AQA GCSE BIOLOGY (4411)

BIOLOGY



EXAM QUESTION PACK

UNIT B2 HIGHER TIER BLY2H PAPERS

STEMUP

These questions belong to AQA, not to us.

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

What we do not own

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

Where to find the originals

AQA publishes its past papers, mark schemes and examiner reports free of charge. Always check the current specification at aqa.org.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.

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2012

Additional Science
Unit Biology B2

BLY2H

H

Biology
Unit Biology B2

Written Paper

Monday 21 May 2012 9.00 am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

STEMUP.CO.UK

Do not write outside the box

Answer **all** questions in the spaces provided.

1 People often grow pondweed in fishponds to *oxygenate* the water.

1 (a) Name the process that the pondweed uses to produce oxygen.

.....

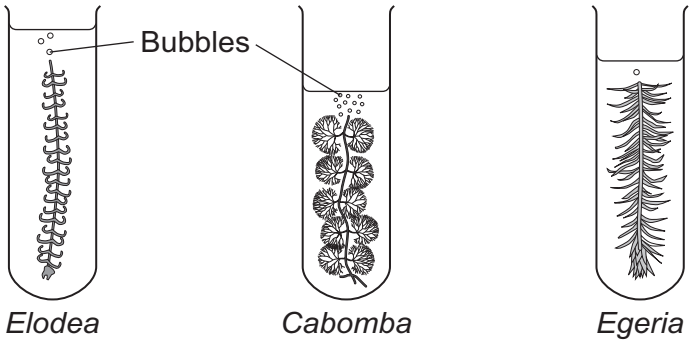
(1 mark)

1 (b) A student investigated oxygen production in three different pondweeds, *Elodea*, *Cabomba* and *Egeria.*

The student:

- cut a piece of pondweed from an *Elodea* plant
- put the pondweed into a tube of water
- counted the bubbles given off in one minute
- did the experiment again using a piece of pondweed from a *Cabomba* plant
- did the experiment a third time using a piece of pondweed from an *Egeria* plant.

The diagram shows the student's investigation.



The table shows the results.

Pondweed	Number of bubbles produced in 1 minute
Elodea	17
Cabomba	28
Egeria	8

Do not write outside the box

1 (b) (i) The student said:

"I suggest that people grow *Cabomba* in garden ponds to oxygenate the water fastest."

Give **three** variables the student should have controlled to make sure his conclusion was valid.

Use information from the student's method and the diagram.

1 .....

.....

2 .....

.....

3 .....

.....

(3 marks)

1 (b) (ii) The three pondweeds all cost about the same.

Suggest **one** other factor that people with fishponds might think about before deciding which type of pondweed to use.

.....

(1 mark)

1 (c) A person grows *Cabomba* in his pond.

The *Cabomba* plants develop yellow leaves.

Which mineral ion would stop the leaves turning yellow?

.....

(1 mark)

6

Turn over for the next question

Do not write outside the box

2 It is important that the concentration of glucose (sugar) in the blood is controlled.

2 (a) (i) Which hormone controls the concentration of glucose in the blood?

.....

(1 mark)

2 (a) (ii) Which organ produces this hormone?

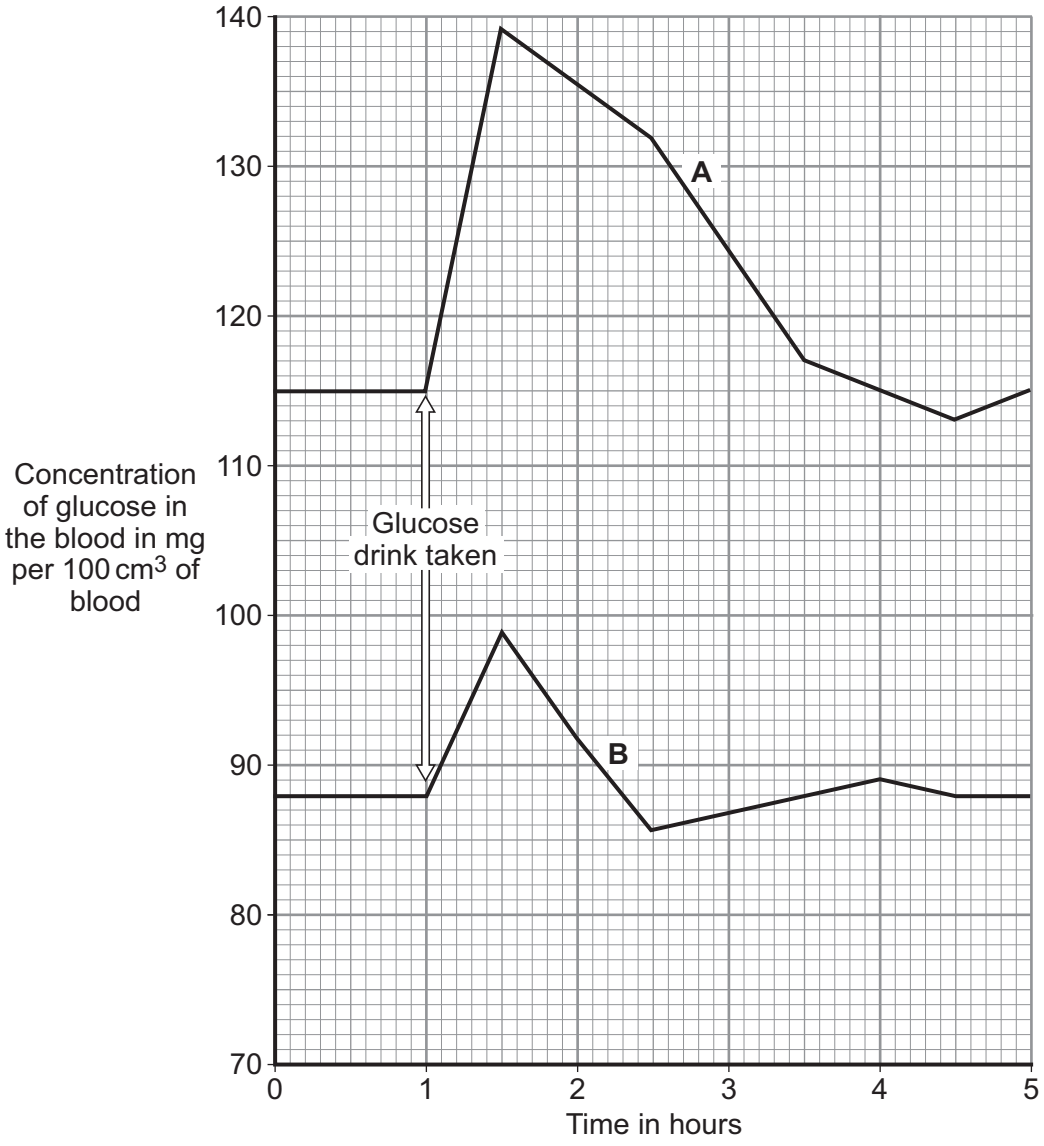
.....

(1 mark)

2 (b) The concentration of glucose in the blood of two people, **A** and **B**, was measured every half an hour.

One hour after the start, both people drank a solution containing 50 g of glucose.

The graph shows the result.



Do not write outside the box

2 (b) (i) By how much did the blood glucose concentration in person **B** rise after drinking the glucose drink?

..... mg per 100 cm^3 of blood

(1 mark)

2 (b) (ii) A doctor suggests that person **A** has diabetes.

Give **two** pieces of evidence from the graph to support this suggestion.

1 .....

.....

2 .....

.....

(2 marks)

2 (b) (iii) Give **one** reason for the fall in blood glucose concentration in person **B**, shown in the graph.

.....

.....

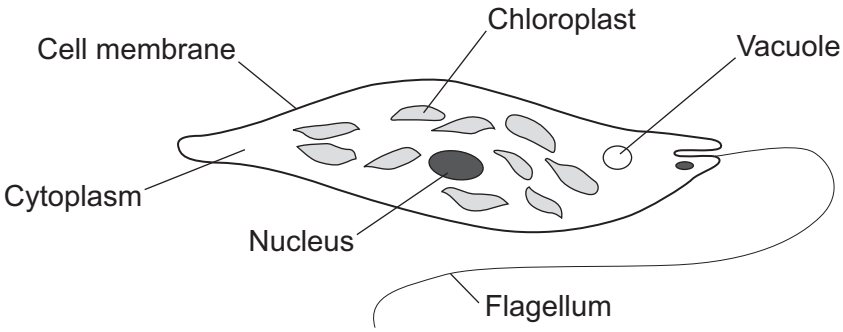
(1 mark)

6

Turn over for the next question

Do not write outside the box

3 The diagram shows a single-celled organism called *Euglena*.



3 (a) In the 19th century, scientists could not decide whether *Euglena* should be described as a plant or an animal.

Use your knowledge of plant and animal cells to answer these questions.

3 (a) (i) Suggest **two** reasons why some scientists thought *Euglena* was a plant cell and not an animal cell.

1 .....

2 .....

(2 marks)

3 (a) (ii) Suggest **one** reason why some scientists thought *Euglena* was an animal cell and not a plant cell.

.....

(1 mark)

3 (b) The *Euglena* shown in the diagram lives in fresh water.
If this *Euglena* is put into salty water, the *Euglena* shrinks.

Explain why.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

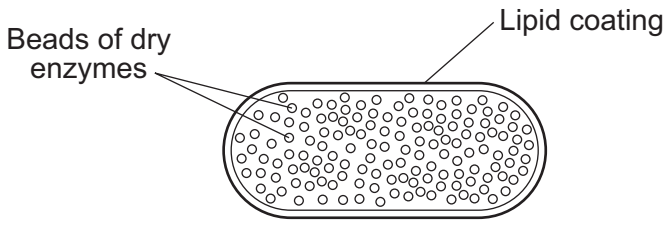
6

Do not write outside the box

4 A patient has a disease. The disease damages his pancreas.

A doctor prescribes a course of treatment for the patient:
'Take one capsule with each meal.'

Each capsule contains hundreds of small, dry beads.
The beads are made of enzymes. The pancreas normally produces these enzymes.
The outer coating of the capsule is made of lipid.



4 (a) One enzyme in the beads is lipase.
In a healthy person, lipase is made in the pancreas.

Name **two** other enzymes made in the pancreas of a healthy person.

1 .....

2 .....

(2 marks)

4 (b) The lipid coating on the capsule makes sure that the enzymes are not released until the capsule reaches the small intestine.

Explain how.

.....

.....

.....

.....

.....

(2 marks)

4 (c) The lipase in the beads does **not** digest the lipid coating around the capsule.

Suggest why.

.....

.....

(1 mark)

5

Turn over ▶

Do not write outside the box

5 Read the passage.

Super Farm

In a traditional farm, cows graze in fields. Cows are milked twice a day. Each cow produces around 20 litres of milk per day. Waste from the cows is used as a natural fertiliser on fields.

A group of dairy farmers is planning to build a £50 million new 'super farm' to produce milk. The new farm will contain over 8 000 cows, kept in three large sheds. Each cow will have about six square metres to move around in. When animals are kept near to each other diseases can spread easily between them.

The cows in the 'super farm' will produce up to 250 000 litres of milk each day from three milkings. In the sheds, the cows will be fed high quality food and stand or lie on deep sand. Waste from the cows in the 'super farm' will be collected and used to provide electricity for up to 2 000 homes.

5 (a) Evaluate the new 'super farm' compared with a traditional farm.

Use information from the passage, and your own knowledge and understanding.

You should give a conclusion to your evaluation.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

Do not write outside the box

5 (b) The cows' waste is mainly faeces and urine.
In a traditional farm the waste is spread on fields.
The waste contains carbon compounds.

The carbon in the carbon compounds can be made available for grass plants in the field to use.

Describe how.

Use your knowledge of the carbon cycle to help you.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

7

Turn over for the next question

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

6 One group of scientists is working in a hot desert and another group is working in a tropical rainforest.

The table shows information about the scientists and the conditions in the desert and the rainforest.

Information	Hot desert	Rainforest
Mean core body temperature of scientists in °C	37.3	38.9
Air temperature in °C	36.0	35.5
Mean percentage concentration of moisture in the air	9.0	92.0
Mean wind speed at ground level in metres per second	12.0	3.0

6 (a) Both groups of scientists are doing similar jobs. The jobs cause the scientists to sweat a lot.

Use information from the table to explain the difference in the mean core body temperature of the two groups of scientists.

.....

.....

.....

.....

.....

(2 marks)

6 (b) Changes to blood vessels in the skin help to decrease body temperature.

Explain how.

.....

.....

.....

.....

.....

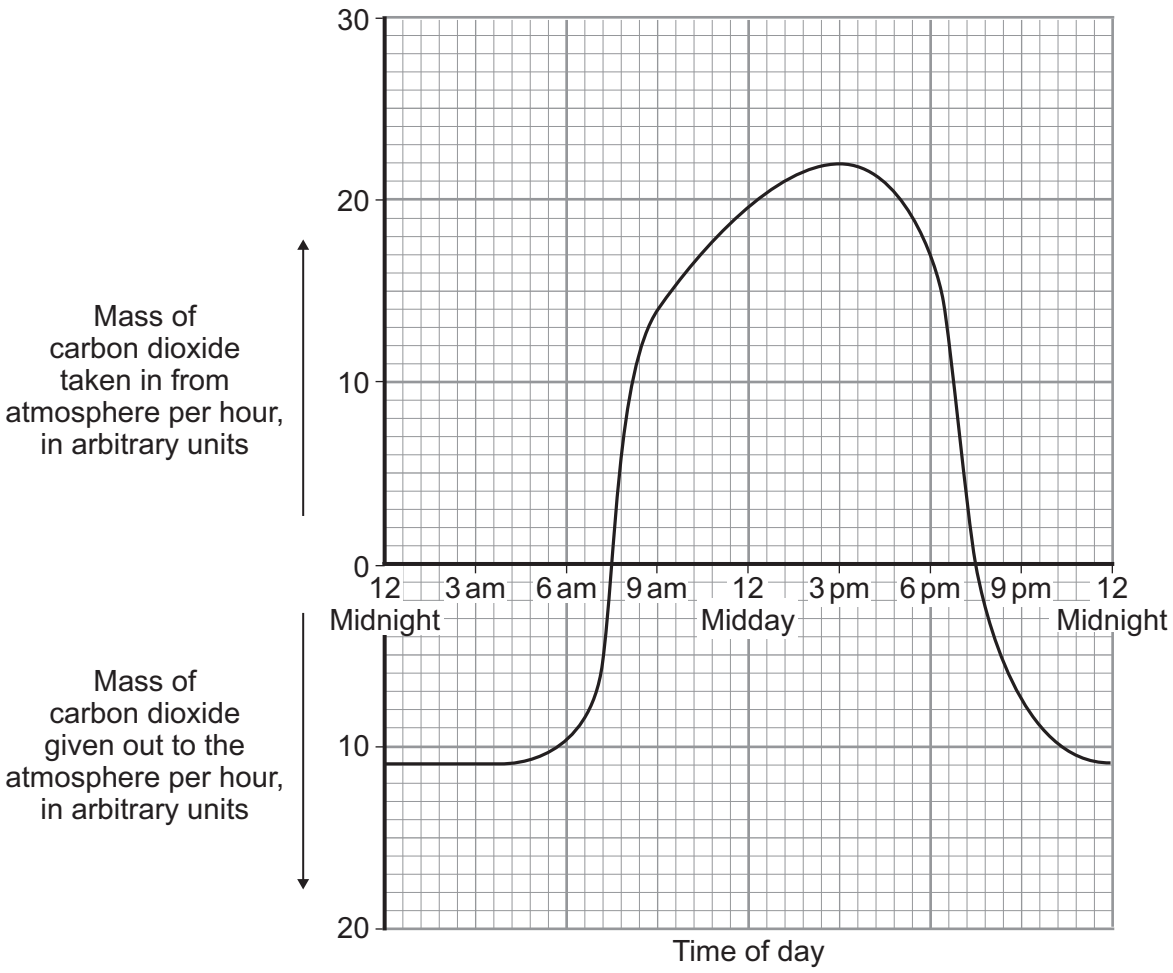
(2 marks)

4

Turn over ▶

Do not write outside the box

7 The graph shows the uptake of carbon dioxide and the release of carbon dioxide by a bean plant on a hot summer's day.



7 (a) At which **two** times in the day did the rate of photosynthesis exactly match the rate of respiration in the bean plant?

1 ..... 2 .....

(1 mark)

7 (b) The bean plant respires at the same rate all through the 24 hour period.

7 (b) (i) How much carbon dioxide is released each hour during respiration?

..... arbitrary units

(1 mark)

7 (b) (ii) How much carbon dioxide is used by photosynthesis in the hour beginning at 3 pm?

.....

.....

Answer = ... arbitrary units

(1 mark)

Do not write outside the box

7 (c) Over the 24 hour period, the total amount of carbon dioxide taken in by the bean plant was greater than the total amount of carbon dioxide given out by the bean plant.

Explain, in detail, why this was important for the bean plant.

.....

.....

.....

.....

.....

.....

(2 marks)

5

Turn over for the next question

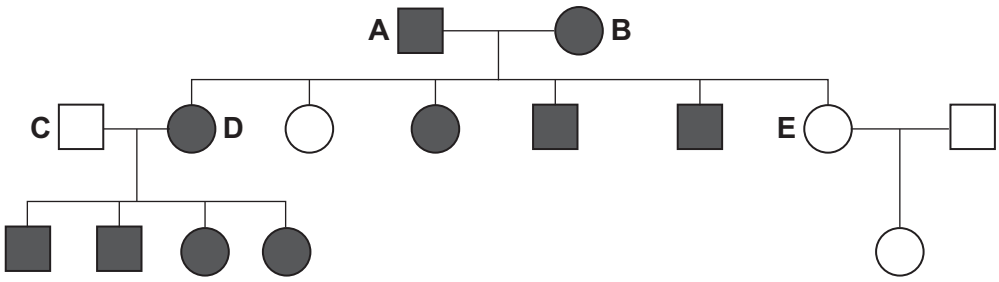
Do not write outside the box

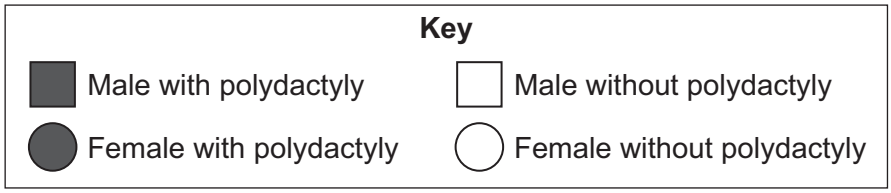
8 Cats normally have four toes on each back paw.

The picture shows the back paw of a cat with an inherited condition called polydactyly.



The family tree shows the inheritance of polydactyly in three generations of cats.





Do not write outside the box

8 (a) What combination of alleles did the original parents, **A** and **B**, have?

Explain how you work out your answer.

You may use a genetic diagram in your answer.

Use the symbol **H** to represent the dominant allele.
Use the symbol **h** to represent the recessive allele.

.....

.....

.....

.....

.....

.....

A = ... **B =** .....

(4 marks)

8 (b) (i) Give **two** possible combinations of alleles for cat **D**.

1 ..... 2 .....

(1 mark)

8 (b) (ii) You cannot be sure which one of these two is the correct combination of alleles for cat **D**.

Why?

.....

.....

.....

(1 mark)

6

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Question 8 © Jim Plumb, / Flickr.com

Copyright © 2012 AQA and its licensors. All rights reserved.

Version : 10/08/2012



General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Mark Scheme

2012 examination – June Series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2012 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered schools / colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools / colleges to photocopy any material that is acknowledged to a third party even for internal use within the school / college.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

BLY2H

Question 1

question	answers	extra information	mark
1(a)	photosynthesis	do **not** accept other additional processes	1
1(b)(i)	any **three** from, eg: • mass of pondweed • volume of water • other reasonable features of the water • light intensity • light colour • carbon dioxide • temperature • pH	ignore time / apparatus type of pondweed = max **2** accept amount / volume / length / size ignore number / surface area of leaves / pondweed unqualified accept amount accept distance between light source and tube / pondweed accept light if neither colour nor intensity is given	3

Question 1 continues on the next page ….

STEMUP.CO.UK

BLY2H

Question 1 continued

question	answers	extra information	mark
1(b)(ii)	any **one** idea from, eg: • how much oxygen they give off • is pondweed poisonous to fish • will fish eat pondweed • is pondweed harmful to environment • how long the pondweed lives • growth rate / size of pondweed • reference to appearance / aesthetics • availability	ignore reference to cost	1
1(c)	magnesium / Mg	accept iron / Fe ignore ion and $^{+}$ or $^{-}$ ignore nitrate	1
Total			**6**

STEMUP.CO.UK

BLY2H

Question 2

question	answers	extra information	mark
2(a)(i)	insulin	accept glucagon (correct spelling only)	1
2(a)(ii)	pancreas	accept phonetic spelling allow pancrease	1
2(b)(i)	11(.0)	accept in range 10.5–11 (.0)	1
2(b)(ii)	any **two** from: • high(er) concentration (of blood glucose) (anywhere / any time) • large(r) increase (in concentration after the drink) • fast(er) / steep(er) rise • slow(er) fall	ignore numbers unless comparative accept 115 not 88 139 not 99 accept increase by 24 not 11 / their b(i) accept it takes 3 hours not 1 ¼ hours to get back to original level accept it takes a long time to get back to normal	2
2(b)(iii)	any **one** from: • insulin present / produced • (used in) respiration • taken into cells	accept glucagon not produced allow exercise allow converted to glycogen allow taken into liver (cells) / muscle (cells) allow produce / make energy	1
Total			**6**

STEMUP.CO.UK

BLY2H

Question 3

question	answers	extra information	mark
3(a)(i)	(has) chloroplast(s) vacuole	accept chlorophyll	1 1
3(a)(ii)	any **one** from: • no (cell) wall • can move / has flagellum	 ignore reference to cell membrane	1
3(b)	water leaves **or** water diffuses out by osmosis **or** membrane partially / selectively / semi permeable because concentration (of salt) is greater outside than inside	do **not** accept solute / salt moves do **not** allow osmosis of salt allow description of membrane assume concentration refers to salt unless candidate indicates water concentration accept explanations in terms of water potential **or** concentration gradient accept with gradient but **not** along gradient	1 1 1
Total			**6**

STEMUP.CO.UK

BLY2H

Question 4

question	answers	extra information	mark
4(a)	protease	allow trypsin / peptidase do **not** allow pepsin	1
	carbohydrase / amylase	do **not** allow sucrase / maltase / lactase	1
4(b)	no lipase produced / found		1
	in stomach / mouth / before small intestine **OR** accept lipase <u>only</u> produced / found (1) in small intestine / pancreas (1)		1
		if no other mark is awarded lipid is not broken down in the stomach **or** lipid is digested in small intestine gains **1** mark	
4(c)	enzymes only work in solution / when dissolved **or** because enzyme / lipase / it is dry	allow enzymes only work in presence of water **or** enzymes do not work when dry ignore other physical conditions	1
Total			**5**

STEMUP.CO.UK

BLY2H

Question 5

question	answers	extra information	mark
5(a)	for super farm any **three** from: advantages: • more energy efficient • more milk produced per cow • larger population needs more food / milk • produces electricity from renewable resource • high quality food (for cows) so improved quality of milk disadvantages: • cruel / unethical / equivalent because of limited movement / space • disease spreads more easily • more antibiotics needed **or** higher vet costs • consequence of more antibiotics eg resistance • fields get less / no fertiliser **or** need artificial fertiliser **or** crops grow less well (as less fertiliser)	**must** include at least **one** advantage and **one** disadvantage for all **3** marks ignore costs / profits except where stated below allow more milk per unit area accept don't have to use fossil fuel	3
	final conclusion regarding personal choice based on comparison of at least one advantage and one disadvantage, eg The super farm is good idea because advantage xxx, outweighs disadvantage of yyy	accept converse, ie 'a bad idea because…'	1

Question 5 continues on the next page…

STEMUP.CO.UK

BLY2H

Question 5 continued

question	answers	extra information	mark
5(b)	any **three** from: • decay / decomposition / breakdown / digestion • microorganisms / microbes / bacteria / fungi / decomposers / detritus feeders / named • respiration (of / by microorganisms etc) • carbon dioxide released / produced (by respiration or by microorganisms)	accept from clear diagram do **not** accept if respiration of faeces ignore reference to fossil fuels / combustion / photosynthesis	3
Total			**7**

STEMUP.CO.UK

BLY2H

Question 6

question	answers	extra information	mark
6(a)	in rainforest:	accept converse	
	(water from) sweat does not evaporate (as much)	max **1** if not clear whether desert or rainforest	1
	any **one** from: • (due to) less wind / higher moisture / humidity • <u>less</u> cooling effect	ignore references to temperature	1
6(b)	blood vessels supplying capillaries dilate / widen **or** vasodilation	do **not** award mark if candidate refers only to blood vessels dilating **or** to capillaries dilating. accept 'arteries' or 'arterioles' for 'blood vessels supplying, capillaries' but do **not** accept 'veins'. ignore expand / get bigger / relax / open do **not** accept idea of blood vessels moving	1
	more blood (through skin / surface capillaries) leads to greater heat loss		1
Total			**4**

STEMUP.CO.UK

BLY2H

Question 7

question	answers	extra information	mark
7(a)	7.15 to 7.45 am **and** 7.15 to 7.45 pm	**both** required, either order accept in 24 hr clock mode	1
7(b) (i)	11		1
7(b) (ii)	32.5 to 33	allow answer to (b)(i) + 21.5 to 22	1
7(c)	any **two** from: • more photosynthesis than respiration • more biomass / carbohydrate made than used • so plant able to grow / flower	 allow more food made than used accept plant able to store food	2
Total			**5**

STEMUP.CO.UK

Question 8

question	answers	extra information	mark
8(a)	**A** = Hh **B** = Hh	may not be in answer space accept heterozygous or description	1
	(allele for) polydactyly is dominant **or** polydactyly is H,	for marking points 1, 2 and 3 accept evidence in clearly labelled / annotated genetic diagram	1
	cats with polydactyly have H	accept if polydactyly was recessive all offspring would have polydactyly	1
	E or (some) offspring of **A** and **B**, does not have polydactyly, so **A** and **B** must both have h		1
8(b)(i)	HH **and** Hh **or** homozygous dominant **and** heterozygous	both required, in either order allow description	1
8(b)(ii)	any **one** from: • polydactyly is dominant • parents are both Hh • if D is Hh all offspring could inherit H	accept annotated genetic diagram to explain answer	1
Total			**6**

UMS Conversion Calculator www.aqa.org.uk/umsconversion

STEMUP.CO.UK

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	



General Certificate of Secondary Education
Higher Tier
January 2012

Additional Science
Unit Biology B2

BLY2H

H

Biology
Unit Biology B2

Written Paper

Tuesday 24 January 2012 9.00 am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.



