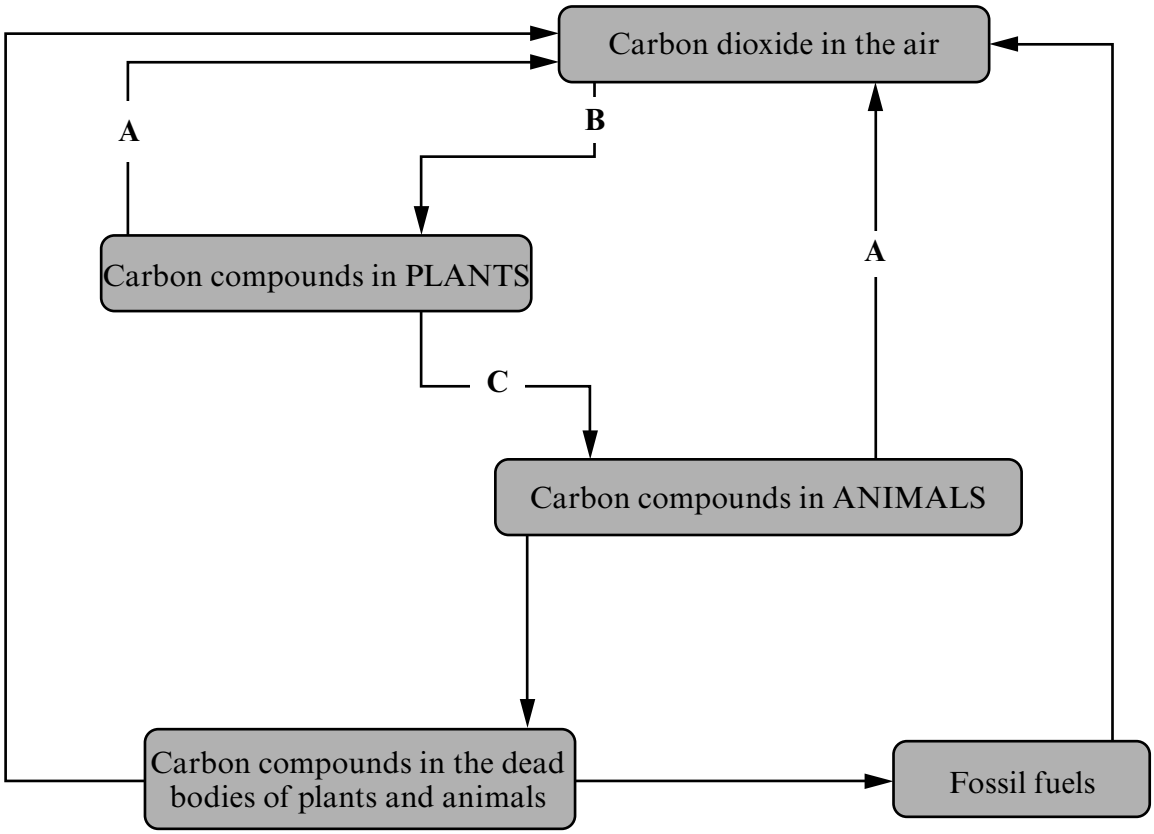
.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

4. The diagram below shows the carbon cycle.



(a) Name the processes **A**, **B** and **C**. [3]

A .....

B .....

C .....

(b) Explain how the carbon compounds in the bodies of dead animals and plants are returned to the air as carbon dioxide. [2]

.....

.....

.....

.....

.....

5

© WJEC CBAC Ltd.

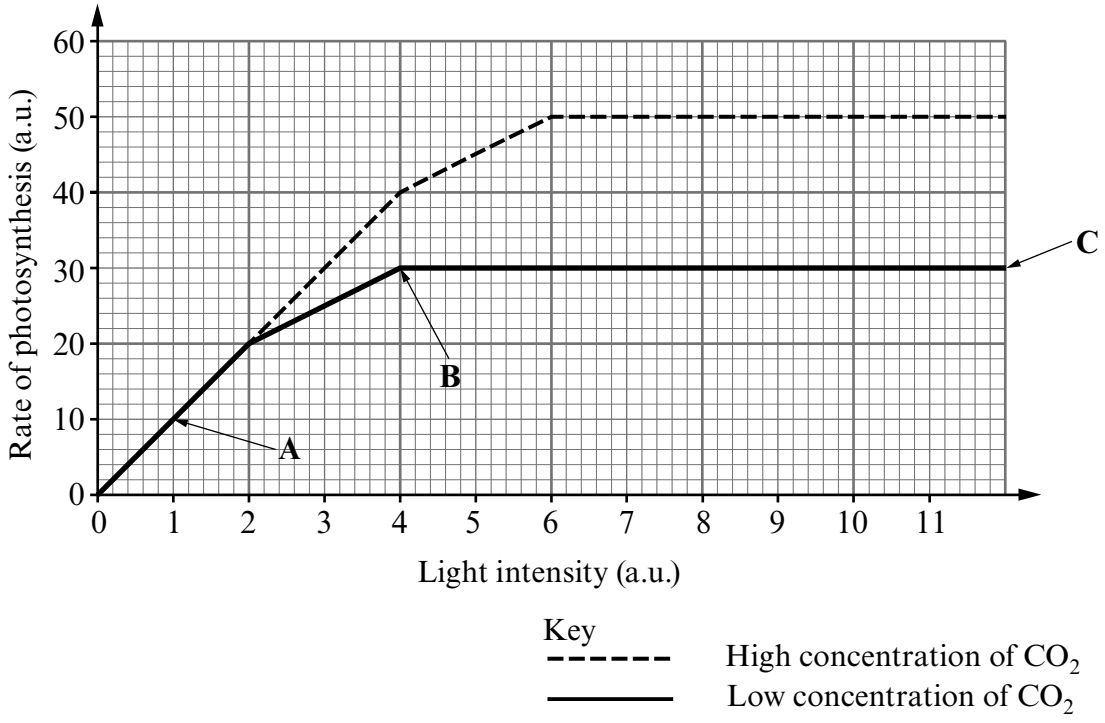
STEMUP.CO.UK

Examiner only

5. *(a)* Complete the word equation for photosynthesis below (do not use chemical formulae). [1]

..... + ... ⟶ ..... + ...

(b) The graph below shows the rate of photosynthesis under differing environmental conditions of light and carbon dioxide.



(i) State why the rate of photosynthesis is low at point **A.** [1]

.....

.....

(ii) Explain why the rate of photosynthesis has levelled off between points **B** and **C**. [1]

.....

.....

(c) State **one** way in which the rate of photosynthesis could be measured in the laboratory. [1]

.....

.....

(d) State **one** way in which the glucose produced during photosynthesis is used by the plant. [1]

.....

.....

5

© WJEC CBAC Ltd.

STEMUP.CO.UK

0239 020007

Examiner only

6. The following information is about the feeding habits of some birds which feed on a mud flat on the coast of South Wales.

Key: + means that the bird eats the animal

	Type of bird			
Animal used as food	Oystercatcher	Sandpiper	Turnstone	Knot
Spire shell (lst consumer)	+	+	+	+
Clam (1st consumer)	+	+	+	+
Sand hopper (1st consumer)			+	+
Crab (2nd consumer)		+	+	
Fish (2nd consumer)		+	+	

1st consumers = herbivores; 2nd consumers = carnivores.

Using only the information in the table

(a) Name the bird with the least varied diet. ..... [1]

(b) The food chain for the mud flat begins with primitive plants called diatoms. Suggest a possible four stage food chain using only the animals given in the table. The first stage, diatoms, is given.

Diatoms → ..... → ..... → ..... [3]

(c) The mud flat became polluted by heavy metals.

(i) Name the **two** animals which you would expect, eventually, to be the most affected by the heavy metals. [1]

.....

.....

(ii) Suggest a source of the heavy metal pollution. [1]

.....

6

© WJEC CBAC Ltd.

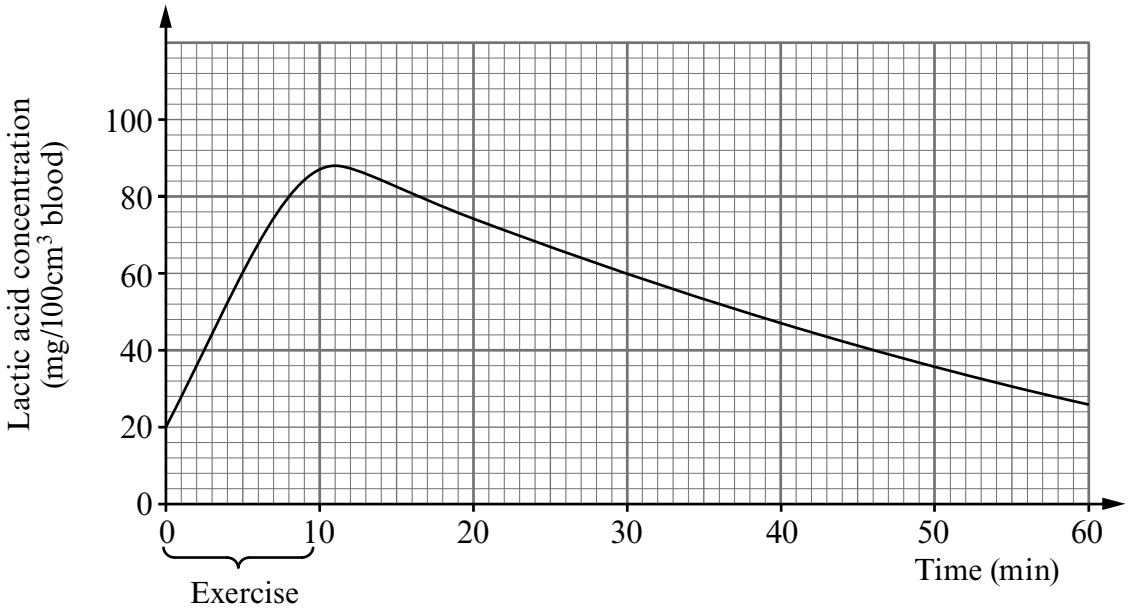
STEMUP.CO.UK

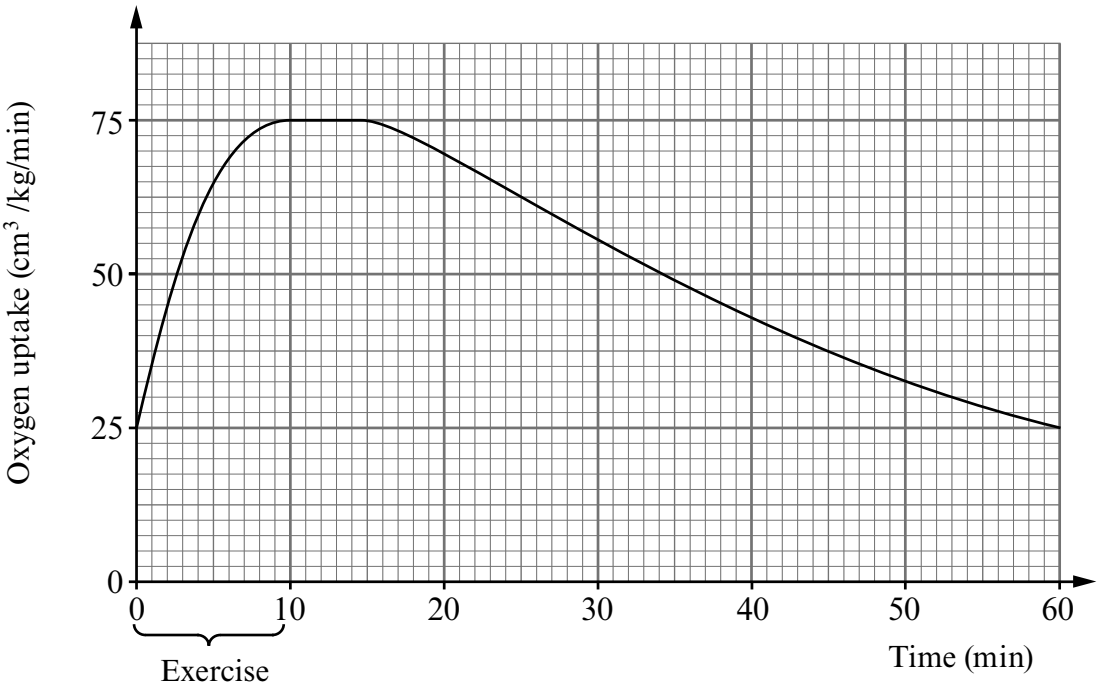
BLANK PAGE

© WJEC CBAC Ltd.

