Examiner Only	
Marks	Remark

(c) One technique used to manage woodland is called **coppicing**. This involves cutting down tall, overgrown trees to ground level.

It encourages new growth of shoots from the cut stumps, eventually thickening the woodland.

Photograph A below shows a woodland **(A)** that has been coppiced.



© Dr Jeremy Burgess / Science Photo Library

Photograph B below shows a woodland **(B)** that has not been coppiced.



© Simon Fraser / Science Photo Library

Some months after woodland A had been coppiced, the pupils carried out a study to find the average number of plant species/m^2 growing on the woodland floor (i.e. ground) in the two woodlands. Their results are shown in the table.

Woodland	Average number of plant species/m^2
A	17
B	10

(i) Describe how the pupils would have determined the average number of plant species in a woodland.

_____

_____

_____

_____

_____ [3]

(ii) Suggest why the average number of plant species/m^2 was much higher in woodland **A**.

_____ [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

3 **(a)** Complete the table about food tests.

Food type	Reagent used to carry out food test	Initial colour of reagent	Final colour for a positive result
Fat		Clear	
Protein			Purple

[4]

(b) Explain why obesity levels have increased greatly in the United Kingdom and many other countries in recent years.

_____

_____

_____ [2]

(c) Name the component of an unhealthy diet that can cause

high blood pressure. _____

diabetes. _____ [2]

(d) (i) Paul read in a magazine that orange juice that has been freshly squeezed from oranges contains more vitamin C than the processed orange juice purchased in cartons. Paul wished to investigate this.

His teacher provided him with a dropper, graduated cylinder, test tubes, the two different orange juices and DCPIP solution. Describe an experiment that Paul would carry out to test the claim that freshly squeezed orange juice contains more vitamin C than processed orange juice.

Give one factor that needs to be controlled to make the test a valid (fair) one.

In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

(ii) Explain why it would have been better for Paul to use a syringe rather than a dropper in this investigation.

[1]

Examiner Only	
Marks	Remark

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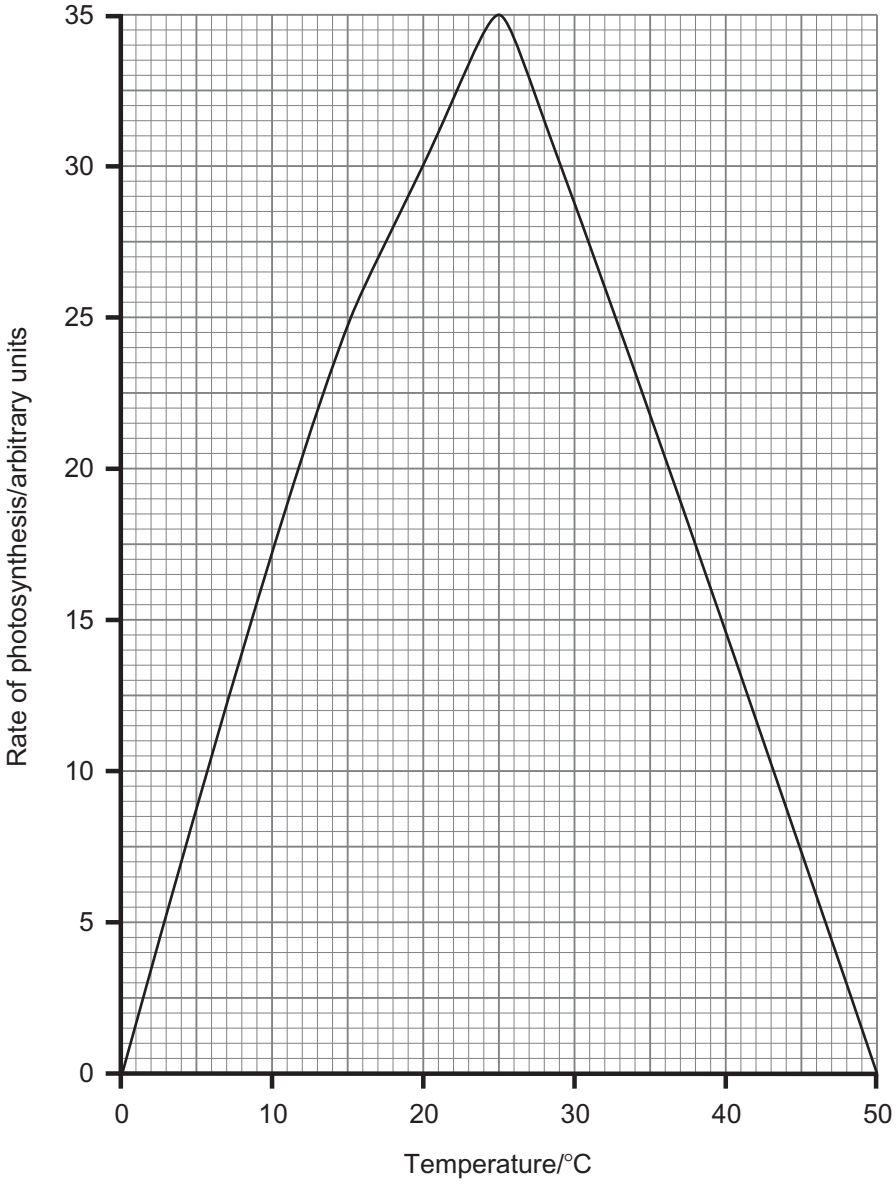
Examiner Only	
Marks	Remark

4 **(a)** Glucose is one of the products of photosynthesis. Give **two** uses of glucose in plants.

1. _____

2. _____ [2]

The graph shows the effect of temperature on the rate of photosynthesis for grass.



(b) Use the graph to find

the rate of photosynthesis for the grass at 20 °C.

_____ arbitrary units

the best temperature for photosynthesis.

_____ °C [2]

(c) The process of photosynthesis is controlled by enzymes. Use this information to explain why photosynthesis stops at 50 °C.

_____

_____

_____ [2]

(d) If a farmer adds too much slurry to a field, it will form a thick coating on the grass leaves. Explain why this would reduce the yield of grass.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 Two adaptations of respiratory surfaces in animals are a large surface area and a moist surface.

(a) Explain the importance of these adaptations to animals.

Large surface area _____

_____

Moist surface _____

_____ [2]

(b) Give **two** other adaptations of respiratory surfaces in animals.

1. _____

2. _____ [2]

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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

6 **(a)** Explain the ecological term habitat.

_____

_____ [1]

(b) The table shows the percentage of different invertebrate groups present on the ground, in the vegetation and in the air above the vegetation in a grassland.

Area where found	Invertebrate group/%			
	Spiders	Flies	Beetles	Bees
On the ground	67	20	7	30
In the vegetation	33	37	52	26
In the air	0	43	41	44
Total	100	100	100	100

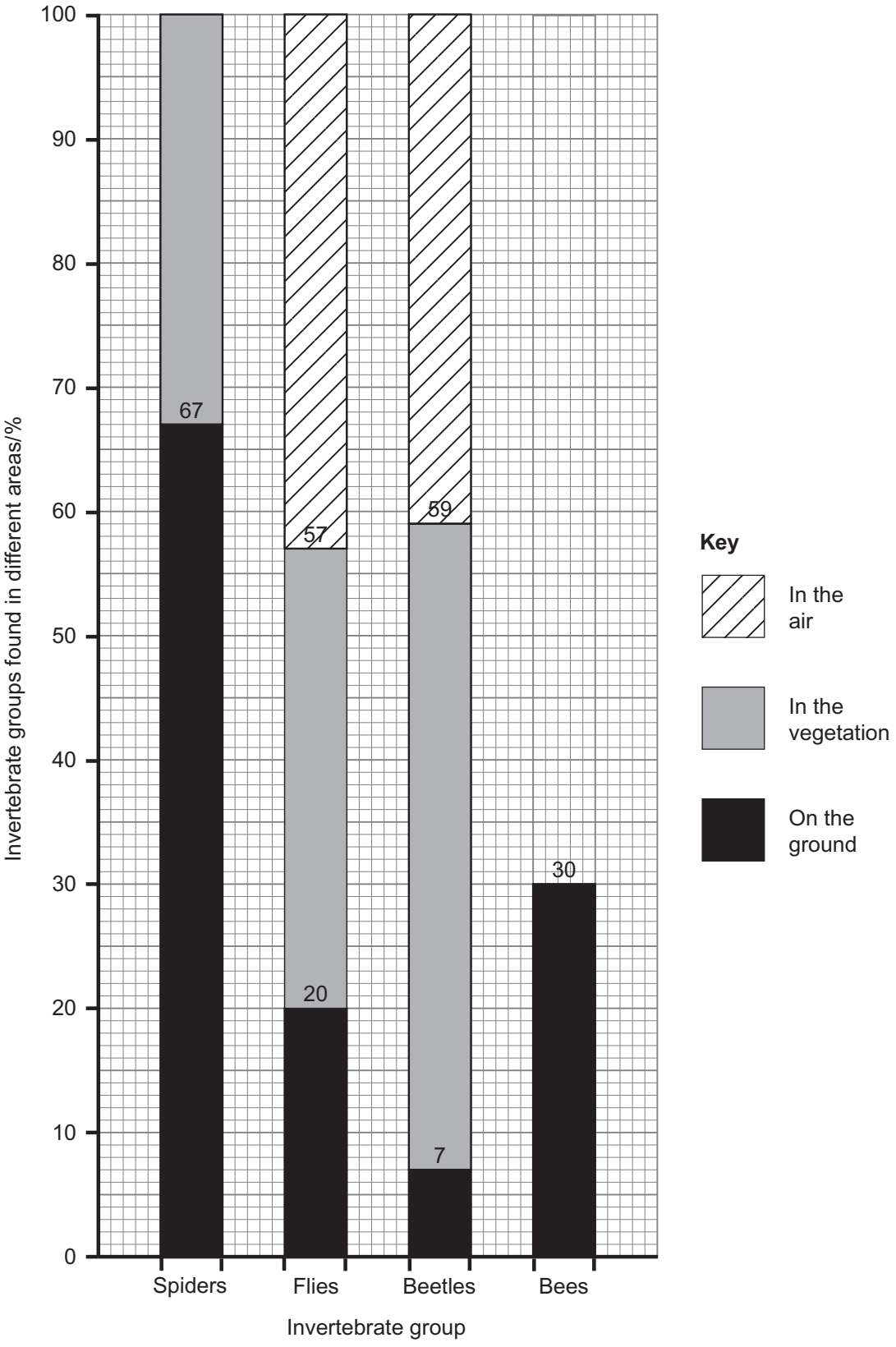
© J W Garvin taken from Skills in advanced biology. Vol. 1 Dealing with data by J W Garvin, published by Stanley Thornes Ltd, 1986

Suggest a suitable sampling method for collecting invertebrates

on the ground. _____

in the vegetation. _____ [2]

(c) Complete the bar chart to include the figures for the bees.



[2]

Examiner Only

Marks	Remark

(d) Use the bar chart to state which invertebrate group cannot fly.

_____ [1]

(e) Yellowhammers are small birds found mostly in the east of Northern Ireland. The yellowhammer chicks feed on insects, while the adult birds feed on barley and wheat seeds.

If the grassland, referred to in part **(b)**, was sprayed with an insecticide (a chemical that kills insects), explain the impact on the population of yellowhammers.

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

7 The table gives information on some sources and amounts of greenhouse gas (GHG) emissions in the United Kingdom for the years 2000 and 2010.

Source	Amount of GHG emissions/ million tonnes		Percentage change, 2000–2010
	2000	2010	
Generating Electricity	220	205	
Transport	120	114	–5
Business	110	90	–18
Residential	91	89	–2
Agriculture	58	51	–12

© Crown Copyright - Department of Energy and Climate Change

(a) Complete the information in the table by entering the missing value. (Show your working.)

[2]

(b) Describe the general trend for the amounts of GHG emissions for all sources over the period 2000–2010.

_____ [1]

(c) The table below shows the cost of generating electricity from different sources in the United Kingdom and shows whether the source produces carbon dioxide.

Carbon dioxide is a greenhouse gas. Scientific research suggests that an increase in levels of carbon dioxide leads to global warming.

Source	Cost per unit of electricity/p	Carbon dioxide produced
Gas	2.2	Yes
Coal	2.5	Yes
Wind	5.5	No
Wave	6.6	No

© RenewableUK

Use the information in the table to argue why there is controversy about using renewable energy (wind and wave) as a solution to global warming.

_____

_____

_____

_____

_____ [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

8 **(a)** Describe and explain the function of digestive enzymes.

