

New  
Specification

Rewarding Learning

General Certificate of Secondary Education  
2012–2013

## Science: Single Award

Unit 1 (Biology)

Higher Tier

[GSS12]



MONDAY 12 NOVEMBER 2012, AFTERNOON

### TIME

1 hour 15 minutes.

### 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 eleven** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is 75.  
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 **2** and **8(a)**.

Centre Number

71

Candidate Number

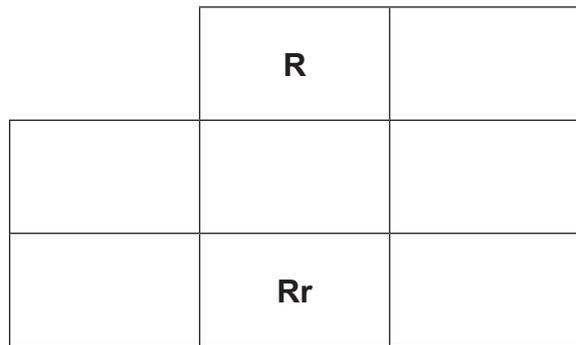
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

<b>Total Marks</b>	
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1 (a) The ability to roll your tongue is caused by a dominant allele (R).

(i) Complete the diagram below to show how two parents who are tongue rollers can have a child who cannot roll his/her tongue.



[3]

(ii) What is the probability that they will have a child who cannot roll his/her tongue?

\_\_\_\_\_ [1]

(b) Tongue rolling is an example of discontinuous variation.

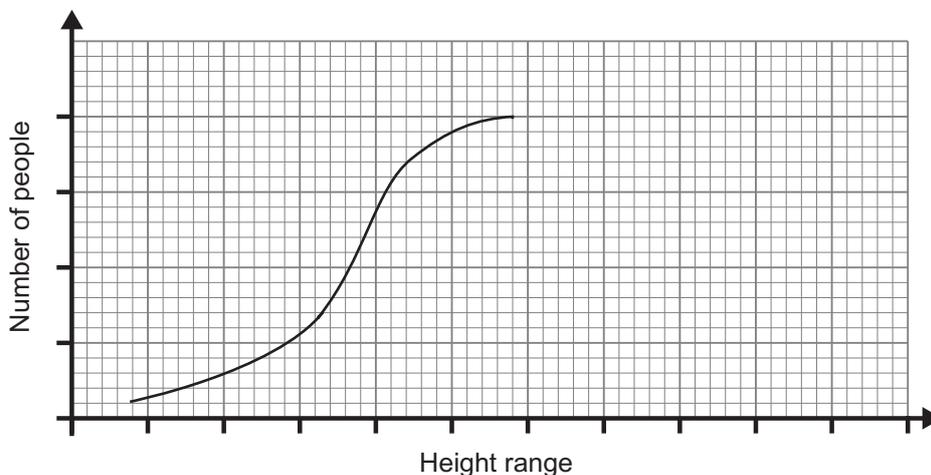
(i) What is meant by the term **discontinuous**?

\_\_\_\_\_ [1]

(ii) Suggest **one** other example of discontinuous variation.

\_\_\_\_\_ [1]

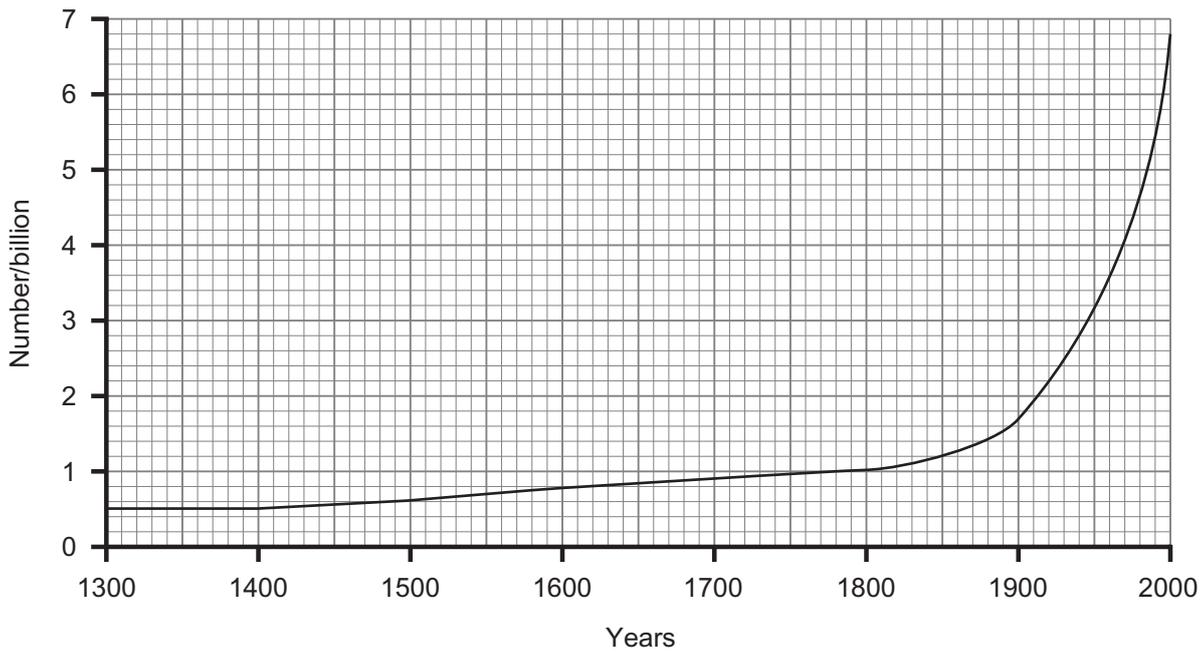
(c) The graph shows the result of recording the heights of a very large number of people. Complete the sketched line in the graph below.