STEMUP.CO.UK

7. The effects of exercise on lactic acid concentration and oxygen uptake in the blood are shown below.





© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(a) (i) Calculate the increase in the concentration of lactic acid in the blood during the period of exercise. [1]

.....

(ii) Name the process taking place in the muscle cells which causes the production of lactic acid. [1]

.....

(iii) Name the chemical broken down to produce lactic acid in cells. [1]

.....

(b) Explain the level of oxygen uptake during the five minutes AFTER the exercise has finished. [2]

.....

.....

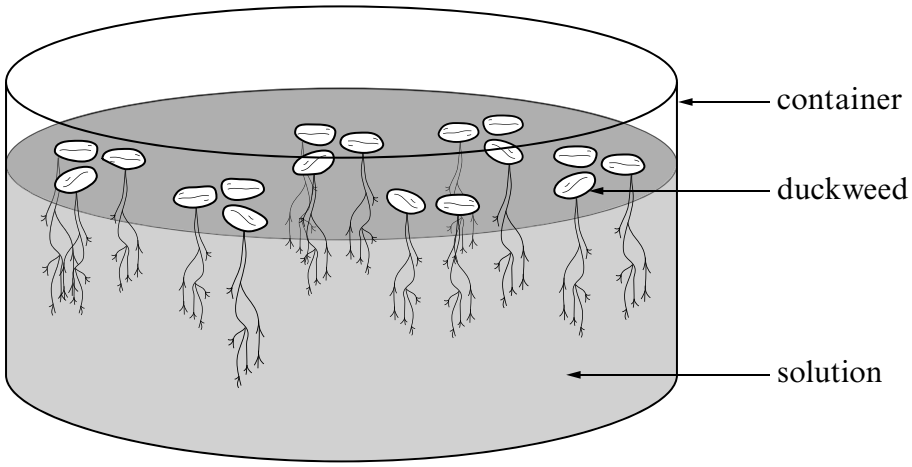
.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

8. A student wanted to investigate the effects of nitrate concentration on plant growth. She used a water plant called duckweed *(Lemna minor)*. This plant reproduces asexually by repeatedly dividing into two.



10 plants were added to containers containing equal volumes of sodium nitrate of different concentrations. They were left for 7 days and the numbers of plants counted.

The results are shown in the table below.

Container	Sodium nitrate (M)	Number of plants at start	Number of plants after 7 days
1	0.1	10	12
2	0.4	10	15
3	0.6	10	20
4	0.8	10	8
5	1.0	10	2

(a) In this investigation, state **two** factors apart from those stated above which should have been kept constant. [1]

.....

.....

(b) What do the results suggest about the use of nitrate as a fertiliser? [2]

.....

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(c) A control experiment was set up. All conditions were kept identical to the original investigation, except that sodium sulphate was used instead of sodium nitrate.
After 7 days all the plants were dead.
What was the reason for using sodium sulphate instead of sodium nitrate? [2]

.....

.....

.....

(d) Describe how the leaching of fertilisers containing nitrate from farmland might affect fish living in a lake. [3]

.....

.....

.....

.....

.....

.....

.....

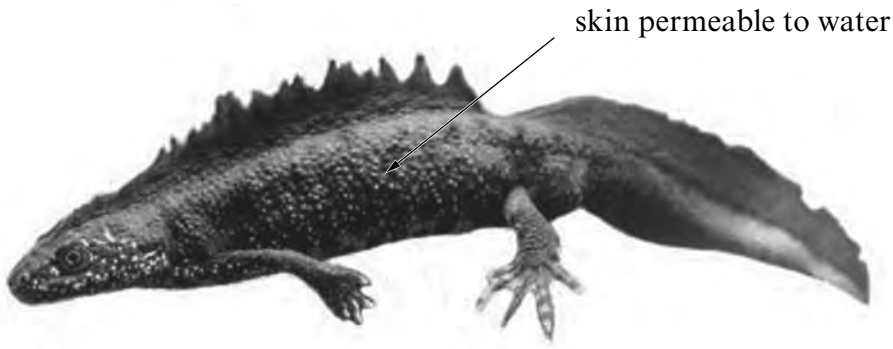
.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

9. During the very cold winter of 2009 - 2010, thousands of tonnes of salt were put on many roads in Wales to melt the ice.
Some of this salt was washed into ponds which were near roads.
Some of the ponds are breeding areas for the protected Great Crested Newt, *Triturus cristatus*.



Google Images

(a) Explain in detail how the salt in the water could affect the Great Crested Newts. [4]

.....

.....

.....

.....

.....

.....

(b) Besides this seasonal threat to the Great Crested Newt, it has also been threatened because of building developments.
A breeding colony lives on a proposed building site.
Suggest what the developers would have to do to protect the Great Crested Newts in this area before they go ahead with building. [2]

.....

.....

.....

.....

THERE ARE NO MORE QUESTIONS IN THE EXAMINATION.

6

© 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 B2 (LEGACY)

FOUNDATION TIER

Question			Marking details	Marks Available
1.	(a)	(i)	A Cell membrane;	1
			B Nucleus;	1
			C Cytoplasm;	1
		(ii)	Any **two** from cell wall; chloroplast; vacuole;	2
	(b)	(i)	Stem;	1
		(ii)	Plants grow throughout life but animals grow to a definite size;	1
			Question total	**[7]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
2.	(a)	(i)	Takes {land/area/ ground} needed {for breeding/ nesting/ laying eggs} NOT prevent breeding	1
		(ii)	There will be {less/ fewer} {eggs/ young/ baby birds}/ fewer eggs will hatch;	1
		(iii)	Kills/ reduces/ less/ fish needed for food; Accept No fish available for food Accept poisons birds.	1
	(b)		Decrease fishing / stop over-fishing/ limit fishing/ stop fishing;	1
	(c)	(i)	{Pollution / tourism / fishing} increasing; To prevent extinction/ being endangered; Help numbers increase or to prevent numbers declining; The numbers are decreasing;	1
		(ii)	Reference to an economic factor (More jobs / more money);	1
			Question total	**[6]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
3.	(a)	(i)	Snake / frog;	1
		(ii)	Lettuce;	1
			Sun(light); NOT light alone	1
	(b)	(i)	12000 – 1600 **and** 10400;	1
		(ii)	Lettuce to slug; (allow e.c.f)	1
	(c)		Heat (qualified) e.g. from respiration / maintenance and repair of cells / waste materials or named waste material (as specification) NOT death/ decomposition	1
			Question total	**[6]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
4.	(a)	(i)	Correctly Placed	
			Accept Words or correct formulae	
			Water;	1
			Glucose;	1
		(ii)	Absorbs light;	1
	(b)	(i)	Oxygen/ O_2;	1
		(ii)	I Increase <u>then</u> no change / steady/ level;	1
			NOT increase and stops	
			II Correct from <u>graph</u> – 38 (a.u);	1
			Not incorrect units	
			III Calculation consistent with II 38 (allow ECF) and graph (26/ 25.5)	1
			38-26=12	
			Or 38-25.5=12.5;	
		(iii)	Reduced / lower / decreased;	1
			Question total	**[8]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question		Marking details	Marks Available
5.	(a)	Protein;	1
		Chemical;	1
		pH (value); correct cases	1
	(b)	All plots correct. +/- ½ small square ;;	2
		Deduct one mark for extrapolation	
		Line through centre of plots;	1
	(c)	Sketch line consistent with clear decrease in activity and must reach/ cross 70°C vertical;	1
	(d)	Denatures / destroys;	1
		NOT kills/ loses shape/ stops it working	
		Question total	**[8]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
6/1	(a)		A – Oesophagus / gullet;	1
			B – Stomach;	1
			C – Small intestine/ ileum;	1
			D – Large intestine/ colon; Allow phonetic spelling	1
	(b)	(i)	(pH) 1.5;	1
		(ii)	Stomach;	1
		(iii)	Temperature / mass of protein <u>at start</u> / same protein / same volume / same mass or concentration of enzyme; NOT amount	1
			Question total	**[7]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question		Marking details	Marks Available
7/2	(a)	A species {introduced/ brought in/ imported} from another country/ the introduction of a species not native to the country.	1
	(b)	Biological control/ biocontrol	1
	(c)	{Research/ tests / trials/ experiments} have to be carried out;	1
		To make sure that the species (biological control agent) {does not become a pest itself /doesn't harm non target species or humans} (OWTTE)/ to check species does not introduce disease.	1
		Question total	**[4]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
8/3	(a)		Insecticide is on the {food/ plants/ crops} (that it eats).	1
	(b)	(i)	Sparrowhawk eats {<u>many/ lots of</u>} {pigeons / blue tits/ prey}; insecticide is {persistent / bioaccumulates / builds up in the body / not excreted/ not broken down}; NOT concentration increases/ more concentrated/ becomes concentrated	2
		(ii)	It reaches {<u>toxic/poisonous</u>} level in sparrowhawk (ORA)	1
			Question total	**[4]**
			TOTAL FOUNDATION TIER	**50**

© WJEC CBAC Ltd.

STEMUP.CO.UK

HIGHER TIER

Question		Marking details	Marks Available
4.	(a)	A Respiration; NOT anaerobic respiration	1
		B Photosynthesis;	1
		C Feeding/ eating;	1
	(b)	{Decomposers/ bacteria/ fungi} {feeding on / break down/ decompose/ putrefy/ decay/ rot} the bodies;	1
		Release {it/ carbon dioxide} during respiration;	1
		Decomposers respire producing carbon dioxide = 2	
		OR	
		Dead plants and/ or animals become fossilised;	
		{Combustion/ burning} of fossil fuels releases {carbon dioxide/ it};	
		Question total	**[5]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

(b) (i) Not enough light available/ low light intensity; 1
Any reference to carbon dioxide being in low concentration negates a correct answer.

(ii) Photosynthesis is taking place at the maximum rate for the (concentration of) Carbon dioxide available/ CO_2 is {a/the} limiting factor/ not enough carbon dioxide available to increase the rate of photosynthesis; 1
(amount= neutral)
Any reference to light being the limiting factor negates a correct answer.

(c) Any **one** of: 1
Measure the volume /concentration/ number of bubbles of $\underline{O_2}$;
Measure volume of CO_2 taken up;
Measure the mass of starch / glucose produced
(NOT volume of water used/ any record of light used).
(NOT amount).

(d) Any **one** from: 1
Respired to provide energy/ respiration;
Converted/ changed to starch;
Used to make cellulose / proteins / lipids;
NOT cell walls/ growth and repair

Question total **[5]**

6. (a) Oystercatcher; 1

(b) Spire shell / clam / sandhopper; 3

crab / fish;

sandpiper / turnstone;

(c) (i) Sandpiper and turnstone; 1

(ii) Industry / factories/ relevant named industry e.g. paper mill; 1

Question total **[6]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking details	Marks Available
7.	(a)	(i)	67/68 mg/100cm^3;	1
		(ii)	Anaerobic respiration;	1
		(iii)	Glucose;	1
	(b)		Oxygen debt has to be repaid/ paid back/ removed; to remove/ break down lactic acid;	2
			Question total	**[5]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question		Marking details	Marks Available
8.	(a)	Light / temperature / pH; (amount = neutral)	1
	(b)	Useful up to a maximum concentration / can increase growth up to stated concentration (0.6); then does not increase growth / decrease growth/ kills plants above 0.6M/ kills plants at 0.8M;	2
	(c)	To show NITRATE causes growth; not SODIUM;	2
	(d)	Any 3 Overgrowth/ excess growth of plants or algal bloom and they die; Decayed/ decomposed by bacteria/ decomposers; Take in oxygen by respiration and the fish die;	3
		Question total	**[8]**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question		Marking details	Marks Available
9.	(a)	Osmosis (correct context); water passes out of {cells / eggs / animals]; from where it is in high concentration to low concentration/ down a gradient / from high to low water potential (must be clear that high concentration of water is inside newt); through {selectively / partially / semi} permeable membrane.	4
	(b)	{Make / provide/ choose} {new ponds / habitat/ safe area}; relocate newts;	2
		Question total	**[6]**
		TOTAL HIGHER TIER	**50**

© WJEC CBAC Ltd.

