



General Certificate of Secondary Education  
2013–2014

## Science: Single Award

Unit 1 (Biology)

Higher Tier

[GSS12]



WEDNESDAY 13 NOVEMBER 2013, 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 ten** 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 **4(a)** and **10(a)**.

Centre Number

71

Candidate Number

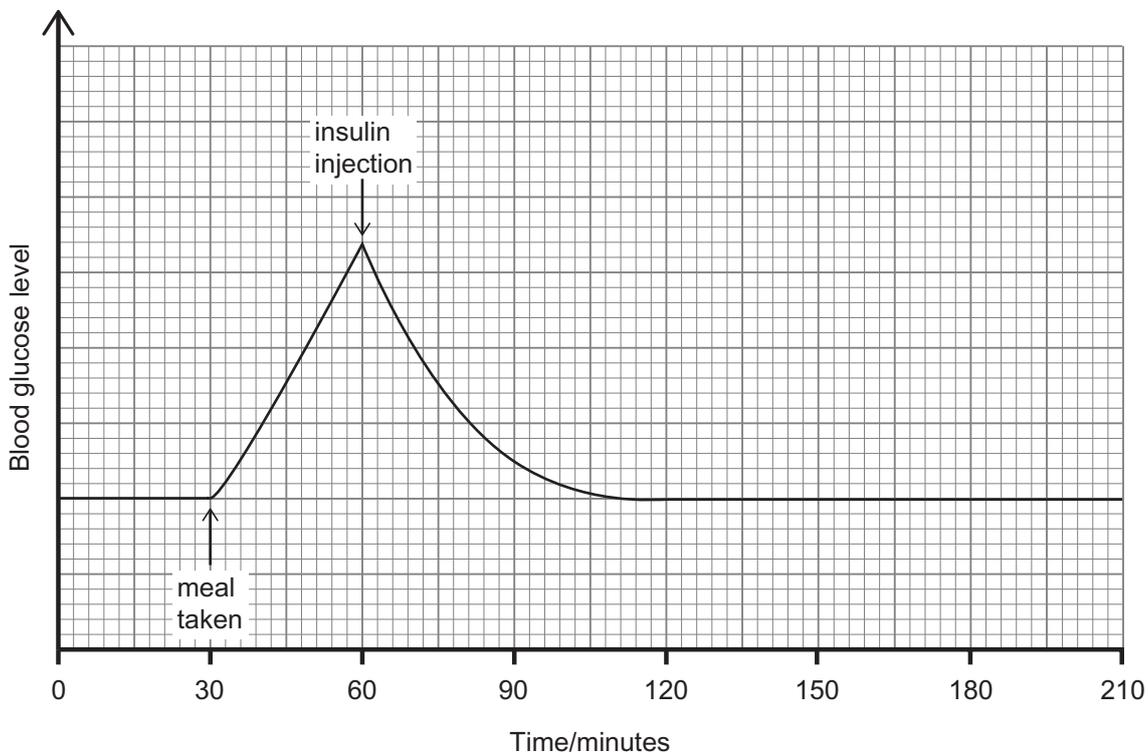
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Total  
Marks



1 Hormones such as insulin are produced by the body. However, sometimes insulin is injected if a person has diabetes.

(a) The graph below shows how the blood glucose level in a person with diabetes changes because of a meal and an insulin injection.



(i) Describe and explain the effect of the insulin on blood glucose level.

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[2]

(ii) Use the information provided to suggest which type of diabetes (Type 1 or Type 2) the person has. Explain your answer.

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[1]

Examiner Only

Marks Remark

(b) Insulin, like all medical drugs, had to be tested in trials before it could be used on humans. Testing involves clinical, in-vitro and animal trials.

(i) Put these trials (**clinical, in-vitro** and **animal**) in the order they take place.

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

(ii) Describe what in-vitro testing is and suggest why it is a very expensive process.