STEMUP.CO.UK

Do not write outside the box

Answer **all** questions in the spaces provided.

1 A group of students is going on an outdoor expedition.
The students need to keep warm in windy conditions.

The table shows the effect of wind speed on how quickly someone gets frostbite at different air temperatures.

Wind speed in metres per second	Air temperature in °C				
	10	**0**	**–10**	**–20**	**–30**
0					
5					
10					
15					
20					

Key

Time taken to get frostbite:
- No frostbite
- 30 minutes
- 10 minutes
- 5 minutes

1 (a) (i) Describe the effect of changing air temperature on the time taken to get frostbite.

.....

.....

(1 mark)

1 (a) (ii) What is the longest time it is safe to stay outside when the air temperature is –20 °C and the wind speed is 10 metres per second?

..... minutes

(1 mark)

Do not write outside the box

1 (b) When core body temperature begins to fall, changes may happen in the body.

Which **two** changes will happen when core body temperature begins to fall?

Tick (✓) **two** boxes.

More blood flows through skin capillaries ☐

Muscles 'shiver' ☐

Blood vessels supplying the skin capillaries constrict ☐

Sweat glands release more sweat ☐

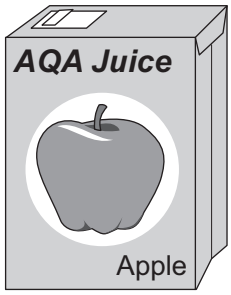
(2 marks)

4

Turn over for the next question

Do not write outside the box

2 Fruit is crushed to release fruit juice.



More juice can be collected if the plant cell walls in the fruit are broken down.

Some students tested the effect on the volume of fruit juice that they could collect of:

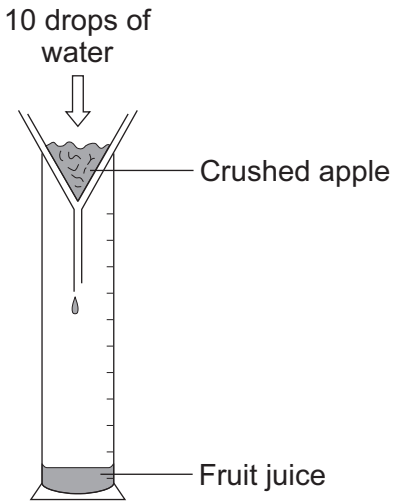
- **either** boiling the fruit
- **or** adding the enzyme pectinase to the fruit
- **or** adding the enzyme amylase to the fruit.

In their first experiment the students:

- crushed 20 g of apple
- added 10 drops of water
- measured the volume of fruit juice that they collected.

Diagram 1 shows how they collected the fruit juice.

Diagram 1



Do not write outside the box

The students did three more experiments.

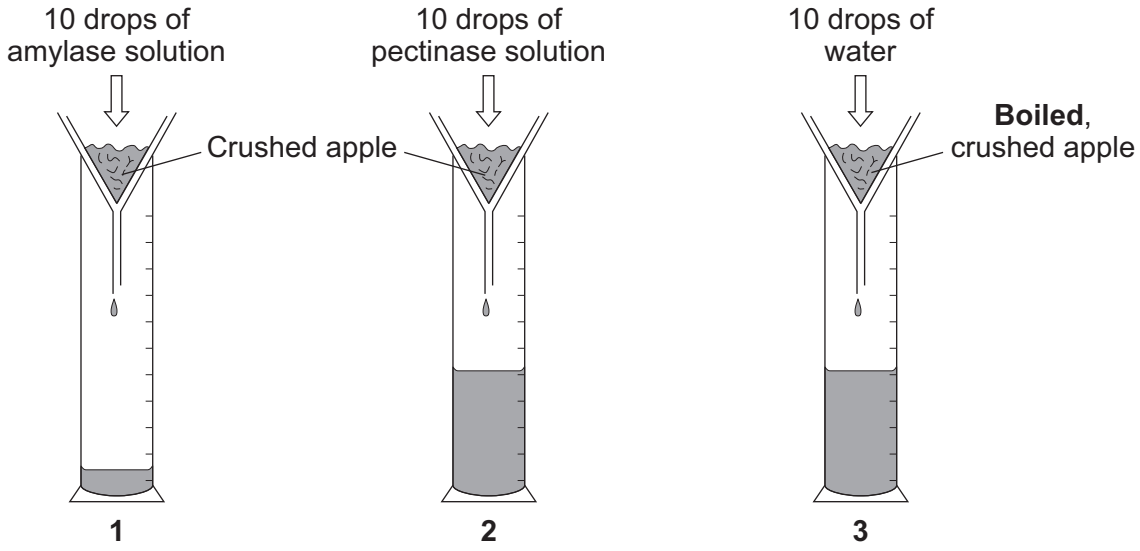
1 They added 10 drops of amylase solution to 20 g of crushed apple.

2 They added 10 drops of pectinase solution to 20 g of crushed apple.

3 They added 10 drops of water to 20 g of **boiled**, crushed apple.

Diagram 2 shows these experiments.

Diagram 2



2 (a) Give **one** control variable in this investigation.

.....

(1 mark)

2 (b) Using drops to measure the volume of water and enzyme added might lead to inaccurate results.

Give **one** reason why.

.....

(1 mark)

Question 2 continues on the next page

Turn over ▶

Do not write outside the box

2 (c) The students' results are shown in the table.

What was added to the crushed apple	Was the apple boiled?	Volume of juice collected in cm^3
10 drops of water	No	1.2
10 drops of amylase solution	No	1.2
10 drops of pectinase solution	No	11.3
10 drops of water	Yes	11.6

Explain as fully as you can the students' results shown in the table.

Use all the information given in question 2 to help you to answer this question.

.....

.....

.....

.....

.....

.....

(3 marks)

Do not write outside the box

2 (d) One student said:

'If we add 10 drops of pectinase solution to crushed apple *while it is boiling*, we should collect more juice than if we add 10 drops of water to boiled apple.'

This is **not** correct.

What volume of juice would you predict the students would collect if 10 drops of pectinase solution were added to crushed apple *while it was boiling*?

Draw a ring around **one** answer.

1.2 cm^3 **11.3 cm^3** **11.6 cm^3** **22.9 cm^3**

(1 mark)

Explain your answer.

.....

.....

.....

.....

(2 marks)

8

Turn over for the next question

Do not write outside the box

3 Diabetes is a disease in which a person's blood glucose concentration may rise.

Doctors give people drugs to treat diabetes.

The table shows some of the side effects on the body of four drugs, **A**, **B**, **C** and **insulin**, used to treat diabetes.

Drug	Side effects on the body
A	Weight loss Liver, kidney and heart damage Feeling of sickness
B	Weight gain Damage to some cells in pancreas
C	More water is kept in the body Weight gain Increased chance of bone breakage in women
Insulin	A little more water is kept in the body Weight gain Increased risk of lung damage

3 (a) Which drug, **A**, **B**, **C** or **insulin**, is most likely to result in an increase in blood sugar concentration in some people?

Explain your answer.

Drug .....

Explanation

.....

.....

(2 marks)

Do not write outside the box

3 (b) (i) Drugs **A**, **B** and **C** can be taken as tablets.

The chemicals in the tablets are absorbed into the blood from the digestive system.

Insulin is a protein.

Insulin **cannot** be taken as a tablet.

Why?

.....

(1 mark)

3 (b) (ii) Other than using drugs, give **two** methods of treating diabetes.

1 .....

2 .....

(2 marks)

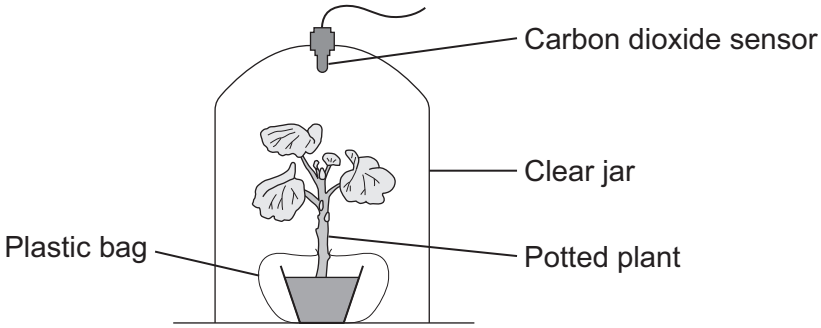
5

Turn over for the next question

Do not write outside the box

4 A student measured the concentration of carbon dioxide in the air around a potted plant on two different days.

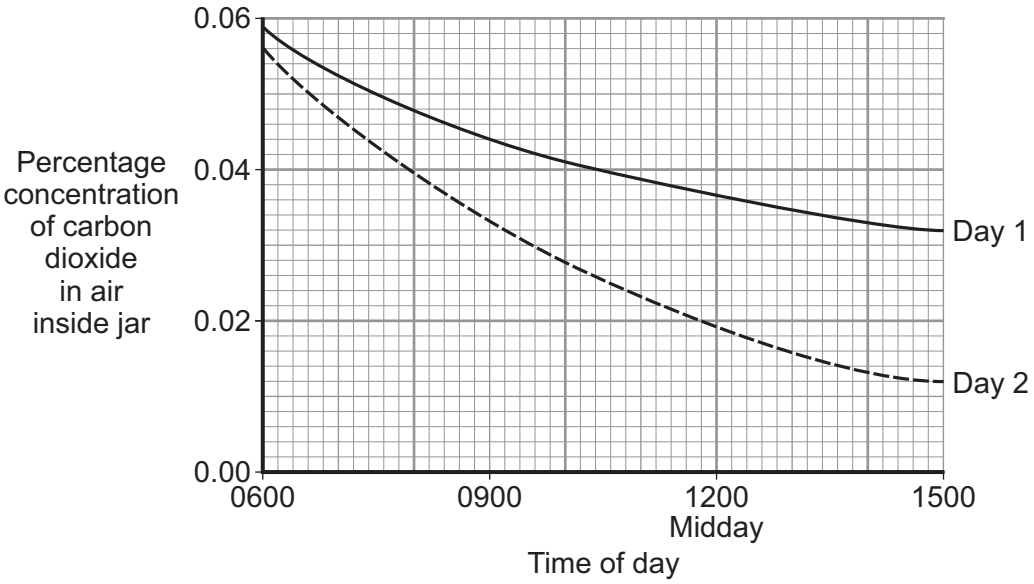
The diagram shows the student's apparatus.



There was a plastic bag round the plant pot to stop microorganisms in the soil affecting the concentration of gases in the air inside the jar.

The apparatus was put near a window.

The graph shows the results.



STEMUP.CO.UK

Do not write outside the box

4 (a) **Day 1** was cloudier than **Day 2**.

What evidence from the graph shows that **Day 1** was cloudier?

Explain your answer.

.....

.....

.....

.....

(2 marks)

4 (b) A potted plant sometimes develops yellow leaves.
The development of yellow leaves could be due to the lack of a mineral ion.

Suggest the mineral ion that could be lacking.

.....

(1 mark)

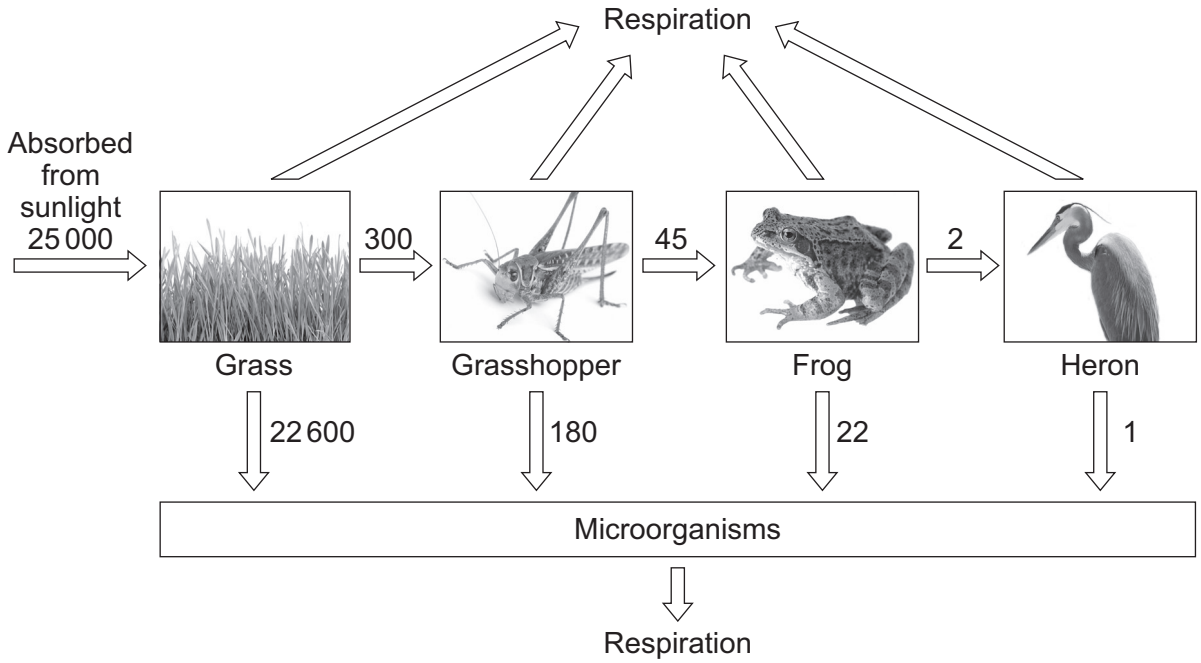
3

Turn over for the next question

Do not write outside the box

5 The diagram shows the annual energy flow through 1 m^2 of a habitat.

The unit, in each case, is kJ per m^2 per year.



5 (a) Calculate the percentage of the energy absorbed by the grass from sunlight that is transferred to the frog.

Show clearly how you work out your answer.

.....

.....

Answer ..... %

(2 marks)

5 (b) All of the energy the grass absorbs from the sun is eventually lost to the surroundings.

In what form is this energy lost?

.....

(1 mark)

Do not write outside the box

5 (c) Food chains are usually **not** more than five organisms long.

Explain why.

To gain full marks you must use data from the diagram.

.....

.....

.....

.....

(2 marks)

5 (d) In this habitat microorganisms help to recycle materials.

Explain how.

.....

.....

.....

.....

.....

.....

(3 marks)

8

Turn over for the next question

Do not write outside the box

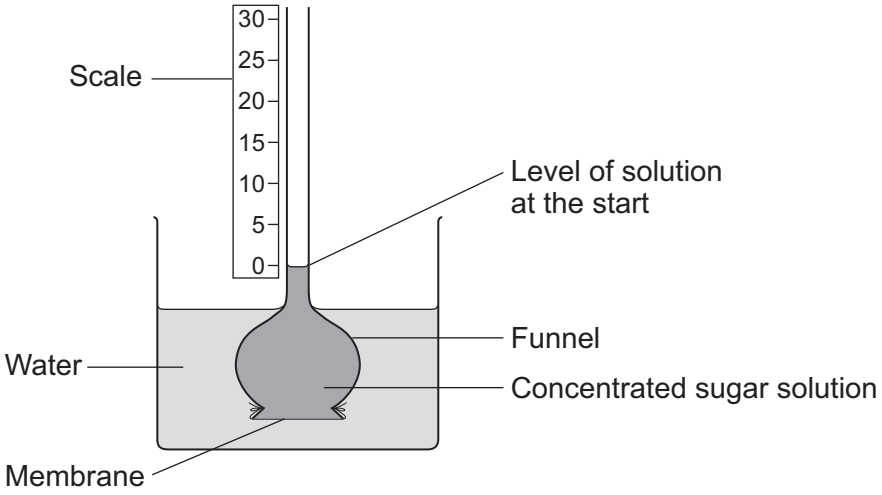
6 Some substances move through membranes.

A student set up an investigation.

The student:

- tied a thin membrane across the end of a funnel
- put concentrated sugar solution in the funnel
- put the funnel in a beaker of water
- measured the level of the solution in the funnel every 30 minutes.

The diagram shows the apparatus.



The graph shows the results.



Do not write outside the box

6 (a) After 3 hours, the level of the solution in the funnel is different from the level at the start.

Explain why, as fully as you can.

.....

.....

.....

.....

.....

.....

(3 marks)

6 (b) The student repeated the investigation using dilute sugar solution instead of concentrated sugar solution.

In what way would you expect the results using dilute sugar solution to be different from the results using concentrated sugar solution?

Give the reason for your answer.

.....

.....

.....

.....

(2 marks)

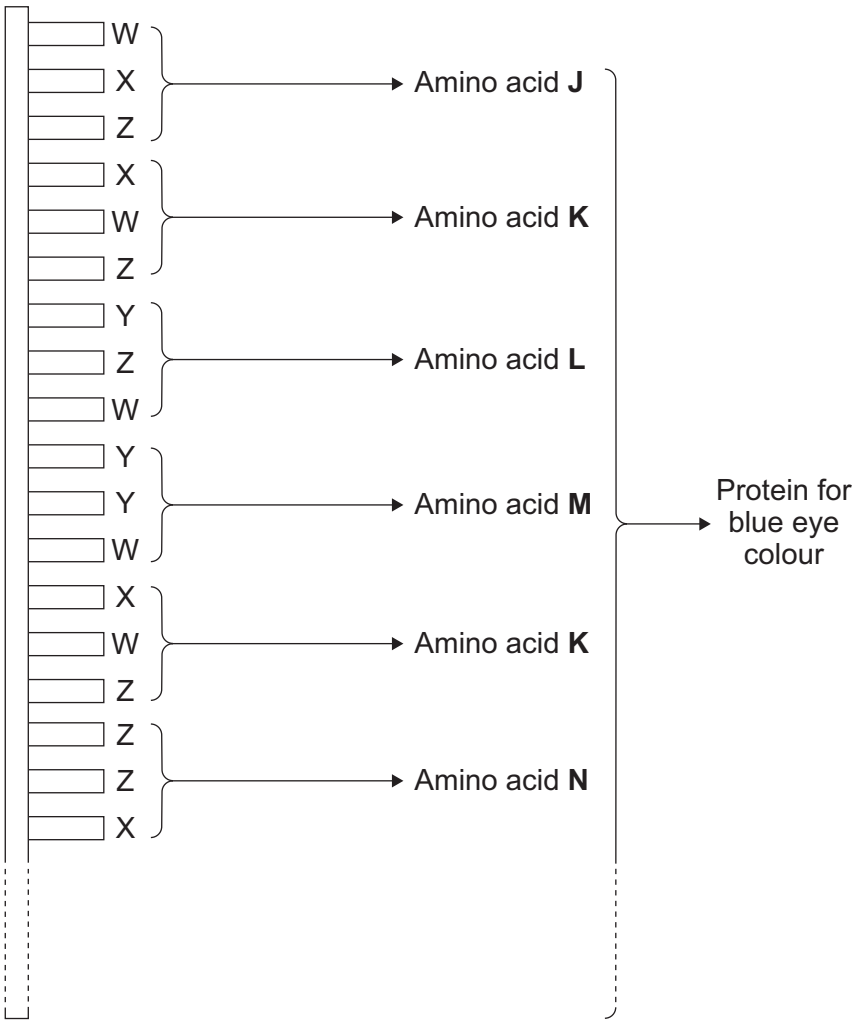
5

Turn over for the next question

Do not write outside the box

7 A molecule of DNA contains four different bases, **W**, **X**, **Y** and **Z**.
The four bases are arranged in a long chain.
The chain of bases controls the synthesis of a protein.

The diagram shows a small section of a DNA molecule.
This section is responsible for synthesising the protein for blue eye colour.



7 (a) What word is used to describe '*a small section of a DNA molecule that controls the synthesis of a protein*'?

.....

(1 mark)

7 (b) In the cell, where are proteins synthesised?

.....

(1 mark)

Do not write outside the box

7 (c) Describe how the protein for blue eye colour is synthesised.

To gain full marks you must use information from the diagram.

.....

.....

.....

.....

.....

.....

(3 marks)

7 (d) Mistakes sometimes occur when DNA molecules are copied during cell division.

Suppose that one of the **W** bases shown in the diagram was substituted by an **X** base.

7 (d) (i) What would happen to the structure of the protein synthesised by this part of the DNA molecule?

.....

.....

(1 mark)

7 (d) (ii) What might be the effect of this change in structure of the protein?

.....

.....

(1 mark)

7

Turn over for the next question

Do not write outside the box

8 Read the information about stem cells.

Stem cells are used to treat some human diseases.

Stem cells can be collected from early embryos. These stem cells have not begun to differentiate, so they could be used to produce any kind of cell, tissue or organ. The use of embryonic stem cells to treat human diseases is new and, for some diseases, trials on patients are happening now.

Stem cells can also be collected from adult bone marrow. The operation is simple but may be painful. Stem cells in bone marrow mainly differentiate to form blood cells. These stem cells have been used successfully for many years to treat some kinds of blood disease. Recently there have been trials of other types of stem cell from bone marrow. These stem cells are used to treat diseases such as heart disease.

Evaluate the use of stem cells from embryos or from adult bone marrow for treating human diseases.

You should give a conclusion to your evaluation.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(5 marks)

5

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Question 5: Photographs © www.thinkstock.com

Copyright © 2012 AQA and its licensors. All rights reserved.