STEMUP.CO.UK

Surname	Centre Number	Candidate Number
Other Names		0

WJEC CBAC

GCSE

0239/02

ADDITIONAL SCIENCE
HIGHER TIER
BIOLOGY 2

A.M. TUESDAY, 24 January 2012

45 minutes

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

0239
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

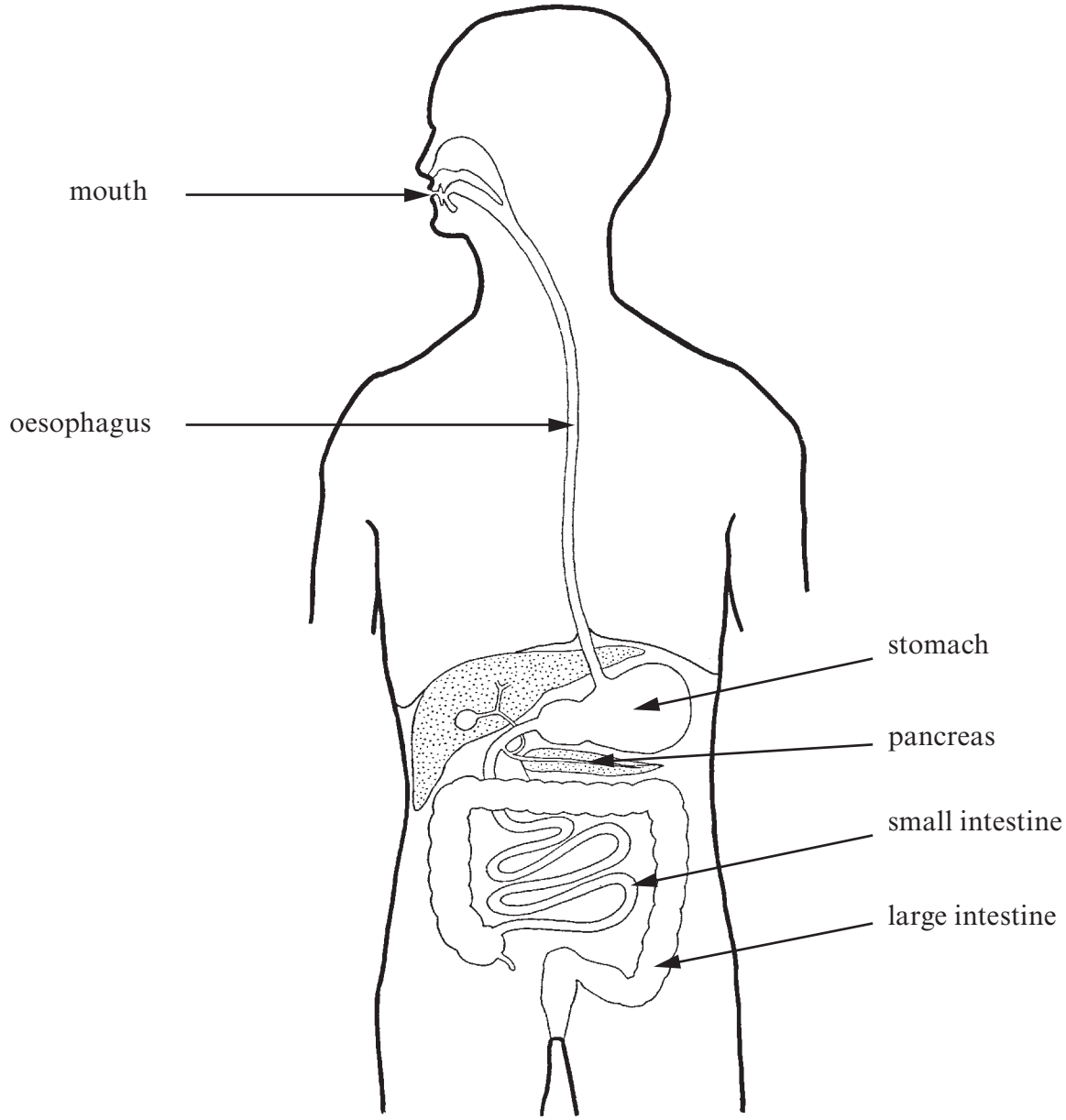
The number of marks is given in brackets at the end of each question or part-question.

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

STEMUP.CO.UK

Answer **all** *questions.*

1. The diagram shows the digestive system.



(a) Write down the name of the organ from the diagram that best fits each description below.

(i) An organ that secretes lipases, proteases and carbohydrases. [1]

.....

(ii) The organ where fats are digested to fatty acids and glycerol. [1]

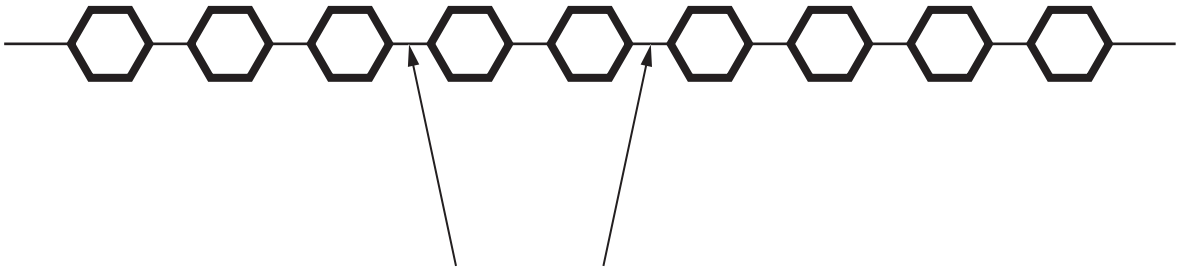
.....

(iii) The organ where the digestion of starch begins. [1]

.....

STEMUP.CO.UK

(b) The diagram below represents a short length of a starch molecule.



(i) Name the type of enzyme that digests the chemical bonds in the starch molecule. [1]

.....

(ii) Name the end product of starch digestion. [1]

.....

5

2. *(a)* What is meant by the term *biological control*? [2]

.....

.....

.....

(b) What name is given to a species of animal or plant which is introduced to an area where it has not previously lived? [1]

.....

3

STEMUP.CO.UK

Examiner only

3. A commercial tomato grower was concerned that the temperature in his greenhouses was too high at certain times of the year. The high temperature was reducing the yield of tomatoes.

He experimented by using 7 greenhouses made of 'SMARTglass'. When an electric current is passed through 'SMARTglass' the percentage of light and heat, it lets in, changes. By adjusting the strength of the electric current, the 'SMARTglass' can let a varying percentage of light and heat into the greenhouse.

The experiment was allowed to run for a complete growing season.

The results of the experiment are shown in the table below.

	Greenhouse number						
	1	2	3	4	5	6	7
Light and heat allowed to pass (%)	0	30	40	50	60	70	80
Mean mass of tomatoes produced (kg/plant)	0.0	3.4	5.2	5.6	6.9	4.3	2.2

(a) (i) To obtain the largest mass of tomatoes, what percentage of heat and light is it best to allow to pass into the greenhouse? [1]

..... %

(ii) All the plants were given as much water as they needed.
Name **one** *other* factor, which affects the rate of photosynthesis, which should be kept the same for all the tomato plants. [1]

.....

(iii) When setting up this experiment suggest **two** *other* ways in which the tomato grower could have kept the experiment fair. [2]

I. .....

.....

II. .....

.....

(b) Explain fully why the yield of tomatoes in greenhouse number 2 was less than greenhouse number 5. [3]

.....

.....

.....

.....

.....

.....

7

STEMUP.CO.UK

Examiner only

4. *(a)* In the space below draw a large diagram of a plant cell. [3]
Label **three** parts which are **only** found in **plant cells**.

(b) Plants and animals have different patterns of growth and development.
State **one** of these differences. [1]

.....

.....

(c) State **one** medical use of human stem cells. [1]

.....

.....

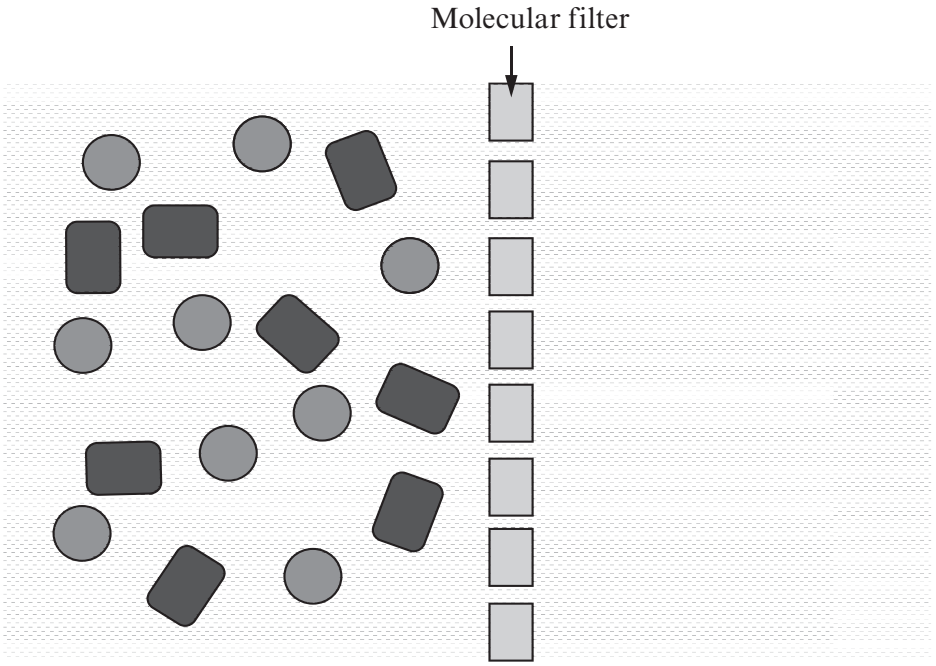
5

Turn over.

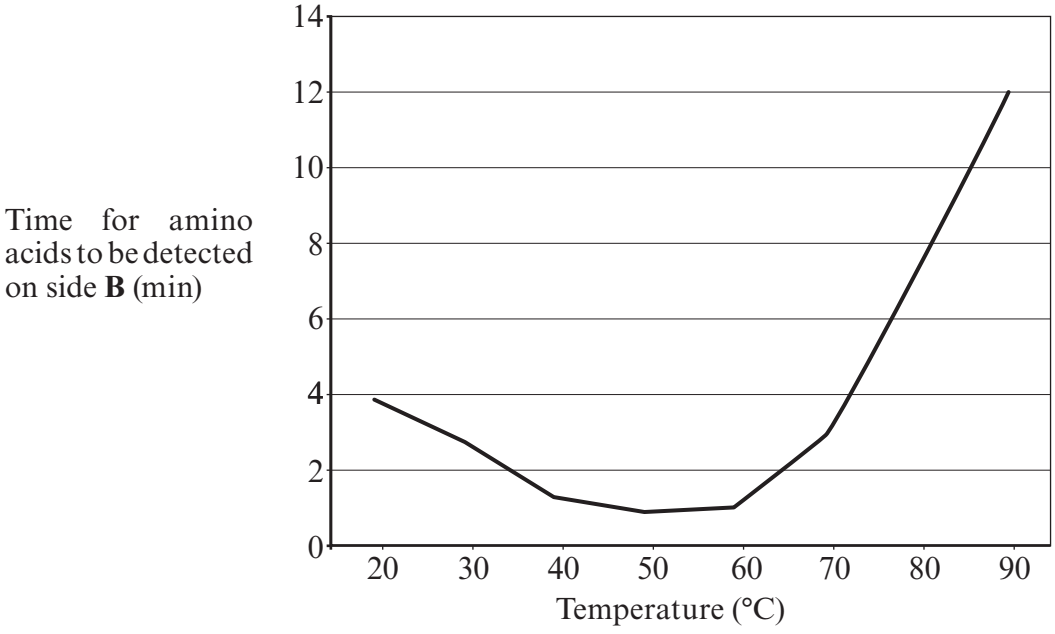
STEMUP.CO.UK

Examiner only

5. An experiment was set up to investigate the effect of temperature on the action of protease enzyme. A mixture of egg white (protein) and protease in water was separated from pure water by a molecular filter.



The experiment was carried out at different temperatures and the time taken for amino acids to be detected in the pure water on side **B** was noted. The results are shown in the graph below.