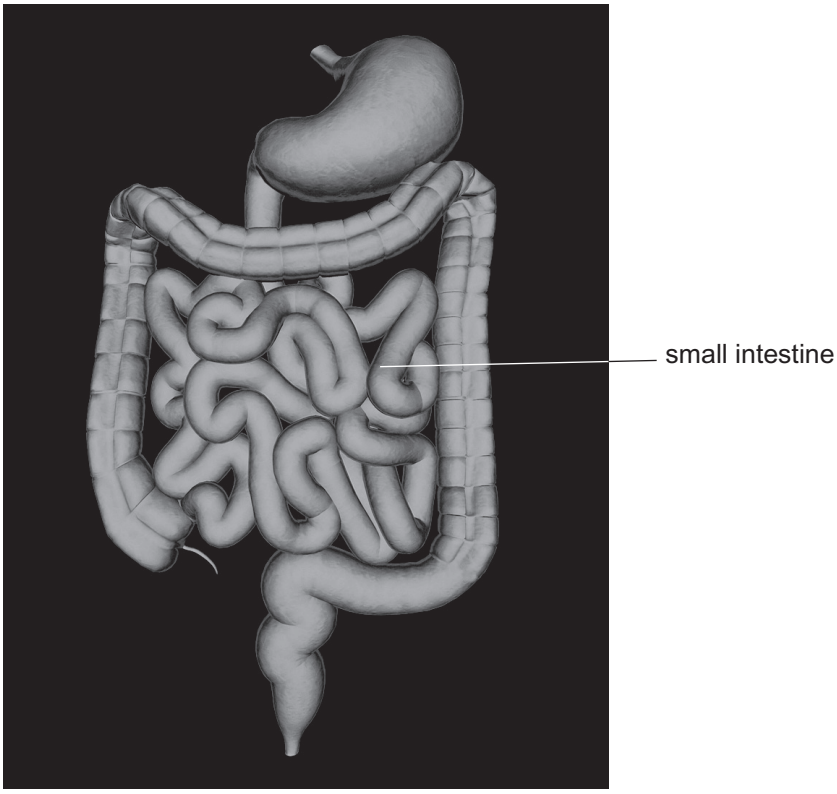
_____

_____

_____

_____ [2]

(b) The image shows part of the digestive system.



© PASIEKA / Science Photo Library

(i) Using only the information in the image give **one** adaptation of the small intestine for absorption.

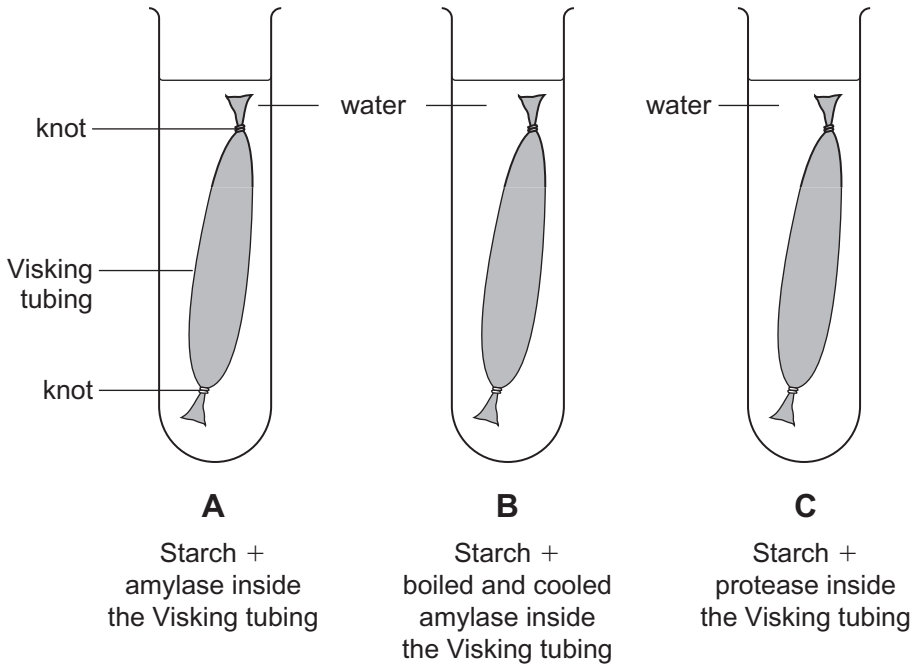
_____ [1]

(ii) Give another adaptation of the small intestine for absorption, that is **not** shown in the diagram.

_____ [1]

Examiner Only	
Marks	Remark

(c) The diagram shows apparatus and materials used by a student to investigate the effect of two digestive enzymes, amylase and protease, on starch.



Visking tubing allows small molecules (e.g. glucose) to pass through but not large molecules (e.g. starch).

The experimental set-up was left for 30 minutes. The student then carried out the Benedict's test on the liquid outside the Visking tubing in each of the boiling tubes **A**, **B** and **C**.

(i) Describe and explain the result the student obtained for the liquid in

tube **A** _____

_____

_____

tube **B** _____

_____

_____ [4]

(ii) Explain why there was a negative result for the Benedict's test in tube **C**.

_____

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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112970

New Specification

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Double Award Science: Biology

Unit B1

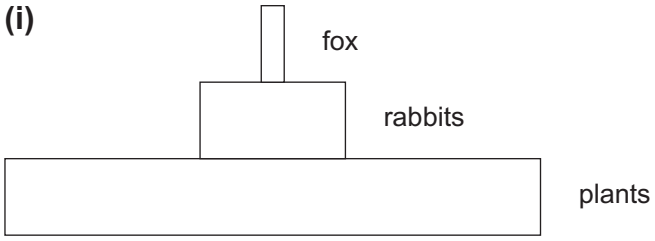
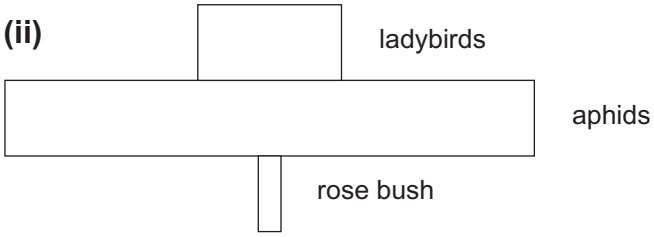
Foundation Tier

[GSD11]

MONDAY 12 NOVEMBER 2012
1.30 pm–2.30 pm

MARK SCHEME

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			AVAILABLE MARKS
1	**(a)** Living organisms [1] plus the abiotic/non-living/physical environment [1]	[2]	
	(b) **(i)** Sun/sunlight	[1]	
	(ii) Tree	[1]	
	(iii) Aphid/worm/caterpillar/blackbird	[1]	
	(iv) Third trophic level/trophic level 3	[1]	
	(c) **(i)** 	1 mark for shape; 1 mark for labels [2]	
	(ii) 	1 mark for shape; 1 mark for labels; [2]	
	(d) Any **two** from: • (blackbird) loses **heat**/energy in **respiration** • (blackbird) loses energy in **movement** • (blackbird) loses energy in **excretion/waste** • **reproduction** • not all blackbird **is/can be eaten**	[2]	12

			AVAILABLE MARKS
2	**(a)**	As the area sampled increases, more species recorded [1] then graph levels off/no more species found [1] [2]	
	(b)	6 [1]	
	(c)	**(i)** Any **three** from: • use quadrats • which are randomly placed/throw quadrat • count number of plant **species** • repeat (for reliability) • use a key • divide number of plant species by number of quadrats [3]	
		(ii) More light/more room [1]	7

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AVAILABLE MARKS

3 **(a)**

Fat	Ethanol		White
Protein	Biuret	Blue	

[4]

(b) Energy intake/food intake is higher/too much food eaten/junk food/ availability of cheap/junk food/cheap alcohol
Not enough exercise/sedentary lifestyle described [1] [2]

(c) sodium/salt/fat/cholesterol [1]
glucose/sugar [1] [2]

(d) **(i)** **Indicative Content:**

- Place DCPIP in test-tube
- Add drops of juice to the DCPIP
- Shake/mix
- Count the number of drops of juice (needed to produce colour change in the DCPIP)
- DCPIP goes colourless/clear or changes from blue to clear or changes from blue to pink/clear
- Repeat for the other orange juice
- The fewer the drops of juice needed the more vit. C or converse – more drops needed the less vit. C present (one that changes the fastest has most vit. C)
- Repeat for reliability – same juice several times
- Controlled variable – same amount of mixing/shaking – or same volume of DCPIP in both test-tubes

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout using at least **5** of the above points (which must include a controlled variable) to describe in a logical sequence how they would compare the amounts of vitamin C in freshly squeezed orange juice and processed orange juice. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates must use some appropriate specialist terms throughout using **3** or **4** of the above points to partially describe how they would compare the amounts of vitamin C in freshly squeezed orange juice and processed orange juice. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe using **1** or **2** of the above points how they would compare the amounts of vitamin C in freshly squeezed orange juice and processed orange juice. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit	[0]

[6]

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			AVAILABLE MARKS
	(ii) More accurate determination of volume/size of drops can be variable	[1]	15
4	**(a)** Any **two** from: • respiration/energy • starch • sucrose • cellulose • amino acids/protein/oils	[2]	
	(b) 1. 30 2. 25 °C	[2]	
	(c) Enzymes broken down destroyed/damaged/denatured [1] Enzyme not correct shape (to fit substrate) [1]	[2]	
	(d) Leaves absorb **less light**/less CO_2 absorbed [1] So **less photosynthesis** [1]	[2]	8

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				AVAILABLE MARKS
5	**(a)**	(Large surface area allows) **more** oxygen to pass in/**more** gas exchange/**more** carbon dioxide to leave [1] Gases need to be **dissolved** in moisture [1]	[2]	
	(b)	Any **two** from: • thin/short distance/one cell thick/thin wall • permeable • good blood supply/lots of capillaries/blood near alveoli • diffusion gradient or described	[2]	4
6	**(a)**	Place where an animal or plant is found/lives	[1]	
	(b)	1. Pitfall trap [1] 2. Sweep net/net [1]	[2]	
	(c)	Vegetation figure correctly plotted [1] Air figure correctly plotted and shaded [1]	[2]	
	(d)	Spiders	[1]	
	(e)	Any **three** from: • less insects/food • for chicks to feed on • so population decreases • fewer breeding adults as chicks do not survive to adults	[3]	9
7	**(a)**	–6.8/–7% = [2]	[2]	
	(b)	Decreasing (emissions)	[1]	
	(c)	Any **three** from: • While renewable does not produce carbon dioxide • Does not contribute to global warming • The cost of producing electricity is far greater than the non-renewables • People not prepared to pay the extra cost	[3]	6

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	AVAILABLE MARKS

8 **(a)** Any **two** from:
- they break down/starch/fat/protein/food
- from large to small molecules/named correctly
- from insoluble to soluble molecules
- so that these can be absorbed/taken into the bloodstream
- Biological catalyst/speed up reactions [2]

(b) **(i)** Long/large surface area [1]

only allow large surface area once

(ii) Has villi/microvilli/good blood supply/walls only one cell thick/ lacteals/folds/large surface area/folded/permeable/ semi-permeable/short diffusion distance [1]

(c) **(i)** **Tube A** Any **two** from:
- (amylase) breaks down starch (into glucose)
- sugar/glucose passes through pores of Visking tubing/into water/solution/boiling tube
- Benedict's turns **from blue** to brick red [2]

Tube B Any **two** from:
- amylase does not break down the starch
- enzyme is destroyed/damaged (by boiling)
- negative result for Benedict's/remains blue/no colour change
- no glucose present [2]

(ii) Enzyme specificity/lock and key fit/protease doesn't break down starch/only breaks down protein/only amylase breaks starch/ starch doesn't fit protease/no substrate for protease [1]

9

Total **70**

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New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Double Award Science: Biology

Unit B1

Foundation Tier

[GSD11]

GSD11

TUESDAY 15 MAY 2012, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Questions **3(a)(v)** and **7(b)**.

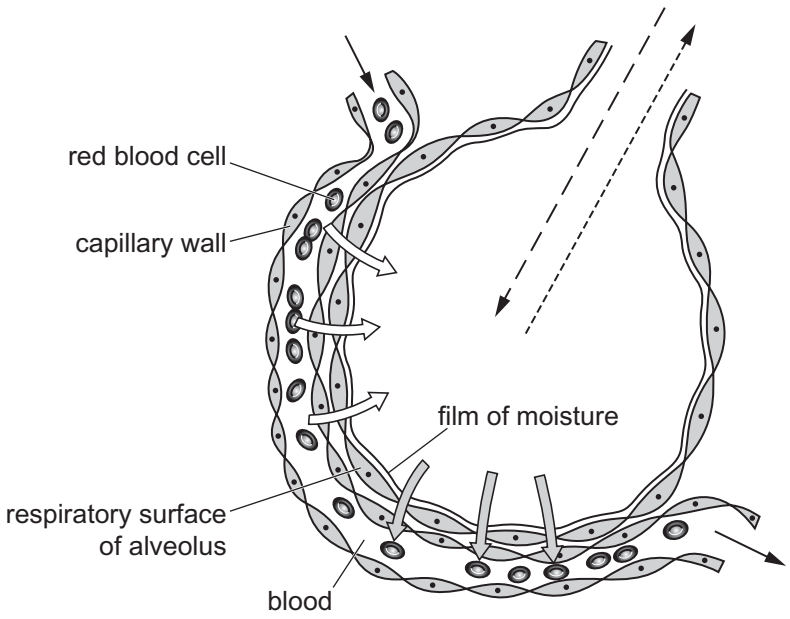
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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Examiner Only	
Marks	Remark

1 The lungs have many small air sacs called alveoli. Gas exchange occurs across the surface lining of the alveoli. The diagram shows a single alveolus and blood capillary.



