



General Certificate of Secondary Education 2012

Biology

Unit 1

Higher

[GBY12]



WEDNESDAY 30 MAY, AFTERNOON

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Use blue or black ink. Write your Centre Number and Candidate Number in the spaces provided at the top of this page. Answer **all twelve** questions in the spaces provided.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100. 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 **4**, **7(c)** and **12(c)**.

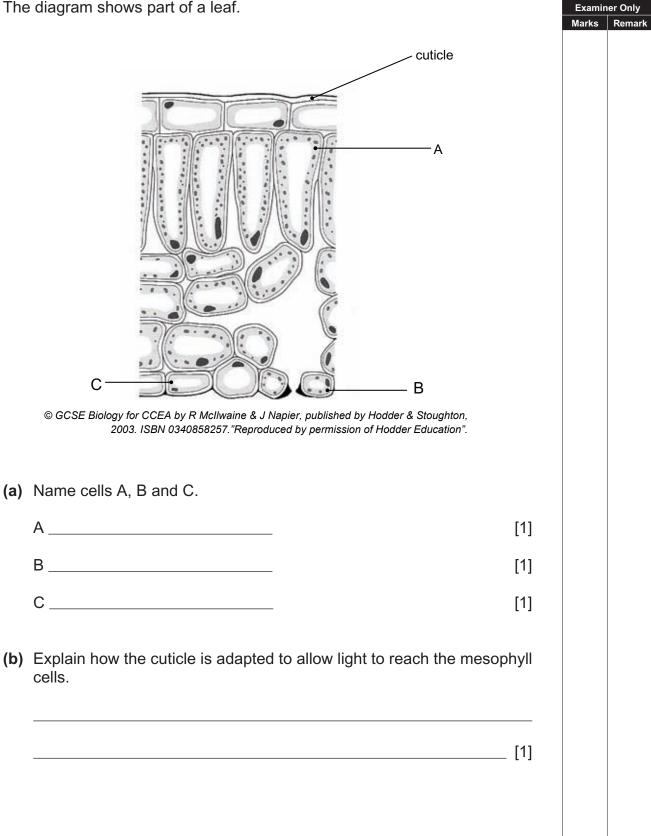


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For Examiner's use only		
Question Number	Marks	
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
Total Marks		

StudentBounty.com

1 The diagram shows part of a leaf.



- **2** The nervous and hormonal systems carry information from one part of the body to another.
 - (a) Describe how the nervous and hormonal systems differ in the type of signal they use.

Nervous	[1]
Hormonal	[1]

(b) The table shows the relationship between the diameter of a neurone and the speed of conduction.

Organism	Neurone diameter/µm	Speed of conduction/m s ⁻¹
Cat	1	3
Crab	30	5
Worm	50	30
Squid	500	35

(i) Describe the relationship between the diameter of a neurone and the speed of conduction.

_____ [1]

Examiner Only Marks Remark

(ii) Suggest why the large diameter of the squid's neurones helps it to escape predation by whales.

_____ [1]

[Turn over

3 When investigating the energy requirements of boys and girls with a normal activity level, a scientist found the following table in a research document.

Examiner Only Marks Remark

A	Energy requirement/kJ per day		
Age/years	Boys	Girls	
1–3	5 1 5 0	4878	
4–6	7 180	6469	
7–10	8248	7 285	
11–14	9295	7725	
15–18	11 535	8834	

(a) What conclusions can be reached from these results?