Version : 07/03/2012



General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Mark Scheme

2012 examination – January Series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2012 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered schools / colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools / colleges to photocopy any material that is acknowledged to a third party even for internal use within the school / college.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

BLY2H

Question 1

question	answers	extra information	mark
1(a)(i)	the lower the temperature the shorter the time **or** the lower the temperature the more chance of frostbite	a trend is required accept reverse accept the lower the temperature the faster you get frostbite accept positive correlation but **not** directly proportional ignore wind speed	1
1(a)(ii)	any value from 5 to below 10	do **not** accept 10 allow less than 10 **or** < 10	1
1(b)	Muscles 'shiver' Blood vessels supplying the skin capillaries constrict	if more than two boxes ticked deduct **1** mark for each additional tick	1 1
Total			**4**

STEMUP.CO.UK

Question 2

question	answers	extra information	mark
2(a)	any **one** from:	ignore control variables that are not given in the method, such as 'equally crushed' **or** same time do **not** accept volume of apple juice	1
	• 20 g (of apple) **or** (same) mass / amount / weight of apple	ignore volume / size	
	• crushed (apple)		
	• 10 drops (of solution) **or** (same) number / amount / volume of drops	do **no**t accept 10 drops of amylase alone	
	• apple **or** type of fruit	ignore type of apple	
2(b)	(may) have different volume / amount / sizes	ignore reference to human error ignore don't know / can't measure size of drop	1
2(c)	amylase has no / little effect on cell / walls / apple **or** amylase does not breakdown / digest cell / walls / apple	accept ideas that refer to shape of enzyme being 'incorrect' accept amylase <u>only</u> breaks down / digests starch	1
	pectinase breaks down cell / walls / apple	allow digest for breakdown allow shape of pectinase fits cell / walls / apple	1
	boiling breaks down cell / walls / apple		1
2(d)	11.6		1
	enzyme / pectinase destroyed / denatured / damaged / broken down	do **not** allow kill	1
	only effect of boiling (relevant)		1
Total			**8**

STEMUP.CO.UK

BLY2H

Question 3

question	answers	extra information	mark
3(a)	B		1
	less / no insulin (produced) **or** insulin produced in pancreas	allow pancreas can't monitor (blood) sugar (level) ignore pancreas can't control (blood) sugar (level) allow increased glucagon production allow A as liver stores less glucose / sugar for **2** marks only	1
3(b)(i)	(it / protein / insulin) digested / broken down	if ref to specific enzyme must be correct (protease / pepsin) ignore denatured do **not** accept digested in mouth / other incorrect organs	1
3(b)(ii)	any **two** from: • (attention to) diet • exercise • (pancreas) transplant / stem cells / genetic engineering	ignore injections accept examples, eg eat less sugar(y food) **or** eat small regular meals allow eat less carbohydrate / control diet ignore cholesterol or balanced / healthy diet ignore keep fit / healthy	2
Total			**5**

STEMUP.CO.UK

BLY2H

Question 4

question	answers	extra information	mark
4(a)	less carbon dioxide used **or** higher carbon dioxide (concentration) in jar because less photosynthesis **or** light was a limiting factor	do **not** allow no carbon dioxide used **or** no change in carbon dioxide do **not** allow no photosynthesis	1 1
4(b)	magnesium / Mg	do **not** allow manganese / Mn allow iron / Fe ignore nitrates	1
Total			**3**

STEMUP.CO.UK

BLY2H

Question 5

question	answers	extra information	mark
5(a)	0.18	award both marks for correct answer irrespective of working if no answer or incorrect answer allow **1** mark for 45 ×100 / 25000	2
5(b)	heat / thermal	allow heat <u>from</u> respiration	1
5(c)	energy / mass / biomass lost / not passed on **or** energy / mass / biomass is used **or** not enough energy / mass / biomass left	ignore reference to losses via eg respiration / excretion / movement / heat	1
	a sensible / appropriate use of figures including heron	eg <u>only</u> 2 from frog / to heron ignore units	1
5(d)	any **three** from: • (microorganisms) decay / decompose / digest / breakdown / rot • (breakdown) releases minerals / nutrients / ions / salts / named • (microorganisms) respiration • (microorganisms / respiration) release of carbon dioxide	accept marking points if candidate uses other terms for microorganisms ignore eat ignore food ignore other organisms respiring	3
Total			**8**

STEMUP.CO.UK

BLY2H

Question 6

question	answers	extra information	mark
6(a)	water enters (funnel / sugar solution) **or** water diffuses in (to the funnel)	do **not** accept if diffusion of sugar	1
	membrane partially / selectively / semi permeable **or** by osmosis	allow description	1
	because concentration (of sugar) greater inside funnel than outside / water / in beaker	assume 'concentration' refers to sugar unless candidate indicates otherwise the position of the solutions may be implied	1
6(b)	(level / it) rises more slowly **or** levels out earlier **or** does not rise as much	accept inference of less steep gradient (of graph) allow less / slower osmosis / diffusion / less water passes through or less water enters funnel allow water enters / passes through slower	1
	less difference in concentration (between solution / funnel and water / beaker)	accept due to lower diffusion / concentration gradient / described	1
Total			**5**

STEMUP.CO.UK

BLY2H

Question 7

question	answers	extra information	mark
7(a)	gene / allele		1
7(b)	(in / on) ribosome(s)		1
7(c)	any **three** from: • amino acids make up a protein • (protein is) particular combination / sequence (of amino acids) • bases form a <u>code</u> • the bases work in threes or description • (code / three bases) for one amino acid	accept bases work in triplet accept eg (bases) WXZ for amino acid J for **2** marks	3
7(d)(i)	different / wrong amino acid (coded for) **or** different / wrong shape	ignore reference to amino acid 'made' ignore change unqualified ignore different protein	1
7(d)(ii)	different / example of different eye colour	allow protein may / would not be made / function (normally)	1
Total			**7**

STEMUP.CO.UK

Question 8

question	answers	extra information	mark
8		Marks should **not** be awarded for simply copying the information provided A mark may be awarded for a <u>comparison</u> between treatments if the answer only involves copied information	
	any **four** from: <u>embryo stem cells – examples of</u> pros • can treat a wide variety / lots of diseases / problems • many available / plentiful • using them better than wasting them • painless cons • (possible) harm / death to embryo • (relatively) untested / unreliable / may not work • embryo can't be 'asked' / 'embryo rights' idea <u>adult bone marrow stem cells – examples of</u> pros • no ethical issues (in collection) **or** permission given • quick recovery • (relatively) safe • well tried / tested / know they work	For all **4** marks to be awarded, there must be at least 1 pro and 1 con allow long term effects not known **or** may be more risky allow does not kill (donor) / low risk	4

STEMUP.CO.UK

	cons • operation hazards eg infection • few types of cell / tissue produced **or** few diseases / problems treated • painful so may deter donors Conclusion to evaluation: A reasoned conclusion from the evidence		1
Total			**5**

UMS Conversion Calculator www.aqa.org.uk/umsconversion

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2011

Additional Science
Unit Biology B2

BLY2H

H

Biology
Unit Biology B2

Written Paper

Thursday 19 May 2011 1.30 pm to 2.15 pm

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

STEMUP.CO.UK

Do not write outside the box

Answer **all** questions in the spaces provided.

1 Cells contain a solution of salts and sugars.

A student is investigating how cells change when they are put into water.

1 (a) The student:

- looks at a plant cell using a microscope
- adds water to the cell.

The plant cell swells up.

Explain why, as fully as you can.

.....

.....

.....

.....

.....

.....

(3 marks)

1 (b) When **animal** cells are put in water, they swell up, and then burst.
When **plant** cells are put in water, they swell up, but do **not** burst.

How does the structure of plant cells prevent them from bursting?

.....

.....

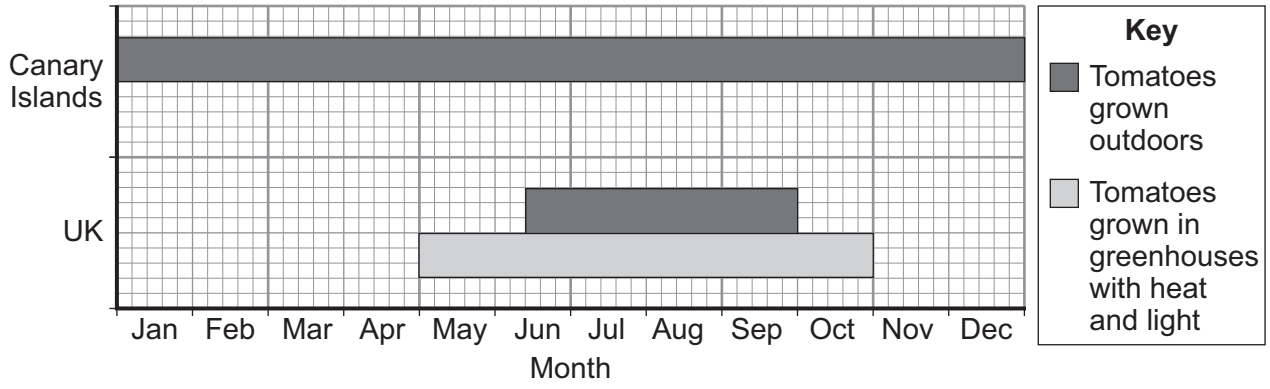
(1 mark)

4

Do not write outside the box

2 Tomatoes are grown in greenhouses in the UK and outdoors in the UK and the Canary Islands.

The chart shows in which months these tomatoes can be bought in shops in the UK.



The Canary Islands are about 3000 km from the UK.

Some people prefer to buy tomatoes grown in the UK.

What are the **advantages** and **disadvantages** of buying tomatoes grown in the UK, instead of buying tomatoes grown in the Canary Islands?

Advantages of buying tomatoes grown in the UK

.....

.....

.....

.....

Disadvantages of buying tomatoes grown in the UK

.....

.....

.....

.....

(3 marks)

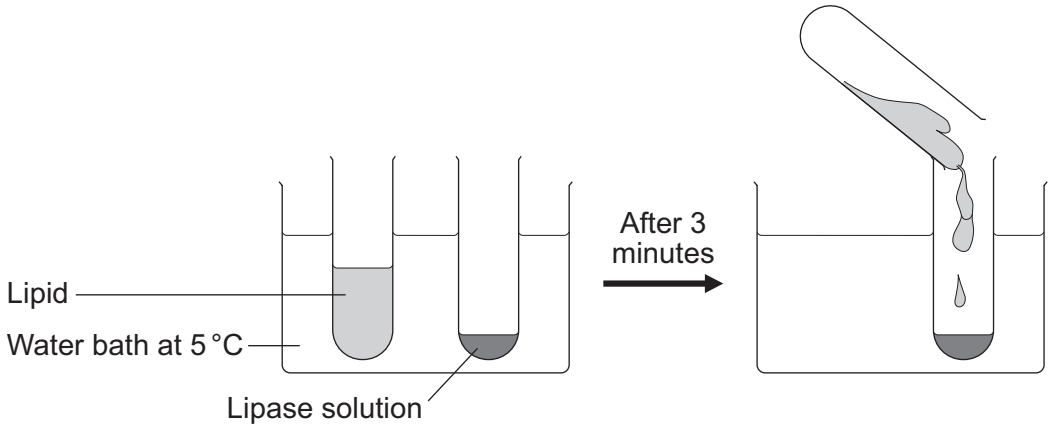
3

Do not write outside the box

3 A group of students investigated the effect of temperature on the action of the enzyme lipase.

The students:

- put 1 cm^3 of lipase solution into a test tube
- put 5 cm^3 of lipid into a different test tube
- put both tubes in a water bath at 5°C for 3 minutes
- mixed the lipid with the lipase solution.



Every five minutes the students tested a sample of the mixture for lipid, until no lipid remained.
The students repeated the experiment at different temperatures.

3 (a) To make their investigation fair the students needed to control some variables.

Give **one** variable the students controlled in their investigation.

.....

(1 mark)

3 (b) The tubes of lipase solution and lipid were kept separately in the water bath for 3 minutes before mixing. Why?

Tick (✓) **one** box.

So that the lipase broke down the lipid quickly ☐

So that the lipase and the lipid reached the right temperature ☐

To give enough time for the lipase to break down the lipid ☐

To give enough time for the water bath to heat up ☐

(1 mark)

Do not write outside the box

The table shows the students' results.

Temperature in °C	Time taken until no lipid remained in minutes
5	40
20	15
35	5
50	30
95	lipid still there after 120 minutes

3 (c) Describe the effect on the breakdown of the lipid of increasing the temperature from 5°C to 50°C.

.....

.....

.....

.....

(2 marks)

3 (d) Suggest **two** ways in which the students could have improved their investigation.

Use information from the students' method and the results table to help you.

1 .....

.....

.....

2 .....

.....

.....

(2 marks)

Question 3 continues on the next page

Do not write outside the box

3 (e) (i) The lipase did **not** break down the lipid at 95°C.

Why?

.....

.....

(1 mark)

3 (e) (ii) At 35°C the lipase broke down the lipid after 5 minutes.

What new substances will be in the tube?

Draw a ring around **one** answer.

amino acids **fatty acids and glycerol** **sugars**

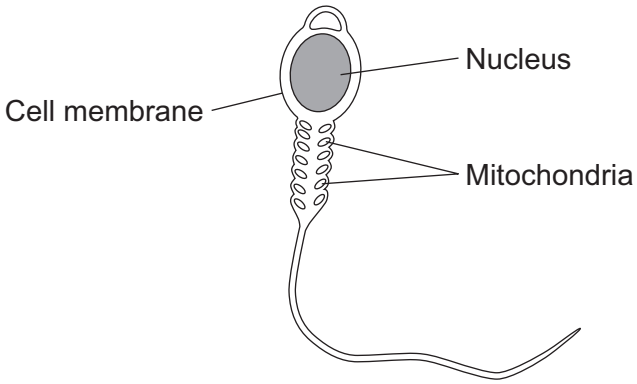
(1 mark)

8

Do not write outside the box

4 Cells in the human body are specialised to carry out their particular function.

4 (a) The diagram shows a sperm cell.



The sperm cell is adapted for travelling to, then fertilising, an egg.

4 (a) (i) How do the mitochondria help the sperm to carry out its function?

.....

.....

(1 mark)

4 (a) (ii) The nucleus of the sperm cell is different from the nucleus of body cells.

Give **one** way in which the nucleus is different.

.....

.....

(1 mark)

4 (b) Stem cells from human embryos are used to treat some diseases in humans.

Explain why.

.....

.....

.....

.....

(2 marks)

4

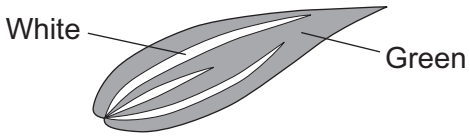
Turn over ▶

Do not write outside the box

5 Students investigated the effect of changing the carbon dioxide concentration on the rate of photosynthesis in pieces of leaf.

Diagram 1 shows the type of leaf used by the students.

Diagram 1

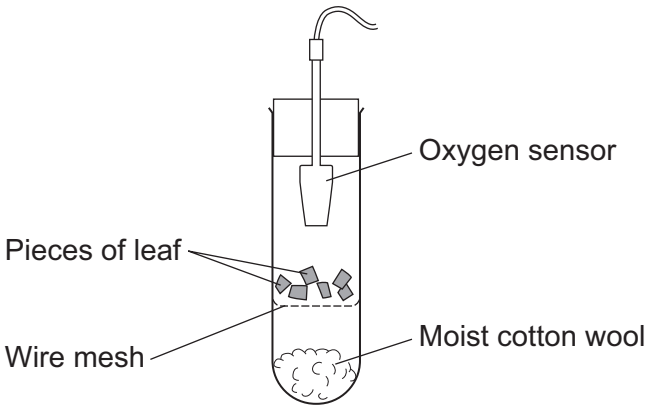


The students:

- cut pieces of leaf from the green region
- put the pieces into tubes
- added different concentrations of carbon dioxide to each tube
- shone lights on the tubes with either high or low light intensity
- recorded the concentration of oxygen in the tubes after 5 hours.

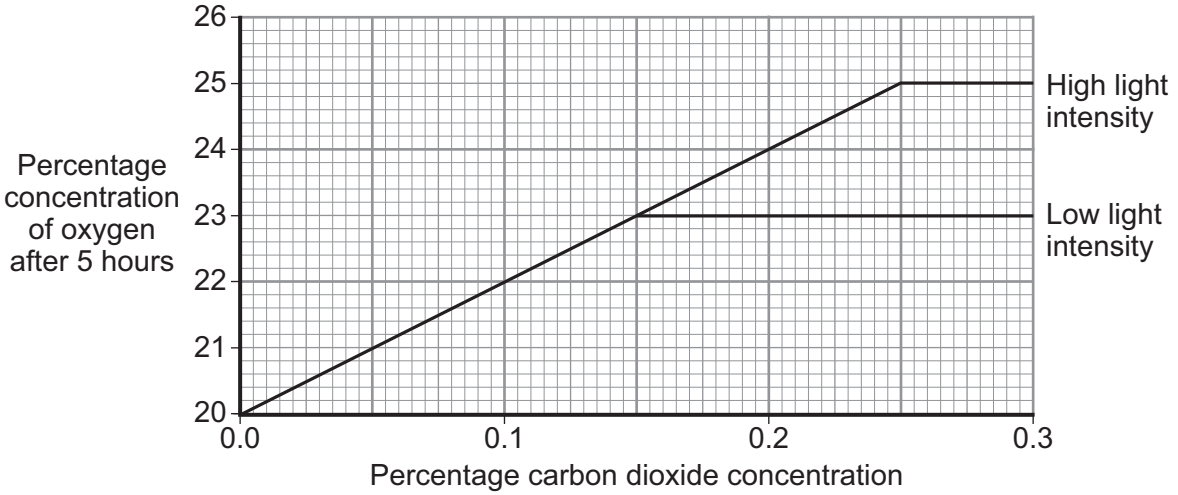
Diagram 2 shows how each experiment was set up.

Diagram 2



Do not write outside the box

The graph shows the results of the investigation.



5 (a) (i) Describe the effect of increasing carbon dioxide concentration on the rate of photosynthesis at low light intensity.

.....

.....

(1 mark)

5 (a) (ii) Explain the effect that you have described.

In your answer you should refer to limiting factors.

.....

.....

.....

.....

(2 marks)

5 (b) What would have been the effect on oxygen concentration over the five-hour period if a white region of the leaf had been used, instead of a green region?

Effect.....

Explain your answer.

Explanation .....

.....

.....

(2 marks)

Question 5 continues on the next page

Turn over ▶

Do not write outside the box

5 (c) Some people keep indoor plants which have variegated leaves (leaves with green and white regions).

If plants with variegated leaves are kept in dim light conditions the white areas of the leaves start to turn green.

This is an advantage to the plant.

Suggest why.

.....

.....

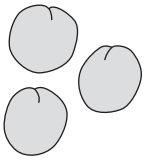
.....

.....

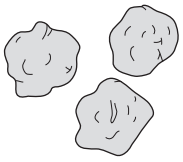
(2 marks)

7

6 In the 1860s, Gregor Mendel studied inheritance in nearly 30 000 pea plants.
Pea plants can produce either round seeds or wrinkled seeds.



Round pea seeds



Wrinkled pea seeds

6 (a) Mendel crossed plants that always produced round seeds with plants that always produced wrinkled seeds.

He found that all the seeds produced from the cross were round.

Use the symbol **A** to represent the dominant allele and **a** to represent the recessive allele.

Which alleles did the seeds from the cross have? .....

(1 mark)

Do not write outside the box

6 (b) Mendel grew hundreds of plants from the seeds of the offspring.
He crossed these plants with each other.

6 (b) (i) Mendel's crosses produced 5496 round pea seeds and 1832 wrinkled pea seeds.

Explain why Mendel's crosses gave him these results.

In your answer you should use:

- a genetic diagram
- the symbols **A** and **a**.

(3 marks)

6 (b) (ii) One of Mendel's crosses produced 19 round seeds and 16 wrinkled seeds.

These numbers do **not** match the expected ratio of round and wrinkled seeds.

Suggest why.

.....

.....

(1 mark)

6 (c) The importance of Mendel's discovery was not recognised until many years after his death.

Give **one** reason why.

.....

.....

(1 mark)

6

Do not write outside the box

7 A walker falls through thin ice into very cold water.



The walker's core body temperature falls. He may die of hypothermia (when core body temperature falls too low).

7 (a) (i) Which part of the brain monitors the fall in core body temperature?

.....

(1 mark)

7 (a) (ii) How does this part of the brain detect the fall in core body temperature?

.....

.....

.....

.....

(2 marks)

7 (b) While in the water the walker begins to shiver.

Shivering helps to stop the core body temperature falling too quickly.

Explain how.

.....

.....

.....

.....

(2 marks)

Do not write outside the box

7 (c) The walker had been drinking alcohol.

Alcohol causes changes to the blood vessels supplying the skin capillaries, making the skin look red.

7 (c) (i) Describe the change to the blood vessels.

.....

.....

(1 mark)

7 (c) (ii) The walker is much more likely to die of hypothermia than someone who has not been drinking alcohol.

Explain why.

.....

.....

.....

.....

(2 marks)

8

Turn over for the next question

Do not write outside the box

8 The table shows energy transfers in a large insect and a small mammal. Both animals feed mainly on grass.

Energy transfer	Amount of energy in kJ	
	Large insect	Small mammal
Eaten as grass	4.00	25.00
Absorbed into body	1.60	12.50
Leaves body as faeces	2.40	12.50
Production of new tissue	0.64	0.25
Transferred by respiration	0.96	12.25

8 (a) What percentage of the energy in food is transferred into new tissue in the large insect?

Show clearly how you work out your answer.

.....

.....

.....

Answer = ... %

(2 marks)

STEMUP.CO.UK

Do not write outside the box

8 (b) The proportion of energy in the food transferred into new tissue is much greater in the large insect than in the small mammal.

Explain why as fully as you can.

You should include references to the data in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

5

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2011 AQA and its licensors. All rights reserved.

Version : 04/08/2011

General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Mark Scheme

2011 examination – June Series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2011 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

BLY2H

Question 1

question	answers	extra information	mark
1(a) **E**	because water enters (the cell / it / named cell)	do **not** accept salt / sugar / solution entering	1
	by osmosis / diffusion	if osmosis / diffusion not given accept concentration inside cell greater than outside cell assume concentration refers to solute concentration unless answer indicates otherwise allow water goes <u>up</u> the concentration gradient allow water goes <u>down its</u> concentration gradient do **not** accept if diffusion of salt / sugar	1
	through a partially permeable membrane	allow semi / selectively permeable membrane **or** description	1
1(b) **E**	(plant cells) have (cell) <u>wall</u>	accept animal cells have no (cell) <u>wall</u> ignore reference to cell membrane do **not** accept reference to other organelles **or** any implication that animal cells have a cell wall eg plant cells have a thicker cell wall	1
Total			**4**

STEMUP.CO.UK

BLY2H

Question 2

question	answers	extra information	mark
2	any **three** from: advantages: (max 2) • less transport / example of transport **or** less fuel used • less pollution / example • support of local / UK economy / farmers disadvantages: (max 2) • not available all year • may require use of heat / light • (production of) heat / light causes pollution	maximum **2** marks if only advantages **or** only disadvantages given ignore references to cost unqualified ignore reference to fresher accept implication eg less food miles allow no transport / fuel costs accept eg less carbon dioxide / smaller carbon footprint allow no pollution / example	3
Total			**3**

STEMUP.CO.UK

BLY2H

Question 3

question	answers	extra information	mark
3(a)	any **one** from: • (same) volume / amount / 1 cm^3 lipase • (same) volume / amount / 5 cm^3 lipid • mixed after 3 minutes / same time before mixing	ignore reference to recording results every 5 minutes **or** concentrations of lipid / lipase allow amount of solution allow keep same volumes in the test tubes do **not** accept temperature	1
3(b)	so that the lipase and the lipid reached the right temperature		1
3(c)	any **two** from • decrease in time **or** faster (breakdown) • then increase in time **or** <u>then</u> slower (breakdown) • fastest / least time / optimum at 35°C	ignore explanations	2
3(d)	any **two** from: • test more regularly eg test every minute • test at smaller temperature intervals • test between 50 (^oC) and 95 (^oC) • repeat at same temperatures **or** repeat the investigation **or** compare results with others	ignore 'test at more temperatures' unqualified any interval < 5min any value <15°C allow test more temperatures in the range any value in range, eg test at 70 allow do **it** again	2

Question 3 continues on the next page

STEMUP.CO.UK

Question 3 continued

question	answers	extra information	mark
3(e)(i)	(lipase / it) denatured / destroyed / changed shape	allow damaged / deformed do **not** accept killed ignore broken (down)	1
3(e)(ii)	fatty acids and glycerol		1
Total			**8**

BLY2H

Question 4

question	answers	extra information	mark
4(a)(i)	release energy	allow provide / supply / give energy do **not** accept produce / create / generate / make energy do **not** allow release energy for respiration	1
4(a)(ii)	contain half the (number of) chromosomes **or** contains one set of chromosomes **or** contains 23 chromosomes	allow genetic information / DNA / genes / alleles instead of chromosomes accept haploid	1
4(b)	any **two** from: • (stem cells) are unspecialised / undifferentiated • are able to become differentiated **or** can form other types of cell / tissue / organ • stem cells can / able to divide / multiply	allow description eg 'no particular job'	2
Total			**4**

STEMUP.CO.UK

BLY2H

Question 5

question	answers	extra information	mark
5(a)(i)	increase (and then level off) **and** max / up to at 0.15(%) (carbon dioxide)	ignore references to oxygen concentration only ignore mention of 23	1
5(a)(ii)	$\underline{CO_2}$ is limiting at low CO_2 / at first light is limiting at high CO_2 / at end	ignore specific numbers	1 1
5(b)	 effect: (oxygen) falls explanation: (oxygen) used for respiration	**mark both parts together** **if no other marks** awarded allow (effect) no change **and** (explanation) no photosynthesis for **1** mark	 1 1
5(c)	more chlorophyll / chloroplasts allows more photosynthesis / description	 for both marks must refer to more at least once	1 1
Total			**7**

STEMUP.CO.UK

BLY2H

Question 6

question	answers	extra information	mark
6(a)	Aa	allow dominant **and** recessive allow heterozygous	1
6(b)(i)	gametes A, a **and** A, a	max **1** if gametes are incorrect (eg in punnet square)	1
	correctly derived offspring from cross	allow ecf from their gametes	1
	identification of round **and** wrinkled offspring	for this mark the phenotype of each different offspring genotype must be indicated	1
6(b)(ii)	(due to) chance **or** expected ratio is only a probability	accept the idea of small numbers not representative ignore anomaly / random / coincidence do **not** accept error	1
6(c)	any **one** idea from: • genes / chromosomes / alleles / DNA not discovered / known about • published in obscure journal / few scientists read his work	do **not** accept religious theme (ie confusion with Darwin's difficulties with the church)	1
Total			**6**

STEMUP.CO.UK

BLY2H

Question 7

question	answers	extra information	mark
7(a)(i)	thermoregulatory centre	allow thermoregulation centre allow hypothalamus	1
7(a)(ii)	it has receptors reference to temperature of blood	ignore receptors in skin allow plasma for blood	1 1
7(b)	muscles contract increased respiration **or** more heat released	ignore relax / expand allow more heat produced if more not given allow respiration releases / produces heat	1 1
7(c)(i)	(blood vessels / arteries / arterioles) dilate / widen	do **not** accept capillaries dilate ignore blood vessels get bigger / expand do **not** accept idea of blood vessels moving	1
7(c)(ii)	more blood close to / near surface more heat lost **or** heat lost faster **or** cools faster	allow blood is closer to the surface do **not** accept idea of blood vessels moving do **not** allow for idea of evaporation	1 1
Total			**8**

STEMUP.CO.UK

BLY2H

Question 8

question	answers	extra information	mark
8(a)	16	accept correct answer for **2** marks, irrespective of working if no answer **or** answer incorrect accept 0.64 x 100 / 4 (.0) **or** 0.16 for **1** mark	2
8(b)	insect cold-blooded / not warm blooded **or** does not control body temperature	accept mammal warm-blooded / constant (high) body temperature / controls body temperature	1
	reference to insect 0.96 (kJ) **and** mammal 12.25 (kJ) transferred by respiration **or** relevant calculation of this transfer	ignore references to other data	1
	(less respiration) so more energy / biomass / food available (for growth of insect)	(more respiration) so less energy / biomass / food available (for growth of mammal)	1
Total			**5**

The AQA UMS Conversion Calculator is available on the **Results statistics** page of the AQA Website

STEMUP.CO.UK

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

AQA

General Certificate of Secondary Education
Higher Tier
January 2011

Additional Science
Unit Biology B2

BLY2H

H

Biology
Unit Biology B2

Written Paper

Thursday 13 January 2011 9.00 am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

STEMUP.CO.UK

Do not write outside the box

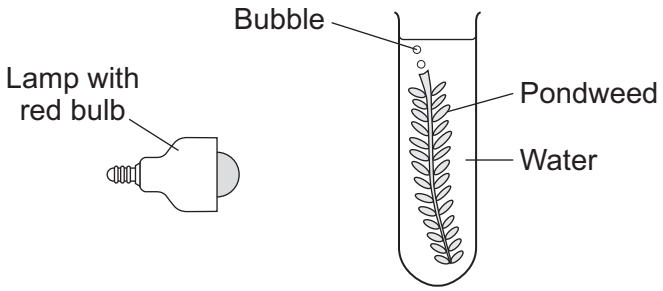
Answer **all** questions in the spaces provided.