© GCSE Biology for CCEA by R McIlwaine and J Napier, published by Hodder & Stoughton, 2003. ISBN 0340858257. 'Reproduced by permission of Hodder Education'.

(a) Use the diagram to give **three** ways in which the alveolar respiratory surface is adapted for gas exchange.

1. _____

2. _____

3. _____ [3]

The table below gives the percentage composition of gases from two air samples.

Gas	Percentage composition	
	Sample A	Sample B
Nitrogen	79	79
Oxygen	21	16
Carbon dioxide	0.04	4

(b) Sample B is from exhaled air. Explain how you know this.

_____ [1]

(c) What is the function of cell respiration?

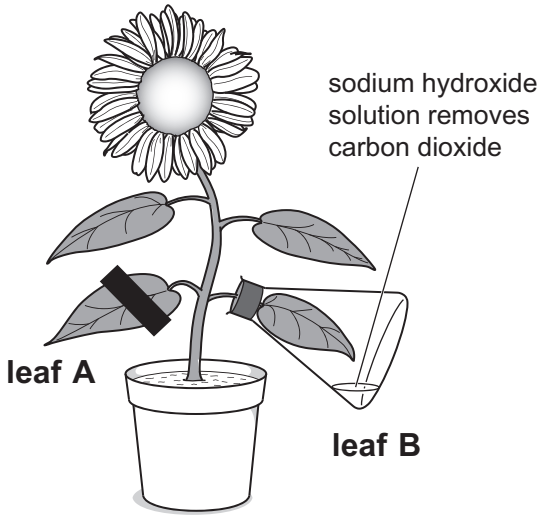
_____ [1]

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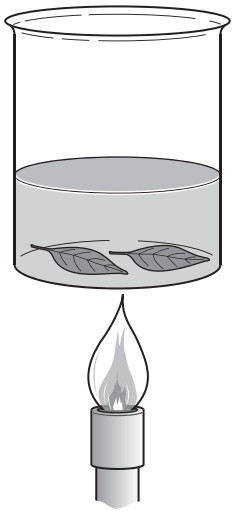
2 The diagrams show the procedure used to investigate factors necessary for photosynthesis. A positive starch test will show that photosynthesis has taken place.



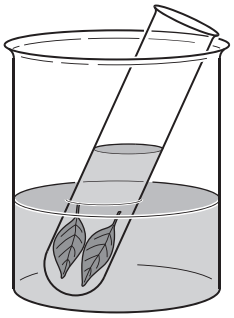
stage 1 plant put in darkness for 48 hours



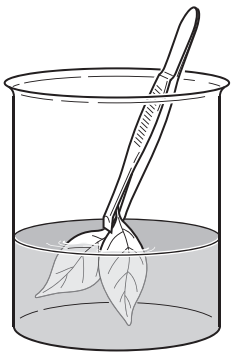
stage 2 plant put into light and treated as shown



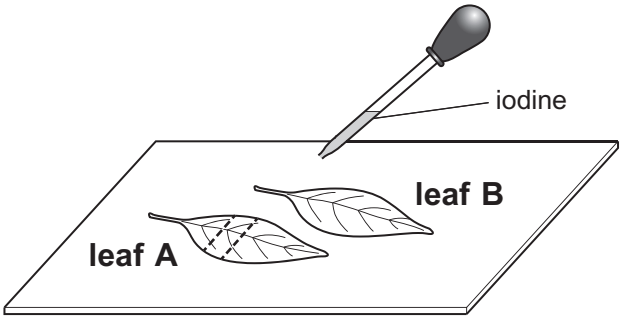
stage 3 leaf A and leaf B removed and put into boiling water



stage 4 leaves put into hot alcohol



stage 5 leaves put into hot water



stage 6 leaves tested for starch

Source: © Diagrams from the KS3 Science Revision guide by Coordination Group Publications Ltd. (CGP) ISBN 1-84146-230-1

(a) Why was the plant placed in darkness for 48 hours in stage 1?

_____ [1]

(b) Why were the leaves boiled in water for a few minutes in stage 3?

_____ [1]

(c) Describe and explain the results you would expect for leaf A and leaf B.

Leaf A _____

_____

_____

_____ [3]

Leaf B _____

_____

_____ [2]

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Marks	Remark

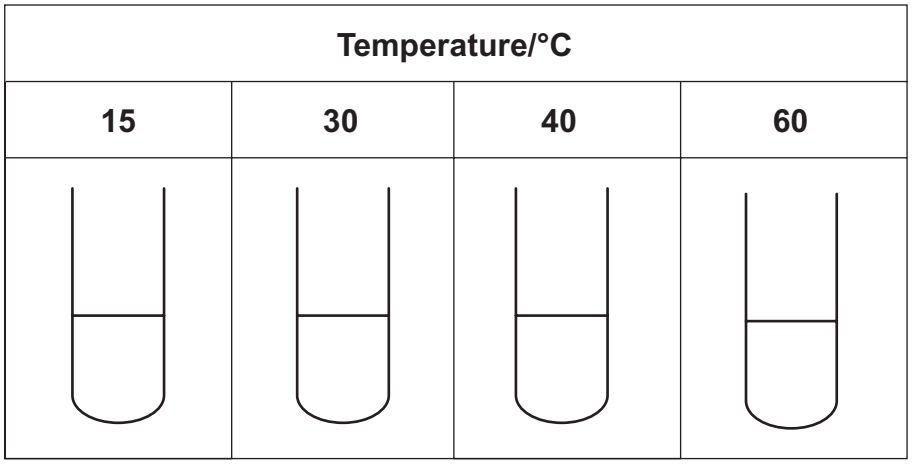
Examiner Only	
Marks	Remark

3 Some washing powders contain enzymes which help to break down stains on clothes. A student tested two enzymes (enzyme 1 and enzyme 2) to find which was more effective at breaking down fat stains on clothing over a range of temperatures.

(a) (i) Name the enzyme that breaks down fats.

_____ [1]

The diagram shows the experimental set-up the student used to find out the time taken to break down fat in the test tubes.



(ii) What substances would need to be present in each of the test tubes?

_____ and _____ [1]

(iii) Give **two** variables that the student should have kept the same.

1. _____

2. _____ [2]

(iv) What are fats broken down into?

_____ and _____ [2]

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The table shows the student's results using the two enzymes.

	Time taken to break down fat/minutes	
Temperature/°C	**Enzyme 1**	**Enzyme 2**
15	30	40
30	10	20
40	15	18
60	50	120

(v) Most washes in washing machines are carried out at temperatures between 30 °C and 60 °C and the washing cycle lasts no more than 90 minutes.

Describe and explain the results for the two enzymes and explain why enzyme 1 is more effective when added to washing powder.

In this question you will be assessed on your written communication skills, including the use of specialist science terms.

[6]

Examiner Only

Marks	Remark

(b) (i) Starch present in foods can also stain clothes. It is broken down by a different type of enzyme. Name the enzyme involved.

_____ [1]

(ii) Suggest why this enzyme would not break down fat stains.

_____

_____ [1]

(iii) When starch is broken down, it is converted into glucose. Describe how you would carry out a food test for glucose and the results you would obtain if glucose was present.

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

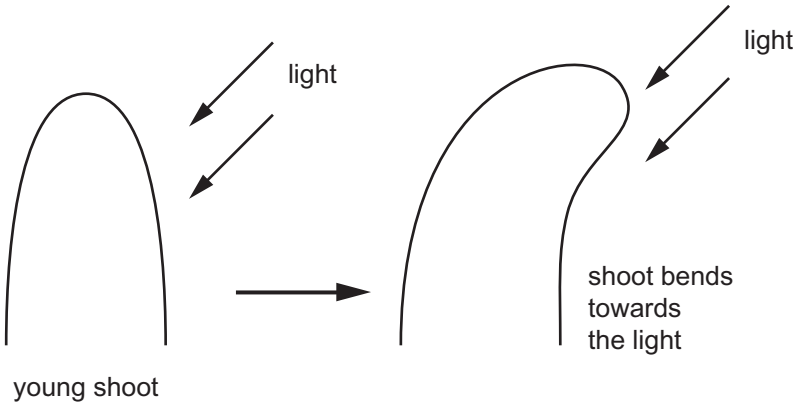
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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

4 The diagram shows the growth response of a young shoot to light from one direction.



(a) (i) Name the growth response shown by the young shoot.

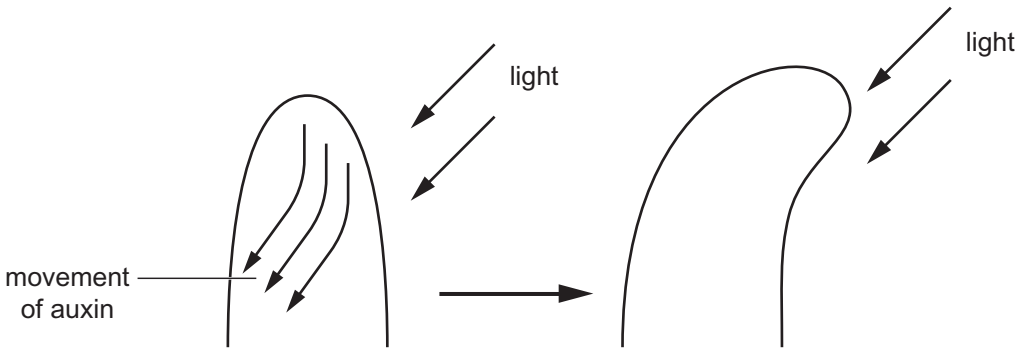
_____ [1]

(ii) Auxin is the substance that causes this growth response.

What type of substance is auxin?

_____ [1]

The diagram shows the movement of auxin in the shoot tip.



(b) Suggest how bending of the shoot tip is brought about by auxin.

_____

_____

_____ [2]

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Examiner Only	
Marks	Remark

(c) **(i)** Auxin is a chemical messenger in plants. Name the chemical messenger in humans that regulates blood glucose levels.

_____ [1]

(ii) Name the target organ for this chemical messenger.

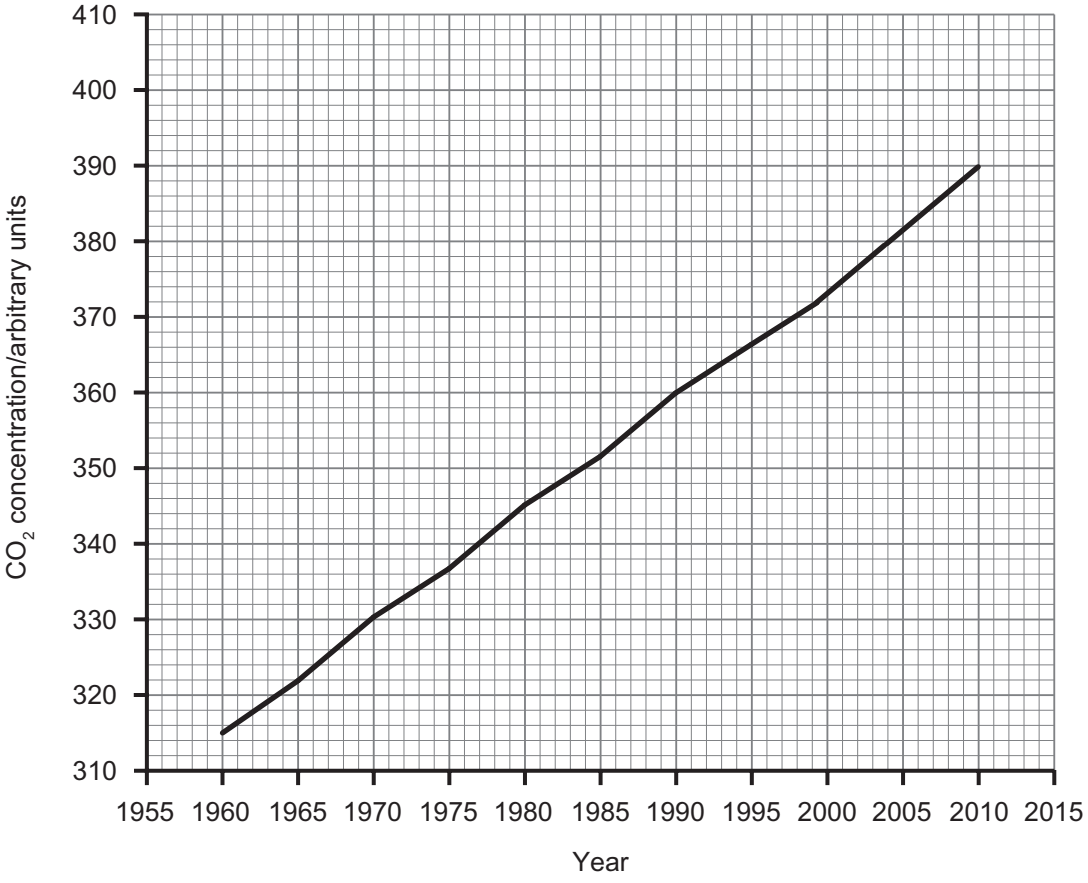
_____ [1]

(iii) Give **one** difference between the ways these two chemical messengers are transported.