[2]

Examiner Only	
Marks	Remark

2 The graph below shows the human population from the year 1300 to the year 2000.



Use this graph and your knowledge to explain why there is concern that the human population size is putting planet Earth at risk.

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

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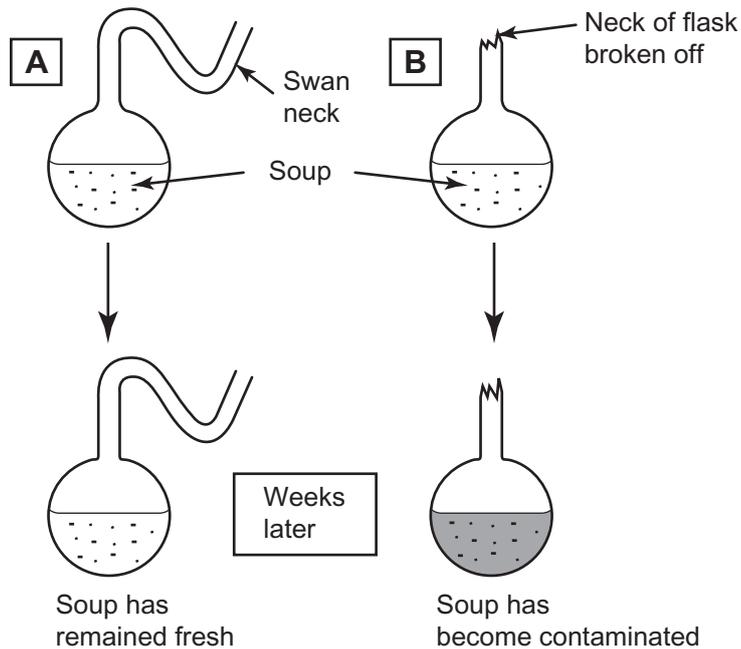
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[6]

Examiner Only	
Marks	Remark

- 3 (a) The following diagram shows the apparatus Louis Pasteur used to show that contamination of food was caused by microorganisms from the air.



- (i) Explain fully why the soup in **A** stayed fresh and the soup in **B** did not.

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[3]

- (ii) Suggest **one** reason why there were less deaths from open wounds after Pasteur's discovery.

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[1]

- (b) (i) Explain fully why diseases such as flu cannot be treated with antibiotics.

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[2]

- (ii) Give **one** example of a disease that can be treated by antibiotics.

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[1]

Examiner Only	
Marks	Remark

- 4 (a) Complete the table to show the differences between a voluntary and a reflex action.

Choose from:

**varies** : **fast** : **always the same** : **slow**

Differences	Voluntary	Reflex
speed of response		
response to stimulus		

[2]

- (b) Describe the pathway taken when we respond to the stimulus of a loud noise by covering our ears with our hands. Include **three** structures of the nervous system in your answer.

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[3]

- (c) Describe the effect on the speed of reactions of:

alcohol. \_\_\_\_\_

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cocaine. \_\_\_\_\_

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[2]

Examiner Only	
Marks	Remark

- 5 In a study, two methods were investigated to see which was better at reducing binge drinking. At the start one hundred men who were binge drinkers were divided into two groups of fifty.

**Group one** received one 5 minute session being given advice on how to reduce alcohol intake.

**Group two** received two 30 minute sessions being given advice on how to reduce alcohol intake.

Both groups were monitored over the following three weeks to note how many had been binge drinking.

Women were also involved in the trial. The same number were used and treated in the same way.

The results are shown in the table.