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

Examiner Only	
Marks	Remark

- 2 The red squirrel is at risk of extinction in Ireland. There are many reasons for its decline but a major factor has been the introduction of the grey squirrel (a competitive invasive species) into Ireland from North America. In comparison to the red squirrel, grey squirrels are a common woodland animal and their numbers are increasing rapidly.

The table below includes some information about red and grey squirrels.

Feature	Red squirrel	Grey squirrel	Examiner Only	
			Marks	Remark
Average body length	21 cm	26 cm		
Average body mass	290 g	600 g		
Habitat	coniferous (e.g. pine) forest	all types of forest		
Feeding area	in the trees	in the trees and on the ground		
Diet	ripe berries, nuts and seeds	ripe and unripe berries, nuts and seeds		
Response to poxvirus	not immune to virus	immune to virus (but can carry it and spread it to other squirrels)		

(a) Use the information provided to answer parts (i), (ii) and (iii).

- (i) Suggest **three** reasons for the grey squirrel being able to outcompete the red squirrel.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

3. \_\_\_\_\_

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

(ii) Suggest **one** reason why grey squirrels are much more likely to be killed by motor vehicles than red squirrels.

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

(iii) Suggest **one** thing that could be done to increase the number of red squirrels.

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

(b) Give **two** things that all competitive invasive species have in common.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

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

Examiner Only	
Marks	Remark

3 (a) Cystic fibrosis is an inherited disease. Jack and Jill are heterozygous (carriers) for cystic fibrosis but do not have the condition.

(i) What is meant by the term inherited disease?

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

(ii) Using the information provided, explain how you know the allele for cystic fibrosis is recessive.

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

(b) The following Punnett square shows how Jack and Jill could have a child with cystic fibrosis.

		Jack	
		C	c
Jill	C	CC	Cc
	c	Cc	cc

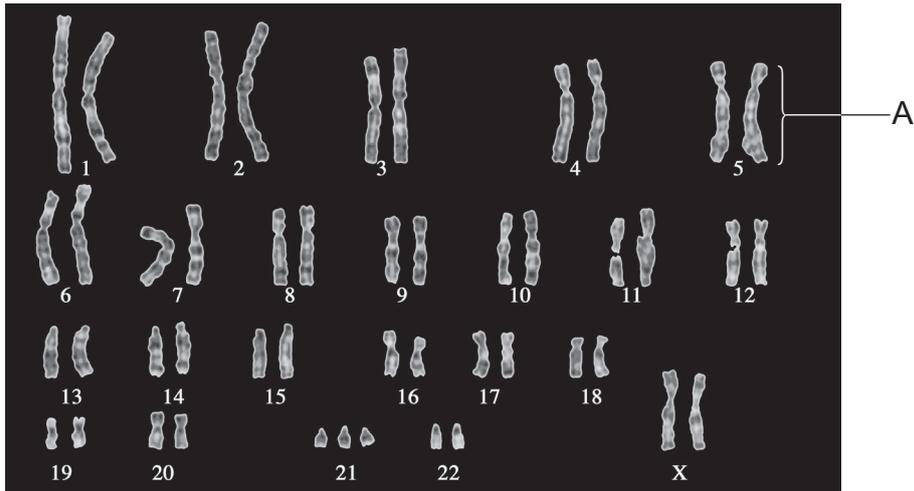
(i) Circle the genotype for cystic fibrosis in the Punnett square. [1]

(ii) How many different genotypes are shown in the Punnett square?

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

Examiner Only	
Marks	Remark

(c) The photograph below shows a human karyotype.



© Look at Sciences / Science Photo Library

(i) What does structure A represent?

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

(ii) What genetic disorder is shown by this karyotype? Explain your answer.

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

Examiner Only	
Marks	Remark





- (b) Pupils in a class collected a sample of leaves from a holly tree and counted the number of spikes on each leaf. Their results are shown in the table below.