_____ [1]

Examiner Only	
Marks	Remark

5 **(a)** The graph shows the carbon dioxide concentration in the air in Hawaii from 1960 to 2010.



(i) Describe the trend shown in the graph.

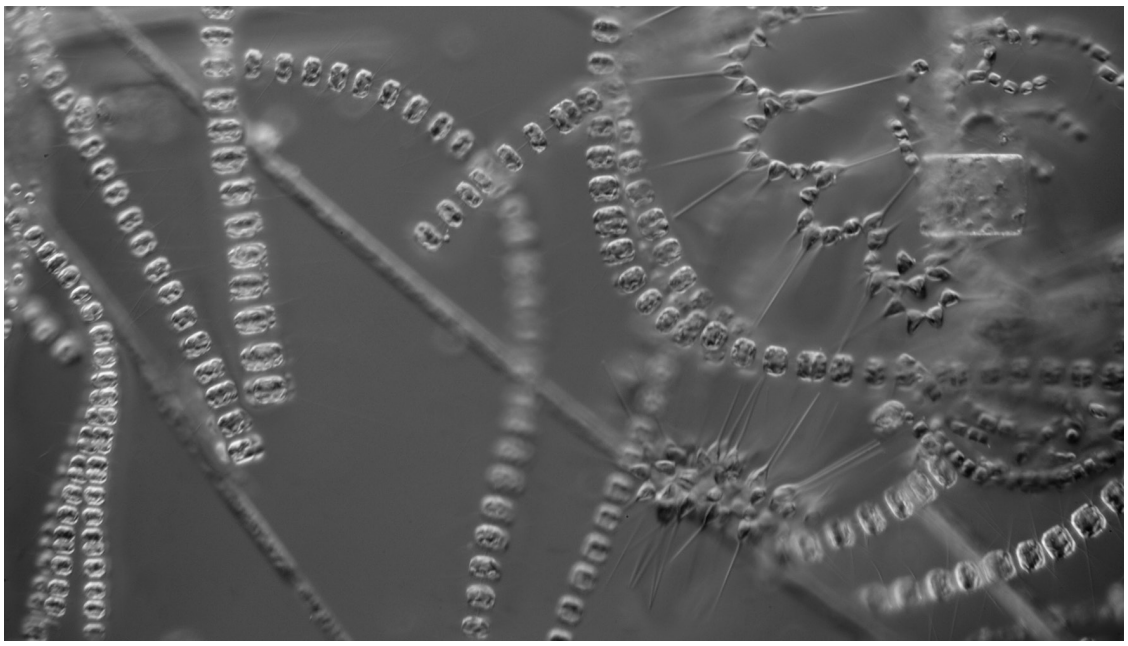
_____ [1]

(ii) Use the graph to suggest what the carbon dioxide concentration in the air will be in 2015.

_____ arbitrary units [1]

Changes in the climate affect the seas and the organisms living in them.

The photograph shows phytoplankton, tiny floating plants found in the sea.



© Wim Van Egmond, Visuals Unlimited / Science Photo Library

Phytoplankton numbers and pattern of distribution are affected by climate change, water temperature and mineral levels in the water.

The impact of climate change on certain species can be used to monitor environmental change.

(b) What are these type of species called?

_____ [1]

(c) Before 1960, one particular species of phytoplankton was only found in the sea around the south coast of England. It is now also found in the sea around Scotland.

Suggest and explain why this species of phytoplankton is now found in the sea around Scotland.

_____

_____ [2]

Examiner Only

Marks	Remark

(d) Every year, off Alaska, as the sea warms up during the spring, the currents change and bring up minerals from the depths. This causes a massive increase in the numbers of phytoplankton in the sea.

Herring that feed on the phytoplankton provide food for the gulls, sea lions and humpback whales that travel thousands of miles from the equator to feed on the herring in the summer.

(i) What is the energy source for this food web?

_____ [1]

(ii) Explain the importance of mineral nitrates to this food web.

_____

_____ [2]

(iii) Using the information given, draw the food web showing all the organisms mentioned.

[2]

(iv) Describe and explain what will happen to the number of sea lions if the number of phytoplankton decreases.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

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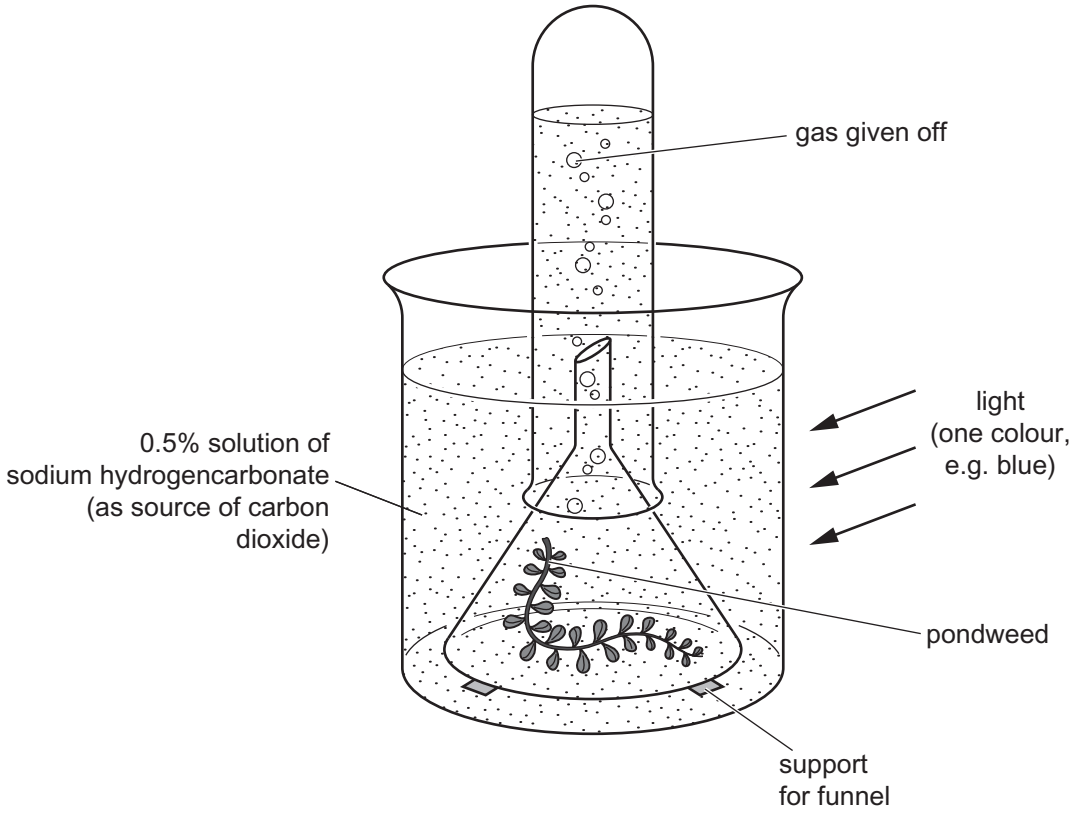
Examiner Only	
Marks	Remark

6 **(a)** Complete the word equation for photosynthesis.

$$\text{_____} + \text{water} \xrightarrow[\text{sunlight}]{\text{chlorophyll}} \text{glucose} + \text{_____} \quad [2]$$

(b) Normal light is made up of different individual colours. A student carried out an experiment to test the effect of different individual colours on the rate of photosynthesis. The diagram shows the apparatus he used.

The pondweed was exposed to one colour of light, e.g. blue, for five minutes and then the number of bubbles of gas given off in 10 minutes was recorded. He repeated the experiment with different individual colours of light.

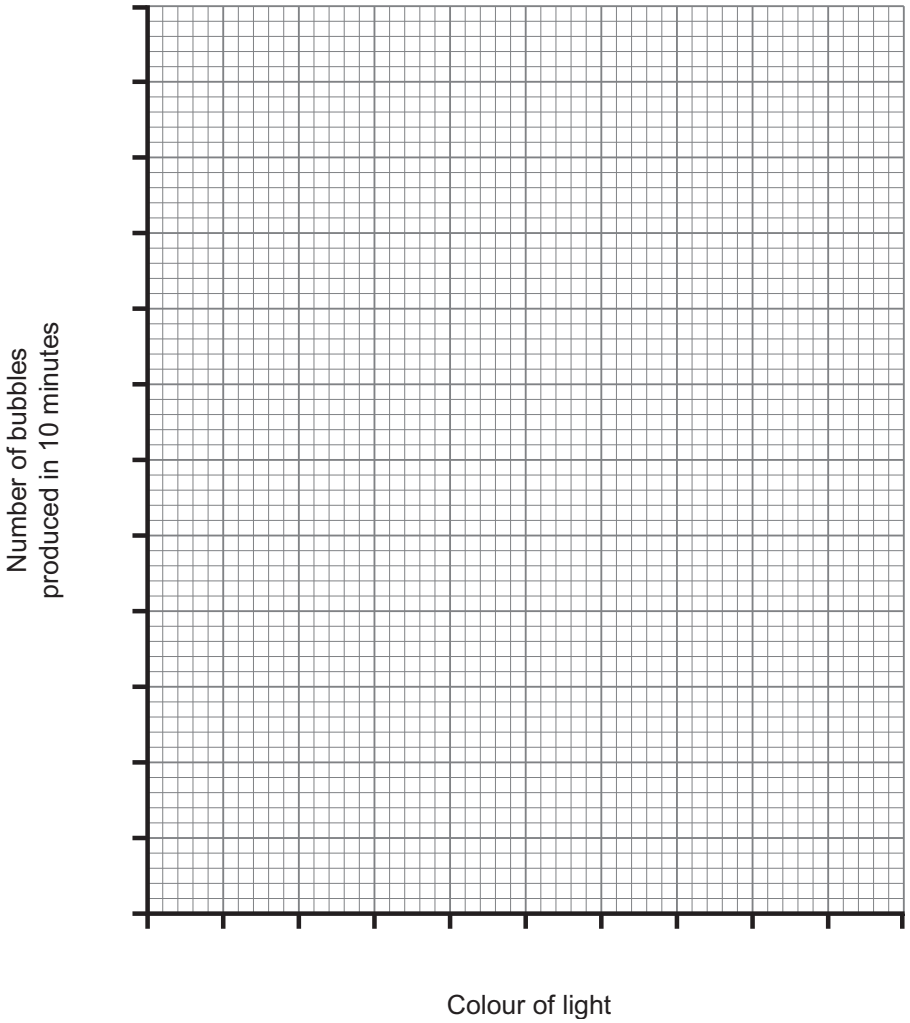


Source: Adapted from 'Understanding Biology: Through Problem Solving' by TH Hoey, Nelson Thornes, ISBN-0216929385

The table shows the results of the experiment.

Colour of light	Number of bubbles produced in 10 minutes
Violet	80
Blue	110
Green	40
Yellow	50
Red	90

(i) Scale the axes below and draw a **bar chart** to show these results.



[4]

(ii) Suggest why measurements were only taken after the pondweed had been left for five minutes in each individual colour of light.

_____

_____ [1]

Examiner Only

Marks	Remark

(iii) Give **one** factor that should be kept constant during the experiment.

_____ [1]

(iv) The photograph shows a geranium plant.



Source: Principal Examiner

Using the results from the experiment, explain why a grower would use blue light to maximise profit when growing geraniums.