		Number binge drinking				Overall decrease	
		Week 1	Week 2	Week 3	Week 4	Number	Percentage
Men	Group 1	50	49	30	22	28	56
	Group 2	50	37	15	12	38	76
Women	Group 1	50	15	13	12	38	76
	Group 2	50	9	7	5	45	

- (a) Complete the table by calculating the overall percentage decrease for Group 2 women over the 4 week period. [1]
- (b) Compare the effectiveness of the two methods in reducing binge drinking in the men in the study.

\_\_\_\_\_

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark



- 6 The photograph below is of jewel anemones living in the sea off the Cornwall coast. It has been decided that this area is soon to be designated as a Marine Conservation Zone (a nature reserve in the sea).



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- (a) Suggest **three** ways in which this decision will benefit the jewel anemones.

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[3]

- (b) Suggest **one** reason why representatives of the wind power industry made objections to this decision.

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[1]

Examiner Only	
Marks	Remark

(c) This area contains a wide variety of species of marine organisms.

(i) What term is used to describe the variety of life on Earth?

\_\_\_\_\_ [1]

(ii) State **two** reasons why we need to maintain a wide variety of life on Earth.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

7 Below are three causes of pollution. For each, state which part of our environment is being polluted and give one strategy for reducing its effect.

Household waste

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Acid rain

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Nitrate levels

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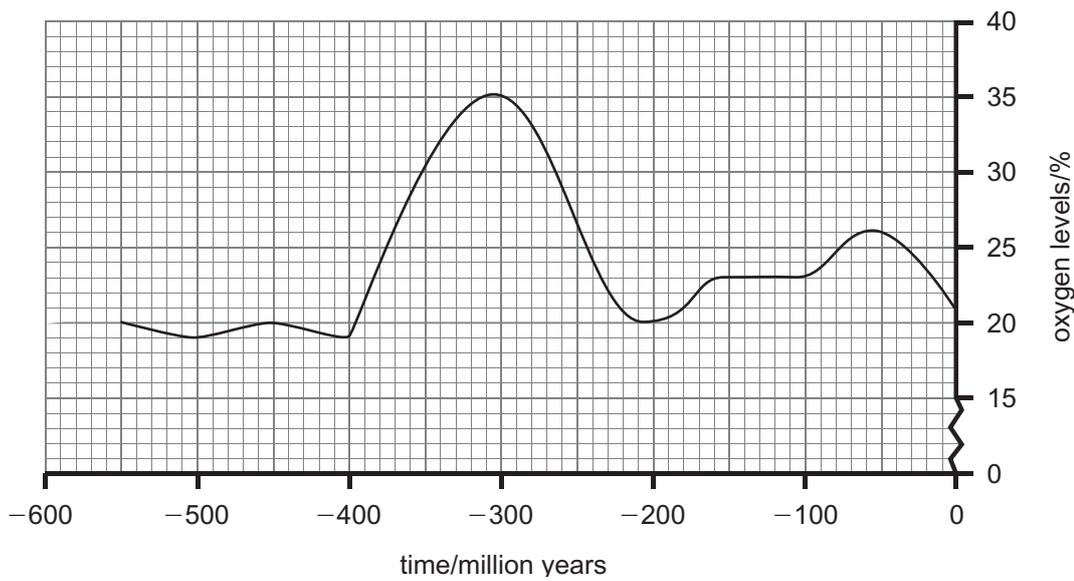
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[3]

Examiner Only	
Marks	Remark

- 8 (a) The graph below shows the percentage of oxygen in the Earth's atmosphere over the past 550 million years.



Describe and fully explain the change in oxygen levels between 400 and 200 million years ago.

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

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[6]

- (b) Suggest **two** reasons why the Church was opposed to Darwin's theory of evolution.

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[2]

Examiner Only	
Marks	Remark

9 (a) Rosalind Franklin and Maurice Wilkins collaborated to gain knowledge about the structure of DNA.

(i) Explain the term 'collaborated'.

\_\_\_\_\_ [1]

(ii) State what Franklin and Wilkins discovered about the structure of DNA and name the practical process they used.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

(b) (i) Name the two scientists who used modelling to investigate the structure of DNA.

\_\_\_\_\_ and \_\_\_\_\_ [1]

(ii) Erwin Chargaff also worked on the structure of DNA. Describe fully what he discovered.