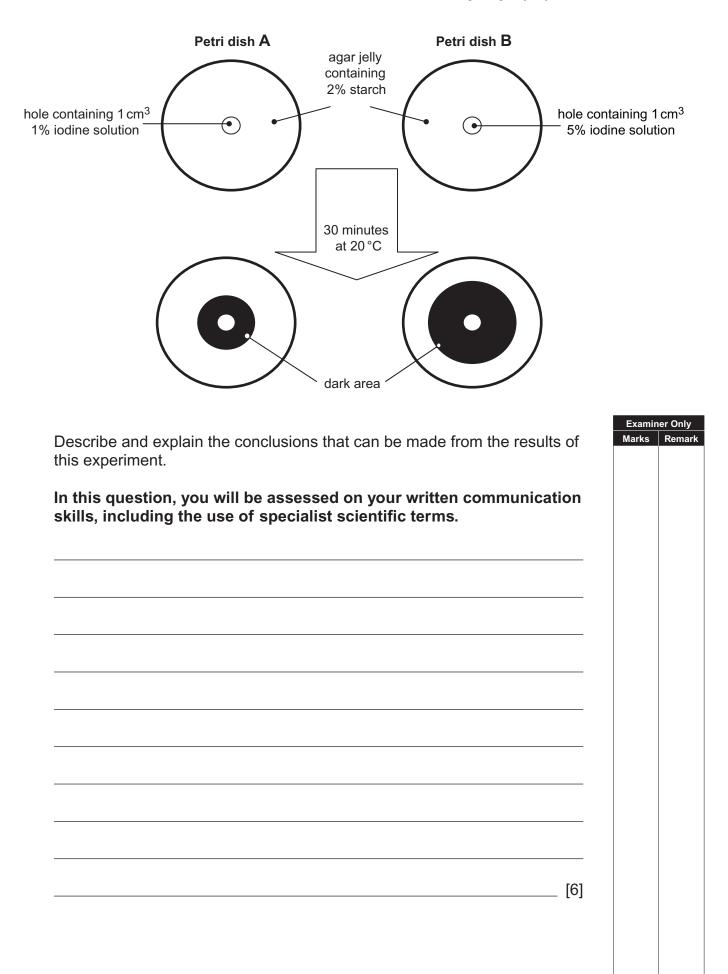
	[2]
A thirteen year old boy with normal activity level has a daily energy intake of 9500 kJ.	
Describe two ways the boy's adult health may be affected by this da energy intake.	aily
	[2]
Explain why the energy requirements change when a woman	

Human health can be affected by the quantity of food eaten, healthy food choices and infections by microorganisms.

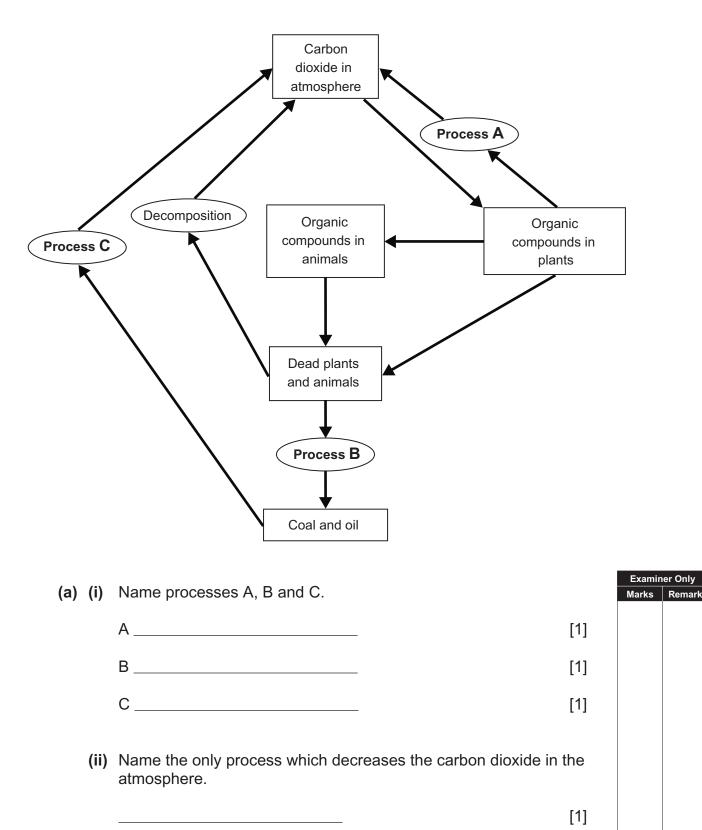
(d) Give one other factor which affects human health.