STEMUP.CO.UK

Examiner only

(a) Explain **fully** why the time taken for the amino acids to appear in the pure water at 40°C was less than at 20°C. [3]

(b) Explain **fully** why the time taken for the amino acids to appear in the pure water at 50°C was less than at 90°C. [2]

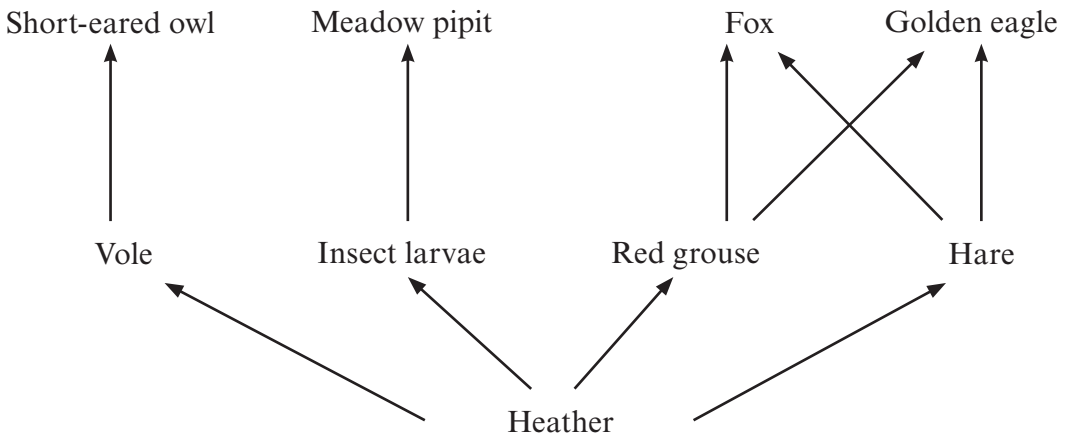
5

Turn over.

STEMUP.CO.UK

Examiner only

6. The diagram below shows part of a food web from a heather moorland.



(a) A number of kestrels moved into the area. Kestrels are birds that feed on insect larvae and meadow pipits.

Add the kestrel to the food web to show the relationship of the kestrels to the other organisms. [1]

(b) The owner of the moorland wants to use it for grouse shooting but is not certain how this will affect the hare population.

(i) Explain why the hare population may decrease if grouse numbers are reduced. [1]

.....

.....

(ii) Explain why the hare population may increase if grouse numbers are reduced. [1]

.....

.....

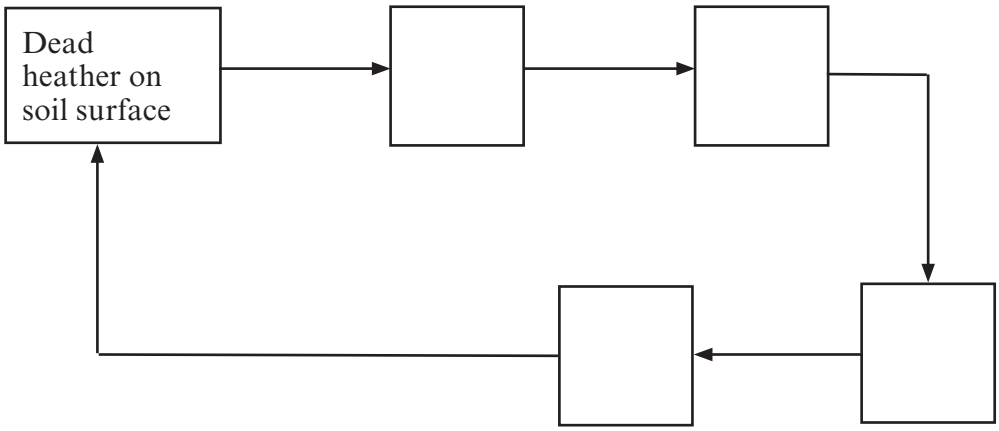
STEMUP.CO.UK

Examiner only

(c) To make sure that the heather on the moorland remains healthy and plentiful, it is necessary to understand how the nitrogen cycle works. The processes involved are listed below but are NOT in the correct order.

A The roots of heather take up nitrogen compounds.
B Nitrates are produced in moorland soil.
C Heather plants produce protein.
D Dead heather plants decay and ammonium compounds are produced.
E Ammonia is formed from nitrogen in the air.

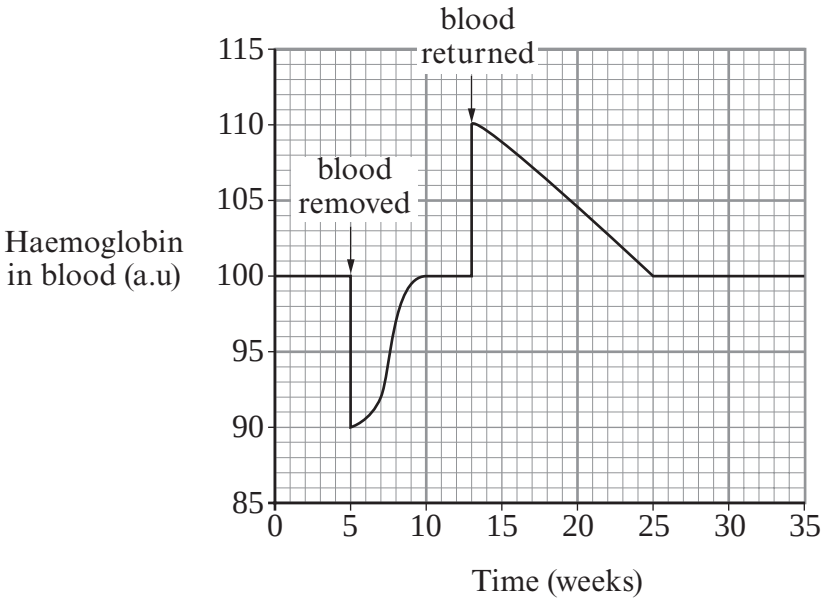
Using some of the letters given above, complete the diagram below to show the correct order of the stages in this cycle. [4]



STEMUP.CO.UK

Examiner only

7. Medical technology has been used in sport to improve the performance of athletes.
An athlete had 500 cm^3 blood removed, stored, and later returned to his body. Haemoglobin is the chemical in the red blood cells which carries oxygen.
The graph shows how the haemoglobin content of the blood in the athlete changed during the treatment. This procedure is now banned in international athletics.



(a) Use the graph to answer the following.

(i) What is the normal level of haemoglobin in the blood?

..... a.u. [1]

(ii) How many weeks did it take for the athlete's haemoglobin to return to normal after the blood was removed?

..... weeks. [1]

(b) The athlete ran a 100m sprint race seven weeks after having the blood returned to his body.
Explain why he produced less lactic acid in his muscles than before he received the treatment. [4]

.....

.....

.....

.....

.....

.....

6

STEMUP.CO.UK

Examiner only

8. Mrs Savemore did not want to spend money on weedkillers. Weeds were growing in her garden so she made a concentrated solution of salt and poured it on the weeds. After four days the weeds were dead.

(a) Explain why the high concentration of salt caused the weeds to die. [4]

.....

.....

.....

.....

.....

.....

.....

(b) In salt marshes, the soil is covered by sea water at high tide. Specially adapted plants (Halophytes) are able to survive in these areas of high salt concentration. They survive because the contents of their cells have high concentrations of salts.

(i) Name the process by which these plants can take salts into their cells against a concentration gradient. [1]

.....

(ii) Name **two** chemicals which are needed to release energy for this process to occur. [2]

.....

.....

7

Questions continue overleaf.

Turn over.

STEMUP.CO.UK

Examiner only

9. An industrial town near lake Nakuru in Kenya has become bigger since 1996. One effect of this is an increase in the volume of sewage that flows into lake Nakuru.
Explain how this sewage pollution might affect the organisms in the lake. [5]

.....

.....

.....

.....

.....

.....

.....

.....

.....

5

STEMUP.CO.UK

WJEC
CBAC

GCSE MARKING SCHEME

SCIENCE – BIOLOGY (LEGACY)

JANUARY 2012

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2011 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)	1
B2 (Legacy)	14

UNIT B2 (LEGACY)

FOUNDATION TIER

Question			Answer	Mark
1.	(a)		one mark for each labelled structure in correct location; Vacuole – should occupy at least quarter of space Nucleus – bigger than chloroplast Cell wall - can be single or double line Labels should be unambiguous Deduct marks for nucleus and/ or chloroplast if inside the vacuole	4
	(b)		cytoplasm clearly indicated in correct location;	1
	(c)	(i)	membrane;	1
		(ii)	chloroplast;	1
	(d)		two from: (cell) membrane / cytoplasm / nucleus	2
			Total for Question	**9**

STEMUP.CO.UK

Question			Answer	Mark
2.	(a)		oxygen;	3
			carbon dioxide + water; (either way round)	
			can use correct symbols	
	(b)	(i)	(I) kill/ destroy (NOT get rid of)bacteria / fungi / microorganisms;	1
			NOT germs	1
			(II) C:	1
			(III) repeat/ do it again NOT increase number of flasks	
		(ii)	(I) <u>rise</u> / fall / stay the same;	1
			(II) rise / fall / <u>stay the same;</u>	1
	(c)		Any suitable reference to life processes e.g. movement/ for exercise / repair / cell division/ excretion/ reproduction/ sensitivity/ feeding or digestion/ maintain body temperature/ keeping warm (not: growth / photosynthesis/ heat energy alone/ catch food/ eat food)	1
			Total for Question	**9**

STEMUP.CO.UK

Question			Answer	Mark
3.	(a)	(i)	all plots correct; tolerance +/- ½ small square, Allow just top of bar drawn/ not shaded. (one error minus 1)	2
		(ii)	Small Skipper; Small Copper, (either order)	2
	(b)	(i)	Common Blue; Hairstreak; (either order)	2
		(ii)	The grass was cut (too low)/ needed longer or higher grass/ grass is too short NOT grass wrong height/ not enough grass/ need a lot of grass	1
		(iii)	10;	1
	(c)		such as: trampling / people walking/ pesticide/ reference to change in habitat/ moved to different habitat/ grass too short/ grass cut below 3cm; NOT moved (alone), scared away	1
			Total for Question	**9**

STEMUP.CO.UK

Question			Answer	Mark
4.	(a)	(i)	bacteria / fungi;	1
		(ii)	acid;	2
			little oxygen; (either order)	
			NOT no oxygen, microbes need oxygen to decay	
		(iii)	dried;	1
	(b)	(i)	(fossil)fuel / burnt to provide heat (burning qualified)	1
		(ii)	carbon dioxide/ CO_2;	1
	(c)		decays;	2
			nutrients absorbed by plants;	
			Total for Question	**8**

STEMUP.CO.UK

FOUNDATION & HIGHER TIER

Question			Answer	Mark
5/1	(a)	(i)	Pancreas/ small intestine	1
		(ii)	small intestine	1
		(iii)	mouth	1
	(b)	(i)	carbohydrase / amylase (spelling must end in –ase)	1
		(ii)	glucose NOT simple sugar (can be neutral)	1
			Total for Question	**5**

STEMUP.CO.UK

Question		Answer	Mark
6/2	(a)	use of {(a living) organism / predator / natural enemy/ animal}/ introduce a species;	1
		to feed off / reduce / kill a (crop) pest / alien species	1
		Correct use of example = 2 marks	
	(b)	Alien/ exotic (species)	1
		Total for Question	**3**

STEMUP.CO.UK

Question			Answer	Mark
7/3	(a)	(i)	60	1
		(ii)	CO_2/ carbon dioxide (amount = neutral)	1
		(iii)	any two from:	2
			same size greenhouse/ same number plants / same spacing / same aspect or greenhouses face same direction/ same variety or type of plants / same age or mass or size of plants / same mineral feed or nutrients / same ventilation / same soil or mass of soil	
			Accept carbon dioxide if not used in (ii) (ECF)	
			NOT same temperature/ same greenhouse/ same glass/ amount of	
	(b)		plants had insufficient or not enough light / heat/ ORA	1
			so less photosynthesis/ reduced rate of photosynthesis	1
			NOT not as easy to photosynthesise or quicker/slower photosynthesis	
			so less food / glucose (for tomato growth)	1
			NOT less energy or les fruit produced	
			Total for Question	**7**

STEMUP.CO.UK

HIGHER TIER

Question		Answer	Mark
4	(a)	cell wall correctly drawn & labelled (must be double line)	1
		vacuole correctly drawn & labelled	1
		(deduct if contains nucleus/mitochondria)	1
		chloroplast(s) correctly drawn & labelled in cytoplasm	
		deduct one mark for each incorrect label	
	(b)	any one from:	1
		plant tissue can regenerate from stem / undifferentiated cells more so than animal tissue/ easier for plants to regenerate from stem cells	
		animals tend to grow to a finite size (more so than plants)/ animals have a maximum size that they grow to (OWTTE)	
		plant growth occurs from (restricted growth areas) meristems/ plants have branching growth or animals have a compact growth	
	(c)	repair / replacement of damaged tissues / organs/ cells (accept named tissue such as tendons/ trachea/ retina/ heart) to treat Parkinson's/ arthritis/ AVP	1
		NOT cure disease	
		Total for Question	**5**