1 A group of pupils investigated the way in which the colour of light affects photosynthesis.

The pupils:

- put a piece of pondweed into a test tube of water
- shone light from a lamp with a red light bulb onto the pondweed
- counted the bubbles of gas produced by the pondweed every minute for three minutes.

The diagram shows the experiment.



The pupils repeated their experiment using a yellow light bulb, a green light bulb and a blue light bulb.

1 (a) (i) What was the independent variable in the investigation?

.....

(1 mark)

1 (a) (ii) To make the investigation fair the pupils needed to control some variables.

Suggest **one** variable that the pupils should have controlled during their investigation.

.....

(1 mark)

1 (a) (iii) It is better to count the bubbles every minute for three minutes than to count all the bubbles in three minutes.

Why?

.....

.....

(1 mark)

Do not write outside the box

1 (b) The table shows the pupils' results.

Colour of bulb	Number of bubbles produced in one minute			
	1st minute	2nd minute	3rd minute	Mean
Red	24	19	21	21
Yellow	18	14	15	16
Green	6	4	3	4
Blue	32	34	32	33

Algae are tiny organisms that photosynthesise.
In natural light algae grow very quickly on the sides of a fish tank.
The algae make it difficult to see the fish.

1 (b) (i) What would be the best colour of light bulb to illuminate the fish tank to reduce the growth of algae?

Use the results in the table to help you to decide.

Draw a ring around **one** answer.

red **yellow** **green** **blue**

(1 mark)

1 (b) (ii) Explain why the colour you have chosen is the best.

.....

.....

.....

.....

(2 marks)

6

Turn over for the next question

Do not write outside the box

2 A group of students investigated a food chain in a garden.

The table shows the estimates of the population and biomass of some of the organisms the students found.

Organism	Number in the garden	Mean mass of each one in g	Biomass of population in g
Hedgehog	1	200	200
Slug	600	2	1200
Lettuce	20	300	

2 (a) (i) Calculate the biomass of the lettuce population.

Show clearly how you work out your answer.

.....

.....

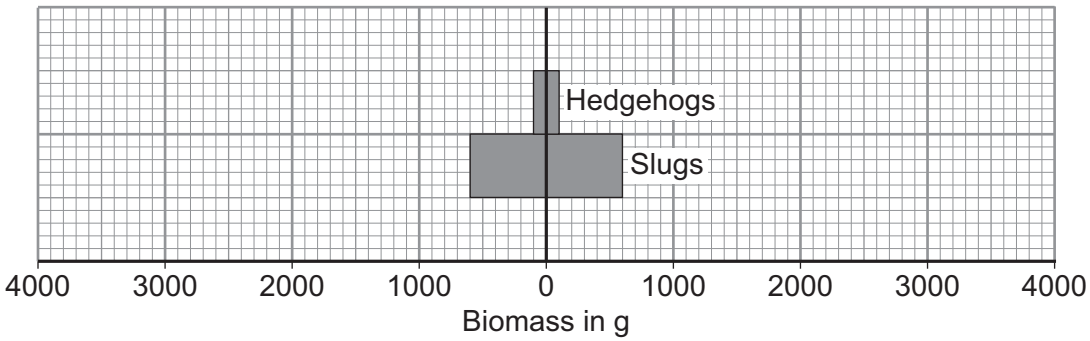
.....

Biomass = ... g

(2 marks)

2 (a) (ii) Use your answer to part (a)(i) to complete the pyramid of biomass.

Show the biomass of the lettuces in the garden.



(2 marks)

Do not write outside the box

2 (b) Hedgehogs eat slugs.

The biomass of the hedgehog population is much less than the biomass of the slug population.

Explain why as fully as you can.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

7

Turn over for the next question

Do not write outside the box

3 In diabetics blood glucose concentrations are sometimes abnormal.

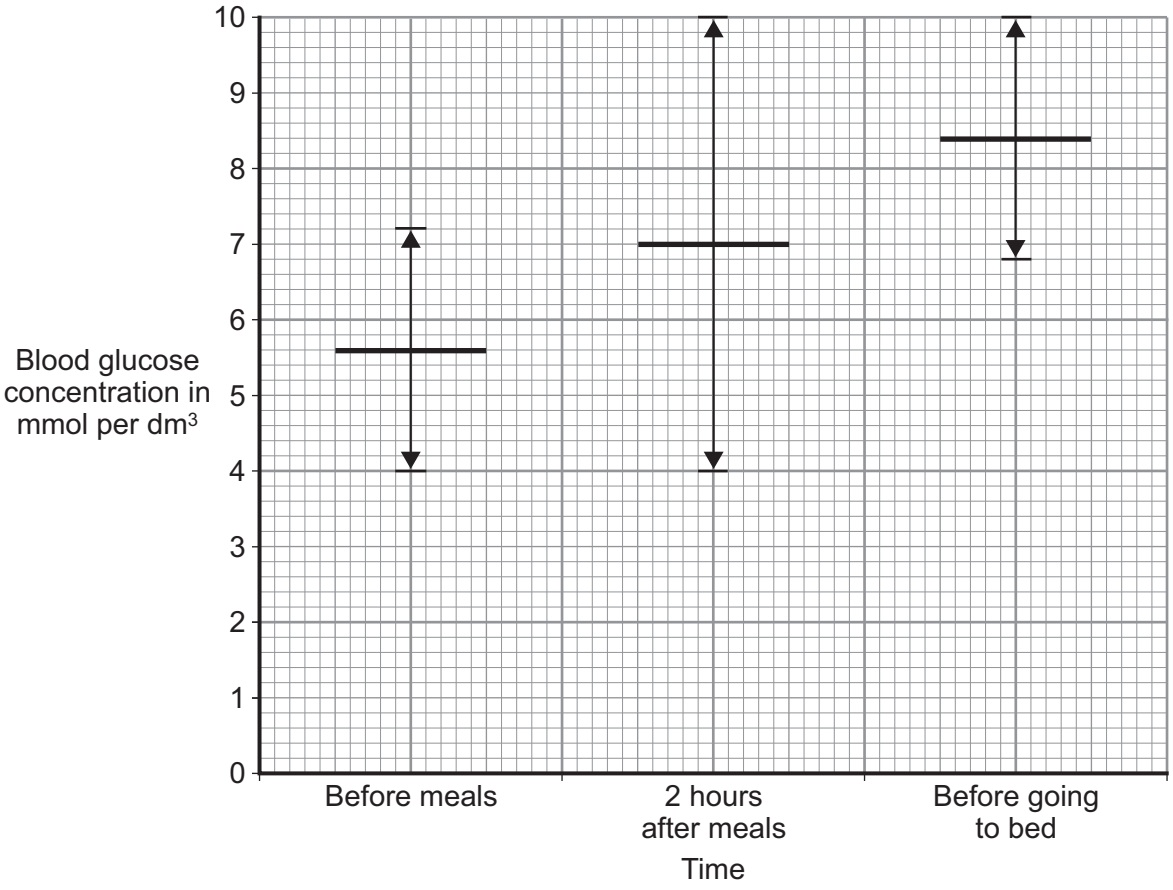
3 (a) Name the organ that monitors the concentration of glucose in the blood.

.....

(1 mark)

3 (b) Diabetics can measure their blood glucose concentration.

The graph shows the best blood glucose concentration and the acceptable range of blood glucose concentration at different times.



What is the acceptable range for the blood glucose concentration before meals?

From ..... to ..... mmol per dm^3

(1 mark)

Do not write outside the box

3 (c) The amount of insulin a diabetic injects can be changed so that blood glucose concentration is kept near to the best level.

Two hours after eating breakfast a diabetic measures his blood glucose concentration. His blood glucose concentration is 13 mmol per dm^3.

He reads these instructions:

- for every 2 mmol per dm^3 of blood glucose *above* the best concentration, inject 1 unit *more* of insulin
- for every 2 mmol per dm^3 of blood glucose *below* the best concentration, inject 1 unit *less* of insulin.

How should he change his normal insulin injection to bring his blood glucose level to the best concentration?

Show clearly how you work out your answer.

.....

.....

.....

.....

.....

.....

.....

.....

Answer = ...

(3 marks)

5

Turn over for the next question

Do not write outside the box

4 A certain allele increases the chance of women developing one type of breast cancer.

A woman has this allele. She wants to be sure that she will not have daughters who also have the allele.

Doctors:

- collect several eggs from her ovaries
- fertilise the eggs with sperm, in dishes.

4 (a) The doctors expect half the embryos produced to be female.

Explain why.

.....

.....

.....

.....

(2 marks)

4 (b) The embryos grow to around 100 cells.

Doctors:

- remove one cell from each embryo
- check the cell for the allele.

Complete the sentence.

This process is known as embryo ..... .

(1 mark)

Do not write outside the box

4 (c) One of the female embryos did not have the allele.
This female embryo was implanted into the woman's uterus.

Evaluate the advantages and disadvantages of the whole procedure.

Use information from all parts of this question and your own knowledge.

Remember to give a conclusion to your evaluation.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

7

Turn over for the next question

Do not write outside the box

5 There are enzymes in biological washing powders. Biological washing powder has to be used at temperatures below 45 °C.

5 (a) The enzymes in biological washing powders do **not** work on the stains on clothes at temperatures above 45 °C.

Explain why.

.....

.....

.....

.....

(2 marks)

5 (b) Some bacteria, called thermophilic bacteria live in hot springs at temperatures of 80 °C.

Scientists have extracted enzymes from these thermophilic bacteria. These enzymes are being trialled in industrial laundries.
The laundries expect to increase the amount of clothes they can clean by using enzymes from thermophilic bacteria instead of using the biological washing powders the laundries use now.

5 (b) (i) The laundries expect to be able to increase the amount of clothes that they can clean each day.

Suggest why.

.....

.....

.....

.....

.....

(2 marks)

Do not write outside the box

5 (b) (ii) Using washing powders with enzymes from thermophilic bacteria may be more harmful to the environment than using the biological washing powders that laundries use now.

Suggest why.

.....

.....

.....

.....

.....

(2 marks)

6

Turn over for the next question

Do not write outside the box

6 Cystic fibrosis and Huntington's disease are inherited disorders.

6 (a) Someone can be a carrier of cystic fibrosis.

Explain how.

You may include a genetic diagram in your answer.

.....

.....

.....

.....

(2 marks)

6 (b) Why does only one parent need to have the Huntington's disease allele for a child to inherit Huntington's disease?

.....

.....

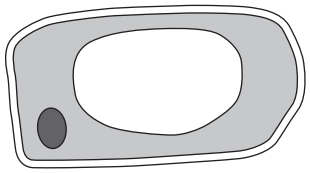
(1 mark)

3

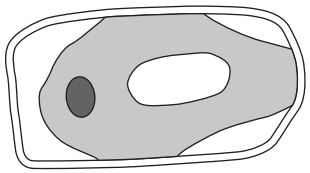
Do not write outside the box

7 The diagram shows the same plant cell:

- after 1 hour in distilled water
- after 1 hour in strong sugar solution.



After 1 hour in distilled water



After 1 hour in strong sugar solution

7 (a) Describe **two** ways in which the cell in the strong sugar solution is different from the cell in distilled water.

1 .....

.....

2 .....

.....

(2 marks)

7 (b) Explain how the differences between the cell in the strong sugar solution and the cell in distilled water were caused.

.....

.....

.....

.....

.....

(2 marks)

4

Do not write outside the box

8 The temperature in a sauna is much hotter than core body temperature.

A woman sits in a sauna.
The high temperature of the sauna causes the woman's core body temperature to rise.

8 (a) When the woman's core body temperature rises, the woman's rate of sweating increases.

Explain why.

.....

.....

.....

.....

(2 marks)

8 (b) The woman comes out of the sauna.
The woman's skin looks redder than when she went into the sauna.

Describe what happened to the blood circulation in her skin to cause this change in colour.

.....

.....

.....

.....

(2 marks)

8 (c) After coming out of the sauna the woman gets into a bath of icy water.
This makes the woman shiver.

8 (c) (i) What process brings about shivering?

.....

.....

(1 mark)

Do not write outside the box

8 (c) (ii) Shivering increases body temperature.

Explain how.

.....

.....

.....

.....

(2 marks)

7

END OF QUESTIONS

STEMUP.CO.UK

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2010 AQA and its licensors. All rights reserved.

Version : 28/02/2011

General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Mark Scheme

2011 examination – January Series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2011 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

BLY2H

Question 1

question	answers	extra information	mark
1(a)(i)	colour of light / bulb / lamp	allow wavelength for colour allow bulb alone do **not** accept light / colour unqualified	1
1(a)(ii)	any **one** from eg • temperature • light intensity **or** distance between lamp and plant / tube • carbon dioxide • other light in room • mass / size / amount / age / type of pondweed • volume / amount of water	 allow heat allow amount / brightness of light ignore light unqualified allow symbols allow use a dark room allow same piece of pondweed ignore pondweed unqualified ignore reference to time	1
1(a)(iii)	improved reliability **or** can spot anomalies / changes	allow for reliability **or** less likely to lose count allow reference to calculating a mean / average ignore reference to accuracy / precision / fair	1
1(b)(i)	green		1

Question 1 continues on the next page

STEMUP.CO.UK

BLY2H

Question 1 continued

question	answers	extra information	mark
1(b)(ii)	any **two** from: • least / less bubbles / gas / oxygen / mean • least / less photosynthesis • least / less glucose / sugar / carbohydrate / food made	ignore references to colour reference to least / less needed only once, in context, for **2** marks only penalise no once, ie no bubbles = **0** mark no bubbles so no photosynthesis = **1** mark allow most / more green light reflected (by chloroplasts)	2
Total			**6**

STEMUP.CO.UK

BLY2H

Question 2

question	answers	extra information	mark
2(a)(i)	6000	award **2** marks for correct answer irrespective of working allow **1** mark for 20 x 300 with incorrect or no answer allow answer in table if answer line blank	2
2(a)(ii)	bar width 6000 **or** to match answer to (a)(i) drawn below slugs	anywhere on scale ignore depth / height of bar label **not** required	1 1
2(b)	any **three** from: • respiration (by hedgehog) • (results in) loss of CO_2 • faeces (of hedgehog) **or** not digested • excreted / urine / urea (by hedgehog) • not all slug(s) are eaten (by hedgehogs) **or** some slugs eaten by other things	ignore reference to size / mass / number of organisms assume reference is to / of hedgehog unless stated otherwise do **not** accept idea that respiration uses / produces energy accept waste for **1** mark if neither faeces nor excretion point made ignore sweat alone ignore some slugs die ignore reference to movement / heat / growth allow references to energy losses by these methods, rather than biomass losses	3
Total			**7**

STEMUP.CO.UK

BLY2H

Question 3

question	answers	extra information	mark
3(a)	pancreas	allow phonetic spelling	1
3(b)	4(.0) to 7.2 **or** 7.2 to 4(.0)		1
3(c)	13 – 7 = 6 6/2 = 3 units increase (dose)	working shows 6 = **1** mark accept the correct answer to the calculation, 3 units, for **2** marks, irrespective of working accept indication of increase, eg extra / more / + could be in working lines	1 1 1
Total			**5**

STEMUP.CO.UK

BLY2H

Question 4

question	answers	extra information	mark
4(a)	half / 50% sperm have X (chromosome) **or** half / 50% sperm have Y (chromosome)	penalise incorrect use of gene / allele once only	1
	all eggs have X (chromosome)	annotated genetic diagram could gain **2 marks**	1
4(b)	screening	ignore selection	1
4(c)	any **three** from: advantages**:(max 2**) • (girl / children / women) don't / less likely to get / inherit (breast) cancer / this / the disease • future generations get less cancer **or** less likely to have the allele • less expensive (for NHS) than treating cancer	max **2** if only advantages **or** only disadvantages discussed do **not** accept reference to allele alone for this point	3
	disadvantages**:(max 2)** • (wrong / immoral to) reject / kill embryos • possible harm to embryo (that is implanted) / miscarriage • possible harm to mother (due to operational procedure)	ignore wrong / immoral / religious argument unqualified ignore reference to termination allow reference to needing hormone treatment	
	argued conclusion	must refer to **both** advantages and disadvantages and must be at end of answer	1
Total			**7**

STEMUP.CO.UK

BLY2H

Question 5

question	answers	extra information	mark
5(a)	shape changed / destroyed (above 45 °C) (shape) doesn't fit (other molecules / stain)	accept denatured accept active site changed do **not** accept enzyme killed	1 1
5(b)(i)	any **two** from: • can wash the clothes at higher temperature • so wash / enzyme action will be quicker • enzyme not destroyed at high temperature / 80 °C	 do **not** accept idea of bacteria working faster accept denaturation or description	2
5(b)(ii)	high(er) temperature / 80 °C uses more energy / fuel more pollution / named (eg carbon dioxide / global warming) (from electricity production) **or** increased release of hot water (into the environment)		1 1
Total			**6**

STEMUP.CO.UK

BLY2H

Question 6

question	answers	extra information	mark
6(a)	cystic fibrosis (allele / gene) recessive carrier has only one cystic fibrosis allele / gene	allow an annotated genetic diagram accept carrier is heterozygous accept any symbol with key or accept conventional use of symbols penalise use of chromosome once only	1 1
6(b)	any **one** from: • Huntington's (allele / gene) dominant • (to have Huntington's) need only one Huntington's allele / gene		1
Total			**3**

STEMUP.CO.UK

BLY2H

Question 7

question	answers	extra information	mark
7(a)		correct names of cell components are required it = cell in sugar solution	
	any **two** from: • smaller vacuole • smaller / less cytoplasm • cell membrane / cytoplasm not (fully) against cell wall **or** cell membrane / cytoplasm (partly) pulled away from cell wall **or** space / liquid / sugar solution between cell membrane / cytoplasm and cell wall	accept reverse only if clearly stated answer refers to cell in distilled water allow protoplasm for cytoplasm accept plasmolysed / flaccid / less turgid ignore reference to nucleus / water ignore explanations	2
7(b)	water passed / moved out (of cell) by osmosis / diffusion	accept reverse answer if clearly refers to cell in distilled water	1
	more concentrated (solution) outside **or** less concentrated (solution) inside **or** lower <u>water</u> concentration outside **or** higher <u>water</u> concentration inside	assume reference to concentration refers to solute concentration unless answer refers to water concentration accept references to hypertonic / hypotonic solutions **or** water potential	1
Total			**4**

STEMUP.CO.UK

BLY2H

Question 8

question	answers	extra information	mark
8(a)	any **two** from • reference to role of thermoregulatory centre detecting rise in temperature (of blood or skin) **or** / causing increase in sweating • more evaporation • more cooling / heat loss	need to refer to more at least once to gain **both** marks without reference to more only award max **1** mark if both ideas given, eg cooling alone gets no marks	2
8(b)	blood vessels supplying (skin) capillaries **or** arteries **or** arterioles dilate / widen	do **not** accept capillaries / veins allow vasodilation do not accept idea of blood vessels moving note: marks are awarded independently accept shunt vessels close for **2** marks	1 1 1
8(c)(i)	muscle contraction	ignore relaxing do **not** allow vasoconstriction	1
8(c)(ii)	respiration (respiration) releases / produces heat	 reference to respiration is required for this mark	1 1
Total			**7**

STEMUP.CO.UK

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2010

Additional Science
Unit Biology B2

BLY2H

H

Biology
Unit Biology B2

Written Paper

Friday 21 May 2010 9.00 am to 9.45 am

You will need no other materials.
You may use a calculator.

Time allowed
- 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

STEMUP.CO.UK

Do not write outside the box

Answer **all** questions in the spaces provided.

1 This question is about photosynthesis.

1 (a) Plants make glucose during photosynthesis. Some of the glucose is changed into insoluble starch.

What happens to this starch?

Tick (✓) **one** box.

The starch is converted into oxygen. ☐

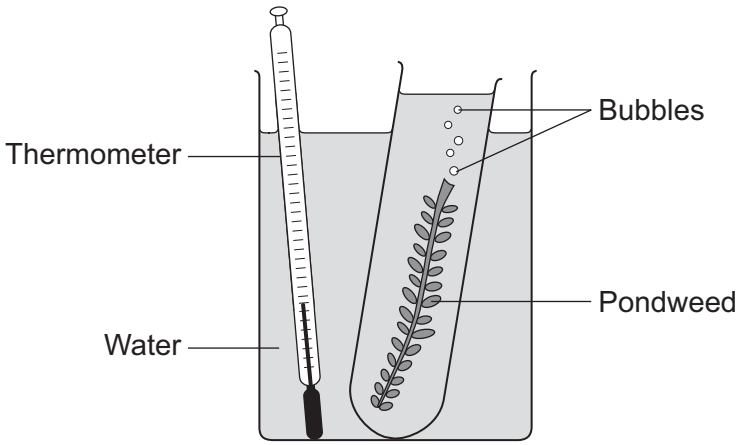
The starch is stored for later use. ☐

The starch is used to make the leaf green. ☐

(1 mark)

1 (b) A student investigated the effect of temperature on the rate of photosynthesis in pondweed.

The diagram shows the way the experiment was set up.



1 (b) (i) The student needed to control some variables to make the investigation fair.

State **two** of these variables.

1 .....

2 .....

(2 marks)

Do not write outside the box

1 (b) (ii) The bubbles of gas are produced only while photosynthesis is taking place.

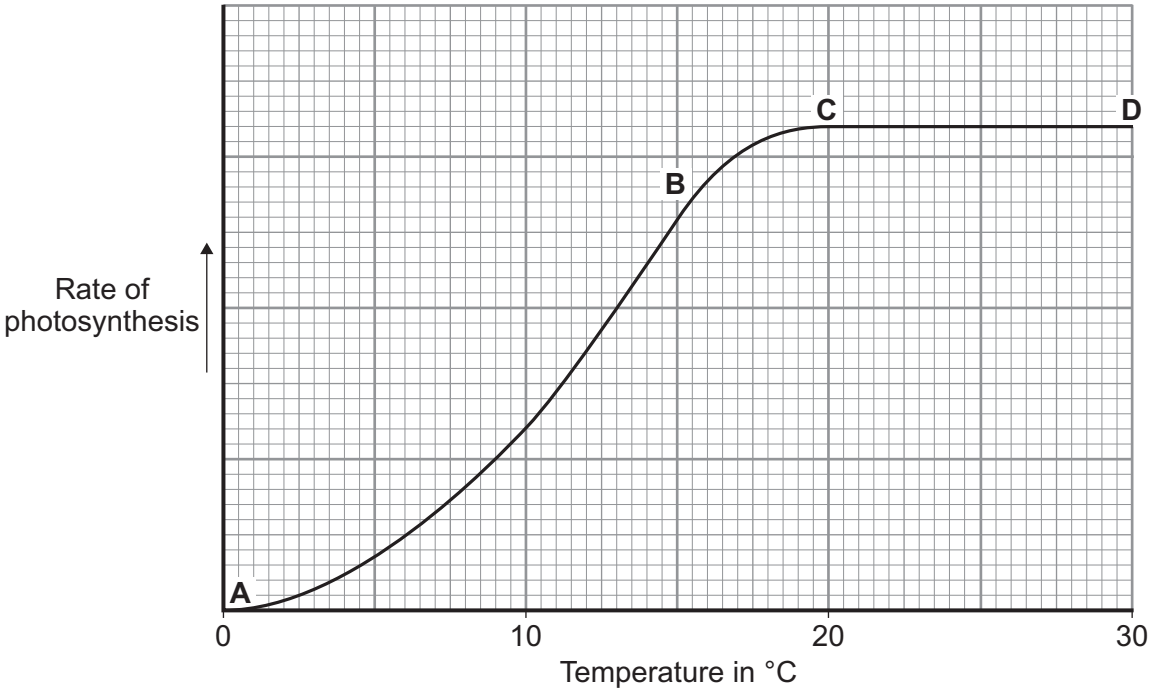
What **two** measurements would the student make to calculate the rate of photosynthesis?

1 .....

2 .....

(2 marks)

1 (c) The graph shows the effect of temperature on the rate of photosynthesis.



1 (c) (i) Name the factor that limits the rate of photosynthesis between the points labelled **A** and **B** on the graph.

.....

(1 mark)

1 (c) (ii) Suggest which factor, carbon dioxide, oxygen or water, might limit the rate of photosynthesis between the points labelled **C** and **D** on the graph.

.....