_____ [1]

Examiner Only Marks Remark 4 The diagram shows an experiment to investigate the effect of increasing the concentration of iodine solution on the rate at which iodine diffuses through agar jelly.

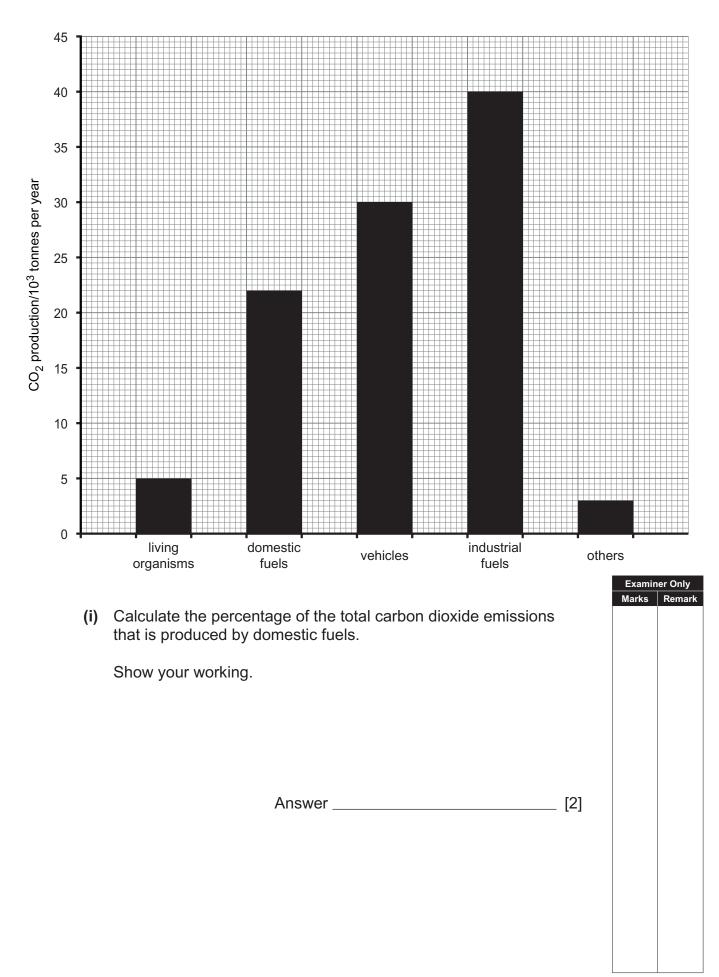


5 The diagram shows some of the processes of the carbon cycle.

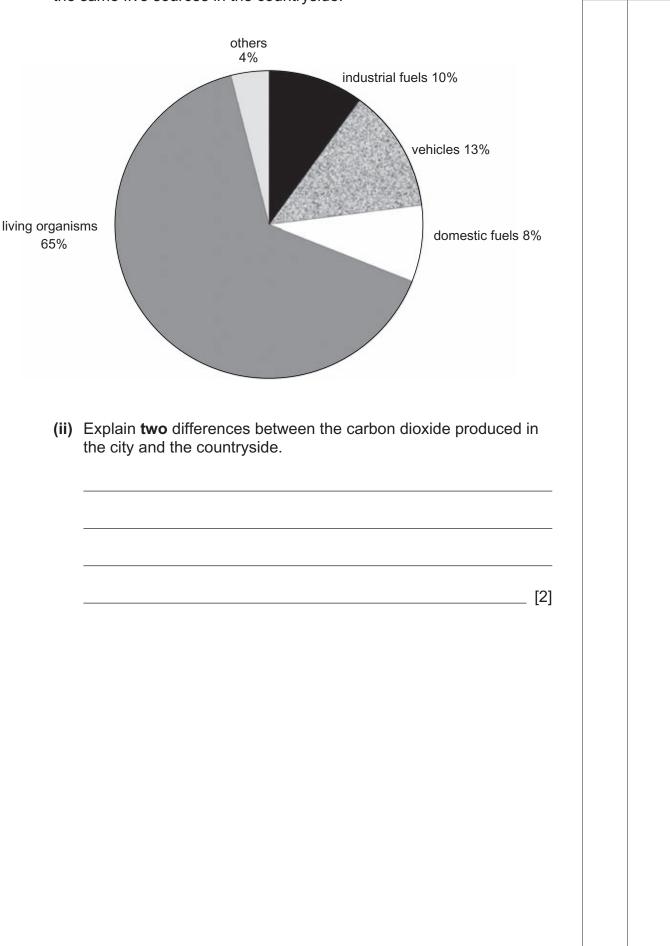


[Turn over

(b) The graph shows the annual amount of carbon dioxide emissions produced by five different sources in a city.



The pie chart shows the annual amount of carbon dioxide produced by the same five sources in the countryside.



Examiner Only

Marks Remark