_____

_____

_____

_____

_____ [3]

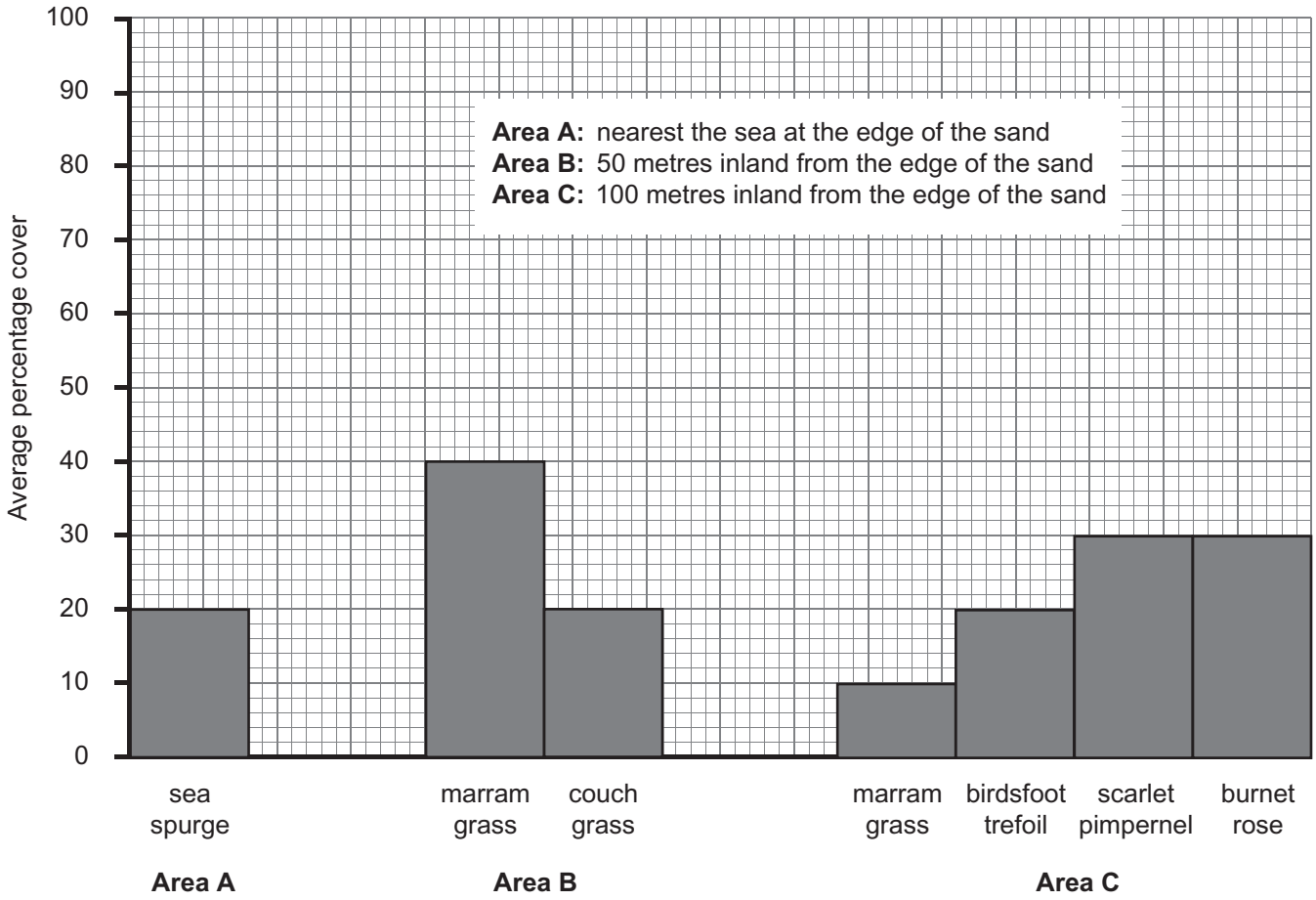
Examiner Only	
Marks	Remark

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(Questions continue overleaf)

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7 **(a)** Pupils carried out an investigation into plant distribution and physical (abiotic) factors on sand dunes in April. The graph below shows their results for the plant distribution.



(i) Give **two** trends shown by the graph across the three areas.

1. _____

2. _____ [2]

(ii) Suggest **one** explanation for these trends.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

(b) Describe how the pupils would have carried out this investigation into plant distribution. Your account should describe how they would have measured **one** physical factor.

In this question you will be assessed on your written communication skills, including the use of specialist science terms.

[6]

(c) The pupils also collected snails in the different areas of the dunes. The results from one group of pupils are given in the table.

Area A	Area B	Area C
5	8	15

(i) Suggest why the pupils found most snails in **Area C**.

[1]

(ii) If the pupils repeated the experiment in June, suggest why they would have found more snails in all the areas.

[1]

THIS IS THE END OF THE QUESTION PAPER

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112941

New Specification

Rewarding Learning

General Certificate of Secondary Education
2011–2012

Double Award Science: Biology

Unit B1

Foundation Tier

[GSD11]

TUESDAY 15 MAY 2012, MORNING

MARK SCHEME

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			AVAILABLE MARKS
1	**(a)**	Any three from: • Large surface area • Moist • Thin/short diffusion distance/one cell thick • Good blood supply/capillary close to alveoli • Porous/permeable [3]	
	(b)	B – less oxygen or more CO_2/B only 16% O_2 [1]	
	(c)	to (provide) energy [1]	5
2	**(a)**	destarch/remove all starch/show any starch found was produced during the experiment/use up starch [1]	
	(b)	to kill them/stop reactions/remove waxy cuticle/stop photosynthesis/ stop respiration at both ends; stop resp. [1]	
	(c)	leaf A is blue black; at both ends starch present; where covered/centre of leaf A is yellow/brown, no starch here; [3] Leaf B – yellow brown; as no CO_2 no photosynthesis/no starch made [2]	7
3	**(a)**	**(i)** lipase [1]	
		(ii) lipid/oil/fat/substrate + enzyme (lipase) (both needed for mk) [1]	
		(iii) Any two from: • Volume of solution/fat/concentration/volume of water/amount substrate/amount of substances • Concentration of enzyme/volume of enzyme • At the required temperature BEFORE MIXING • pH [2]	
		(iv) fatty acids and glycerol [2]	

AVAILABLE MARKS

(v) Indicative content

- Enzyme 1 works best/has optimum temperature @ 30 °C;
- Enzyme 2 works best/has optimum temperature @ 40 °C;
- Enzyme 1 works fastest at all temperatures;
- Enzyme 2 very slow to break down fat @ 60 °C/only breaks down some fat @ 60 °C/within washing cycle;
- Because it is denatured;
- Enzyme 1 works slowest @ 60 °C;
- Because it is denatured; (only award denatured mark **once**)
- At low temperatures Enzyme 1/2/both enzymes work slowly;
- Because of fewer collisions/less kinetic energy/of the molecules
- Save energy/money using Enzyme 1;
- Enzyme 1 is more thermostable/Enzyme 2 less thermostable;

Response	**Mark**
Candidates must use appropriate specialist terms throughout using at least 5 of the above points to describe the properties of the two enzymes and explain with reasons which one should be added to washing powder. Candidates use good spelling, punctuation and grammar and the form and style are of a high standard.	[5-6]
Candidates must use some appropriate specialist terms throughout using at least 3 of the above points to describe the properties of the two enzymes and explain with reasons which one should be added to washing powder. Candidates use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3-4]
Candidates describe one or two of the properties of the enzymes or explain with a reason which one should be added to washing powder. They use limited spelling punctuation and grammar and they have made little use of specialist terms.	[1-2]
Response not worthy of credit	[0]

[6]

(b) **(i)** amylase [1]

(ii) amylase is substrate specific/lock + key/amylase is specific to starch/shapes are not complementary/active site doesn't match [1]

(iii) use Benedicts; + heat; [3]
blue to brick red (need both)

17

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				AVAILABLE MARKS
4	**(a)**	**(i)**	phototropism/tropism [1]	
		(ii)	hormone [1]	
	(b)		unequal distribution of auxin/more auxin on shaded side/auxin moves away from light; causes more **elongation** of cells on side away from light/more growth/ faster growth. [2]	
	(c)	**(i)**	insulin [1]	
		(ii)	liver [1]	
		(iii)	Insulin is carried in the blood/auxin is carried through cells/ diffuses [1]	7
5	**(a)**	**(i)**	(over time) level of CO_2 is rising/CO_2 increases [1]	
		(ii)	from graph 398–400 [1]	
	(b)		indicator (species) [1]	
	(c)		warmer waters; due to global warming/climate change OR colonisation introduced by man; explanation of how colonisation occurred e.g. boat/travel/drift [2]	
	(d)	**(i)**	sun/sunlight [1]	
		(ii)	Any 2 from 3 minerals taken up by phytoplankton; used to produce amino acids/protein; growth; [2]	
		(iii)	[phytoplankton → herring] [→ gulls; → sea lions; → humpback whales] *1 mk* *1 mk* if arrows missing or wrong direction max 1 [2]	
		(iv)	decrease in sea lions; because there is decrease in herrings/food [2]	12

			AVAILABLE MARKS
6	**(a)**	CO_2/carbon dioxide; ⟶ O_2/oxygen [2]	
	(b) **(i)**	x axis: colours as bars equal width and labelled; x axis: space between bars; correct scaling on y axis – more than half the axis used must start at 0 correct plots of bars [4]	
	(ii)	adjust to the colour of light/ equilibrate/acclimatise to that colour/time for steady stream of bubbles [1]	
	(iii)	any one from: • amount pondweed • concentration of carbonate in water/concentration of CO_2 • temperature (of water) • amount of water in beaker/solution • intensity of the light/same distance from light [1]	
	(iv)	more gas bubbles produced/more O_2 produced; shows more photosynthesis; more yield/faster growth/bigger/more growth; [3]	11

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AVAILABLE MARKS

7 **(a)** **(i)** more plant *species*/different types of plant/more variety of plants at area C than at A or B or converse
higher total % cover as you go inland; or converse (lowest % cover near sea) [2]

(ii) Any one from:
- too much wind at A/less wind at C
- lack soil/minerals at A/more at C
- lack fresh water at A/more at C
- soil pH at A different from C
- warmer inland
- too salty at A
- plants can be washed away by tides [1]

(b) Indicative content
- Use quadrat
- Identify plant species in each quadrat
- Use a key to identify species
- Estimate *% cover* for each plant species in each quadrat
- Carry out at three areas (or at A, B and C)/line transect/belt transect
- *Repeat* (for reliability)/use class results
- Describe how to measure a physical factor i.e. method wind gauge/anemometer/thermometer/temp probe/light meter/rain gauge/measuring cylinder/pH meter/pH probe/dry mass of soil
- Record/write down results
- Name a physical factor – wind/temp/light/water/pH /rain/soil factors

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Response	Mark
Candidates must use appropriate specialist terms throughout, using at least 5 of the above points, to describe how they would have carried out this investigation and explain, in a logical sequence how the pupils would have obtained these results. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5-6]
Candidates must use some appropriate specialist terms, using 3 or 4 of the above points, to describe how they would have carried out this investigation and partially explain, in a logical sequence, how the pupils would have obtained these results. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3-4]
Candidates describe using 1 or 2 of the above points how they would have carried out this investigation or explain how the pupils would have obtained these results using some or all of the above points. However these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1-2]
Response not worthy of credit	[0]

[6]

(c) (i) more food/plants/species in area C/more cover provided by plants/further away from sea/tide/less salty/less wind/less chance of drying out [1]

(ii) plants have grown more/warmer/snails reproduced [1]

Total

AVAILABLE MARKS
11
70

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New Specification

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Double Award Science: Biology

Unit B1

Foundation Tier

[GSD11]

MONDAY 27 FEBRUARY 2012
9.30 am–10.30 am

MARK SCHEME

STEMUP.CO.UK

AVAILABLE MARKS

1

Feature \ Animal Group	Annelids	Insects	Chordates
Backbone	✗	✗	✓
Chaetae	✓	✗	✗
Exoskeleton	✗	✓	✗

One mark for each correct column [3] — 3

2 **(a)** large surface area/extension
(accept description, allow pores) [1]

(b)

Mineral	Function
Calcium	cell walls/cements cell walls together (**not** makes cellulose)
Nitrogen	amino acids/proteins (**not** growth)
Magnesium	chlorophyll/helps photosynthesis/ stops leaves going yellow

[3]

(c) Advantages – Any two from (all points relate to FYM):

- FYM is cheaper
- makes use of an animal byproduct or "waste"
- helps retain soil moisture
- slow release of nutrients
- improves soil structure or improves drainage or improves crumb structure or adds humus to the soil
- free/costs less
- organic
  (Do **not** accept: natural is not harmful to the environment, can only be spread at certain time of the year/time of application)

Disadvantages – Any two from (all points relate to FYM):

- FYM is smelly **or** mucky to apply
- the nutrient content varies or is not known as precisely
- slow release of nutrients i.e. not fast enough for the crop to grow
- uses up more space for storage than bags of artificial fertiliser
- seepage from storage pits can cause water pollution
- more difficult to apply or takes longer to put out manure
- don't know nutrient content
- don't know what is in it/might have harmful bacteria
- could be harmful to the environment/seepage/run-off
- FYM not as readily available [4] — 8

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		AVAILABLE MARKS
3	**(a)** Any two from: ● hormone is a chemical messenger/signal ● produced by a gland ● that is carried in the bloodstream/blood ● to the target organ where it acts [2]	
	(b) insulin is produced in the pancreas [1]	
	(c) glucose converted to glycogen (**not** glycerol); more glucose respired/increased respiration; stores fat max [2]	5
4	**(a)** **(i)** electricity generated and Residential and Transport (all three needed for mark) [1]	
	(ii) $\frac{400}{4200} \times 100 = 9.5\%$ decrease Correct answer – award 2 marks (400 = 1 mark /4200 × 100 = 1 mark) [2]	
	(iii) more houses use natural gas/double glazing/cavity wall insulation/ roof insulation/roof solar panels/less coal fires/less fossil fuels/ using more renewable/more efficient/conserve energy/become more economical/people more aware (Do **not** accept: milder winters, global warming) [1]	
	(iv) graph B shows a steady increase (in the percentage of electricity from renewable sources); this means less fossil fuels being burned to generate electricity; so the Electricity generated data (Graph A) show a decrease in carbon dioxide emissions between 2000 and 2008/Graph A less electricity generated/less CO_2 produced from 2000 to 2008/less CO_2 produced because more coming from renewable [3]	
	(b) non-living/physical factors (Do **not** accept an example on its own such as wind etc) [1]	
	(c) Any two from: ● carbon dioxide (and other greenhouse gases) act as a blanket/ acts as a greenhouse (Do **not** accept: ozone, hole in ozone layer) ● allow sun's rays to reach the Earth's surface ● but prevent the escape of heat from the Earth's surface/traps heat/keeps heat/traps sunlight/prevents sun's rays from leaving ● hence the temperature of the atmosphere and Earth's surface increases [2]	
	(d) to set targets to reduce global warming/so that not too much pollution/ to check or reduce or prevent global warming/prevent climate change/ in case there is an increase accept a consequence such as melting polar ice caps [1]	11