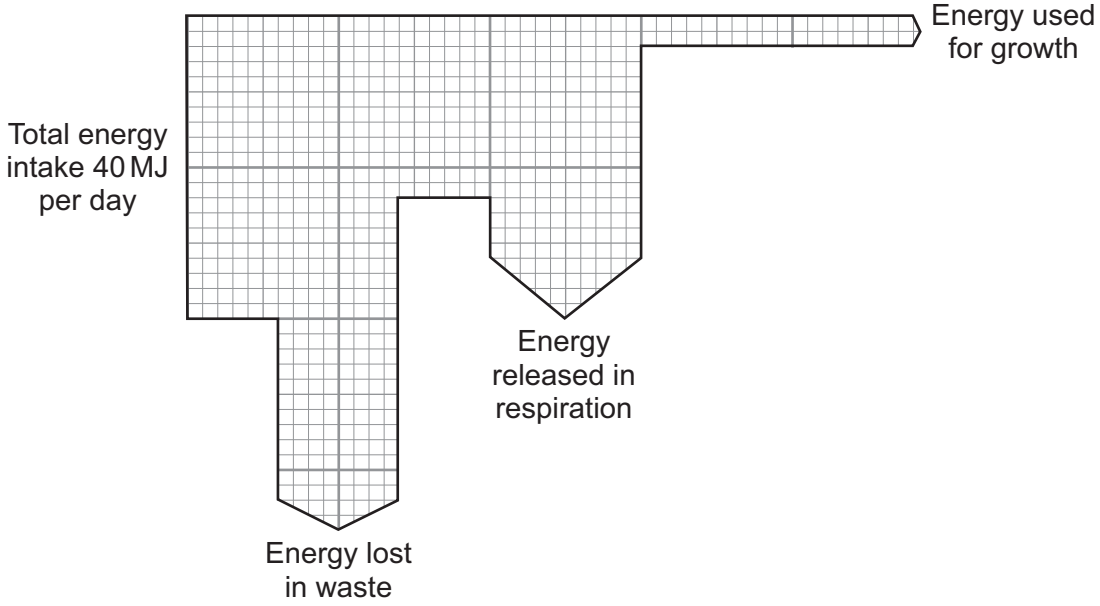
(1 mark)

7

Do not write outside the box

2 (a) **Diagram 1** represents what happens to the energy in the food eaten by a herbivore (an animal that eats plants).

Diagram 1



2 (a) (i) How much energy is released in respiration by the herbivore?

.....

.....

Answer ..... MJ per day
(1 mark)

2 (a) (ii) What proportion of the total energy intake of the herbivore is used for growth?

Show clearly how you work out your answer.

.....

.....

.....

Proportion .....
(2 marks)

2 (b) Give **two** ways in which the energy, released in respiration, is used by a herbivore.

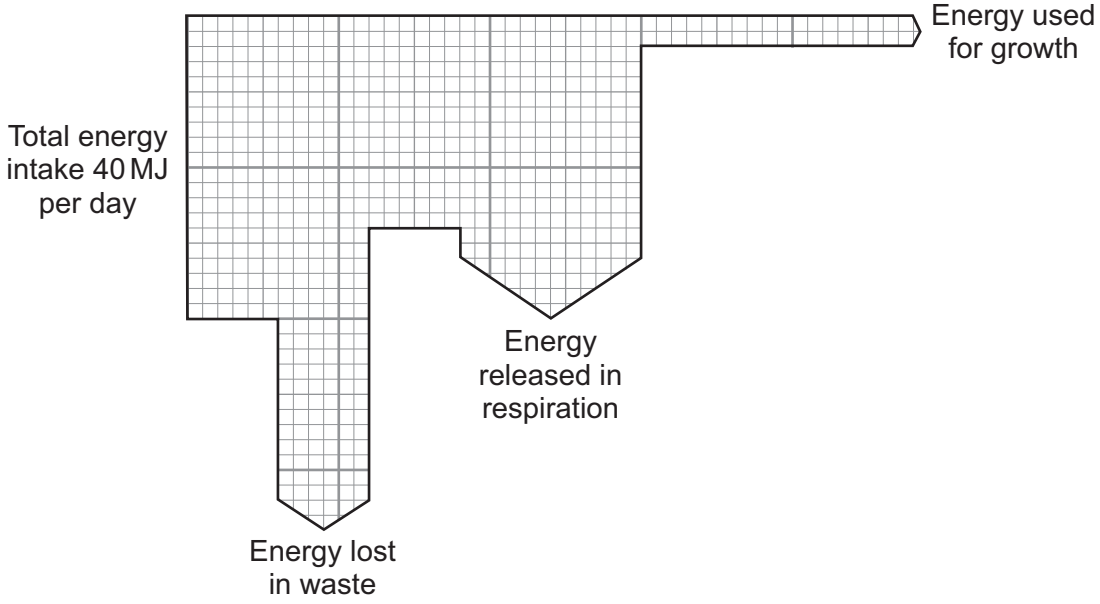
1 .....

2 .....
(2 marks)

Do not write outside the box

2 (c) **Diagram 2** represents what happens to the energy in the food eaten by a carnivore (an animal that eats other animals).

Diagram 2



The carnivore releases a greater proportion of energy in respiration than the herbivore.

Suggest **one** reason for this.

.....

.....

(1 mark)

2 (d) Some farmers keep their animals outdoors. Other farmers keep their animals indoors.

Keeping farm animals indoors increases the proportion of energy in their food that is converted into growth.

Give **two** reasons why.

1 .....

.....

2 .....

.....

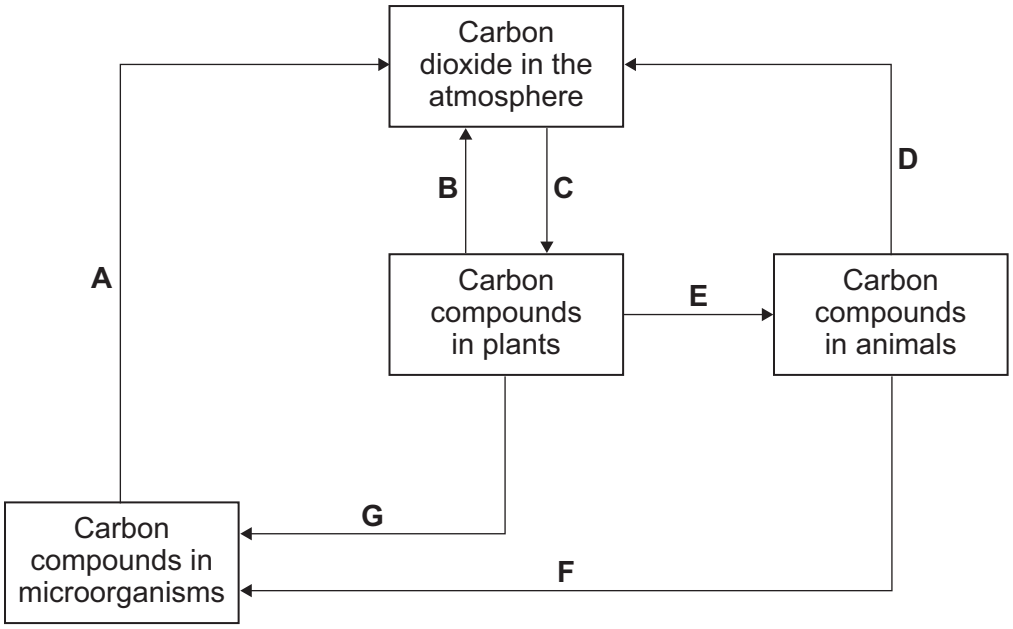
(2 marks)

8

Turn over ▶

Do not write outside the box

3 The diagram shows part of the carbon cycle.



3 (a) Letter **A** represents respiration.

Which **two** other letters represent respiration?

☐ and ☐

(1 mark)

3 (b) Other than carbon dioxide name **two** carbon compounds found in plants.

1 .....

2 .....

(2 marks)

Do not write outside the box

3 (c) Gardeners use compost heaps to decay dead plants. Decayed compost is then spread onto the soil in a garden.

Explain why gardeners spread decayed compost onto the soil.

.....

.....

.....

.....

(2 marks)

5

Turn over for the next question

Do not write outside the box

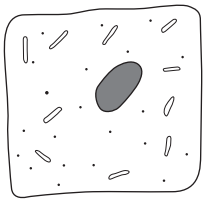
There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

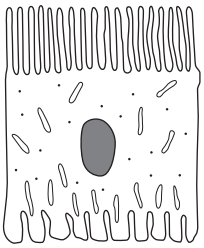
Do not write outside the box

4 Diagrams **A**, **B** and **C** show cells from different parts of the human body, all drawn to the same scale.

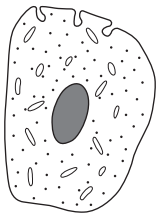
A



B



C



Key
Mitochondrion
Ribosome

4 (a) Which cell, **A**, **B** or **C**, appears to have adaptations to increase diffusion into or out of the cell? ☐

Give **one** reason for your choice.

.....

.....

(1 mark)

4 (b) (i) Cell **C** is found in the pancreas.

Name **one** useful substance produced by the pancreas.

.....

(1 mark)

4 (b) (ii) Use information from the diagram to explain how cell **C** is adapted for producing this substance.

.....

.....

.....

.....

(2 marks)

4

Do not write outside the box

5 Conditions inside the body must be kept constant.

5 (a) Urea must be removed from the body.

5 (a) (i) Name the organ which makes urea.

.....

(1 mark)

5 (a) (ii) Which organ removes urea from the body?

.....

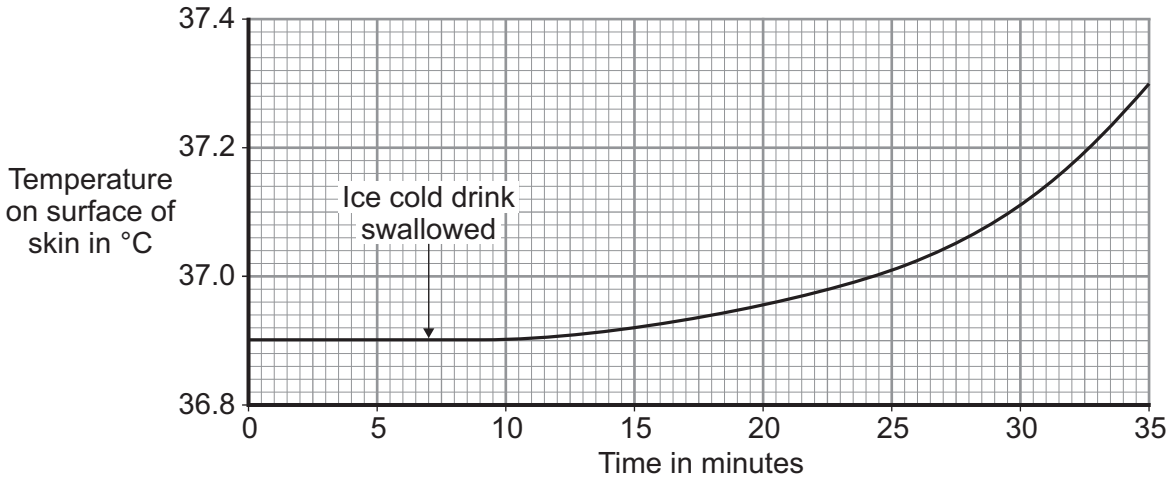
(1 mark)

5 (a) (iii) What is urea made from?

.....

(1 mark)

A man sat in a room where the temperature was maintained at 40 °C.
The temperature on the surface of his skin was monitored for 35 minutes.
He swallowed an ice cold drink at the time indicated on the graph.



Do not write outside the box

5 (b) The sweat glands contribute to the change in the temperature on the surface of the skin shown on the graph.

Explain how.

.....

.....

.....

.....

.....

.....

(2 marks)

5 (c) The blood vessels near the surface of the skin also contribute to the changes in skin temperature shown on the graph.

5 (c) (i) How do the blood vessels in the skin change when the core body temperature falls?

.....

.....

(1 mark)

5 (c) (ii) How does this change in the blood vessels explain the change in the skin temperature shown on the graph?

.....

.....

(1 mark)

7

Turn over for the next question

Do not write outside the box

6 Fresh milk is a mixture of compounds including fat, protein and about 5% lactose sugar. Lactose must be digested by the enzyme lactase, before the products can be absorbed.

Lactase can be added to fresh milk to pre-digest the lactose. This makes 'lactose-free' milk, which is suitable for people who do not produce enough lactase of their own.

A student investigated the effect of changing pH and temperature on the digestion of lactose in milk.

The results are shown in **Tables 1** and **2**.

Table 1
Effect of pH

pH	Time taken to digest lactose in minutes
4.0	20
5.0	18
6.0	13
7.0	7
8.0	5
9.0	6

Table 2
Effect of temperature

Temperature in °C	Time taken to digest lactose in minutes
30	20
35	14
40	11
45	6
50	12
55	23

6 (a) The label on a carton of lactose-free milk states:

'Lactase is normally produced in the stomach of mammals.'

The results in **Table 1** show that this statement is unlikely to be true.

Explain how.

.....

.....

.....

.....

(2 marks)

Do not write outside the box

6 (b) Explain as fully as you can the results shown in **Table 2**.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

6 (c) Bile is produced in the liver and is released into the small intestine.

Explain how bile helps the digestion of milk.

.....

.....

.....

.....

(2 marks)

7

Turn over for the next question

Do not write outside the box

7 The table shows the number of chromosomes found in each body cell of some different organisms.

Animals		Plants	
Species	**Number of chromosomes in each body cell**	**Species**	**Number of chromosomes in each body cell**
Fruit fly	8	Tomato	24
Goat	60	Potato	44
Human	46	Rice	24

7 (a) Nearly every organism on earth has an even number of chromosomes in its body cells.

Suggest why.

.....

.....

(1 mark)

7 (b) Chromosomes contain DNA molecules.

Describe the function of DNA.

.....

.....

.....

.....

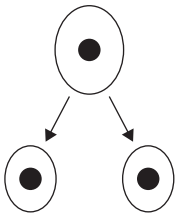
(2 marks)

Do not write outside the box

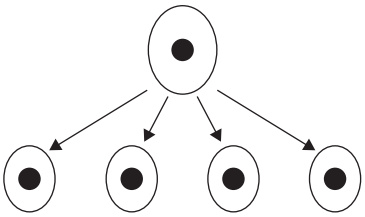
7 (c) Gametes are made in the testes by meiosis.

7 (c) (i) Look at the diagrams.

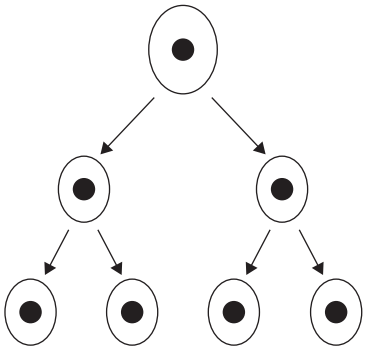
A



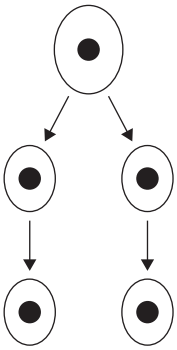
B



C



D



Which diagram, **A**, **B**, **C** or **D**, represents how cell division by meiosis produces gametes in the testes? ☐

(1 mark)

7 (c) (ii) How many chromosomes will each goat gamete contain?

.....

(1 mark)

Question 7 continues on the next page

Do not write outside the box

7 (d) Body cells divide by mitosis.

7 (d) (i) Why is the ability of body cells to divide important?

.....

.....

(1 mark)

7 (d) (ii) When a body cell of a potato plant divides, how many chromosomes will each of the new cells contain?

.....

(1 mark)

7

END OF QUESTIONS

Copyright © 2010 AQA and its licensors. All rights reserved.

Version: 09/08/2010

General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Mark Scheme

2010 Examination – June Series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2010 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

Marking Guidance for Examiners

GCSE Science Papers

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example:

where consequential marking needs to be considered in a calculation;

or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct

substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

BLY 2H

Question 1

question	answers	extra information	mark
1(a)	the starch is stored for later use.		1
1(b)(i)	any **two** from: • carbon dioxide (concentration) • light intensity • light colour / wavelength • pH • size / amount plant • same / species / type plant • amount of water in the tube	do **not** accept temperature – apply list principle ignore reference to time allow **one** mark for light if neither intensity or colour are awarded allow 'the plant' ignore amount of water alone	2
1(b)(ii)	number / amount of bubbles **or** amount of gas / oxygen (relevant reference to) time / named time interval	allow volume of bubbles (together) ignore 'the bubbles' unqualified allow how long it bubbles for do **not** accept time bubbles start / stop ignore speed / rate bubbles ignore instruments do **not** accept other factors eg temperature accept how many bubbles per minute for **2** marks	1 1
1(c)(i)	temperature	allow heat / °C / cold	1
1(c)(ii)	carbon dioxide / CO_2	allow CO2 / CO^2 / Co_2 / Co^2 / co_2 / co^2 do **not** accept CO / 2CO	1
Total			**7**

STEMUP.CO.UK

BLY 2H

Question 2

question	answers	extra information	mark
2(a)(i)	20		1
2(a)(ii)	one tenth / 0.1 / 10% / 1:9 / 1 in 10 / 1 out of 10 / $\frac{1}{10}$	for correct answer irrespective of working ignore any units accept equivalent fractions eg $\frac{4}{40}$ / $\frac{2}{20}$ do **not** allow eg 1:10 / 1 to 10 if answer is incorrect clear selection of 2 **and** 20, **or** equivalent **or** 1:4:5 / 1:5:4 gains **1** mark	2
2(b)	any **two f**rom: • (body) heat / maintaining body temperature • movement (max 2) • growth / cell division / repair / reproduction / building molecules • accept active transport	do **not** accept sweating / cooling / excretion allow keep warm allow **2 different** examples of movement, internally and / or externally eg breathing / exercise / eating / circulation allow muscle contraction if no other muscle action is credited movement + breathing = 1 mark allow examples eg making proteins (from amino acids) ignore 'chemical reactions' / digestion	2

Question 2 continues on the next page

STEMUP.CO.UK

BLY 2H

Question 2 continued

question	answers	extra information	mark
2(c)	more movement / have to hunt / catch food	allow converse if stated for herbivore eg herbivores food is all around ignore reference to size **or** predator unqualified	1
2(d)	any **two** from • less movement • less heat loss • less respiration	ignore reference to food allow no movement allow less space to move ignore less space unqualified allow no heat loss **or** they are kept warm	2
Total			**8**

STEMUP.CO.UK

BLY 2H

Question 3

question	answers	extra information	mark
3(a)	B and D	both required in any order	1
3(b)	any **two** from: • carbohydrate / named example • protein / enzyme • amino acid • hormone / named plant hormone • lipid / fat / oil / wax • chlorophyll • DNA • vitamin(s)	do **not** accept compounds restricted to animals allow **2** marks for 2 named examples do **not** allow a general name and a named example for **2** marks (eg award **1** mark only for carbohydrate and starch) allow **2** marks for 2 named examples	2
3(c)	contains minerals / salts / ions / nutrients / named (needed by plants) for health / better growth	ignore 'food' do **not** allow vitamins / glucose / energy etc for / help plant growth is insufficient ignore moisture retention / soil structure ignore more plants allow examples linked to mineral eg contains magnesium to make chlorophyll for **2** marks	1 1
Total			**5**

STEMUP.CO.UK

BLY 2H

Question 4

question	answers	extra information	mark
4(a)	B large(r) surface / area **or** large(r) membrane	no mark for "B", alone accept reference to microvilli accept reasonable descriptions of the surface do **not** accept wall / cell wall ignore villi / hairs / cilia	 1
4(b)(i)	any **one** from: • insulin / hormone • enzyme / named enzyme	 if named hormone / enzyme must be correct for pancreas	1
4(b)(ii)	many ribosomes (ribosomes) produce protein **or** allow many mitochondria (1) provide energy to build protein **or** to make protein (1)	 accept insulin / hormone / enzyme named is (made of) protein accept ATP for energy	1 1
Total			**4**

STEMUP.CO.UK

BLY 2H

Question 5

question	answers	extra information	mark
5(a)(i)	liver		1
5(a)(ii)	kidney	allow urethra / bladder ignore ureter	1
5(a)(iii)	(excess) protein / named / amino acids	accept amino / ammonia	1
5(b)	less / no sweating less heat lost / evaporation	allow ideas of how sweat glands change in order to reduce sweating	1 1
5(c)(i)	become narrower / constrict	allow contract / get smaller etc allow less blood flows through vessels do **not** allow capillaries become narrower **or** reference to movement of vessels	1
5(c)(ii)	reduced / no heat loss	allow heat gained from room	1
Total			**7**

STEMUP.CO.UK

BLY 2H

Question 6

question	answers	extra information	mark
6(a)	stomach is acidic / has low pH	allow any pH below 7 ignore stomach is not alkaline	1
	lactase works best / well in alkali / high pH / neutral / non-acidic conditions	allow any pH of 7 and above accept works slowly in acid conditions allow figures from table with a **comparison** ignore reference to temperature	1
6(b)	any **three** from • (below 45(°C)) increase in temperature increases rate / *speed* of reaction • reference to molecules moving faster / colliding faster / harder / more collisions • optimum / best at 45(°C) • high temps / above 45(°C) (rate slows due to) denaturation of enzyme / lactase	 allow value(s) in range 41 – 49 allow synonyms of denaturation but **not** killed denaturation at high **and** low temperature does **not** gain this mark ignore body temperature ignore references to time / pH	3

Question 6 continues on the next page

STEMUP.CO.UK

BLY 2H

Question 6 continued

question	answers	extra information	mark
6(c)	any **two** from • acid neutralised **or** conditions made neutral / alkali • *(*allow*)* emulsification / greater surface area of fat / lipid • enzymes (in small intestine) work (more effectively / better)	 accept bile is alkaline allow description of emulsification eg fat is broken down / broken up into droplets allow better for enzymes	2
Total			**7**

STEMUP.CO.UK

BLY 2H

Question 7

question	answers	extra information	mark
7(a)	any **one** from • chromosomes in pairs • inherited one of each pair from each parent • one of each pair in egg **and** one of each pair in sperm • so sex cells / gametes can have half the number	allow need to pair during cell division / meiosis	1
7(b)	any **two** from: • <u>code</u> • combination / sequence of amino acids • forming specific / particular proteins / examples	If **no other mark** gained allow reference to controlling characteristics / appearance for **1** mark	2
7(c)(i)	C		1
7(c)(ii)	30		1
7(d)(i)	for growth / repair / replacement / asexual reproduction	do **not** accept incorrect qualification, eg growth *of* cells **or** repair of cells they equals cells therefore do not accept they grow etc	1
7(d)(ii)	44 **or** 22 pairs		1
Total			**7**

STEMUP.CO.UK

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

General Certificate of Secondary Education
Higher Tier
January 2010

Additional Science BLY2H

Biology H

Unit Biology B2

Written Paper

Thursday 14 January 2010 9.00 am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

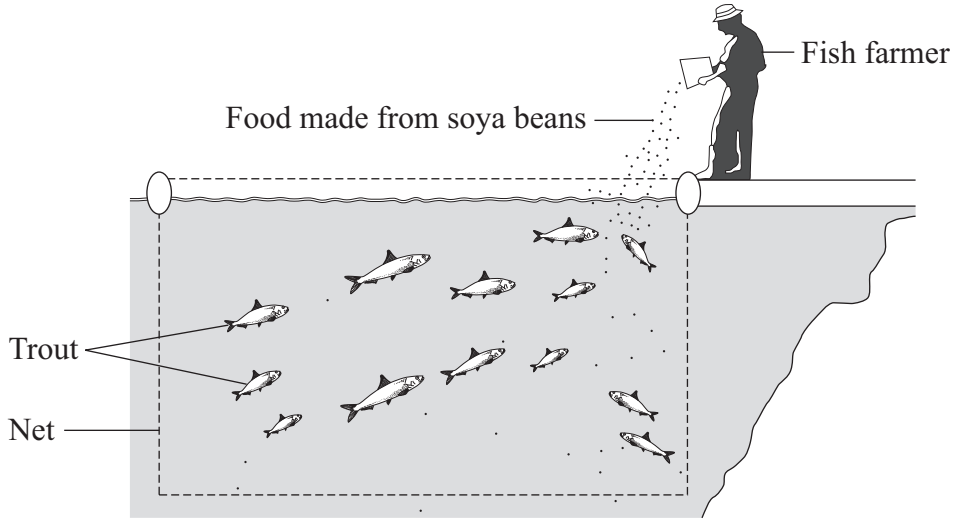
Advice
- In all calculations, show clearly how you work out your answer.

STEMUP.CO.UK

Areas outside the box will not be scanned for marking

Answer **all** questions in the spaces provided.

1 A fish farmer keeps trout in a large net in a lake.



The fish farmer feeds the trout on food made from soya beans.

When the trout are large enough the farmer sells them for food for people.

1 (a) Draw a pyramid of biomass for the three organisms in this food chain.

Label the pyramid.

(2 marks)

Areas outside the box will not be scanned for marking

1 (b) It would be more energy efficient if people ate the soya beans rather than eating the trout.

Which **two** of the following are reasons for this?

Tick (✓) **two** boxes.

Some people do not like eating animals such as trout. ☐

The trout release energy when they respire. ☐

Soya bean plants release energy when they respire. ☐

Some energy will be lost in waste from the trout. ☐

Soya bean plants absorb energy during photosynthesis. ☐

(2 marks)

1 (c) Suggest **one** advantage to the fish farmer of keeping the trout in a large net instead of letting them swim freely in the lake.

.....

.....

(1 mark)

1 (d) Some trout die before they are large enough to be sold.
The dead trout contain carbon.

Use your knowledge of the carbon cycle to describe how this carbon is returned to the atmosphere after the trout die.

.....

.....

.....

.....

.....