Stei pos	earchers may obtain human stem cells from embryos or adult sourc m cells can be cultured and used to produce tissues. It may then be sible to use these cultured cells to replace damaged tissues in peop a certain diseases such as Parkinson's disease.	Marks
(a)	What is a stem cell?	
		[2]
(b)	Suggest two advantages of using embryonic rather than adult stem cells.	
		[2]
(c)	Explain why some people object to human stem cell research for ethical reasons.	
		[3]
Par	kinson's disease is caused by degeneration of tissue in the brain.	
(d)	Suggest what type of tissue researchers need to culture to help in the treatment of this disease.	ne
		[1]

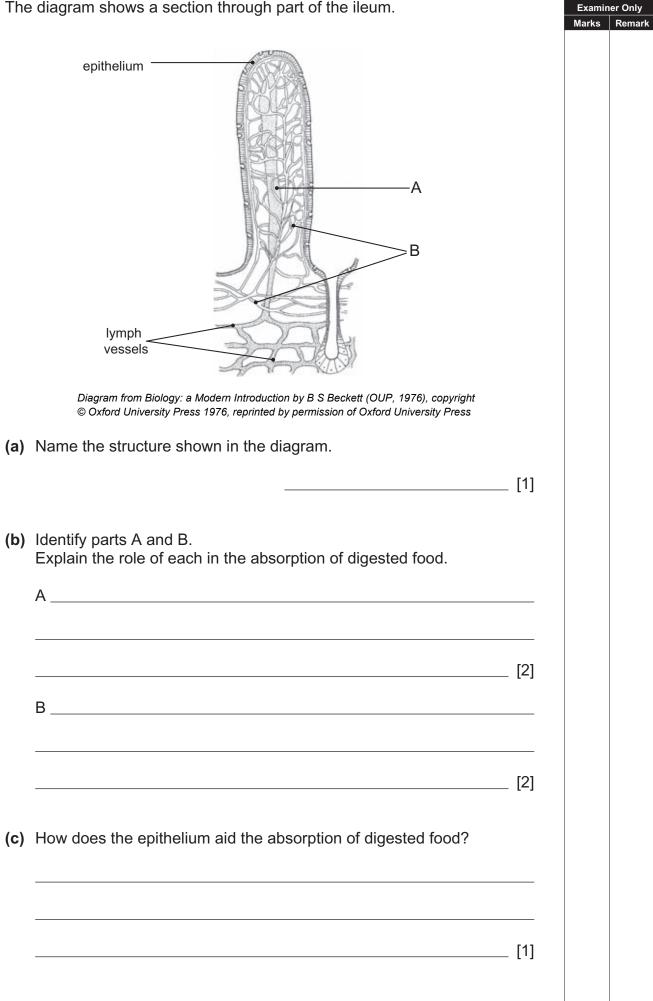
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(Questions continue overleaf)