STEMUP.CO.UK

Question		Answer	Mark
5.	(a)	at 20^0C or at lower temperature (enzyme and protein) molecules are moving slower/ ORA	Any 3
		therefore fewer collisions or description of fewer collisions or fewer reactions/ ORA	
		fewer protein molecules broken down / digested or fewer amino acids produced / less digestion/ ORA	
		fewer amino acid molecules move/ go into side B. NOT time taken	
		(3 from 4)	
	(b)	At 90^0 or higher temperature enzyme denatured or destroyed/ ORA	1
		fewer reactions / fewer amino acids produced/ less digestion/ ORA	1
		NOT slower/ rate of reaction decreases	
		Total for Question	**5**

STEMUP.CO.UK

Question			Answer	Mark
6.	(a)		Arrows from pipit and larvae to kestrel.	1
	(b)	(i)	more <u>foxes</u> and/ or <u>golden eagles</u> would eat the (increasing) hare (population because they would not have grouse to eat.)	1
		(ii)	more heather or food (for hares to eat.)/ less competition for food/ heather	1
	(c)		Correct order clockwise = D, B, A, C	4x1
			Total for Question	**7**

STEMUP.CO.UK

Question			Answer	Mark
7.	(a)	(i)	100	1
		(ii)	5	1
	(b)		More <u>haemoglobin</u>/ higher than normal haemoglobin NOT RBC	1
			More oxygen (carried)	1
			<u>More</u> AEROBIC respiration/ respire aerobically for longer	1
			<u>Less</u> anaerobic respiration.	1
			Total for Question	**6**

STEMUP.CO.UK

Question			Answer	Mark
8.	(a)		Water passes out or is lost/ plant is dehydrated	1
			by osmosis	1
			from higher concentration to lower concentration (must be show clear direction)	1
			through selectively or semi or partially permeable membrane	1
			NOT SPM	
			(No marks if refer to solutions moving rather than water)	
	(b)	(i)	Active transport/ uptake	1
		(ii)	Oxygen/ O_2	1
			Glucose.	1
			NOT ATP	
			Total for Question	**7**

STEMUP.CO.UK

Question	Answer	Mark
9.	Overgrowth of algae/ algal bloom/ rapid growth of plants or algae	1
	Plants /algae/ producers die.	1
	Because of lack of light/ light blocked out	1
	and decay/ decomposes	1
	Bacteria or fungi or decomposers use oxygen.	1
	NOT microbes/ micro-organisms	
	for respiration	1
	aerobic life / fish die / suffocate	1
	Any 5x1	
	Total for Question	**5**

STEMUP.CO.UK

Candidate Name	Centre Number	Candidate Number
		0

WJEC CBAC

GCSE

239/02

ADDITIONAL SCIENCE
HIGHER TIER
BIOLOGY 2

P.M. THURSDAY, 19 May 2011

45 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**4**	
2	**5**	
3	**6**	
4	**6**	
5	**4**	
6	**6**	
7	**3**	
8	**6**	
9	**10**	
Total	**50**	

0239 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 of the necessity for good English and orderly presentation in your answers.

STEMUP.CO.UK

Answer **all** *questions.*

1. Rhys, Angharad and their parents were very excited when they went whale watching from a high powered motor boat.
Rhys said "We got so close to the whales that we even managed to get in between a mother and its calf".



Google images

(a) Suggest **two** harmful effects that this type of ecotourism could have on the whales. [2]

(i) .....

.....

(ii) .....

.....

(b) Ecotourism also occurs in the Manu Biosphere Wildlife Reserve in Peru. This reserve is a good example of a sustainable use of wildlife.

(i) Explain the meaning of sustainable use of wildlife. [1]

.....

.....

(ii) Suggest **one** benefit that ecotourism in the Manu Biosphere Wildlife Reserve has on the local communities. [1]

.....

4

STEMUP.CO.UK

Examiner only

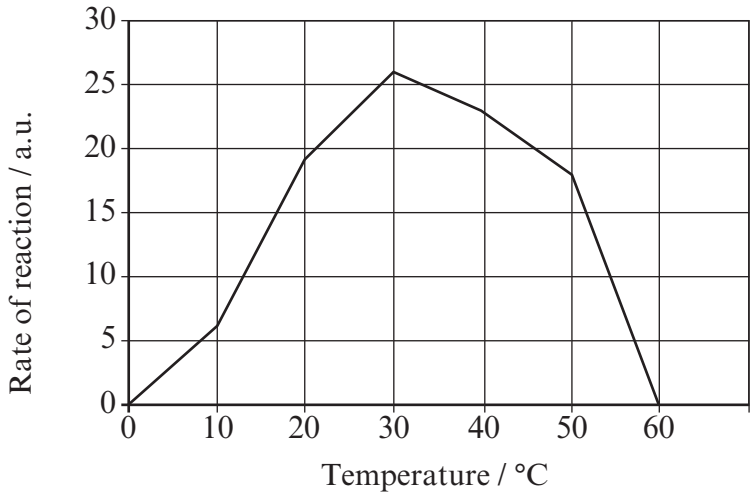
2. *(a)* What is an enzyme? [2]

.....

.....

.....

(b) An investigation was carried out in a school laboratory into the effect of temperature on the breakdown of starch by the enzyme amylase.
The results of the investigation are shown in the graph below.



From the graph:

(i) **Describe** the effect of temperature, above 30°C, on the amylase. [1]

.....

.....

(ii) **Explain** the effect of temperature, above 30°C, on the amylase. [1]

.....

.....

(c) State **one** factor which should be kept constant during this investigation. [1]

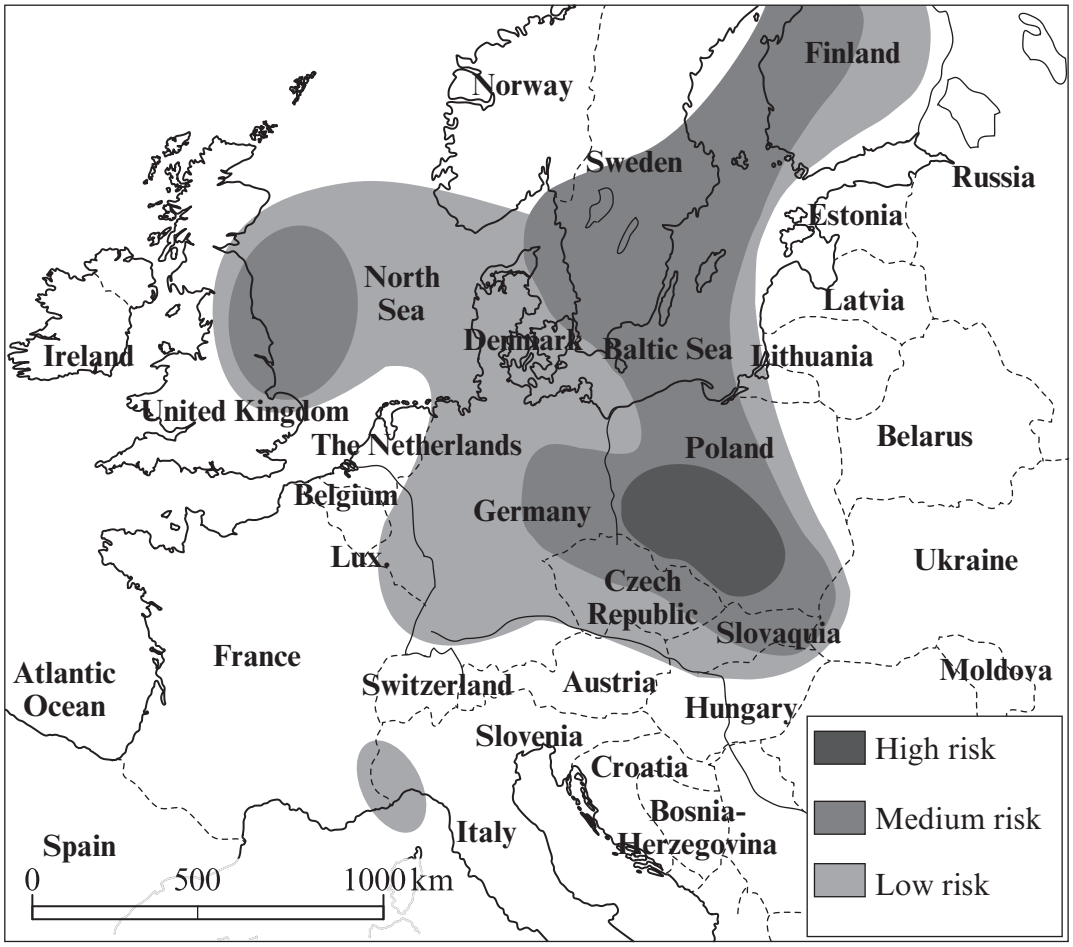
.....

0239 020003

STEMUP.CO.UK

Examiner only

3. The map shows the regions of Europe which are most at risk from acid rain.



(a) Which country and sea are most at risk from acid rain? [2]

Country .....

Sea .....

(b) Acid rain forms when gases such as carbon dioxide (CO_2) and sulphur dioxide (SO_2) dissolve in water in the atmosphere.

(i) Name the process that releases these gases. [1]

.....

(ii) Name the source of these gases. [1]

.....

(c) State **two** effects of acid rain on the environment and living organisms. [2]

.....

.....

.....

STEMUP.CO.UK

0239
020005

BLANK PAGE

STEMUP.CO.UK

Examiner only

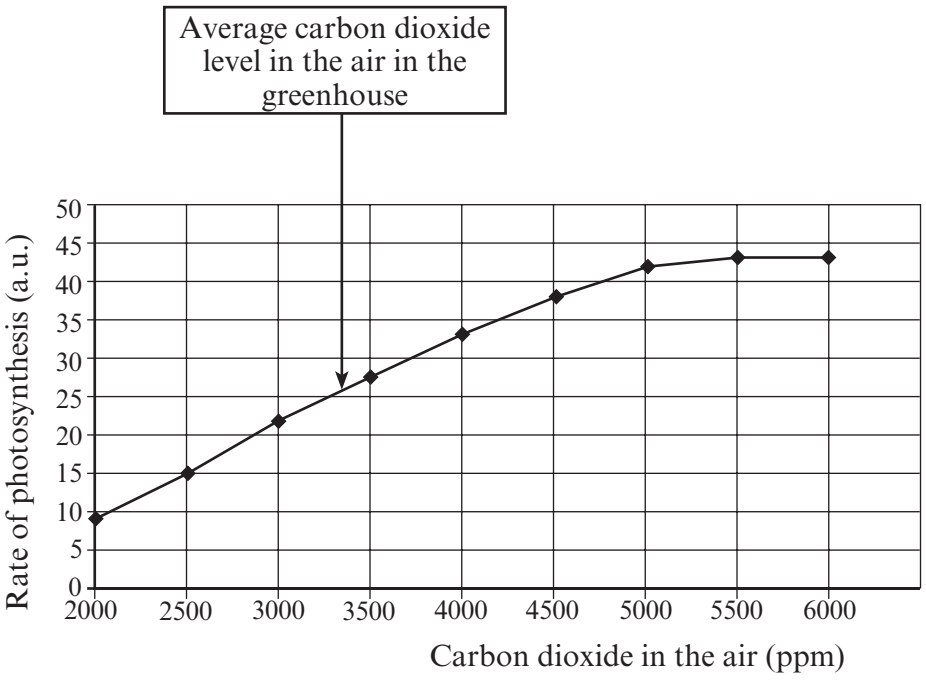
4. *(a)* Complete the word equation for photosynthesis. [2]

..... + ... $\xrightarrow[\text{chlorophyll}]{\text{light}}$ ..... + ...

A farmer wanted to increase the yield of strawberries grown in his greenhouse.



An advisor calculated the average level of carbon dioxide in the air in the greenhouse over a 24 hour period. He compared the average carbon dioxide level in the greenhouse with the carbon dioxide graph below, and marked it on the graph.



STEMUP.CO.UK

Examiner only

(b) (i) Why did the advisor measure the average concentration of carbon dioxide in the air over a 24 hour period rather than taking a single reading at a particular time during the 24 hour period? [1]

.....

.....

(ii) I. Using the graph, draw a conclusion about the rate of photosynthesis of the strawberry plants in the farmer's greenhouse. [1]

.....

.....

II. Using only the graph, what advice would you give the farmer in order to gain a **maximum** yield of strawberries? [2]

.....

.....

STEMUP.CO.UK

Examiner only

5. *(a)* State the role of the following organs in chemical digestion.

(i) the mouth [1]

.....