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		AVAILABLE MARKS
5	**(a)** (biological) catalyst/speeds up rate of reaction or break down (Do **not** accept example on its own) [1]	
	(b) **(i)** amylase [1]	
	(ii) lock and key model [1]	
	(c) **(i)** test tube A at 5 mins, protease had broken down/digested all the egg **or** fastest reaction in A **or** only took 5 minutes to work in A; digestion works best at pH 2 i.e. acid condition (as in stomach) **or** works best in acid conditions **or** works best in similar conditions to stomach [2]	
	(ii) test tube B at 20 mins, the protease had broken down/digested all the egg **or** took longer to react in B **or** only changed after 20 minutes; pH 7 is not the optimum for the enzyme **or** protease can only work in acid conditions [2]	
	(iii) test tube C boiling denatures protease; protein is not broken down/purple shows protein not digested/ protein remains [2]	
	(Additional mark available for part **(c)** – but allow only one in **(i)**, **(ii)** or **(iii)**) purple colour shows protein present/blue colour is that of Biuret **or** blue colour means that no protein present (allow once only)	9
6	**(a)** **(i)** lots of alveoli/air sacs present; (large surface area) for oxygen to diffuse into the blood/carbon dioxide to diffuse out/more gas exchange [2]	
	(ii) Any two from: ● thin/wall is one cell thick/thin cells ● moist ● permeable ● good blood supply/capillaries ● diffusion gradient/well ventilated/expand [2]	
	(b) glucose + oxygen – 1 mark each (either order) [2]	

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(c) Indicative content

- record the initial temperature of the water (in °C)
- set the food alight/burn the food/use Bunsen to set on fire/ heat food sample/burn food completely/relight food if goes out (ignore reference to time)
- hold burning food sample (a set distance) under the test tube
- stir water using stirrer
- record the final temperature of the water
- calculate the temperature increase of the water
- repeat with other food sample
- use same volume of water/same amount of stirring/hold food same distance from test tube
- repeat with biscuits/cheese (must be replicates)
- if replicates – then allow point of working out average temperature rise
- use balance to weigh foods
- measure water with measuring cylinder

Response	**Mark**
Candidates must use appropriate specialist terms throughout using at least 5 of the above points to describe how they would collect data and explain, in a logical sequence, how they would calculate and compare the energy released from equal masses of biscuit and cheese. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
Candidates must use some appropriate specialist terms throughout using 3 or 4 of the above points to describe how they would collect data and partially explain, in a logical sequence, how they would calculate and compare the energy released from equal masses of biscuit and cheese. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
Candidates describe using 1 or 2 of the above points how they would collect data or explain how they would calculate and compare the energy released from equal masses of biscuit and cheese using some or all of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1–2]
Response not worthy of credit.	[0]

[6] 12

AVAILABLE MARKS

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	AVAILABLE MARKS

7 **(a)** Any three from:

- men up to age 44 years higher cholesterol than women/younger men have higher cholesterol than women (comparison needed)
- from age 45 years and older women always have higher cholesterol than men/older women have higher cholesterol than men
- cholesterol increases in men up to 55–64 years then declines
- cholesterol increases in women up to 55–64 years then declines
- women have higher cholesterol levels when older
- 55–64: highest cholesterol levels for both **or** both same at 16–24

[3]

(b) reference to graph Y: increasing circulatory illnesses;
reference to graph X: because of increasing cholesterol levels; [2]

(c) Any two from:

- obesity
- high blood pressure
- diabetes

(Do **not** accept: heart disease, strokes) [2]

7

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AVAILABLE MARKS

8 **(a)** **(i)** more species in grassland A/more types of plants/more flowers (do **not** accept: more plants) [1]

(ii) soil moisture/soil fertility or nutrient status/soil pH/temperature (do **not** accept: light) [1]

(b) Indicative content

- for grassland A, set down two tape measures at right angles
- generate random co-ordinates (random number tables or computer)/throw at random
- set quadrat
- record number of plant species within the quadrat/record types of plants (**not** % cover)
- identify plant species/use keys
- record/write down the results
- repeat/throw several times
- divide total numbers (in each quadrat) by number of quadrats/ calculate average number of species per quadrat
- repeat for grassland B/other area [6]

Response	**Mark**
Candidates must use appropriate specialist terms throughout using at least five of the above points to describe how they would have carried out this investigation and explain, in a logical sequence, how the pupils would have obtained these results. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
Candidates must use appropriate specialist terms throughout using 3 or 4 of the above points to describe how they would have carried out this investigation and partially explain, in a logical sequence, how the pupils would have obtained these results. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
Candidates describe using 1 or 2 of the above points how they would have carried out this investigation or explain how the pupils would have obtained these results using some or all of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1–2]
Response not worthy of credit.	[0]

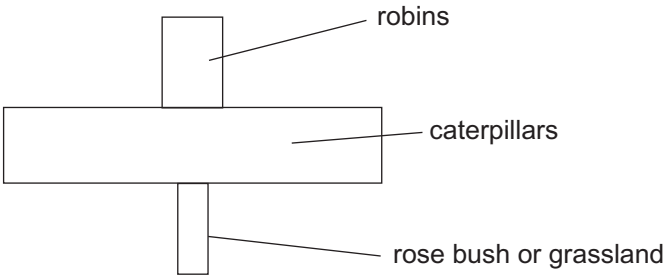
(c) (i) net/sweep net [1]

(ii) Any two from:

- grassland A has more flowering plants (photograph) or higher biodiversity (bar chart);
  (accept reference that A has more flowers or more plants than B)
- so more nectar sources/more food
- so more butterflies [2]

(d) (i) pyramid of numbers

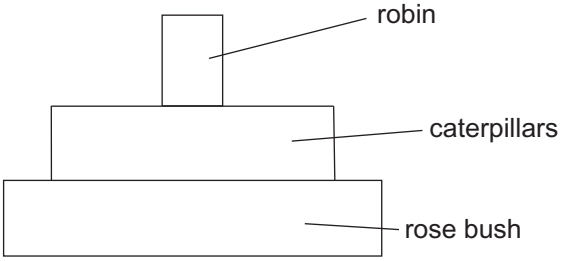
robin	slightly wider bar than for rose bush
caterpillar	widest bar
rose bush	narrowest bar



(1 mark for rose bush narrowest at the bottom or 1 mark if no labels;
2nd mark for caterpillars bigger than robins, and robins need to be bigger than rose bush) [2]

(ii)

robin	narrower bar than for caterpillar
caterpillar	narrower bar than for rose bush
rose bush	widest bar



1 mark rose bush widest at bottom;
1 mark caterpillar wider than robin,
1 mark correct but no labels. [2]

15

Total **70**

AVAILABLE MARKS

New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Double Award Science: Biology

Unit B1

Foundation Tier

[GSD11]

TUESDAY 8 NOVEMBER 2011
1.30 pm–2.30 pm

GSD11

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

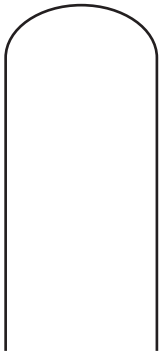
The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in **questions requiring extended answers**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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Examiner Only	
Marks	Remark

1 The diagram shows a shoot tip of a plant before an experiment is carried out. Shoot tips respond to light by growing towards it. A hormone is produced in the tip that causes growth. Bending towards the light occurs because there is more hormone on the shaded side. This causes the cells to become more elongated.



shoot tip before experiment

shoot tip after experiment

(a) Use your knowledge and the information above to draw another shoot tip to show:

(i) its growth (after one week) with light coming from one direction. Mark the light direction on your diagram with an arrow. [2]

(ii) inside your drawn shoot tip, show two plant cells, one on each side of the shoot tip. [2]

(b) Name the hormone that causes this growth response.

_____ [1]

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Examiner Only	
Marks	Remark

2 **(a)** The list below gives some of the steps that are used to test a leaf for starch but they are not in the correct order.

A add iodine onto the leaf to test for starch

B put the leaf in boiling alcohol

C leaf placed in hot water

D leaf placed in boiling water

E leaf spread out on a white tile

(i) Use the letters to give the correct order for the steps when carrying out the starch test.

_____ _____ _____ _____ _____ [1]

(ii) Why is the leaf placed in boiling alcohol?

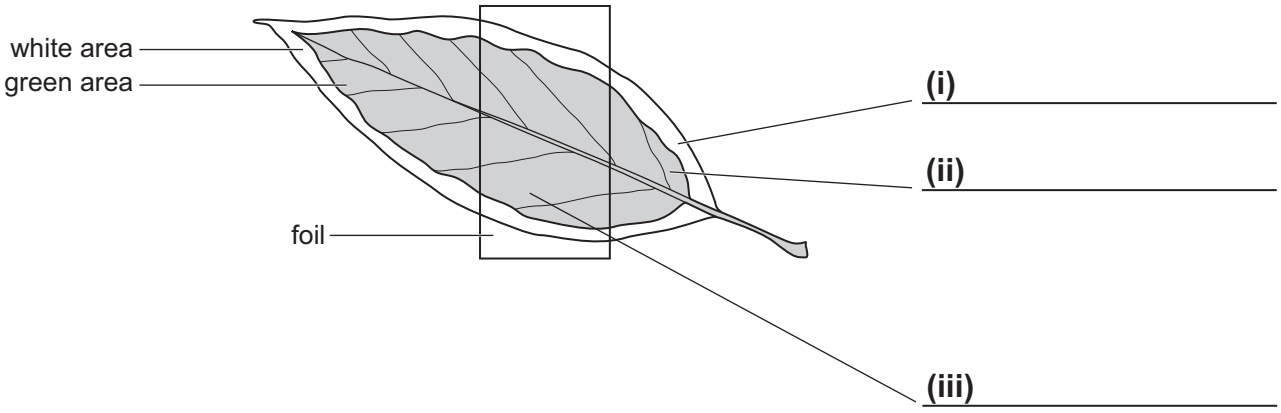
_____ [1]

(iii) Why is the Bunsen burner switched off during step B?

_____ [1]

(b) The diagram shows a variegated leaf used to show that light and chlorophyll are needed for photosynthesis.

Write on the answer lines the colours you would expect when the starch test has been carried out on this variegated leaf from a plant that had been exposed to sunlight for several days.



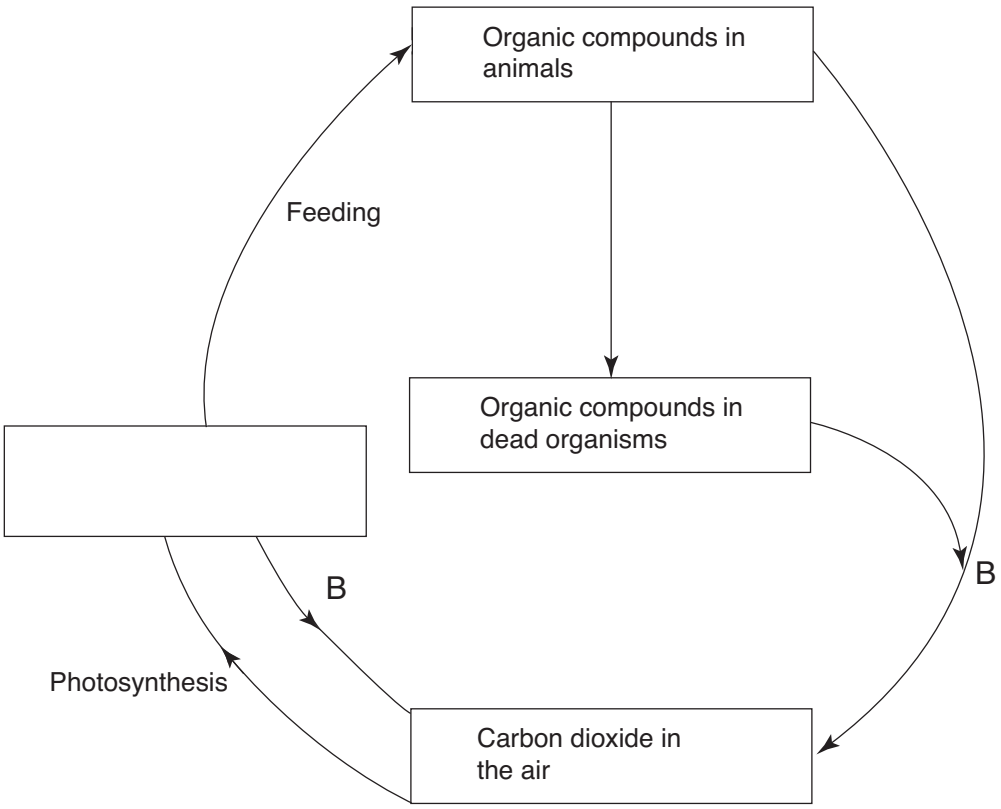
[3]

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Examiner Only	
Marks	Remark

3 **(a)** The diagram shows a carbon cycle.