The diagram shows a lung model.	Examiner Only	
Gest Biology for CEEA second edition Revision Book by James Napier & Seal McKnight, published by Hodder Education, 2013	Examiner Onio Marks Remainer	
 (a) (i) Name the parts of the respiratory system represented by A and A	I B. [1] [1]	
(iii) Explain the changes in the bell jar which cause the balloon to inflate.	[2]	

	efficient gas exchange		
1			
			[2]
2.			
			[2]
e table shows the pe	rcentage of some gase	es in inhaled and exhal	ed air.
Gas	Inhaled air/%	Exhaled air/%	
Oxygen	21	16	
Carbon Dioxide	0.04	4	
Nitrogon		70	
exhaled air.	78 ain the differences in the		ed and
Describe and expla exhaled air. In this question, y communication sl		e composition of inhale	
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The diagram shows a section through part of the ileum. 8



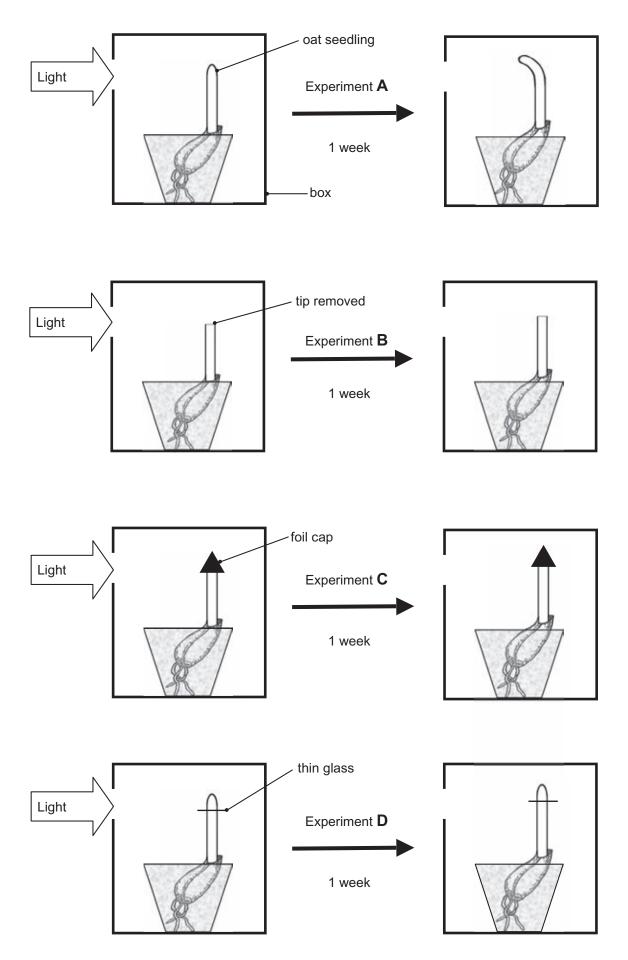
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(Questions continue overleaf)

Process Z	
11 800 kJ 2230 kJ	240 kJ
Image: Sun process X 18 000 kJ Producers Organisms 360 kJ Image: Vision process X Image: Vision process X Image: Vision process X Image: Vision process X	Secondary consumers
2900 kJ Decomposers	90 kJ
(a) Name process Z.	Examiner O Marks Re
(b) Give the term used to describe organisms Y.	_ [1]
 (c) (i) Calculate the amount of the energy passed from the producer organisms Y. Show your working. 	s to
Answer	_ [2]
One reason why this value is smaller than the energy absorbed by producers is because some of the energy passes to process Z .	/
(ii) Explain two other reasons why this value is smaller than the energy absorbed by producers.	
	_ [2]

		-
		-
		-
	[2	.]

10 The diagrams show experiments used to investigate the effect of one-sided light on the growth of oat seedlings.



(a)	(i) Name the response shown by the oat seedling in experime		
			emark
		[']	
	(ii) Name the plant hormone which causes the response.		
		[1]	
	eriment A is the control experiment in the investigation and nonstrates that oat seedlings respond to light.		
(b)	Choose one other experiment and explain how it shows that the response	nis	
	is sensitive to light.		
		[2]	
	involves the diffusion of a plant hormone from the tip.		
		[2]	
(c)	Explain how the plant hormone causes bending in experiment	Δ	
(0)			
		[3]	