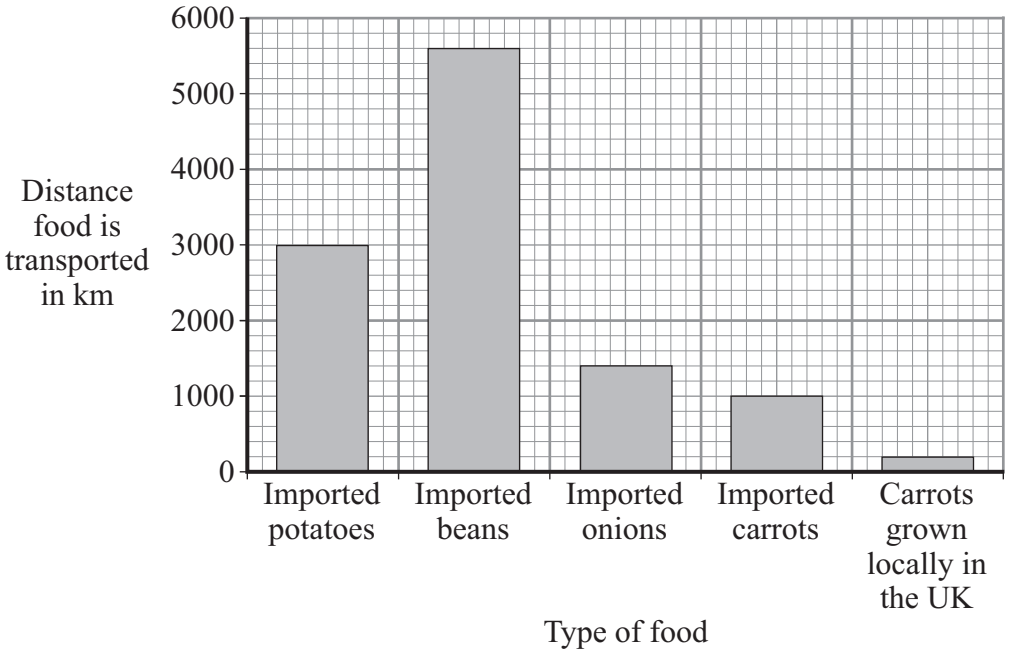
(2 marks)

7

Areas outside the box will not be scanned for marking

2 Some people are concerned about the distance that food is transported between the grower and the supermarket.

The bar chart shows the distances for some foods.



2 (a) Both imported carrots and carrots grown locally in the UK can be bought in supermarkets all year round.

How many times further are imported carrots transported than carrots grown locally in the UK?

Show clearly how you work out your answer.

.....

.....

..... times

(1 mark)

Areas outside the box will not be scanned for marking

2 (b) Many of the beans sold in supermarkets in the UK are grown in Kenya, a tropical country in Africa.

Beans grow faster in Kenya than they do in the UK.

Suggest and explain **one** reason why.

Reason .....

.....

Explanation .....

.....

(2 marks)

2 (c) Many people believe that we should buy locally produced food instead of food imported from abroad.

Explain how this would help the environment.

.....

.....

.....

.....

.....

(2 marks)

5

Turn over for the next question

Areas outside the box will not be scanned for marking

3 (a) (i) Which organ in the body monitors the concentration of glucose (sugar) in the blood?

.....

(1 mark)

3 (a) (ii) In a healthy person, insulin prevents high levels of glucose in the blood.

How does it do this?

.....

.....

(1 mark)

3 (b) There are two forms of diabetes.

In type 1 diabetes, the body produces little or no insulin.
In type 2 diabetes, the body cells do not respond to insulin.

There are two ways in which diabetes can be treated.

Draw lines to join the type of diabetes to the way or ways in which it can be treated.

Type of diabetes	**Treatment**
	Careful attention to diet only
Type 1	
	Careful attention to diet **and** injection of insulin
Type 2	
	Injection of insulin only

(2 marks)

Areas outside the box will not be scanned for marking

3 (c) To make insulin, cells in the pancreas need amino acids.
A *small section of DNA* in the pancreas cells is involved in making insulin from the amino acids.

3 (c) (i) Insulin is a hormone.

What type of substance is insulin?

Draw a ring around **one** answer.

carbohydrate **lipid** **protein**

(1 mark)

3 (c) (ii) What term is used to describe the *small section of DNA* which controls the production of insulin?

.....

(1 mark)

3 (c) (iii) Amino acids cannot be stored in the body.

Describe, as fully as you can, what happens to the excess amino acids.

You may wish to use the following words in your explanation:

liver **kidneys** **bladder**

.....

.....

.....

.....

.....

.....

.....

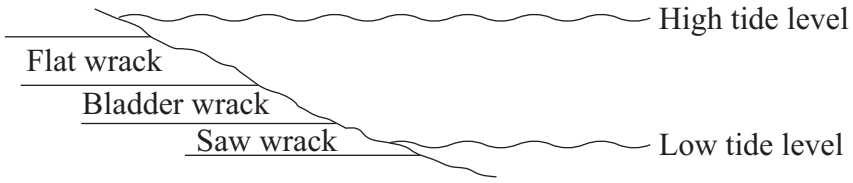
.....

(3 marks)

9

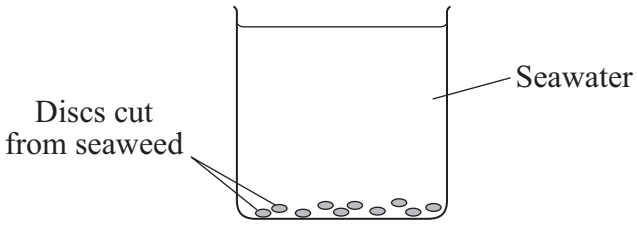
Areas outside the box will not be scanned for marking

4 The diagram shows where three seaweeds live on a seashore.
As the tide moves in and out, these seaweeds are covered with seawater for different lengths of time.



Some students investigated the rate of photosynthesis in these seaweeds.

- They cut ten small discs from one seaweed.
- They dropped the discs into seawater in a beaker.
- They recorded the time taken for the fifth disc to float to the surface.
- They repeated this experiment with the other two seaweeds.



4 (a) (i) Suggest why the discs floated to the surface.

.....

.....

(1 mark)

4 (a) (ii) Suggest the advantage of recording the time taken for the fifth disc to reach the surface, rather than for the tenth disc.

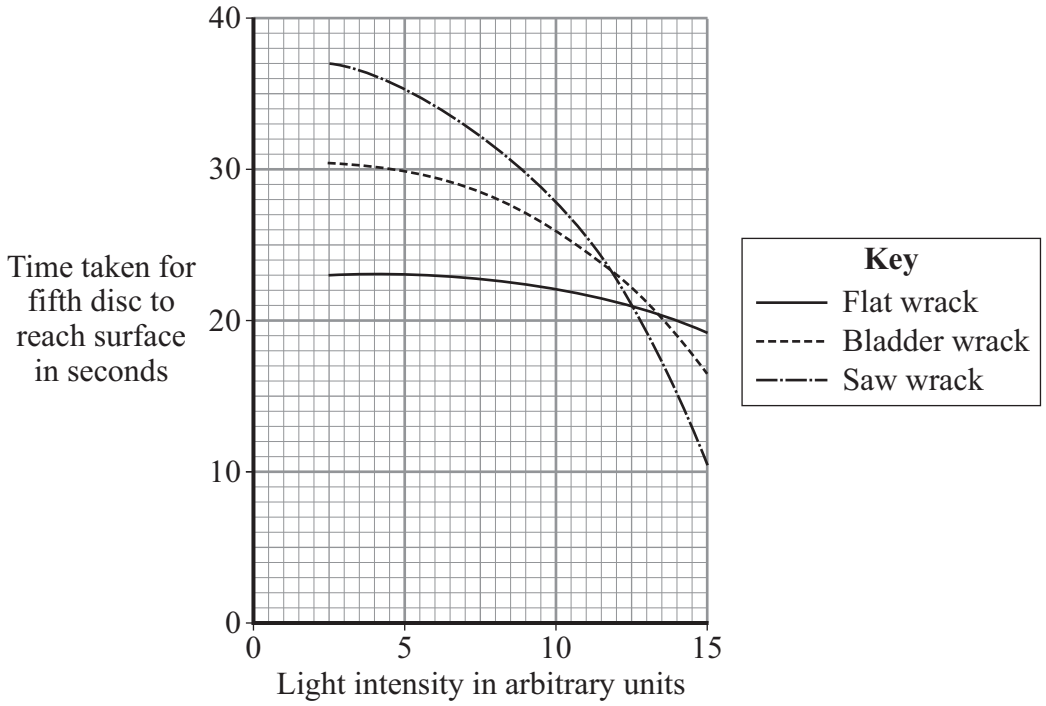
.....

.....

(1 mark)

Areas outside the box will not be scanned for marking

4 (b) The students carried out their experiments at different light intensities.
The graph shows the results they collected.



4 (b) (i) Compare the rate of photosynthesis for flat wrack with the rate for saw wrack at different light intensities.

.....

.....

.....

.....

(2 marks)

4 (b) (ii) Seawater absorbs light.

The growth rate of saw wrack is less than the growth rate of bladder wrack.

Suggest why.

.....

.....

.....

.....

(2 marks)

6

Turn over ▶

Areas outside the box will not be scanned for marking

5 (a) Mr and Mrs Smith both have a history of cystic fibrosis in their families.
Neither of them has cystic fibrosis.
Mr and Mrs Smith are concerned that they may have a child with cystic fibrosis.

Use a genetic diagram to show how they could have a child with cystic fibrosis.

Use the symbol **A** for the dominant allele and the symbol **a** for the recessive allele.

(3 marks)

Areas outside the box will not be scanned for marking

5 (b) Mr and Mrs Smith decided to visit a genetic counsellor who discusses embryo screening.

Read the information which they received from the counsellor.

- Under an anaesthetic five eggs will be removed from Mrs Smith's ovary.
- The eggs will be fertilised in a dish using Mr Smith's sperm cells.
- The embryos will be grown in the dish until each embryo has about thirty cells.
- One cell will be removed from each embryo and tested for cystic fibrosis.
- A suitable embryo will be placed into Mrs. Smith's uterus and she may become pregnant.
- Any unsuitable embryos will be killed.

5 (b) (i) Suggest why it is helpful to take five eggs from the ovary, rather than just one.

.....

.....

(1 mark)

5 (b) (ii) Evaluate the use of embryo screening in this case.

Remember to give a conclusion as part of your evaluation.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

8

Turn over ▶

Areas outside the box will not be scanned for marking

6 Starch is broken down into sugar by amylase. Amylase is produced in the salivary glands.

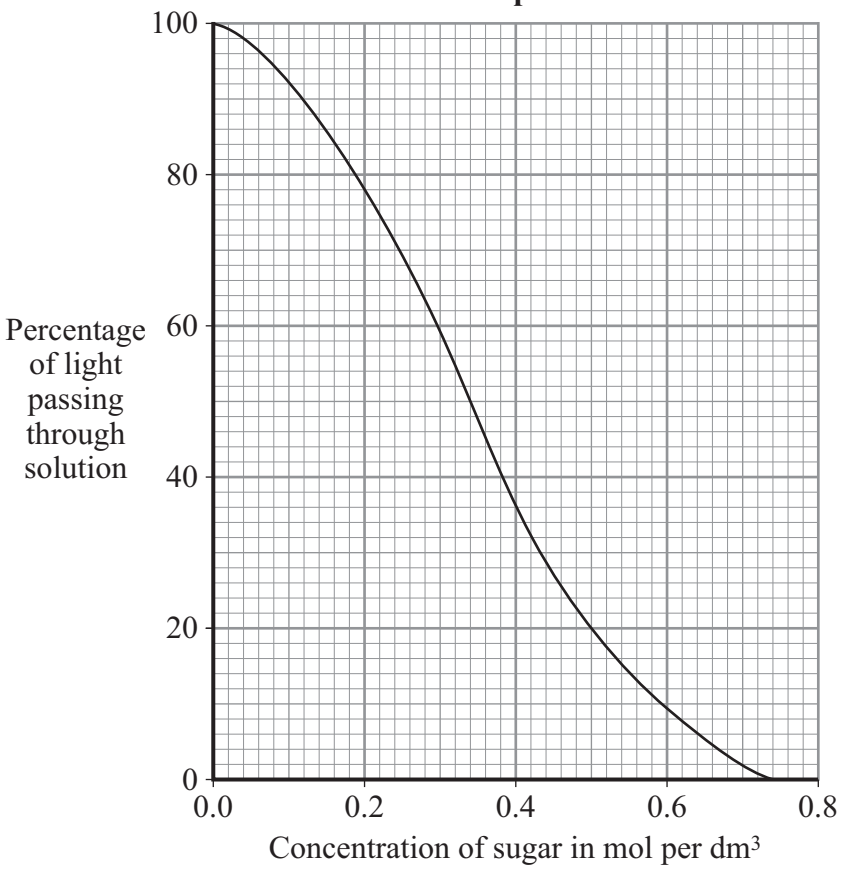
6 (a) Name **two** other organs in the digestive system which produce amylase.

.....and .....

(2 marks)

6 (b) A colorimeter measures colour intensity by measuring the percentage of light that passes through a solution.
Graph 1 shows the percentage of light passing through sugar solutions of different concentrations to which a test reagent has been added.

Graph 1



Students used a colorimeter to compare the starch-digesting ability of amylase enzymes obtained from two organs, **P** and **Q**.

- The students collected 5 cm^3 samples of amylase from **P** and **Q** and placed them into a water-bath at 40 ºC.
- Two test tubes containing 10 cm^3 samples of starch solution were also placed into the water-bath.
- All the tubes were left in the water-bath for 10 minutes.
- Each amylase sample was added to one of the tubes containing the starch solution.
- The test tubes were placed back into the water-bath.
- Every minute, a few drops were taken from each tube, the test reagent was added and the percentage of light passing through this solution was measured in the colorimeter.

Areas outside the box will not be scanned for marking

The tubes containing amylase samples and starch solution were left in the water-bath for ten minutes before the amylase was added to the starch.

Explain why.

.....

.....

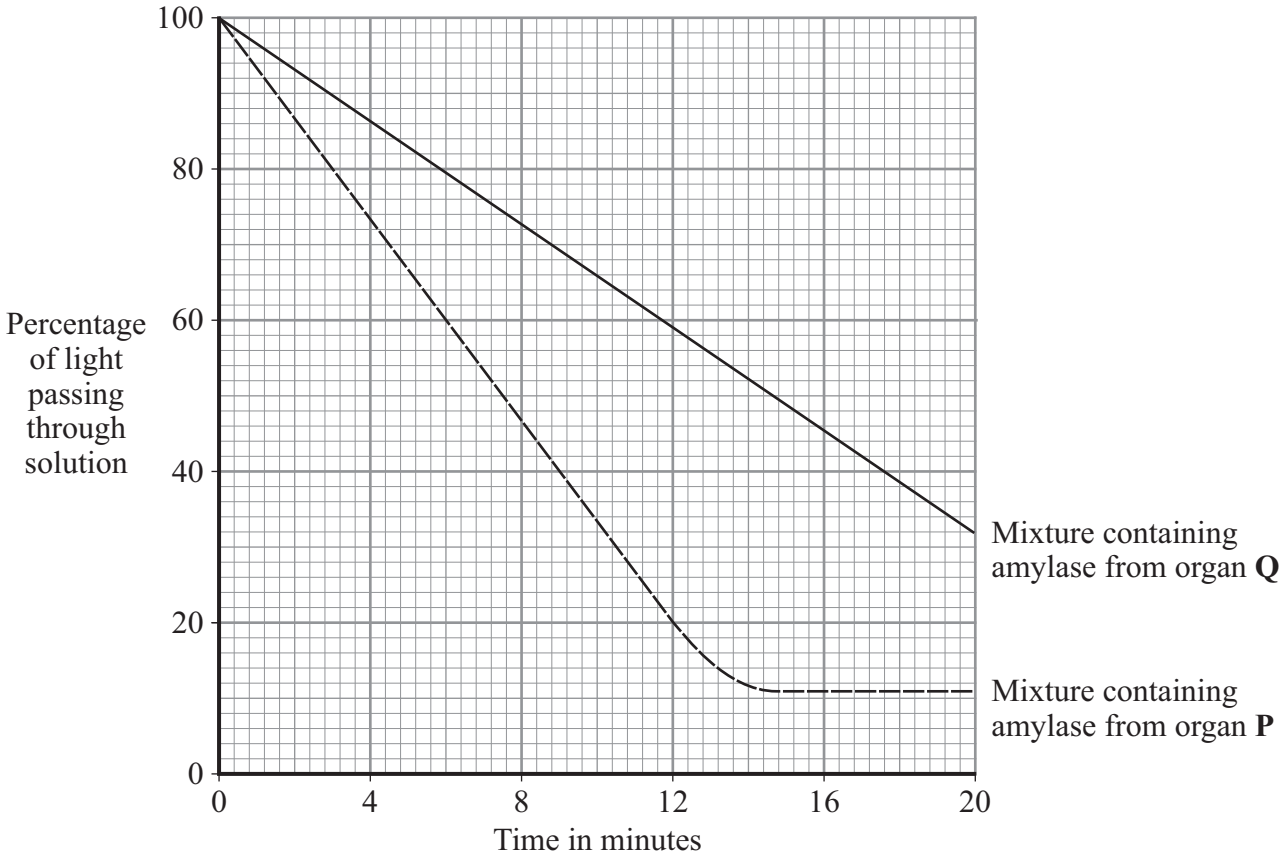
.....

.....

(2 marks)

6 (c) **Graph 2** shows how the readings from the colorimeter changed over the next 20 minutes.

Graph 2



6 (c) (i) Use **Graph 1** and **Graph 2** to determine the concentration of sugar in the mixture from organ **Q** after 20 minutes.

.....

Answer ..... mol per dm^3

(1 mark)

Question 6 continues on the next page

Turn over ▶

Areas outside the box will not be scanned for marking

6 (c) (ii) Use your answer to 6(c)(i) to calculate the rate at which sugar was produced in the mixture containing amylase from organ **Q**.

Show clearly how you work out your answer.

.....

.....

.....

Answer.....mol per dm^3 per minute

(2 marks)

6 (c) (iii) Suggest why the amount of light passing through the mixture from organ **P** did not change after 16 minutes.

.....

.....

.....

(1 mark)

6 (c) (iv) One of the students suggested that they could have completed their experiment more quickly if the temperature of the water-bath had been set at 80 ºC.

This would **not** have been the case.

Explain why.

.....

.....

.....

.....

.....

(2 marks)

10

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2010 AQA and its licensors. All rights reserved.

Version : 09/03/2010

General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Mark Scheme

2010 examination – January Series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2010 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General

STEMUP.CO.UK

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

BLY2H

Question 1

question	answers	extra information	mark
1(a)	three layer triangular pyramid soya / beans / food – trout / fish – people / human (in sequence)	either way up (as blocks or triangle) ignore reference to producers / herbivores / consumers award **1** mark only for a correct food chain with 2 correct arrows showing energy flow	1 1
1(b)	The trout release energy when they respire Some energy will be lost in waste from the trout		1 1
1(c)	any **one** from eg • easy / easier to catch / more caught • easy / easier to feed • no / less predation • less energy loss • less movement	 allow easy / easier to monitor allow control food allow less fishing / poaching allow grow faster ignore less space to move do **not** allow easier to farm	1
1(d)	any **two** from: • microorganisms / bacteria / decomposers / microbes / fungi / detritus feeders • decay / rot / decompose / digest / break down • (microorganisms) respire • turned into fossil fuels / named fossil fuels • carbon dioxide / CO_2 released	 ignore biodegrade do **not** award this mark if response implies the trout respire	2
Total			**7**

STEMUP.CO.UK

BLY2H

Question 2

question	answers	extra information	mark
2(a)	5		1
2(b)	any **one** from: • more light • warm(er) / hot • more water / lot of rain	allow in either section allow more sun / sunnier	1
	increased / more photosynthesis	allow in either section allow more biomass / carbohydrate / named (made) do **not** allow food allow enzymes / metabolism faster **NB** for **2** marks this must be linked to heat to gain **2** marks more / increased must be mentioned at least once	1
2(c)	less pollution / named pollutant eg carbon dioxide / 'fumes' / emissions	allow examples of effect of less pollution eg less global warming / less acid rain allow any relevant environmental effect eg imported diseases	1
	less fuel used / less transport / named transport	ignore 'less distance' / importing allow 'less distance <u>travelled</u>' /' less travel' allow smaller carbon footprint once only for <u>either</u> mark	1
Total			**5**

STEMUP.CO.UK

BLY2H

Question 3

question	answers	extra information	mark
3(a)(i)	pancreas	allow phonetic spelling	1
3(a)(ii)	(increases movement of) glucose into cells / organs / named	allow (glucose*)* converted to glycogen / fat allow (glucose*)* used in (increased) respiration do **not** allow hybrid spellings of glycogen	1
3(b)	**Type of diabetes** / **Treatment** Type 1 → Careful attention to diet only Type 1 → Careful attention to diet **and** injection of insulin Type 2 → Careful attention to diet **and** injection of insulin Type 2 → Injection of insulin only	**1** mark per correct line extra line from a type of diabetes cancels the mark	2
3(c)(i)	protein		1
3(c)(ii)	gene / allele		1

Question 3 continues on the next page

STEMUP.CO.UK

BLY2H

Question 3 continued

question	answers	extra information	mark
3(c)(iii)	any **three** from: • (amino acids) broken down / converted • (amino acids) form / into urea • (break down / convert / urea formed) in liver • (urea / broken down amino acids) removed / filtered by kidney • (urea / broken down amino acids) in urine • (urine / urea / broken down amino acids) stored / held in bladder	max **2** if any one process goes on in the wrong organ	3
Total			**9**

STEMUP.CO.UK

BLY2H

Question 4

question	answers	extra information	mark
4(a)(i)	oxygen produced		1
4(a)(ii)	any **one** from: • average / mean / median • some may be anomalous	ignore reliable / precise / accurate allow some may not float	1
4(b)(i)	any **two** from: • low intensity / below 12.5 / 2.5 – 12.5 *(*units of light*)* flat wrack / it, rate of photosynthesis faster **or** saw wrack rate of photosynthesis slower • high intensity / above 12.5 / 12.5 – 15 (units of light) flat wrack / it, rate of photosynthesis slower **or** saw wrack rate of photosynthesis faster • same (rate) at 12.5 units	do **not** allow answers in terms of time only if candidate answers in terms of comparing rate of change then the rate of change of photosynthesis must be in the correct direction for **1** mark allow any value in range allow any value in range	2

Question 4 continues on the next page

STEMUP.CO.UK

BLY2H

Question 4 continued

question	answers	extra information	mark
4(b)(ii)	any **two** from: • saw wrack receives less light • less photosynthesis **or** less carbohydrate / sugar / starch production • when tide is in **or** at high tide **or** any tide above low tide	 accept converse if clear reference to bladder wrack if first and second responses, 'less' needed only once accept saw wrack covered by water / submerged longer / more reference to position on shore is insufficient	2
Total			**6**

STEMUP.CO.UK

BLY2H

Question 5

question	answers	extra information	mark
5(a)	both parents **Aa**	accept other upper and lower case letters without key **or** symbols with a key allow shown as gametes in punnet square	1
	aa in offspring correctly derived from parents / **aa** correctly derived from the parents given	ignore other offspring / gametes for this mark parents do not have to be correct	1
	offspring **aa** identified as having cystic fibrosis	may be the only offspring shown **or** circled / highlighted / described	1
5(b)(i)	any **one** from: • sure / greater chance of healthy / non-cystic fibrosis egg / embryo / child • greater chance of fertilisation	accept converse if clear eg if you (only) took one it might have cystic fibrosis / might not be fertilised accept some may have the allele reference to suitable embryo is insufficient	1

Question 5 continues on the next page

STEMUP.CO.UK

BLY2H

Question 5 continued

question	answers	extra information	mark
5(b)(ii)	**advantages** any **two** from • greater / certain chance of having child / embryo without cystic fibrosis / healthy • child with cystic fibrosis difficult / expensive to bring up • cystic fibrosis (gene / allele) not passed on through generations **disadvantages** any **two** from: • operation dangers eg infection • ethical or religious issues linked to killing embryos • (high) cost • possible damage to embryo (during testing for cystic fibrosis / during operation) **plus** **conclusion** a statement that implies a valued, qualified judgement eg it is right because the risk of infection is small **or** eg it is wrong because embryos are killed	**to gain 3 marks both advantages and disadvantages must be given** ignore references to abortion unless qualified by later screening ignore risk unqualified accept wrong / cruel to kill embryos accept right to life **Note:** the conclusion mark cannot be given unless a reasonable attempt to give both an advantage and a disadvantage has (already) been made do **not** award the mark if the conclusion only states that advantages outweigh disadvantages	max 3 1
Total			**8**

STEMUP.CO.UK

BLY2H

Question 6

question	answers	extra information	mark
6(a)	pancreas <u>small</u> intestine	either order	1 1
6(b)	any **two** from: • to give them time to come to temperature of the water-bath • at / near body temperature / best / optimum temperature • otherwise reaction would take place at a series of different temperatures **or** sensible statement about control / fair test	accept so (they / both) are at the same temperature	2
6(c)(i)	0.42	allow in range 0.42 to 0.425	1
6(c)(ii)	0.021	correct answer with or without working allow ecf from 6(c)(i) ie 6(c)(i) ÷ 20 correctly calculated for **2** marks if answer incorrect 0.42 ÷ 20 **or** (c)(i) ÷ 20 gains **1** mark	2
6(c)(iii)	(all) starch digested / gone / used up / turned to sugar	allow the amount of sugar stays the same / maximum	1
6(c)(iv)	any **two** from • enzyme destroyed / denatured / damaged / shape changed • unable to fit (starch molecule) • starch can't be digested	allow reference to active site once only as alternative to first or second bullet point do **not** accept killed enzymes don't work is insufficient	2
Total			**10**

STEMUP.CO.UK

Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Secondary Education
June 2009

ADDITIONAL SCIENCE
Unit Biology B2

BLY2H

H

BIOLOGY
Unit Biology B2

Higher Tier

Wednesday 20 May 2009 1.30 pm to 2.15 pm

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed: 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

For Examiner's Use			
Question	Mark	Question	Mark
1		3	
2		4	
		5	
		6	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

STEMUP.CO.UK

Areas outside the box will not be scanned for marking

Answer **all** questions in the spaces provided.