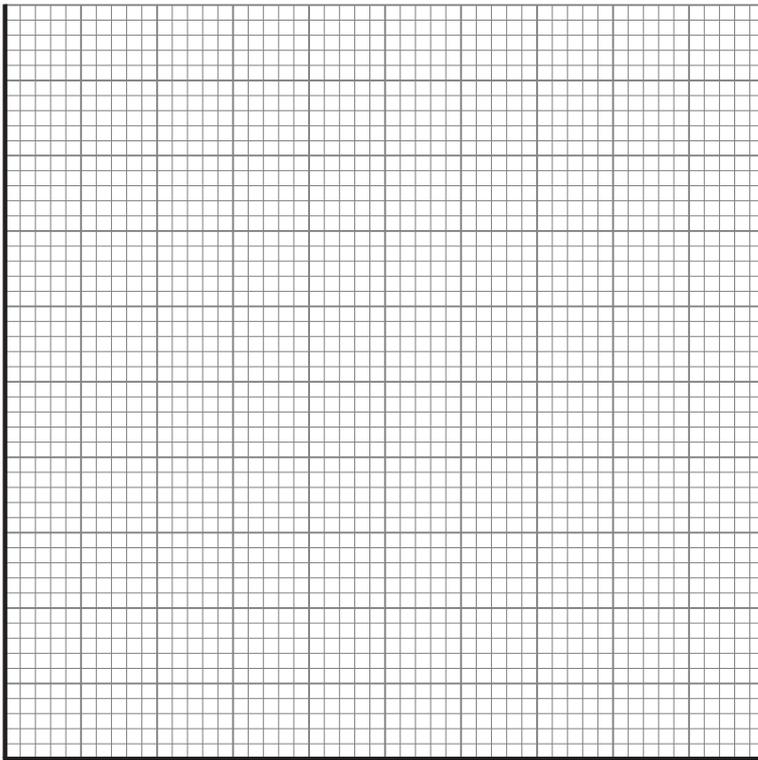
Number of spikes on leaf	Number of leaves
7	2
8	4
9	14
10	19
11	12
12	14
13	10
14	6
15	3
16	2

The pupils want to draw a graph of this information. They have to decide which is the best type of graph to use, e.g. bar chart, line graph or pie chart.

- (i) On the grid opposite, **scale** and **label** the axes for the most appropriate graph type.

(Note: you do **not** need to draw in the bars/points).

Examiner Only	
Marks	Remark



[2]

(ii) The variation shown by the holly leaves is discontinuous.  
Describe what discontinuous variation is.

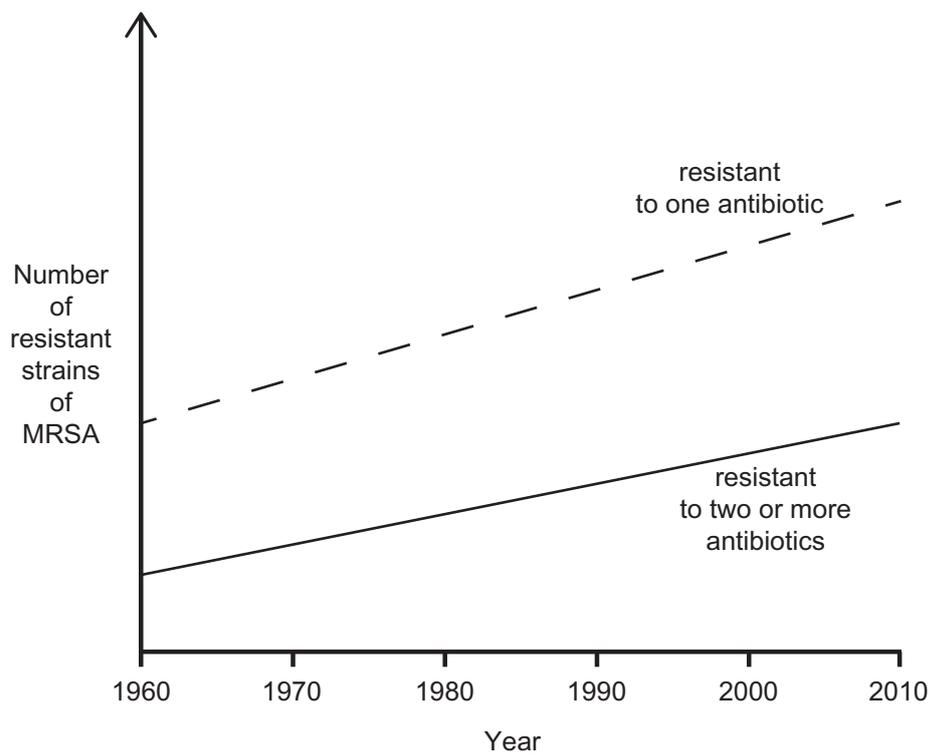
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[1]