Daniel has found many dandelions growing in his lawn and has been advised to spray selective weed killer. The broad leaves of the dandelion plants absorb the weed killer and the plants die. The grasses remain unharmed.	Examiner Only Marks Remar
(d) Suggest why the selective weed killer kills only the dandelions.	
Once the dandelions and other weeds had been killed Daniel noticed that the grass plants grew faster and produced more leaves.	at
(e) Suggest why the grass plants grew faster in the absence of weeds.	[2]
Plant hormones can also be used to stimulate all the fruit in an orchard t	0
form at the same time.(f) Suggest why this is economically useful for apple farmers.	
	[2]

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(Questions continue overleaf)

11 Read the passage on the discovery of insulin and answer the questions below.

The discovery of insulin started in the nineteenth century with 1 observations that those who died from diabetes frequently had a diseased pancreas. In 1869 Paul Langerhans identified groups of 3 cells in the pancreas which did not have a known function. Twenty years later two other German scientists, Minkowski and 5 Mering, showed that if the pancreas was removed from a dog it got diabetes but if the tube from the pancreas to the intestine was 7 surgically tied the dog only suffered minor digestive problems. This suggested that the pancreas not only produced digestive juices but 9 also released a substance directly into the blood stream which controlled the blood glucose concentration. 11 Many attempts were made to isolate the anti-diabetic substance produced by the pancreas but significant progress was not made 13 until 1921 when Fredrick Banting and his assistant Charles Best started a series of experiments, under the supervision of Professor 15 John Macleod at the University of Toronto. They extracted a substance they called "isletin" which, when injected into a diabetic 17 dog several times a day, returned it to full health. To obtain larger volumes Banting and Best used the pancreas of 19 cattle and showed that it also could be used to treat diabetic dogs. Work progressed guickly and the extract, renamed insulin, was 21 eventually purified sufficiently to make it a successful treatment for human diabetics.

Source: www.nobelprize.org

 collaborative nature of science.

 1.

 2.

 3.

 3.

 [3]

(a) Give three reasons why the discovery of insulin is an example of the

(b) Explain how the results of scientific experiments (lines 14–16), such as those of Banting and Best, are validated by the scientific community.

_____ [1]

Examiner Only Marks Remark

One symptom of diabetes is high blood glucose concentration.	Examiner Only Marks Remark
(c) Give one other symptom of diabetes.	Marks Remark
	_
[1]
L	.1
(d) Explain how the control of blood glucose concentration by insulin is a example of a feedback mechanism.	n
	_
	_
[2	2]
A second hormone called glucagon is now known to help control the blood glucose concentration.	b
(e) Describe the role of glucagon in controlling blood glucose concentration.	
	_
	_
	_
	-
	-
[3]

12 During periods of heavy rain some sewage treatment plants overflow and Examiner Only release sewage directly into a river. The sewage released contains Marks Remar suspended solids which have a high concentration of nitrogen compounds. The graphs show changes which occur in a river when sewage is released into it. 110 100 Quantity of material/arbitrary units 90 Oxygen dissolved 80 in water 70 60 50 40 30 Solids suspended 20 in water 10 0 0.5 1.5 2.5 3.5 5.5 2 3 4.5 6.5 7.5 0 4 5 6 7 Distance/km Sewage overflow 120 110 Bloodworms 100 Relative population size/arbitrary units Small fish 90 80 70 60 50 40 30 20 Bacteria 10 0 1.5 2.5 3.5 4.5 6.5 7.5 0.5 2 3 4 5 5.5 0 6 7 Distance/km Sewage overflow © The Biology of Polluted Waters by H B N Hynes, published by Liverpool University Press, 1978. ISBN 0853232008

)	Suggest what effect the high concentration of suspended solids in the	
	sewage entering the river would have on the plants in the river.	Ren
	[3]	
	[0]	
)	At what distance from the sewage overflow are no fish left alive?	
	[1]	
)	Use information from the graphs to help explain the link between the	
	numbers of bacteria and bloodworms with the quantity of suspended	
	solids found in the river.	
	In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.	
	[6]	
	[6]	
	[6]	

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