1 (a) (i) Complete the word equation for photosynthesis.

carbon dioxide + ... (+ light energy) → glucose + ...

(2 marks)

1 (a) (ii) Most of the carbon dioxide that a plant uses during photosynthesis is absorbed from the air.

Give **one** other source of carbon dioxide for a plant.

Draw a ring around your answer.

the soil **respiration in the plant** **osmosis in the plant** **water**

(1 mark)

A student investigated the conditions that plants need for photosynthesis.
The leaves of the plant he used had green and white parts.

Diagram 1 shows how part of one leaf was covered in black (opaque) card.
The plant was placed in a warm, sunny area and was watered well.
Eight hours later the leaf was removed from the plant and was tested for starch.

The results of the test are shown in **Diagram 2**, the shaded parts show where starch was present.

Diagram 1

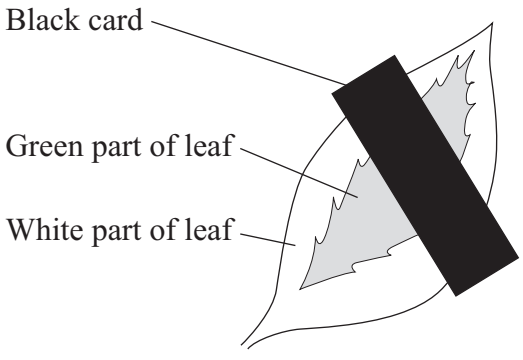
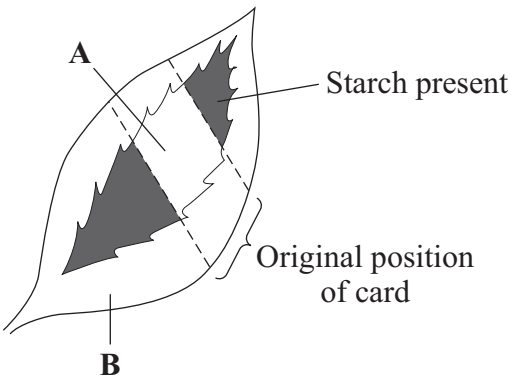


Diagram 2



Areas outside the box will not be scanned for marking

1 (b) Name the **two** independent variables in this investigation.

1 .....

.....

2 .....

.....

(2 marks)

1 (c) Why was no starch found in:

1 (c) (i) the part of the leaf labelled **A**

.....

.....

(1 mark)

1 (c) (ii) the part of the leaf labelled **B**?

.....

.....

(1 mark)

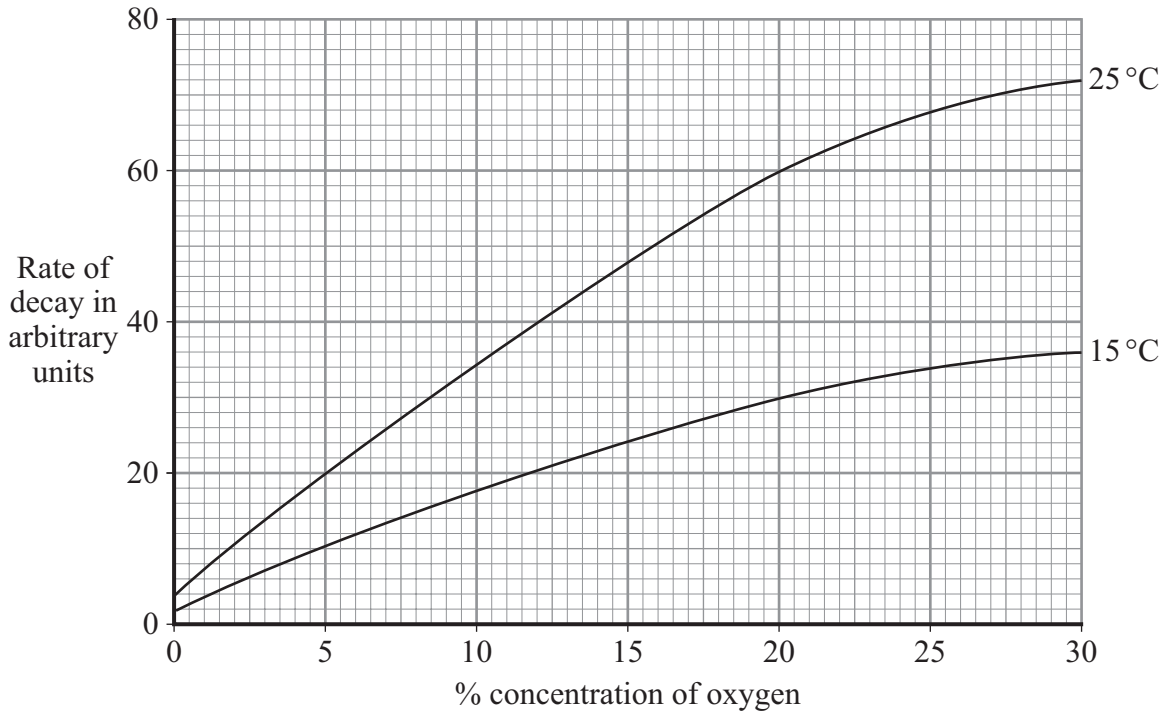
7

Turn over for the next question

Areas outside the box will not be scanned for marking

2 Gardeners often put waste materials onto compost heaps.

The graph shows how the conditions in a compost heap affect how quickly waste materials in the heap decay.



2 (a) (i) Describe the effect of increasing the temperature from 15 °C to 25 °C on the rate of decay at 20 % oxygen concentration.

.....

.....

.....

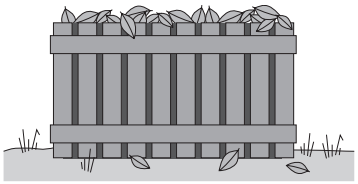
.....

.....

(2 marks)

Areas outside the box will not be scanned for marking

2 (a) (ii) Gardeners are advised to put waste materials into special compost bins.
These bins have holes in their sides.



Holes in the sides of the compost bin help the waste materials to decay faster.

Explain why.

.....

.....

.....

.....

.....

(2 marks)

2 (b) A gardener noticed that some of his plants were growing poorly.

He put some decayed compost onto the soil, around the plants.
Six months later the plants were growing well.

Explain why.

.....

.....

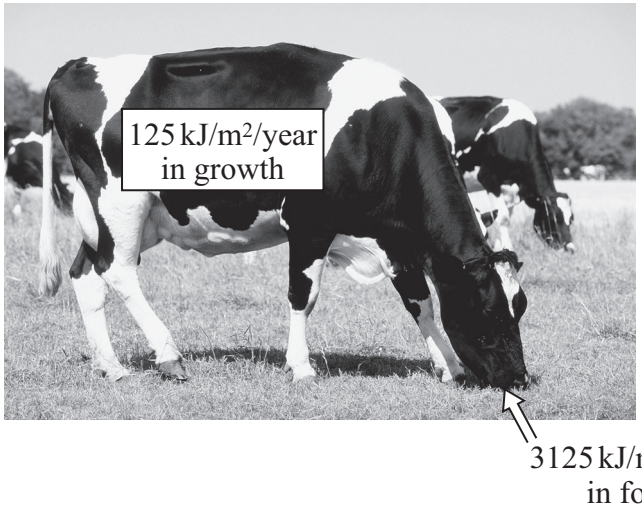
(1 mark)

5

Turn over for the next question

Areas outside the box will not be scanned for marking

3 The photograph shows what happens to some of the energy in the food that a cow eats.



3 (a) Calculate the percentage of the energy in the cow's food that is transferred into new growth.

Show clearly how you work out your answer.

.....

.....

Answer = ...%

(2 marks)

3 (b) The energy from the cow's food which is not transferred into new growth is lost.

Give **three** ways in which this energy is lost.

1.....

.....

2.....

.....

3.....

.....

(3 marks)

Areas outside the box will not be scanned for marking

3 (c) The animals that we raise for food are usually herbivores (plant eaters) rather than carnivores (flesh eaters).

Explain why.

.....

.....

.....

.....

.....

(2 marks)

7

Turn over for the next question

Areas outside the box will not be scanned for marking

4 A manufacturer is trying to improve the quality of the biological detergent he produces.

Scientists at his company carried out the following experiments on enzymes:

- Samples of lipase were collected from five different types of bacterium, **A**, **B**, **C**, **D** and **E**.
- The samples were diluted to give the same concentration of lipase.
- Agar jelly containing a lipid was prepared in a dish. This forms a cloudy mixture which becomes clear when the lipid is digested.
- Five small holes were cut into the agar.
- Two drops of lipase solution from bacterium **A** was added to hole **A**.
- This process was repeated for each sample of lipase.

Diagram 1 shows the appearance of the dish.

Diagram 1

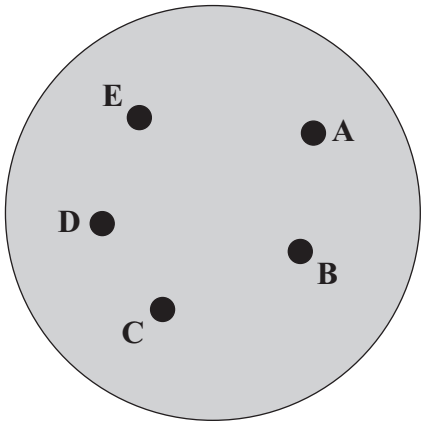
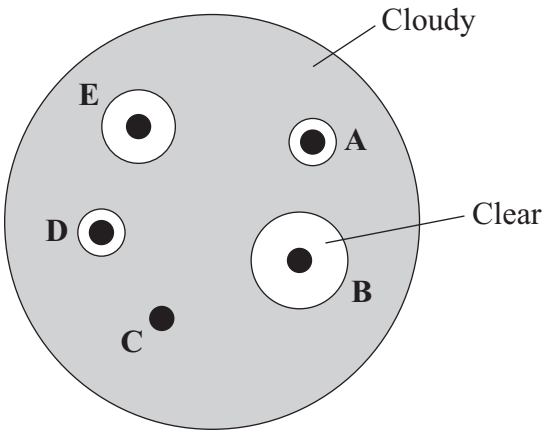


Diagram 2 shows the appearance of the dish 24 hours later.

Diagram 2



Areas outside the box will not be scanned for marking

4 (a) (i) Which type of bacterium, **A**, **B**, **C**, **D** or **E**, produced the most effective lipase in this investigation?

Write your answer, **A**, **B**, **C, D** or **E**, in the box.

(1 mark)

4 (a) (ii) Explain your answer.

.....

.....

(1 mark)

4 (b) The manufacturer plans to add the most effective lipase to the washing powders he produces.

Suggest **two** other factors he should investigate before deciding which lipase is the most effective.

1.....

.....

2.....

.....

(2 marks)

4 (c) Many biological detergents cannot be used at high temperatures.

Explain why.

.....

.....

(1 mark)

5

Turn over for the next question

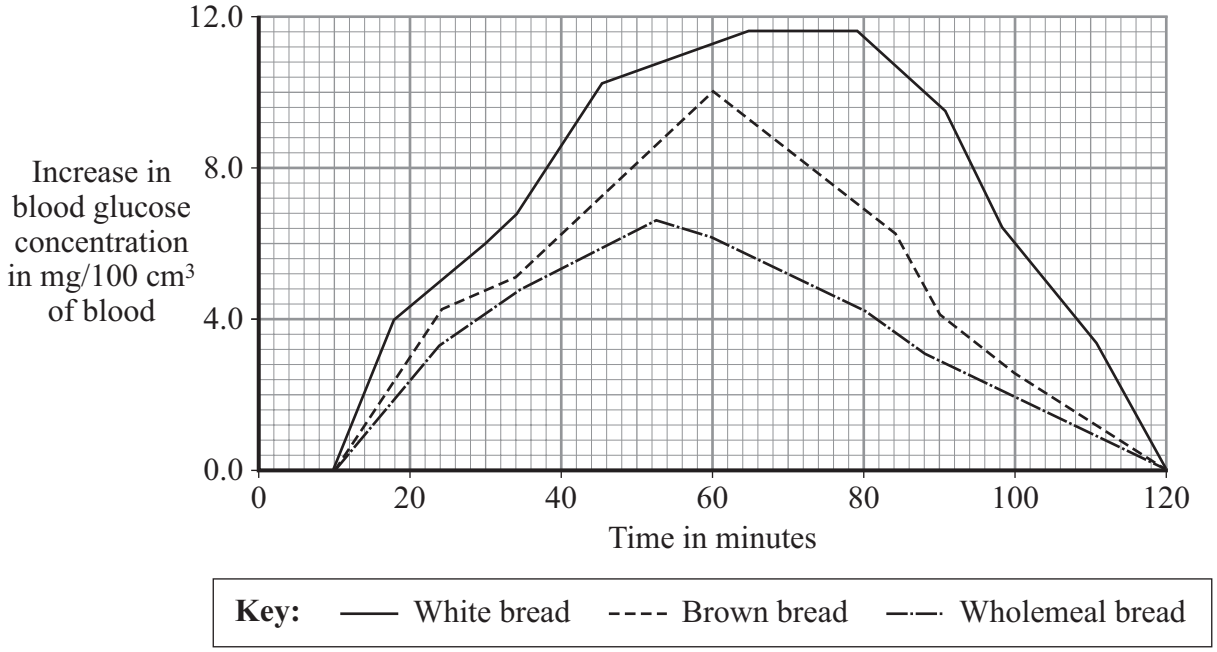
Areas outside the box will not be scanned for marking

5 Insulin controls blood glucose concentration.

5 (a) The rate at which blood glucose concentration changes is affected by the food eaten.

In an experiment a person who does not have diabetes ate two slices of white bread. The change in her blood glucose concentration was recorded over the next 120 minutes.
The experiment was repeated; first with two slices of brown bread and then with two slices of wholemeal bread.

The graph shows the results of the three experiments.



5 (a) (i) Which type of bread would be most suitable for a person with diabetes?

Type of bread.....

Give **two** reasons for your answer.

1 .....

.....

2 .....

.....

(2 marks)

Areas outside the box will not be scanned for marking

5 (a) (ii) Explain, as fully as you can, the reasons for the changes in blood glucose concentration when the person ate the brown bread.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

5 (b) *Pancreatic-cell transplantation* is a new treatment for diabetes. Insulin-making cells are taken from up to three dead donors. The cells are kept alive before being injected into the diabetic in a small operation. The cells soon begin to make insulin.

In one recent study 58% of recipients of pancreatic-cell transplants no longer needed insulin injections.

Give the advantages and disadvantages of the new treatment for diabetes compared with using insulin injections.

.....

.....

.....

.....

.....

.....

.....

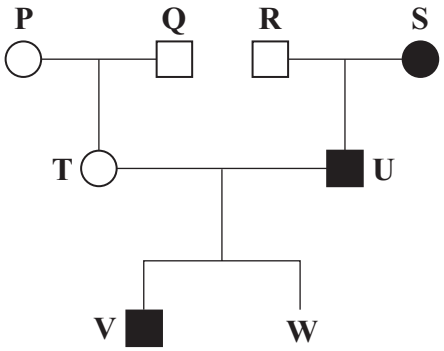
(3 marks)

9

Areas outside the box will not be scanned for marking

6 Huntington's disease is a disorder of the nervous system. It is caused by a dominant allele.

The family tree shows the inheritance of Huntington's disease in one family.



Key

- Male with Huntington's disease
- Unaffected male
- Female with Huntington's disease
- Unaffected female

6 (a) **T** and **U** already have a son, **V**, with Huntington's disease. What is the chance that their next child, **W**, will also develop Huntington's disease?

Use a genetic diagram in your answer.

Use the symbols **H** to represent the dominant allele and **h** to represent the recessive allele.

Chance that child **W** will have Huntington's disease = ...

(4 marks)

Areas outside the box will not be scanned for marking

6 (b) A doctor advises parents **T** and **U** that embryo **W** should be 'screened'.

6 (b) (i) What is embryo screening?

.....

.....

.....

(1 mark)

6 (b) (ii) Some people do not believe that embryos should be screened.

Give **one** reason why.

.....

.....

.....

(1 mark)

6 (c) Cystic fibrosis is an inherited disorder in which the person's mucus becomes thick.

6 (c) (i) For this gene, one allele in every 30 in the population is the cystic fibrosis allele. However, only one person in every 900 has cystic fibrosis.

Explain why.

.....

.....

.....

.....

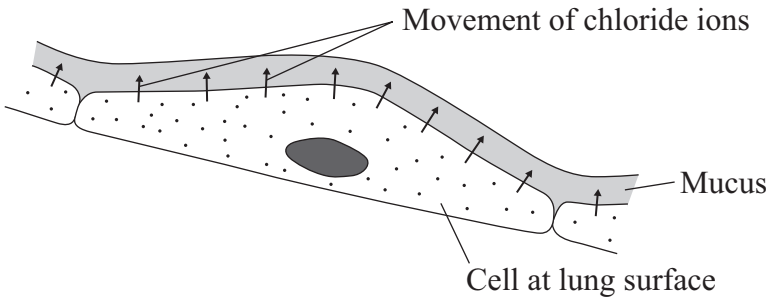
.....

(2 marks)

Question 6 continues on the next page

Areas outside the box will not be scanned for marking

6 (c) (ii) The diagram shows how, in a healthy person, cells at the lung surface move chloride ions into the mucus surrounding the air passages.



This movement of chloride ions causes water to pass out of the cells into the mucus.

Explain why.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

6 (c) (iii) Mucus contains protein.

Which parts of the lung cells manufacture the protein in mucus?

.....

(1 mark)

12

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Question 3 Cows Grazing © Goodshoot/Corbis

Copyright © 2009 AQA and its licensors. All rights reserved.

Version 1.0: 21.07

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit 2 Biology

Mark Scheme

2009 examination – June series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2009 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

BLY2H

Question 1

question	answers	extra information	mark
1(a)(i)		answers must be in this order	
	water / H_2O	allow hydrogen oxide	1
	oxygen / O_2 / O	allow upper and lower case symbols and superscripts	1
1(a)(ii)	respiration in the plant	allow clear indication of correct response	1
1(b)	light (: no light) / light intensity	ignore references to the card / covered / uncovered	1
	chlorophyll (: no chlorophyll) / chloroplast	allow leaf colour **or** both green **and** white given	1
1(c)(i)	no light (received) **or** it's dark	allow no photosynthesis do **not** allow little light / photosynthesis ignore sun apply list principle for other factors	1
1(c)(ii)	no chlorophyll / chloroplasts (present)	allow no / little photosynthesis allow white **or** not green **or** little chlorophyll / few chloroplasts apply list principle for other factors	1
Total			**7**

STEMUP.CO.UK

BLY2H

Question 2

question	answers	extra information	mark
2(a)(i)	increase / higher / faster / quicker numerical comparison eg from 30 to 60 / by 30 **or** it is 30 at 15°C and 60 at 25°C	 award **2** marks for doubles / goes twice as fast or 30 units <u>more</u>	1 1
2(a)(ii)	any **two** from: • oxygen / air (in) • for microorganisms / bacteria / microbes / fungi / decomposers • (for aerobic) respiration • let heat out • heat kills microorganisms	 do **not** accept lets oxygen / air out ignore reference to other substances / light passing in or out ignore microorganisms passing in ignore worms / germs / bugs ignore heat in	2
2(b)	compost contains minerals / nutrients / elements / ions / named	allow improve moisture / drainage allow nitrogen ignore CO_2 / food / goodness / fertilisers do **not** accept vitamins / glucose etc	1
Total			**5**

STEMUP.CO.UK

BLY2H

Question 3

question	answers	extra information	mark
3(a)	4	award **both** marks for correct answer, irrespective of working. allow 125/3125 (× 100) **or** 0.04 for **1** mark	2
3(b)	any **three** from: • excreted / urine / urea • not digested / faeces • methane • respiration • movement / named internal / external movement • heat / temperature control / sweating	} if neither of these marks is awarded then waste gains **1** mark do **not** allow **for** respiration allow sound allow milk production allow active transport	3
3(c)	any **two** from: • no / less biomass / energy lost (by intermediate) **or** examples of losses • shorter food chain • cheap(er) to feed herbivores	herbivores contain more energy is insufficient ignore reference to carnivores being dangerous	2
Total			**7**

STEMUP.CO.UK

BLY2H

Question 4

question	answers	extra information	mark
4(a)(i)	B		1
4(a)(ii)	any **one** from: • largest area of / most digestion (of lipid) • largest clear area	allow agar / jelly / mixture broken down / digested do **not** allow digestion of bacteria / lipase ignore digestion **by** bacteria	1
4(b)	any **two** from: • effect of pH / pH described • effect of temperature • effect on different types of lipid / fat • cost **or** allergic reactions **or** effect on skin / fabrics / **or** environment **or** interaction with other chemicals in powder **or** shelf life		2
4(c)	enzymes / named enzyme denatured / destroyed	allow active site(of enzyme) altered	1
Total			**5**

STEMUP.CO.UK

BLY2H

Question 5

question	answers	extra information	mark
5(a)(i)	(wholemeal bread) any **two** from: lower maximum / peak / less change slower rise / change need to take less insulin / less likely to hyper	no mark for identifying the type of bread but max **1** mark if not identified ignore references to rate of fall **or** first to peak	 1 1
5(a)(ii)	any **four** from: • amylase / carbohydrase • starch to sugar • (sugar) absorbed / diffused / passes into blood • correct reference to pancreas • insulin produced • glucose (from blood) into cells / tissue / organ **or** named tissue / organ • glucose used in respiration / for energy	max 3 for explaining rise max 3 for explaining fall allow starch to glucose allow once only as rise or fall allow glucose to glycogen	4

Question 5 continues on the next page…

STEMUP.CO.UK

BLY2H

Question 5 Continued

question	answers	extra information	mark
5(b)	any **three** from: advantages (compared to insulin injections): • (may be) permanent / cure • no / less need for self monitoring • no / less need for insulin / injections • no / less need for dietary control disadvantages (compared to insulin injections): • low success rate • (may) still need insulin / dietary control • operation hazards • risk of infection from donor • rejection / need for drugs to prevent rejection	max **2** if only advantages **or** only disadvantages discussed can give converse if clear that it relates to insulin injections ignore reference to cost	3
Total			**9**

STEMUP.CO.UK

BLY2H

Question 6

question	answers	extra information	mark
6(a)	(genotype / gametes from **T** / mother) h and h (accept h) (genotype / gametes from **U** / father) H and h offspring genotypes: correctly derived from correct gametes chance = 50% / ½ / 0 .5 / 1 : 1 / 1 out of 2	eg may be in punnett square allow own upper and lower case symbols or allow any symbol correctly used with key do **not** accept 1 : 2 allow irrespective of working	1 1 1 1
6(b)(i)	(cells from) embryo tested for particular allele / gene / (named) genetic condition / the disease / gender	ignore x-rays / ultra sound	1
6(b)(ii)	any **one** from: • possible harm to embryo **or** mother • sensible reference to abortion • hard to make moral / ethical decisions	ignore moral / ethical unqualified ignore not natural / playing God references to other ideas eg designer babies must be well argued	1
6(c)(i)	(cystic fibrosis is) recessive (allele / gene) need two alleles / genes **or** need one allele / gene from each parent **or** both parents must have cystic fibrosis allele / gene	allow not dominant	1 1

Question 6 continues on the next page…

STEMUP.CO.UK

BLY2H

Question 6 Continued

question	answers	extra information	mark
6(c)(ii)	any **three** from: • osmosis / diffusion • more concentrated solution outside cells / in mucus • water moves from dilute to more concentrated solution • partially permeable membrane (of cell)	do **not** accept reference to movement of ions / solution by osmosis / diffusion assume concentration is concentration of solute unless they tell us otherwise allow correct references to movement of water in relation to concentration gradient	3
6(c)(iii)	ribosomes		1
Total			**12**

STEMUP.CO.UK

Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Secondary Education
January 2009

ADDITIONAL SCIENCE
Unit Biology B2

BLY2H

H

BIOLOGY
Unit Biology B2

Higher Tier

Monday 12 January 2009 9.00 am to 9.45 am

For this paper you must have:
- a pencil and a ruler.

You may use a calculator.

Time allowed: 45 minutes

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

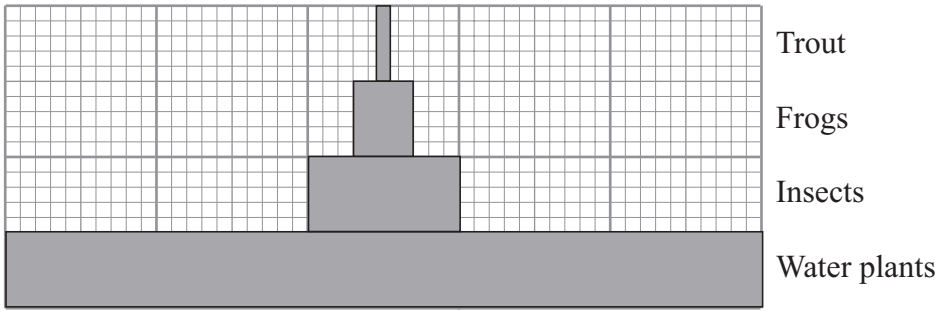
For Examiner's Use			
Question	Mark	Question	Mark
1		3	
2		4	
		5	
		6	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

STEMUP.CO.UK

Areas outside the box will not be scanned for marking

Answer **all** questions in the spaces provided.