Examiner Only	
Marks	Remark

6 (a) MRSA is a type of bacteria resistant to antibiotics. The graph below gives information on resistant strains of MRSA.



(i) Give **two** trends shown by the information in the graph.

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[2]

(ii) As part of their attempts to combat MRSA, scientists identify and classify the new strains as they appear. Suggest **one** reason why it is important to identify and classify the new strains of MRSA.

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[1]

Examiner Only	
Marks	Remark

(b) MRSA is found on the skin of many people. However, it only causes infection if it can get into the blood.

(i) Suggest **one** reason why most infections of MRSA take place in hospitals.

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

(ii) Suggest **two** measures that are used to restrict the spread of MRSA in hospitals.

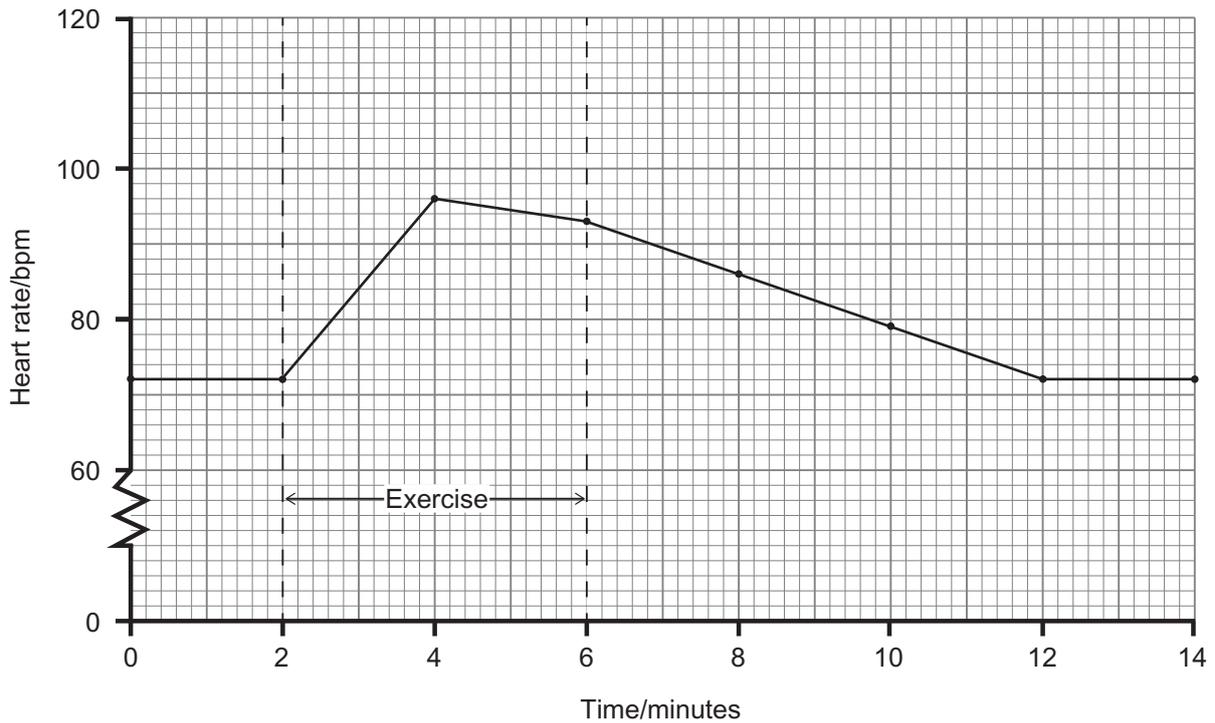
1. \_\_\_\_\_ [2]  
2. \_\_\_\_\_

(c) Explain fully in terms of changes within bacteria, how antibiotic resistance develops.