\_\_\_\_\_

\_\_\_\_\_

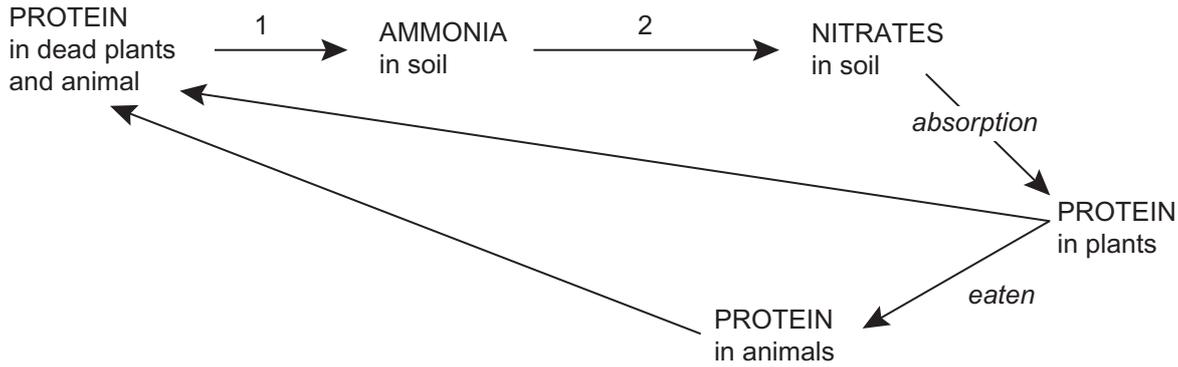
\_\_\_\_\_ [2]

Examiner Only

Marks

Remark

10 (a) Part of the nitrogen cycle is shown below.



(i) Name the processes labelled 1 and 2 in the diagram above.

Process 1 \_\_\_\_\_

Process 2 \_\_\_\_\_ [2]

(ii) Describe and explain **one** way that human activity could upset the balance of the nitrogen cycle.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

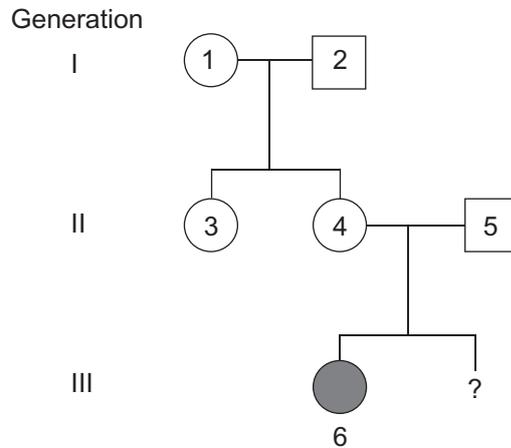
(b) Describe how the **carbon cycle** has become unbalanced and state the effect this is having.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [3]

Examiner Only	
Marks	Remark

- 11 (a) Below is an example of a pedigree diagram showing how the condition cystic fibrosis is inherited.

Cystic fibrosis is a medical condition caused by a recessive allele.



Key

	Normal male		Normal female		Female with cystic fibrosis
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- (i) What is the relationship between person 3 and person 4?

\_\_\_\_\_ [1]

- (ii) Using the symbol  $c$  to represent the cystic fibrosis allele, give the genotypes of person 4 and person 6.

person 4 \_\_\_\_\_

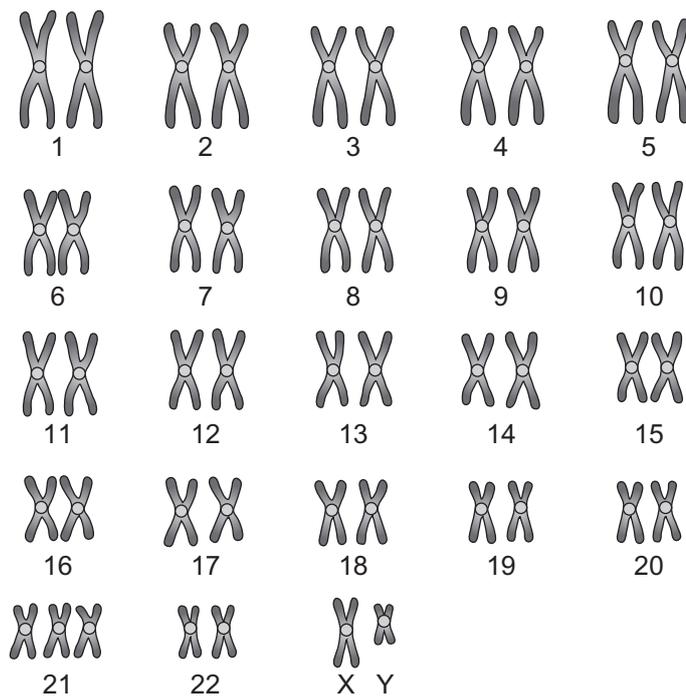
person 6 \_\_\_\_\_ [2]

- (iii) The first child of persons 4 and 5 inherited cystic fibrosis. What is the probability that their second child will also inherit it?

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

- (b) Below is a diagram showing the karyotype of someone who has Down syndrome.



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- (i) Fully describe the mutation shown in this karyotype.

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[2]

- (ii) Suggest a reason why this mutation affects more parts of the body than the mutation that causes cystic fibrosis.

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[3]

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**THIS IS THE END OF THE QUESTION PAPER**

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Examiner Only	
Marks	Remark

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