(i) Complete the diagram by filling in the empty box. [1]

(ii) Name process B.

_____ [1]

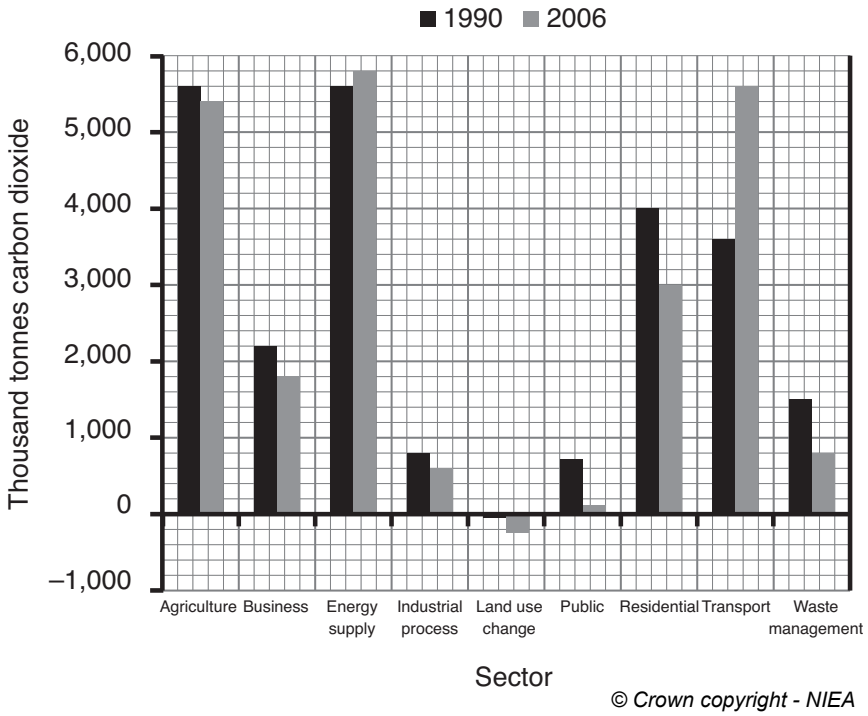
(iii) Name **two** organic compounds found in a plant.

_____ and _____ [2]

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Examiner Only	
Marks	Remark

(b) Carbon dioxide is a greenhouse gas. The graph shows the levels of greenhouse gas emissions from different sources in Northern Ireland in 1990 and 2006.



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Use the information in the graph and your knowledge to answer the following questions.

(i) What are the **three** main sectors that contributed to greenhouse gas emissions in 2006?

_____ _____ _____ [1]

(ii) What is the general trend for greenhouse gas emissions in the time period from 1990 to 2006? Give any examples of exceptions to this trend.

_____

_____

_____ [2]

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(iii) Suggest **one** reason why it is difficult to reduce greenhouse gas emissions.

_____ [1]

(iv) Why is it important to monitor greenhouse gas emissions?

_____ [1]

(v) Explain **one** harmful consequence of global increases in greenhouse gases on:

climate _____ [1]

plants _____

_____ [1]

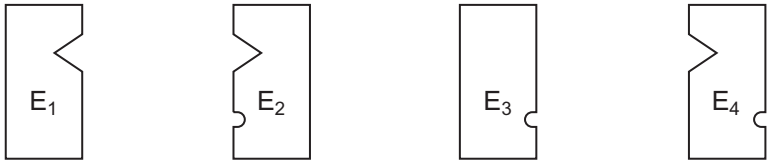
Examiner Only	
Marks	Remark

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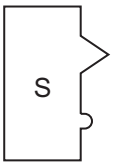
Examiner Only	
Marks	Remark

4 **(a)** The diagrams show a substrate along with several enzymes and possible products. The letters E, S and P refer to enzyme, substrate and product respectively.

Enzymes:



Substrate:



Possible products:



(i) From the diagrams pick the enzyme that would react with the substrate.

_____ [1]

(ii) Choose from the diagram the products that would be formed when the substrate reacted with the enzyme.

_____ and _____ [2]

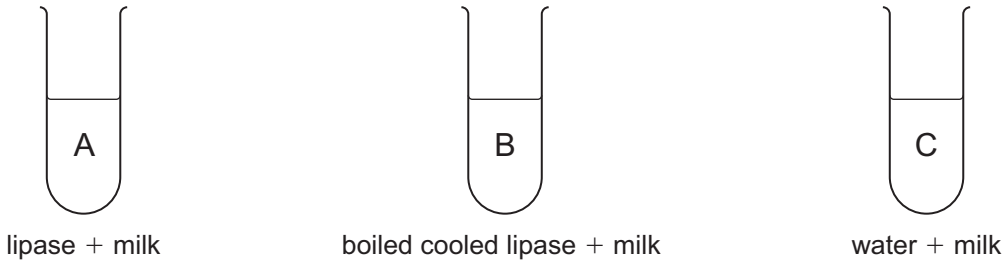
(iii) Name this model of enzyme action.

_____ [1]

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(b) Louise carries out an experiment to test the effect of lipase on the fat in milk.

Three test tubes were placed in a water bath at 30 °C for 20 minutes and then samples were removed from the test tubes and their pH tested. The results are shown in the table.



Results

A	B	C
pH 5	pH 7	pH 7

Describe and account for Louise's results for test tubes **A**, **B** and **C**.

In this question you will be assessed on your written communication skills, including the use of specialist science terms.

[6]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** The table gives figures for Conor's blood glucose levels during part of a day.

Time	Blood glucose level/mg/100 ml
7 am	90
9 am	120
10 am	90
11 am	110
12 am	90
2 pm	140

Use the information in the table and your knowledge to answer the following questions.

(i) What is Conor's normal (resting) blood glucose level?

_____ mg/100 ml blood [1]

(ii) Suggest an explanation for Conor's blood glucose levels at 9 am and at 2 pm.

9 am _____

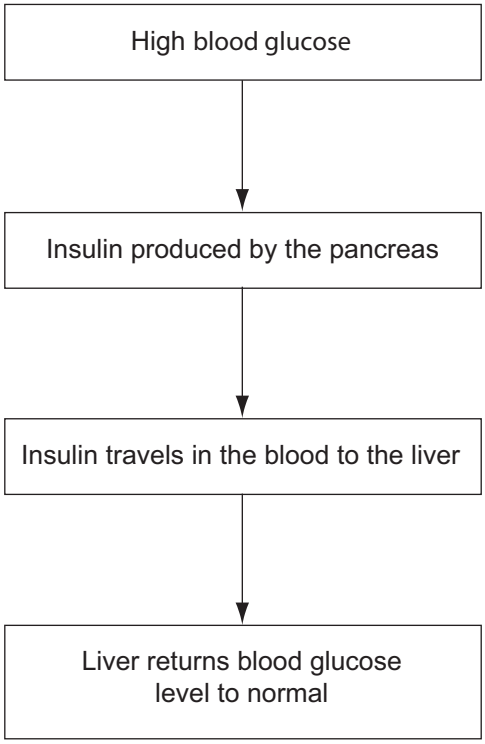
_____

2 pm _____

_____ [2]

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(b) The diagram shows the mechanism for controlling blood glucose levels.



(i) Use the diagram and your knowledge to explain how high or rising blood glucose levels are controlled by the body.

_____

_____

_____

_____

_____ [3]

(ii) Diabetes is a condition in which the blood glucose control mechanism fails. Give two symptoms of diabetes.

1. _____

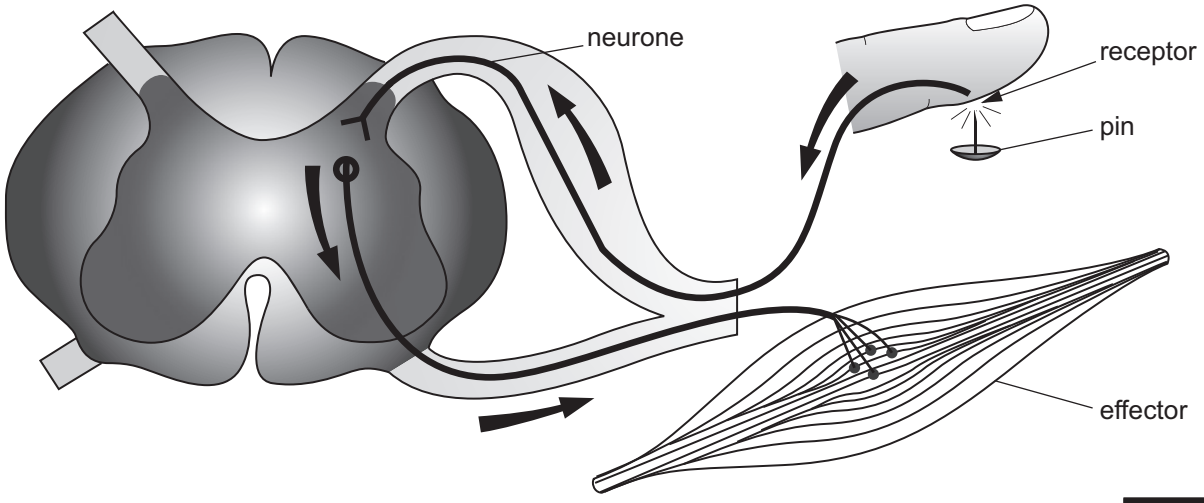
2. _____ [2]

Examiner Only

Marks	Remark

(c) The diagram shows the body's response to a finger touching a sharp object.

Use the diagram and your knowledge to answer the questions that follow.



Examiner Only	
Marks	Remark

(i) What body system is involved in this process?

_____ [1]

(ii) Name the effector in the diagram.

_____ [1]

(iii) What part of the body coordinated the response to this stimulus?

_____ [1]

(iv) Compare and contrast the body's response to the pin and to high blood glucose levels.

_____

_____

_____ [2]

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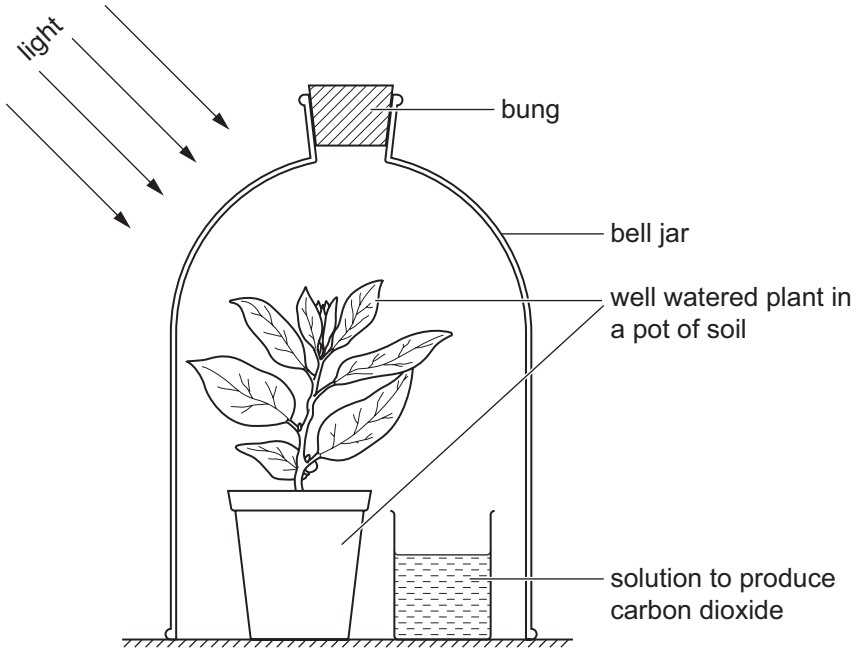
(Questions continue overleaf)

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Examiner Only	
Marks	Remark

6 The diagram shows an investigation into how carbon dioxide levels affect plant growth.

The apparatus was set up with six plants of the same size and mass (75 g) but the plants were given different levels of carbon dioxide.