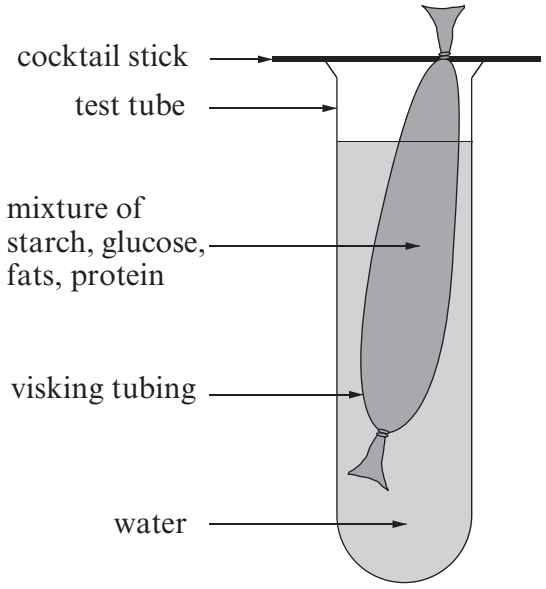
.....

(ii) the stomach [1]

.....

.....

(b) The visking tubing below represents a model of the intestine.
Starch, glucose, fats and protein were mixed in water. The mixture was poured into the visking tubing. The visking tubing was tied at the end and suspended in a test tube of water.



After 24 hours the water in the test tube was sampled.

In the table below indicate with a tick (✓) or a cross (×) to show whether each of the food substances was present in the water or not. [2]

Food substance	Contents of the water in the test tube after 24 hours (✓ or ×)
starch	
glucose	
fats	
protein	

4

STEMUP.CO.UK

Examiner only

6. Otters live near rivers and eat fish and other small animals that live in water.

(a) Between 1950 and 1970 the otter population in Wales decreased. Conservationists suggested that the decrease was because of the use of pesticides to kill insects.
Suggest how the use of pesticides caused a decrease in the population of otters. [2]

.....

.....

.....

.....

(b) Since 1929 the American mink has been bred in mink farms in Britain for their fur.
Mink eat the same food as otters.
In 1998 animal rights supporters released over 2000 mink from a mink farm.

(i) What word is used to describe animals which have been introduced to a country where they do not normally live in the wild? [1]

.....

(ii) Explain how the release of the mink could affect biodiversity in Wales. [3]

.....

.....

.....

.....

.....

6

7. When an athlete starts to run a race,

(a) aerobic respiration is taking place in her muscle cells.
Complete the word equation (do **not** use chemical symbols) to show this process. [1]

..... ⟶ ..... + energy

(b) Towards the end of the race anaerobic respiration is taking place in her muscle cells.
Write a word equation (do **not** use chemical symbols) to show this process.
[1]

..... ⟶ ..... + energy

(c) Explain why aerobic respiration is more efficient than anaerobic respiration. [1]

.....

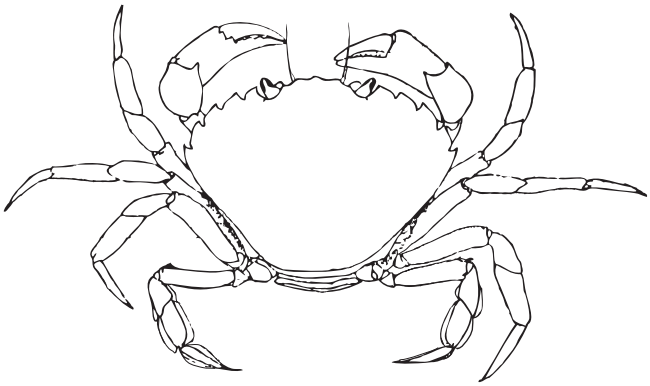
.....

3

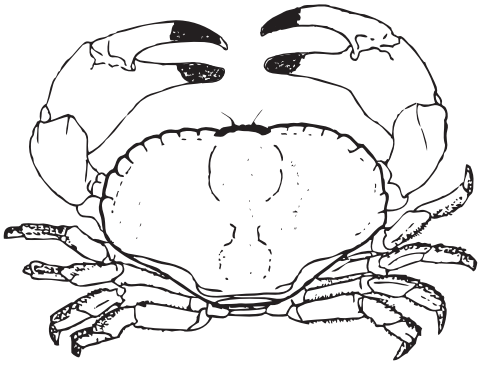
STEMUP.CO.UK

Examiner only

8.



Carcinus maenas



Cancer pagurus

The common shore crab, *Carcinus maenas,* lives in sea water and also in the mouths of rivers where sea water is very dilute. It is able to keep a constant concentration of salts in its body fluids. This overcomes the problem of osmosis. It does this by transporting salts in or out of its body by active transport.

(a) (i) What does a*ctive transport* mean? [2]

.....

.....

.....

(ii) How does the common shore crab adjust the concentration of its body fluids, by active transport, in very dilute sea water? [1]

.....

.....

(b) The edible crab, *Cancer pagurus*, only lives in sea water and not in the mouths of rivers. It is unable to adjust the concentration of its body fluids like the common shore crab. Explain how osmosis would affect the edible crab if it was kept in very dilute sea water. [3]

.....

.....

.....

.....

.....

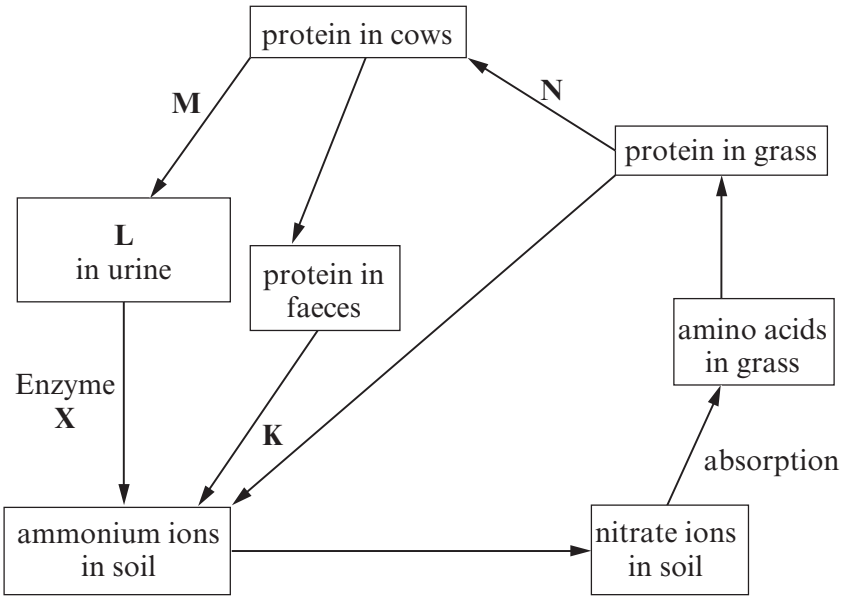
.....

6

STEMUP.CO.UK

Examiner only

9. The flow diagram shows part of the nitrogen cycle in a field grazed by cows.



(a) Name the processes **M**, **N** and **K**. [3]

M .....

N .....

K .....

(b) Name the chemical **L** and the enzyme **X**. [2]

L .....

X .....

Turn over for question *(c)*.

STEMUP.CO.UK

Examiner only

(c) There are internationally recognised areas where the use of chemical fertiliser is restricted. In 2009, the Welsh Assembly Government designated such an area around a lake, Llyn Caron, in Anglesey. This was because the lake had an algal bloom (overgrowth of water plants).

(i) Name a **non-chemical** factor which affects the rate of growth of the algal bloom.

..... [1]

(ii) Describe and explain the possible effect on the fish in Llyn Caron if the algal bloom was allowed to increase. [4]

.....

.....

.....

.....

.....

.....

.....

.....

10

STEMUP.CO.UK

Candidate Name	Centre Number	Candidate Number
		0

WJEC CBAC

GCSE

239/02

ADDITIONAL SCIENCE
HIGHER TIER
BIOLOGY 2

A.M. THURSDAY, 13 January 2011

45 minutes

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

0239
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 of the necessity for good English and orderly presentation in your answers.

STEMUP.CO.UK

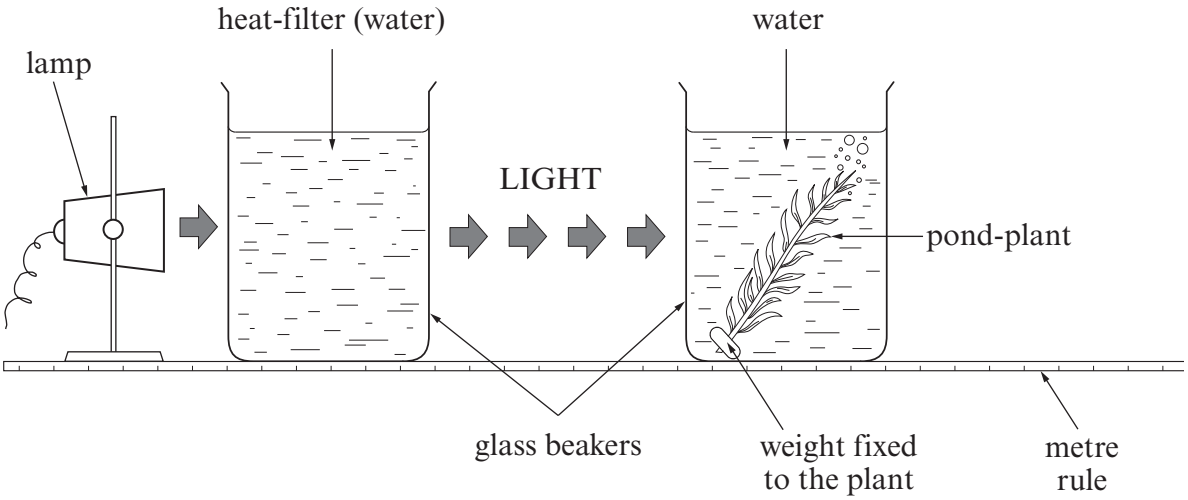
Examiner only

Answer **all** *questions.*

1. *(a)* Name the chemical used by green plants to absorb sunlight energy during photosynthesis. [1]

.....

(b) The following apparatus was set up by students in a school laboratory.



Explain how you could use the apparatus to investigate the effect of different light intensities on the **rate** of photosynthesis of the pond plant. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) State **two** ways in which plant cells use the glucose produced in photosynthesis. [2]

.....

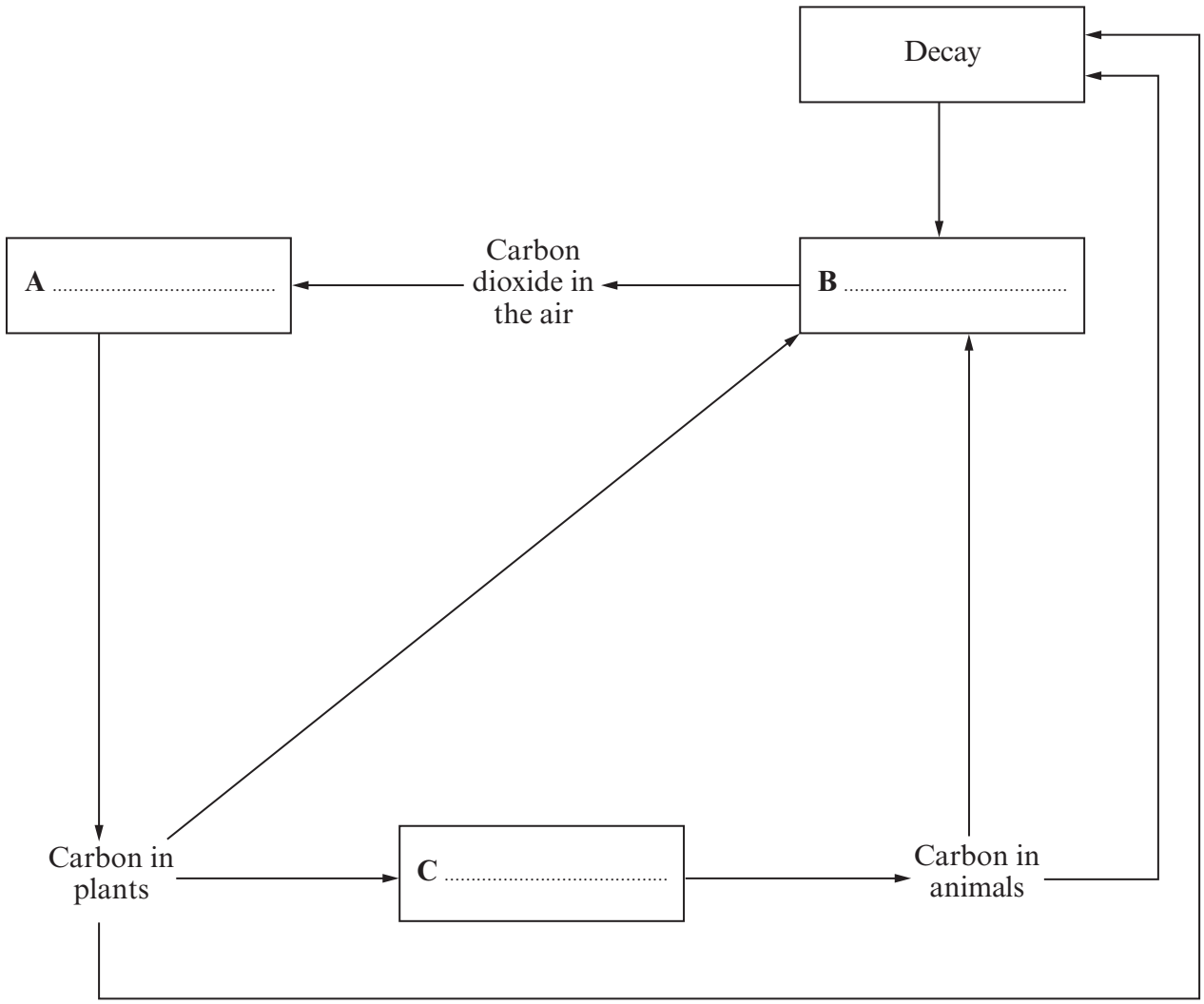
.....