1 The diagram shows a pyramid of biomass drawn to scale.



1 (a) What is the source of energy for the water plants?

.....

(1 mark)

1 (b) The ratio of the biomass of water plants to the biomass of insects is 5 : 1.

Calculate the ratio of the biomass of insects to the biomass of frogs.

Show clearly how you work out your answer.

.....

.....

ratio = ... : 1

(2 marks)

1 (c) Give **two** reasons why the biomass of the frog population is smaller than the biomass of the insect population.

1 .....

.....

2 .....

.....

(2 marks)

Areas outside the box will not be scanned for marking

1 (d) Some insects die.

Describe how the carbon in the dead insect bodies may be recycled.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

9

Turn over for the next question

Areas outside the box will not be scanned for marking

2 Diabetes is a disease in which a person's blood glucose concentration rises to higher levels than normal.
Diabetes is caused by insufficient insulin being produced.

2 (a) (i) Which organ monitors blood glucose concentration?

.....

(1 mark)

2 (a) (ii) Insulin reduces the concentration of glucose in the blood.

Describe how insulin does this.

.....

.....

(1 mark)

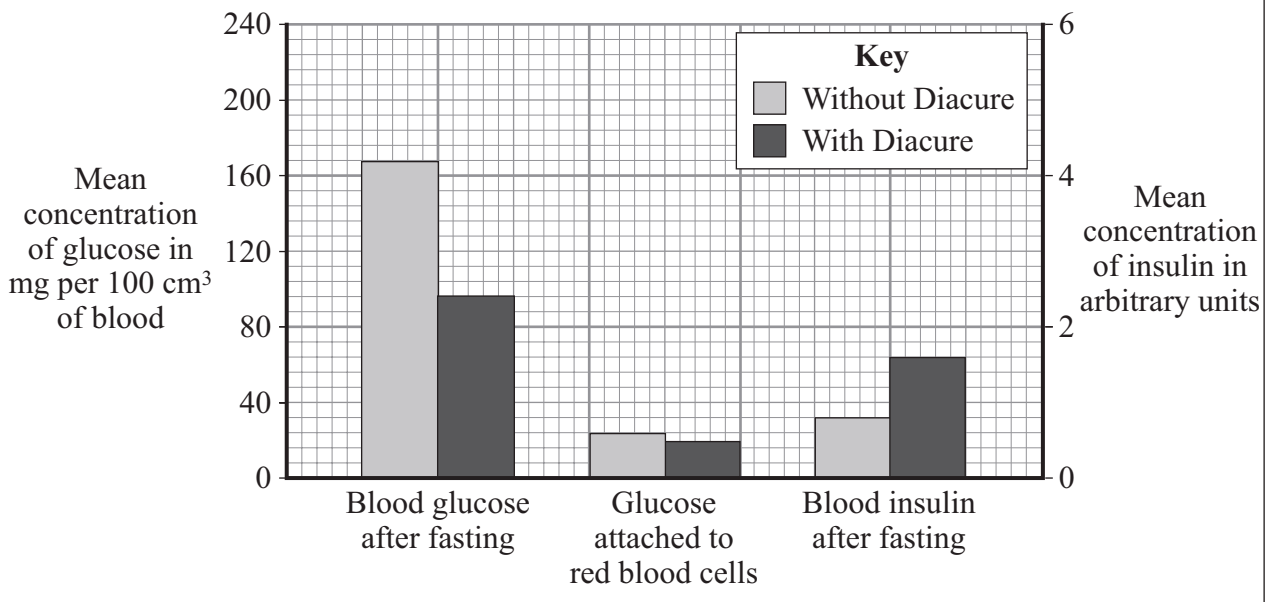
2 (b) A person with diabetes can be monitored in three ways:

- measuring the blood glucose concentration after fasting (going without food for 12 hours)
- measuring the amount of glucose attached to red blood cells: this is a measure of the average blood glucose concentration over the previous three months
- measuring the concentration of insulin in the blood after fasting

The manufacturer of a new treatment for diabetes, called Diacure, publishes the following two claims.

1. 98.6% of all people who used Diacure reported an improvement in their condition.

2. An independent study of 30 diabetic patients showed a significant reduction in blood glucose concentrations and a significant increase in insulin production, as shown by the graph.



Areas outside the box will not be scanned for marking

2 (b) (i) Which of the manufacturer's claims is **not** based on scientific evidence?

.....

.....

(1 mark)

2 (b) (ii) Why might the data in this study be unreliable?

.....

.....

.....

(1 mark)

2 (b) (iii) The manufacturer did **not** draw attention to the data for the amount of glucose attached to red blood cells.

Suggest an explanation for this.

.....

.....

.....

.....

.....

(2 marks)

2 (b) (iv) The study of diabetic patients was carried out by an independent company.

Why is it important that the study should be independent?

.....

.....

.....

(1 mark)

7

Areas outside the box will not be scanned for marking

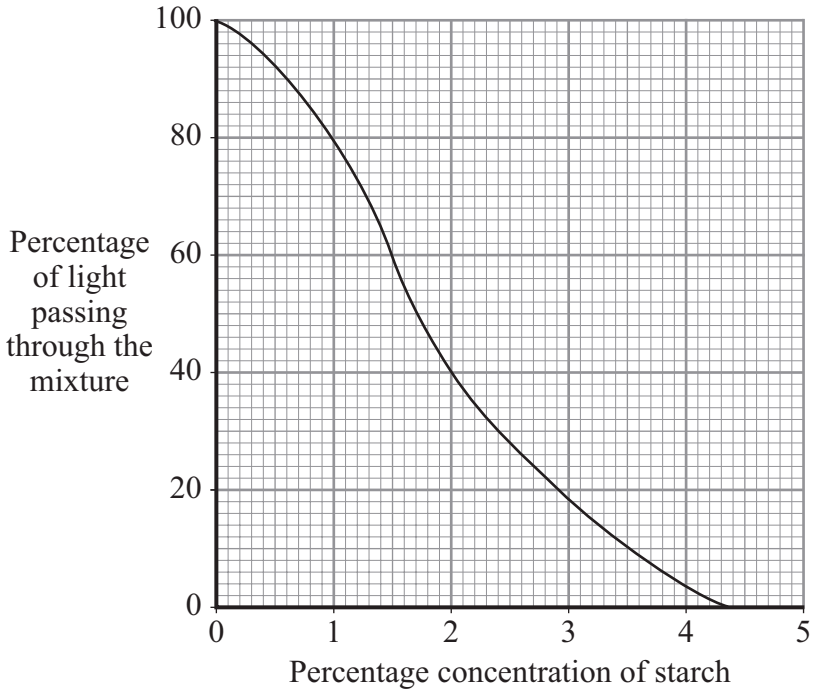
3 A manufacturer of slimming foods is investigating the effectiveness of carbohydrases from different microorganisms.

Iodine solution is a pale golden brown, transparent solution. Starch reacts with iodine to form a dark blue mixture.

Known concentrations of starch are added to iodine solution. The mixture is placed in a colorimeter which measures the percentage of light passing through the mixture.

Graph 1 shows the results.

Graph 1



3 (a) Explain why less light passes through the mixture when the starch is more concentrated.

.....

.....

.....

(1 mark)

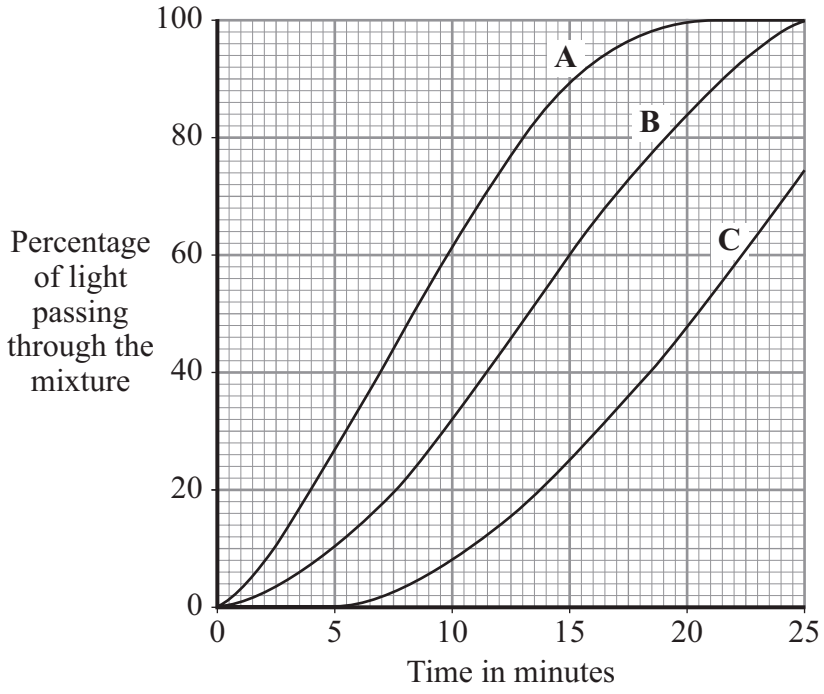
Areas outside the box will not be scanned for marking

3 (b) The manufacturer adds carbohydrase from each of three different microorganisms, **A**, **B** and **C**, to starch in flasks at 40 °C.

Every minute a sample of the mixture is added to iodine solution and placed in the colorimeter.

Graph 2 shows these results.

Graph 2



3 (b) (i) When the concentration of starch reaches 2 %, digestion is considered to be sufficient for the next stage in the manufacture of the slimming food.

How long does this take for the most effective carbohydrase?

Show clearly how you work out your answer.

.....

.....

..... minutes
(2 marks)

Question 3 continues on the next page

Turn over ▶

Areas outside the box will not be scanned for marking

3 (b) (ii) Explain why the manufacturer carried out the investigation at 40 °C.

.....

.....

.....

.....

.....

(2 marks)

3 (c) Carbohydrases convert starch into glucose. To complete the manufacture of the slimming food the glucose should be converted into fructose.

3 (c) (i) Name the enzyme which would be used to convert glucose into fructose.

.....

(1 mark)

3 (c) (ii) Explain why fructose, rather than glucose, is used in slimming foods.

.....

.....

.....

.....

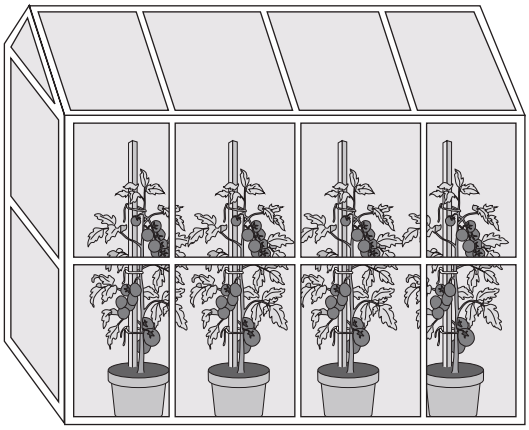
.....

(2 marks)

8

Areas outside the box will not be scanned for marking

4 In this country most tomatoes are grown in greenhouses.



4 (a) Suggest **one** way in which a grower could increase the yield of tomatoes from plants growing in his greenhouse.

.....

.....

(1 mark)

4 (b) Large supermarkets often import tomatoes from overseas.

4 (b) (i) Suggest **two** reasons why a supermarket might decide to import tomatoes rather than buy them from British growers.

1 .....

.....

2 .....

.....

(2 marks)

4 (b) (ii) Importing tomatoes may be more damaging to the environment than selling tomatoes grown in this country.
Explain why.

.....

.....

.....

.....

(2 marks)

5

Turn over ▶

Areas outside the box will not be scanned for marking

5 During exercise an athlete's core body temperature may rise.

5 (a) What causes this rise in core body temperature?

.....

.....

(1 mark)

5 (b) During a long race one athlete did not drink any liquid. Towards the end of the race the amount of sweat he produced began to fall.

5 (b) (i) This athlete's core body temperature increased more than that of other similar athletes who had drunk enough liquid during the race.

Explain why.

.....

.....

.....

.....

.....

(2 marks)

5 (b) (ii) Describe **one** other way in which this athlete's body would respond in order to reduce core body temperature.

.....

.....

.....

.....

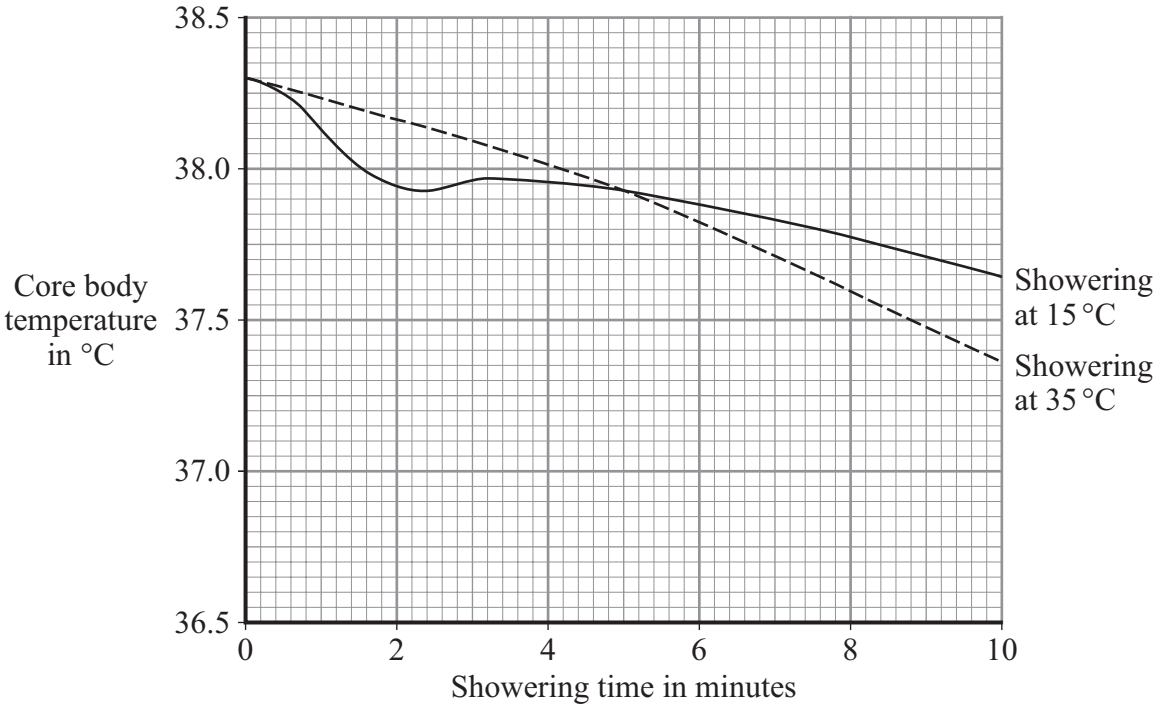
.....

(2 marks)

STEMUP.CO.UK

Areas outside the box will not be scanned for marking

5 (c) The graph shows the effects of showering for ten minutes at 15 °C and at 35 °C on core body temperature after a long race.



Suggest an explanation for the differences in core body temperature:

5 (c) (i) between 0 and 2 minutes

.....

.....

.....

(1 mark)

5 (c) (ii) between 4 and 10 minutes.

.....

.....

.....

.....

.....

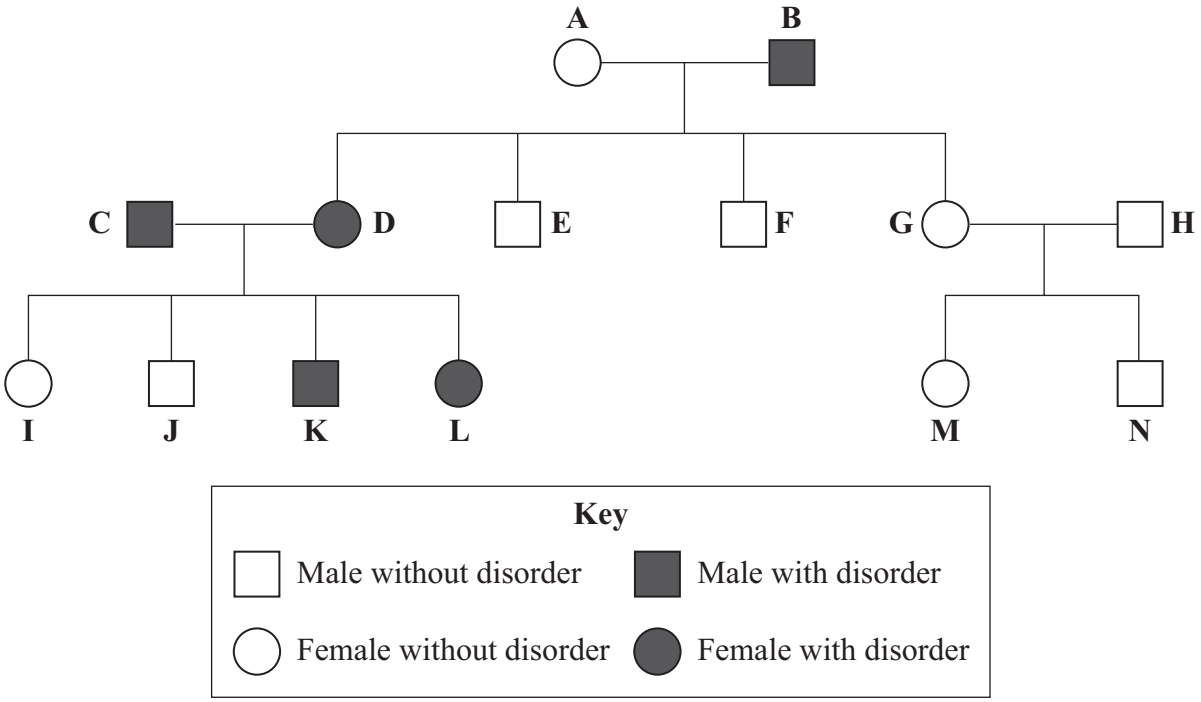
(2 marks)

8

Turn over ▶

Areas outside the box will not be scanned for marking

6 The diagram shows a family tree in which some individuals have an inherited disorder, which may cause serious long-term health problems.



6 (a) What proportion of the children of **A** and **B** have the disorder?

.....

(1 mark)

6 (b) Explain the evidence from the diagram which shows that the allele for the disorder is dominant.

Use the appropriate letters to identify individuals in your answer.

You may use genetic diagrams in your explanation. There is space for you to draw a genetic diagram at the top of the facing page.

.....

.....

.....

.....

.....

.....

Areas outside the box will not be scanned for marking

(3 marks)

6 (c) (i) What is meant by 'embryo screening'?

.....

.....

(1 mark)

6 (c) (ii) A doctor suggests that couple **C** and **D** should have their embryos screened but that couple **G** and **H** do **not** need this procedure.

Explain the reasons for the doctor's suggestions.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

8

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2009 AQA and its licensors. All rights reserved.

Version 1: 0109

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Mark Scheme

2009 examination – January series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2009. AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example:
where consequential marking needs to be considered in a calculation;
or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
1(a)	the sun / light / sunshine / solar	allow radiation from the sun ignore photosynthesis / respiration apply list principle do **not** allow water / minerals / heat	1
1(b)	2.5 (:1)	correct answer with or without working ignore rounding with correct working do **not** allow other equivalent ratios for both marks evidence of selection of 10(insects) **and** 4(frogs) **or** 50 **and** 20 **or** 1 **and** 0.4 for **1** mark if no other working allow **1** mark for 0.4:(1) on answer line	2
1(c)	any **two** from: • some parts indigestible / faeces • waste / examples of waste eg urea / nitrogenous compounds / urine / excretion • movement / eg of movement • heat • not all eaten / eg of not all eaten • respiration	allow for insects **or** frogs allow energy for biomass allow keeping warm do not accept energy for respiration	2

Question 1 continued on next page…

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

Question 1 continued…

question	answers	extra information	mark
1(d)	any **four** from: • (bodies) consumed by animals / named / scavengers / detritus feeders • microorganisms / bacteria / fungi / decomposers • reference to enzymes • decay / <u>breakdown</u> / decompose / rot • respiration • carbon dioxide produced • photosynthesis • sugar / glucose produced • fossilisation / fossil fuels / named • combustion / burning • (burning) produces carbon dioxide	ignore digest(ion) accept other organic molecules must be linked with fossilisation / fossil fuels allow carbon dioxide produced once only	4
Total			**9**

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
2(a)(i)	pancreas	allow phonetic spelling	1
2(a)(ii)	glucose into cells / liver / muscles	allow any named organ / cell allow turned into / stored as glycogen **but** do **not** allow hybrid spellings for glycogen allow increases respiration allow stored as / turned into fat	1
2(b)(i)	reference to "98.6% of all people who used Diacure reported an improvement in their condition."	allow claim **1** / **1** / the first one	1
2(b)(ii)	(only) 30 patients **or** not enough / not many patients	allow only one trial **or** only done once **or** not repeated ignore bias	1
2(b)(iii)	little effect / difference suggest drug is not effective (in long term)	allow no effect allow only drops by 4 (±1) allow wouldn't persuade people to take it	1 1
2(b)(iv)	avoid bias / owtte	eg company could change / ignore results / might lie ignore fair / accurate / reliable / valid	1
Total			**7**

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
3(a)	opaque / less transparent / blue	allow mixture becomes dark / black ignore thicker	1
3(b)(i)	7 (minutes) **or** in range 6.7 to 7	award **2** marks for correct answer if answer is incorrect evidence of selection of 40(% light intensity) either in working **or** in graph 2 for **1** mark	2
3(b)(ii)	any **two** from: • slower / takes longer at lower temperatures • (40^{o}C is) optimum / best temperature • enzyme denatured / destroyed / damaged at higher temperatures	 allow near to 37^{o}C / body temperature where enzymes work best allow description of denaturation	2
3(c)(i)	isomerase	allow phonetic spelling	1
3(c)(ii)	fructose is sweeter than glucose needed in smaller quantities **or** less is needed		1 1
Total			**8**

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
4(a)	any **one** from: • increase / give light • increase temperature / make warmer • increase / give CO_2 • add fertiliser / nutrients / minerals / named	award marks if the method by which these could be done is given eg leave lights on all night **or** use a heater allow nitrogen ignore 'food'	1
4(b)(i)	any **two** from: • cheaper • better quality / flavour • available all year	accept converse if clear that answer refers to use of British tomatoes allow grow faster / more grown ignore size allow 'Fair Trade'	2
4(b)(ii)	any **two** from: • greater distance **or** more food miles **or** more transport • transport needs (more) energy / fuel • reference to eg greenhouse effect / global warming / pollution / CO_2 release / carbon footprint	idea of more needed only once ignore ozone	2
Total			**5**

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
5(a)	respiration	allow muscle contraction **or** muscle movement **or** exercise of muscles allow metabolism / chemical reactions	1
5(b)(i)	any **two** from: • less / no water (available) for sweat • less / no heat lost / less / no cooling • less / no evaporation (of sweat)	 allow dehydrated so less sweat allow converse if evident that response refers to athletes who have drunk liquid only need to refer to less / no once	2
5(b)(ii)	**either** blood vessels supplying the skin **or** blood vessels in skin dilate / widen / muscles relax	 do **not** allow first mark if implied that skin capillaries dilate ignore enlarge / open vasodilation in skin = **2** marks allow hairs lie flat for **1** mark allow less insulation for **1** mark if linked to hairs allow more blood in skin for **1** mark if no other marks awarded	1 1
5(c)(i)	cold / 15^{o}C cools the body / blood (more)	**or** reverse argument ignore reference to values for body temperature derived from graph	1

Question 5 continued on the next page…

STEMUP.CO.UK

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

Question 5 continued…

question	answers	extra information	mark
5(c)(ii)	any **two** from: • cools slower at 15°C cold / 15°C • cold / 15°C causes reduced blood flow to surface / skin • blood not cooled as much / as quickly • cold / 15°C causes shivering • muscles contract / more respiration / heat made	allow converse arguments ignore reference to capillaries	2
Total			**8**

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
6(a)	1 in 4 / $^1/_4$ / 1: 3 / 25% / 0.25	do **not** accept 3:1 / 1:4 / 2:6	1
6(b)	**either** from C **and** D	accept synonyms for dominant / recessive eg. Normal / faulty accept genetic diagram if clearly referring to correct individuals or genotypes on family tree allow 'gene' for 'allele'	
	any **three** from: • C **and** D have disorder • I/J don't have disorder • C **and** D have dominant **and** recessive alleles • recessive alleles from C **and** D passed to I/J **or** I/J have two recessive alleles	ignore **'**C & D are carriers'	3
		NB if allele was recessive then all offspring of C **and** D would have the disorder = **3** marks	
	or from A **and** B	assume response refers to A+B unless contradicted	
	• A is homozygous recessive / rr, **and** B is heterozygous / Rr can be shown in words or symbols	allow any symbol	
	• offspring can be rr **or** Rr described	allow without key	
6(c)(i)	(embryos) checked for inherited / genetic disorders / conditions	accept diseases for disorders	1

Question 6 continued on next page…

STEMUP.CO.UK

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

Question 6 continued…

question	answers	extra information	mark
6(c)(ii)	any **three** from: • C/D have disorder / have dominant allele • chance of embryo / foetus / child having disorder **or** may pass on alleles for disorder to their offspring • C/D might want to decide on termination **or** prepare for child with disorder • G **and** H don't have disorder / both homozygous recessive / have no dominant alleles (for this disorder) • so offspring (of G **and** H) cannot / don't have disorder	accept disease / condition accept 'gene' for 'allele' ignore reference to 'carriers'	3
Total			**8**