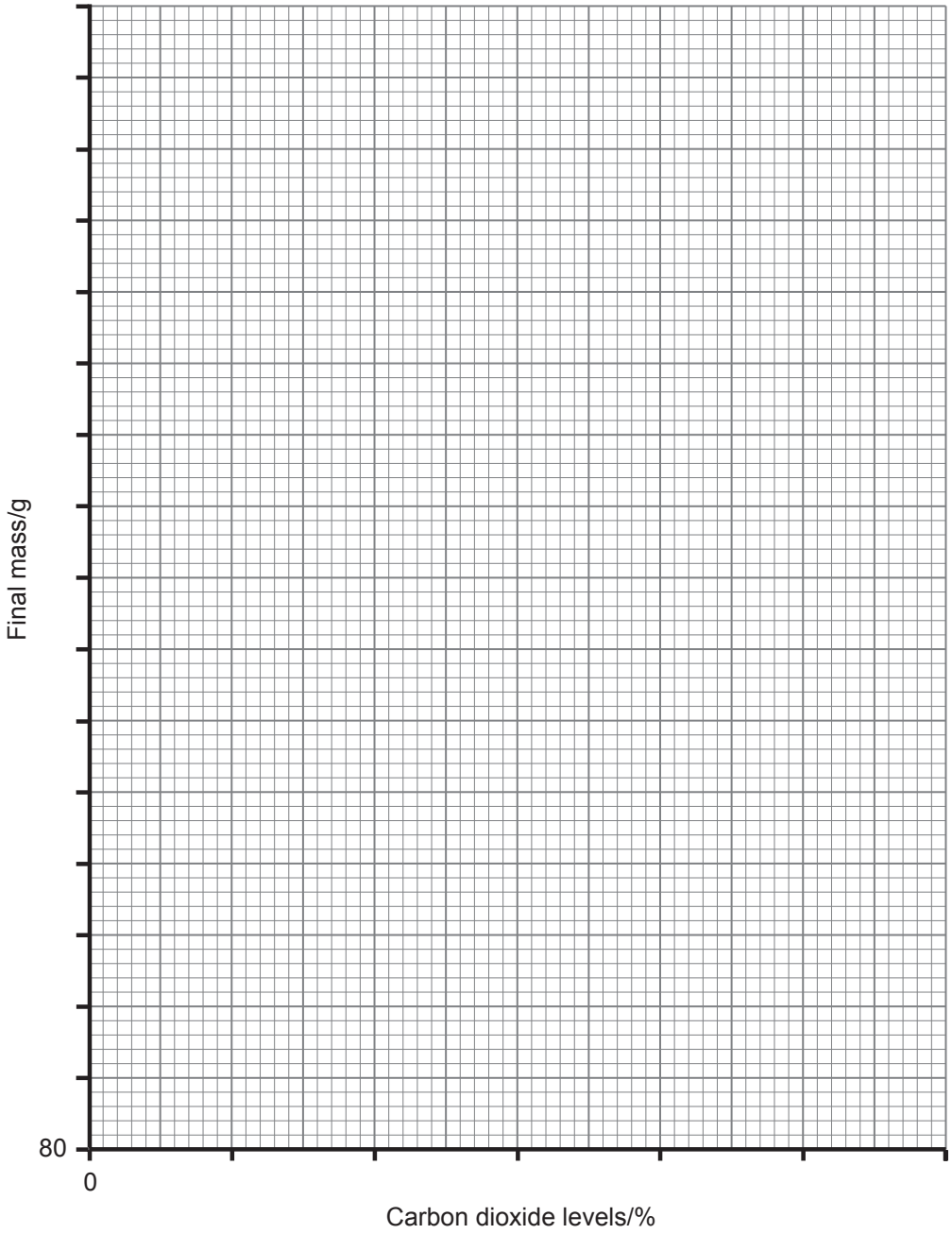
After one week the plants were reweighed and they all had increased in mass. The final mass of each plant was recorded as shown in the table.

Final mass/g	80	84	88	90	95	80
Carbon dioxide levels/%	0.01	0.02	0.03	0.04	0.05	0.06

(a) (i) Plot these results and draw a line graph on the grid opposite.

(You will need to complete the scales in both axes.)

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[4]

(ii) Using evidence from the graph state the optimum (best) carbon dioxide level for plant growth.

_____ [1]

(iii) Normal atmospheric levels of carbon dioxide are 0.04%. Comment on the plant's growth at atmospheric levels of carbon dioxide.

_____ [1]

Examiner Only	
Marks	Remark

(b) (i) Name **one** factor that should have been kept constant during the experiment.

_____ [1]

(ii) Why could you only use this apparatus for a limited period of time?

_____ [1]

(iii) Explain why the plants have increased in mass during the experiment.

_____

_____ [2]

Examiner Only	
Marks	Remark

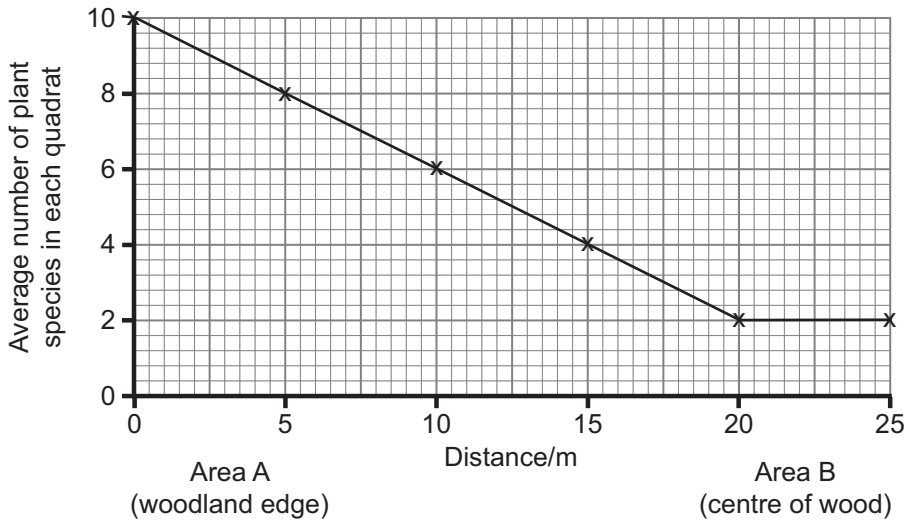
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Examiner Only	
Marks	Remark

7 The graph shows the results obtained by a class during a woodland investigation.



(a) The pupils sampled plants across an area of woodland from Area A (woodland edge) to Area B (centre of wood) and then calculated the average number of plant species/quadrat at 5 m intervals.

(i) Describe the trend shown on the graph from Area A to Area B.

_____ [1]

(ii) Suggest **one** environmental condition that could account for the difference in the results between Area A and Area B.

_____ [1]

(b) Describe how the pupils would have carried out this investigation and explain how they would have obtained these results.

In this question you will be assessed on your written communication skills, including the use of specialist science terms.

_____

_____

_____

_____

_____

_____

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[6]

(c) The table gives the numbers of organisms from a woodland food chain.

Plants → Aphids → Spiders → Beetles

Name of organism	Numbers
Beetles	6
Spiders	50
Aphids	2000
Plants	10

(i) Sketch a pyramid of biomass for this food chain in the space below. Label each trophic level with the name of the organism.

[2]

(ii) Suggest **one** problem in obtaining accurate numbers of animals in this food chain.

[1]

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Examiner Only	
Marks	Remark

(d) To obtain the total number of spiders their numbers were recorded in an area of 0.25 m^2 and the process repeated ten times across the woodland.

The results were as follows:

Sample number	1	2	3	4	5	6	7	8	9	10
Numbers of spiders/0.25 m^2	5	3	2	1	8	7	10	4	6	4

(i) Calculate the average number of spiders per 0.25 m^2. Show your working.

_____ per 0.25 m^2 [1]

(ii) Using this information calculate the average number of spiders per m^2.

_____ per m^2 [1]

(iii) In a similar study two months later the spider population was found to be four per m^2.

Suggest two environmental factors which could account for the change in the population size.

1. _____

2. _____ [2]

THIS IS THE END OF THE QUESTION PAPER

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111996

New Specification

Rewarding Learning

General Certificate of Secondary Education
2011–2012

Double Award Science: Biology

Unit B1

Foundation Tier

[GSD11]

TUESDAY 8 NOVEMBER 2011
9.30 am–10.30 am

MARK SCHEME

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					AVAILABLE MARKS
1	**(a)**	**(i)**	light coming from one side – not above; tip bent towards the light	[2]	
		(ii)	2 cells drawn, one bigger than the other, near top; bigger cell on side away from light	[2]	
	(b)		auxin	[1]	5
2	**(a)**	**(i)**	order D B C E A	[1]	
		(ii)	remove chlorophyll/decolourise/remove green colour	[1]	
		(iii)	alcohol flammable	[1]	
	(b)	**(i)**	yellow/brown;	[1]	
		(ii)	blue/black;	[1]	
		(iii)	yellow/brown	[1]	6
			for **(b)** accept either colour on its own		
3	**(a)**	**(i)**	(organic compounds) in plants/glucose/starch	[1]	
		(ii)	respiration not decomposition	[1]	
		(iii)	Any **two** from: • protein • sugar or glucose • sucrose • starch • cellulose • chlorophyll • lipids or fat • vitamins not minerals	[2]	
	(b)	**(i)**	energy, transport and agriculture	[1]	
		(ii)	decreases from 1990–2006/increases from 2006 to 1990; exceptions transport and energy (both needed)	[2]	
		(iii)	increased use of transport/increased energy consumption/ removal of forests	[1]	
		(iv)	so that know what the levels are/see changes/so that can regulate/to meet targets/global warming	[1]	
		(v)	floods/coastal erosion/arctic ice melts/changing weather patterns; too hot/too cold/too wet/drought/too stormy – for current plant growth	[1] [1]	11

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4 (a) (i) E2 [1]

(ii) P1; and P4 [2]

(iii) Lock and key [1]

(b) Indicative content

A:
- lipase has broken down fats/lipase reacts with fat;
- fatty acids produced;
- lower pH/acidic (**not** pH5 on its own)

B:
- heat has denatured the enzyme/lipase; *(not killed enzyme)*
- fats not broken down/no fatty acids produced;
- pH stays same (**not allow** pH is neutral on its own, **not** pH7)

C:
- no lipase present/no enzymes present
- fats not broken down/no fatty acids produced;
- pH stays the same as start – (but only award once in B or C **not both**, **not** pH7) [6]

AVAILABLE MARKS

10

Response	Mark
Candidates must use appropriate specialist terms throughout to describe the results they would expect and account for the results, using at least 5 of the above points in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	5–6
Candidates must use some appropriate specialist terms to describe the results they would expect and partially account for these results, using at least 3 of the above points in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	3–4
Candidates describe one of the results they would expect or account for one of these results, using at least one of the above points. However, these may not be presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	1–2
Response not worthy of credit.	0

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					AVAILABLE MARKS
5	**(a)**	**(i)**	90 mg/100 ml	[1]	
		(ii)	eaten meal; bigger meal/more sugar in lunch than breakfast/ bigger meal	[2]	
	(b)	**(i)**	insulin is involved in control; and conversion of glucose to glycogen/stored as glycogen; this lowers blood glucose levels. max [3]	[3]	
		(ii)	Any **two** from: • high blood glucose • glucose in urine • lethargy • thirst • coma • frequent toilet visits • weight loss	[2]	
	(c)	**(i)**	nervous	[1]	
		(ii)	muscle	[1]	
		(iii)	CNS/spinal cord (**not** brain)	[1]	
		(iv)	pin/nervous – faster/blood glucose slower; method of transmission – nerves and hormones in blood; response in nerves is specific to one site/response in hormones may have several sites.	[2]	13
6	**(a)**	**(i)**	Scale on x axis written in; Scale on y axis written in; (more than $\frac{1}{2}$ axis used) 6 points all correctly plotted; Straight line joins points; (line must **not** start at origin)	[4]	
		(ii)	0.05%	[1]	
		(iii)	Lower than optimum (higher than when grown at higher or lower levels of CO_2)/grows faster at 0.05	[1]	
	(b)	**(i)**	Amount of soil/water/minerals/temperature/sunlight/amount of solution (**not** time, **not** CO_2)	[1]	
		(ii)	CO_2 would be depleted/run out/used up (**not** water run out, **not** allow plant too big)	[1]	
		(iii)	Plants have photosynthesised/fixed CO_2; then produced sugars/ starch/protein/other organic compounds (**not** food, **not** grow)	[2]	10

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AVAILABLE MARKS

7 **(a)** **(i)** more species in quadrats in area A than B [1]

(ii) light/water level/pH levels/type of soil/mineral levels/rain/ temperature [1]

(b) Indicative content

- set out (belt) transect/line/or put down tape measure;
- use quadrats;
- identify plant species;
- use a key (to identify species);
- count the number of (different) species in each quadrat;
- repeat at (5 m) intervals across the transect;
- work out the average/mean;
- record/write results down; [6]

Response	Mark
Candidates must use appropriate specialist terms throughout to describe how they would have carried out this investigation and explain how the pupils would have obtained these results, using at least 5 of the above points in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	5–6
Candidates must use some appropriate specialist terms throughout to describe how they would have carried out this investigation and partially explain how the pupils would have obtained these results, using at least 3 of the above points in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	3–4
Candidates describe how they would have carried out the investigation, using at least 1 of the above points. However these may be presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	1–2
Response not worthy of credit.	0

(c) **(i)** plants at bottom and widest bar labelled;
rest in correct order and progressively smaller bars; [2]
Allow [1] for all labels correct but triangle drawn.

(ii) animals move/animals, e.g. aphids small and difficult to count [1]

(d) **(i)** 5 [1]

(ii) $5 \times 4 = 20$ [1]
apply CM

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		AVAILABLE MARKS
(iii) Any **two** from: • colder • wetter • more predators • plants died or aphids died • disease	[2]	15
	Total	**70**