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

Examiner Only	
Marks	Remark

- 7 (a) The graph below shows the effect of exercise on a student's heart rate. The student was unfit and usually did no exercise.



- (i) Calculate the maximum percentage increase in heart rate caused by the exercise.  
(Show your working out.)

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

- (ii) During the exercise the student began to tire. What is the evidence from the graph that shows this?

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

Examiner Only	
Marks	Remark

(b) The student then trained regularly for a number of weeks becoming fitter.

(i) Compared to the graph opposite, suggest **one** change this will have on the student's heart rate if the exercise is repeated.

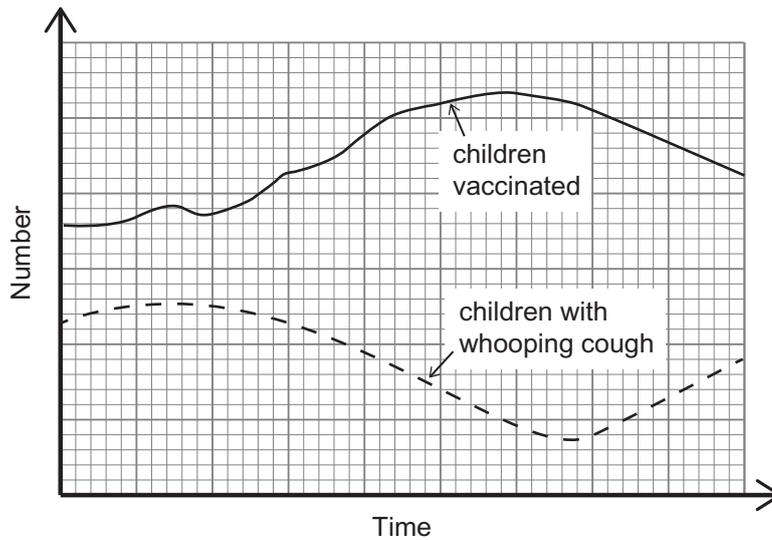
\_\_\_\_\_  
\_\_\_\_\_ [1]

(ii) Describe fully how regular exercise benefits the heart.

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

Examiner Only	
Marks	Remark

- 8 Whooping cough is an infectious disease mainly affecting young children and is easily spread by coughing.



- (a) Describe and explain the relationship between the number of children vaccinated and the number of children with whooping cough.

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[2]

- (b) Whooping cough can often cause epidemic outbreaks.

- (i) What is meant by the term 'epidemic'?

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[1]

- (ii) Suggest why whooping cough can cause epidemic outbreaks.

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[1]

Examiner Only	
Marks	Remark

(c) Most children who have whooping cough are ill for a period of time and recover without medical intervention.

Using your knowledge of the body's defence systems, explain how this recovery occurs.

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[3]

Examiner Only	
Marks	Remark



(c) When adding fertiliser there is a government requirement that the amount of fertiliser added is calculated to meet the requirements of the crop. Additionally, it must not be sprayed on sloping land too close to waterways. Suggest how excess fertiliser can cause pollution.

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[2]

Examiner Only	
Marks	Remark



- (c) (i) The genetic modification of crops builds on the collaborative work of Crick and Watson and other scientists.

Describe fully what a genetically modified (GM) crop is.

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 [2]

- (ii) Some varieties of GM crops can grow on much drier land than the normal varieties. Suggest **one** advantage of this. Explain your answer.

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 [2]

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

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Examiner Only	
Marks	Remark





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