6

STEMUP.CO.UK

Examiner only

2. The diagram shows the carbon cycle.



(a) Complete the diagram of the carbon cycle by naming the processes **A, B** and **C.** [3]

(b) Explain the part played by microbes in the carbon cycle. [2]

.....

.....

.....

.....

STEMUP.CO.UK

Examiner only

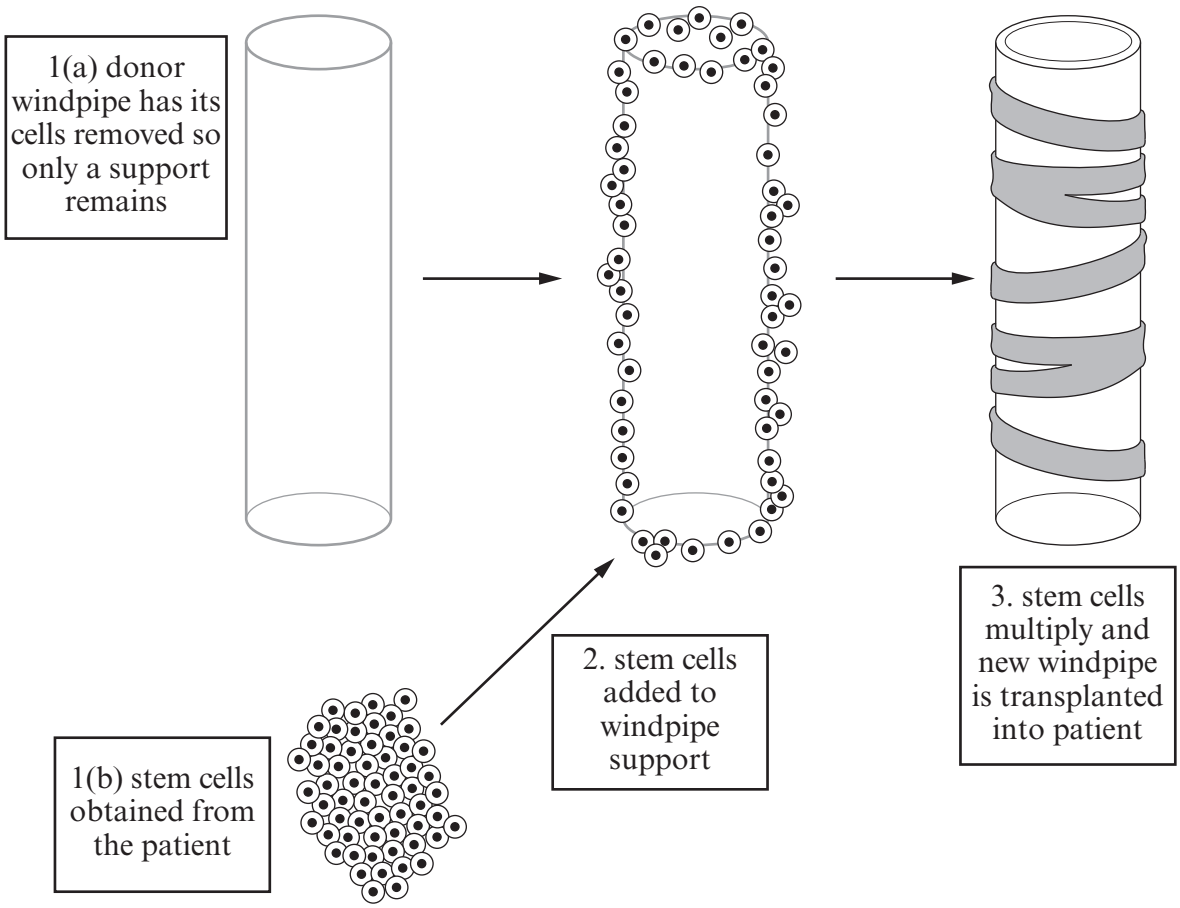
3. *(a)* What are stem cells? [2]

.....

.....

(b) In 2008 scientists carried out the first successful windpipe transplant in humans using the patient's own stem cells.

The process involved the following stages:



State **two** advantages to the patient of using their own stem cells rather than using embryonic stem cells. [2]

(i) .....

.....

(ii) .....

.....

STEMUP.CO.UK

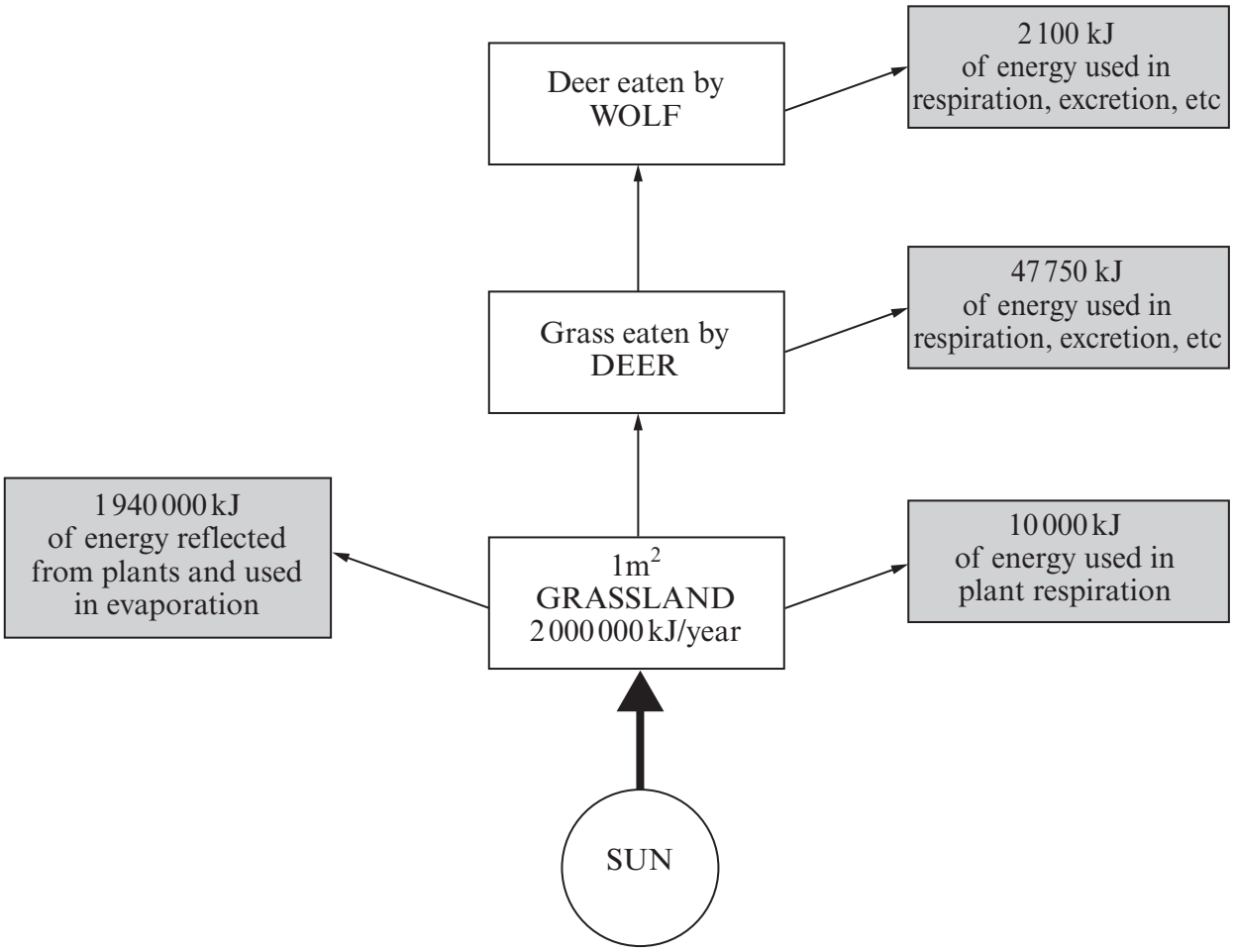
0239
020005

BLANK PAGE

STEMUP.CO.UK

Examiner only

4. The diagram shows how the sunlight energy landing on $1m^2$ of grassland in a year is moved through, and lost from, a food chain. The units of energy are in kilojoules (kJ).



(a) Calculate the amount of energy transferred to the deer. Show your working. [2]

Answer ..... kJ

STEMUP.CO.UK

Examiner only

(b) Give **two** uses of the energy that is released during respiration. [2]

1. .....

2. .....

(c) Why would this food chain not support a third stage consumer? [1]

.....

.....

.....

0239
020007

5

STEMUP.CO.UK

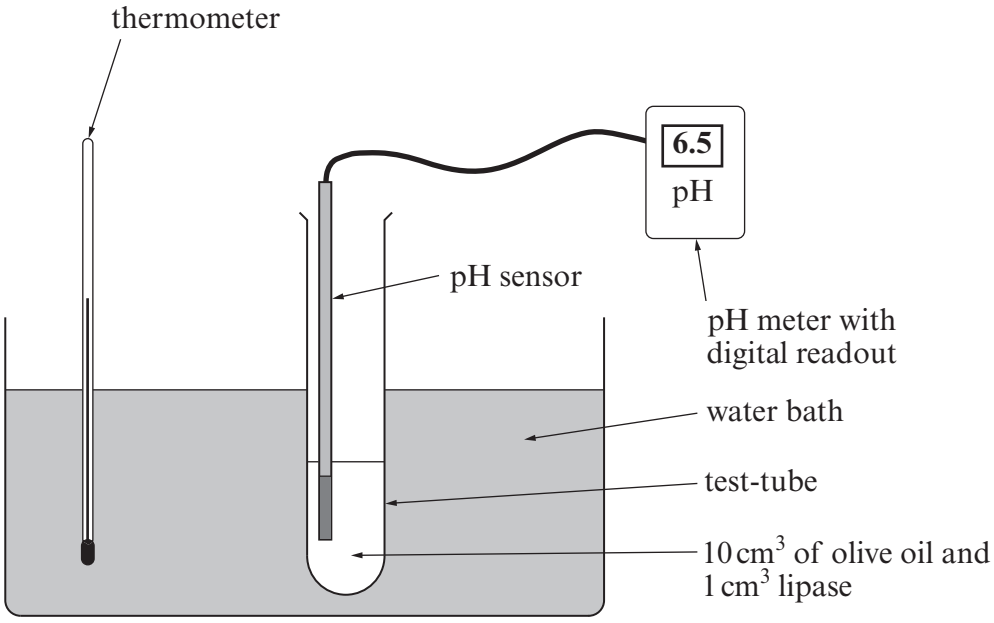
Examiner only

5. *(a)* Complete the following statement: [1]

Lipase enzymes digest lipids (fats and oils) into glycerol and .....

(b) An experiment was set up to discover the effect of temperature on the action of lipase enzyme.

- 9 test-tubes were set up as shown below and kept at a range of temperatures between 20°C and 100°C.
- At the start of the experiment the contents of each tube was at pH 6.5

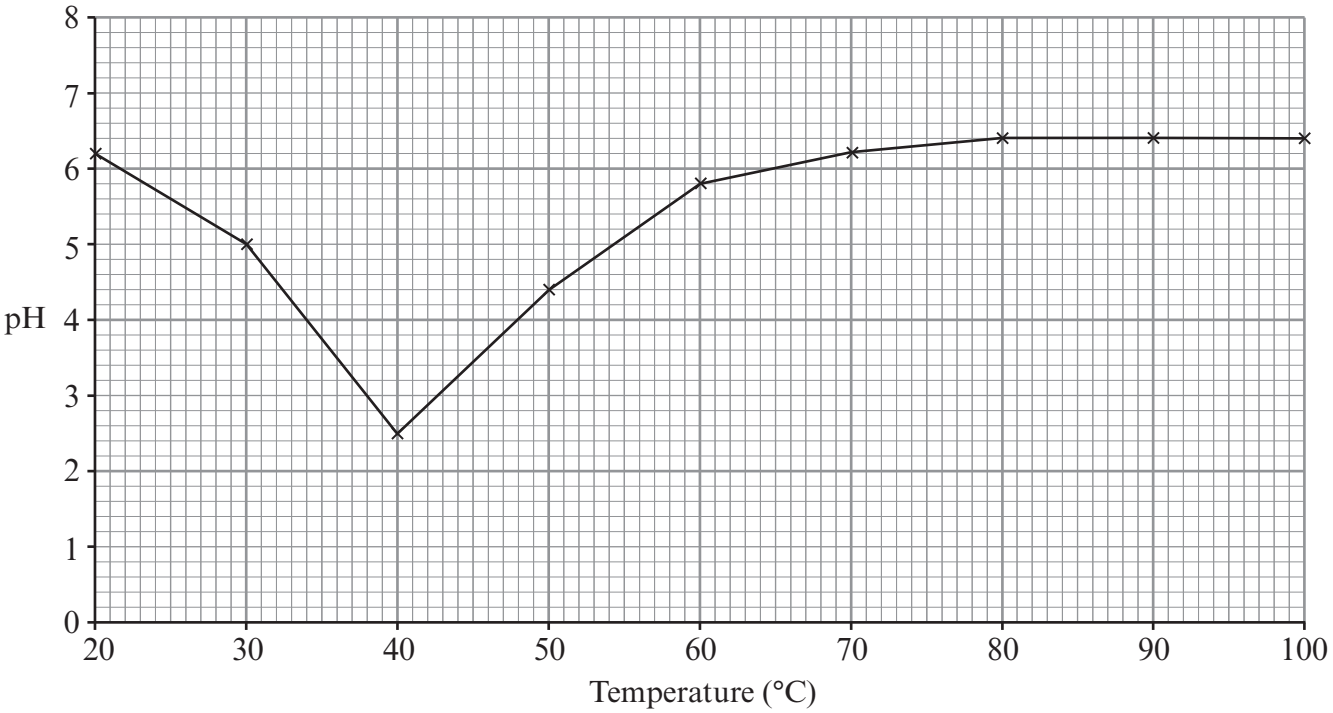


STEMUP.CO.UK

Examiner only

Each test-tube was left for 30 minutes and the reading on the digital pH meter was then recorded.

The results of the experiment are shown in the graph below.



(i) Why did the pH fall between 20 and 40°C? [1]

.....

(ii) What is the optimum temperature for this enzyme? [1]

.....

(iii) Explain why the pH did not change between 80 and 100°C. [1]

.....

.....

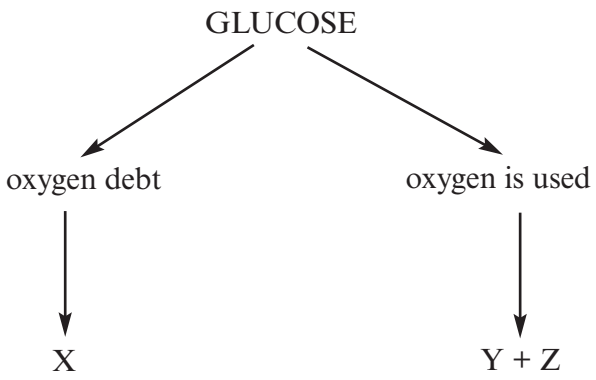
(c) Where in the digestive system would you find an enzyme working at pH 2.5? [1]

.....

STEMUP.CO.UK

Examiner only

6. A sprinter starts a race.
The following is a simplified diagram representing respiration in his muscle cells.



(a) Name substances

(i) X, ...

(ii) Y, ...

(iii) Z. ..... [3]

(b) Why is aerobic respiration more efficient than anaerobic respiration? [1]

.....

.....

(c) Underline the most suitable description of "oxygen debt" below.

(i) The body's oxygen supply exceeds its demand.

(ii) More oxygen is breathed out than is breathed in.

(iii) The body's oxygen demand exceeds its supply.

(iv) There is less oxygen in the air than carbon dioxide. [1]

5

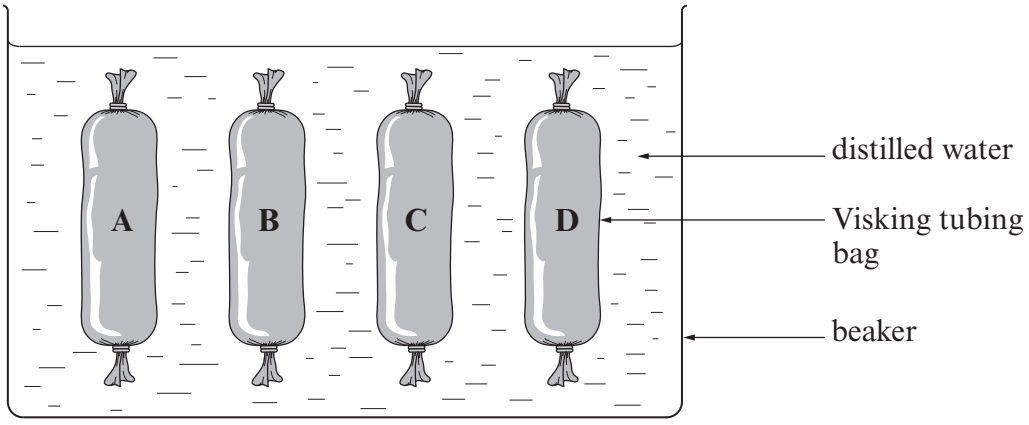
STEMUP.CO.UK

BLANK PAGE

Examiner only

7. A student investigated osmosis as follows.

- Three equal sized Visking tubing bags were filled with salt solutions of different concentrations and their ends tied with thread. A fourth bag was filled with distilled water.
- Each bag had a mass of 20g.
- The bags were placed in a beaker of distilled water, as shown in the diagram, and left for 1 hour.
- The bags were then re-weighed and the results noted in the table shown.



Results

Bag	Initial mass (g)	Final mass (g)
A	20.0	21.9
B	20.0	20.0
C	20.0	26.5
D	20.0	29.5

(a) Which bag contained

(i) distilled water; .....

(ii) the lowest concentration of salt; .....

(iii) the highest concentration of salt? .....

[3]

STEMUP.CO.UK

Examiner only

(b) Which substance was able to pass through the Visking tubing? [1]

.....

(c) What term is used to describe a property of the Visking tubing that allows osmosis to take place? [1]

.....

(d) How would you improve the reliability of this investigation? [1]

.....

(e) Explain what is happening in tube B. [1]

.....

.....

STEMUP.CO.UK

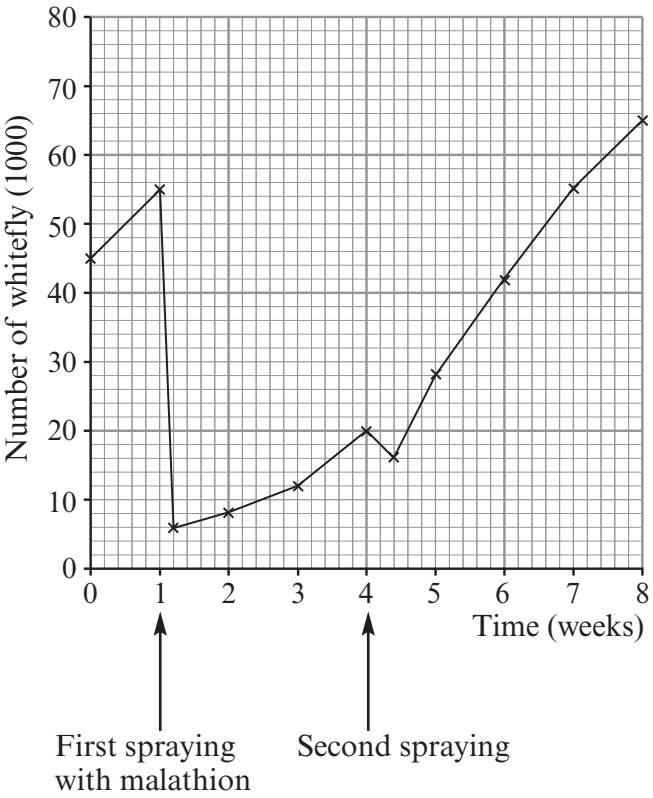
Examiner only

8. Whitefly are insects that feed on the cell sap of tomato plants.
A tomato grower considered using either an insecticide (malathion) or a predatory insect (*Encarsia*) to eliminate an infestation of whitefly in his greenhouses.

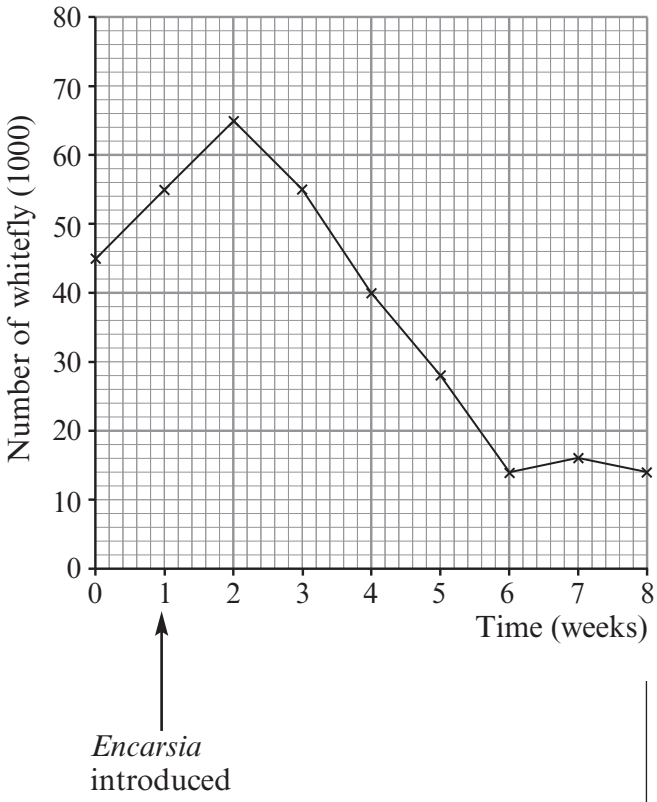
Encarsia
- survives best between 18°C and 27°C.
- is killed at 0°C.
- above 30°C, it leaves the greenhouses.

The tomato grower used this information and the data in the following graphs to decide which method to use.

Effect of malathion



Effect of *Encarsia*



STEMUP.CO.UK

Examiner only

(a) Use ONLY the information given to suggest each of the following.

(i) An advantage of using malathion instead of *Encarsia*. [1]

.....

.....

(ii) A disadvantage of using malathion. [1]

.....

.....

(iii) An advantage of using *Encarsia* instead of malathion. [1]

.....

.....

(iv) A disadvantage of using *Encarsia*. [1]

.....

.....

(b) Why would it not be a good idea to use malathion and *Encarsia* together? [1]

.....

.....

.....

(c) What term describes the use of the predator *Encarsia* to reduce the number of whitefly? [1]

.....

STEMUP.CO.UK

Examiner only

9. The awarding of *Blue Flag* status to unpolluted beaches is based on world-recognised standards.
In 2009, the number of *Blue Flag* beaches in Wales fell from 69 to 58.
Scientists say that the heavy rains and floods of the summers of 2007 and 2008 caused polluted water from farms and sewage treatment works to reach the beaches.

(a) Suggest why the Welsh Assembly Government is concerned about the loss of *Blue Flag* status awards in Wales. [1]

.....

.....

.....

(b) Explain how the polluted water from farms or sewage works could affect the animals and plants that live in coastal waters. [6]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

7

STEMUP.CO.UK