



*Rewarding Learning*

**General Certificate of Secondary Education  
2015–2016**

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**Science: Single Award**

Unit 1 (Biology)

Higher Tier

**[GSS12]**

**TUESDAY 17 MAY 2016, AFTERNOON**

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**MARK  
SCHEME**

## General Marking Instructions

### Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

### The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

			AVAILABLE MARKS	
<b>1</b>	<b>(a)</b> Any <b>two</b> from:	• a non-native species/introduced by man		
		• out-competes other (native) species		
		• spreads (rapidly) across countryside/reproduces rapidly	[2]	
	<b>(b)</b>	<b>(i)</b> 150 – 15 [1]		
		135 [1]	[2]	
		<b>(ii)</b> 10%	[1]	
	<b>(c)</b>	<b>(i)</b> Prevents/reduces other plants' growth [1] not enough light/or other resource described [1] for photosynthesis/explanation of effect of reduced resource [1]	[3]	
		<b>(ii)</b> Increased	[1]	
	<b>(d)</b>	Grey squirrel (or other suitable example)	[1]	11
	<b>2</b>	<b>(a)</b>	<b>(i)</b> Change [1] in gene/chromosome/DNA [1]	[2]
<b>(ii)</b> Weakened/dead/modified [1] flu virus [1]			[2]	
<b>(iii)</b> It takes a long time/weeks before immunity is achieved/antibodies reach a high enough level			[1]	
<b>(iv)</b> The vaccination was for a different strain/two strains (species) were different			[1]	
<b>(b)</b>		<b>(i)</b> Numbers increased from 2003–2015 [1] increase supported by reference to any two percentages from flow chart [1]	[2]	
		<b>(ii)</b> Don't believe vaccination is safe	[1]	9

### 3 Indicative content

- use the thermometer to record the temperature of the water
- at the start and end of the investigation
- burn the food sample, e.g. biscuit
- record difference in temperature/the higher the temperature rise, the more energy in the food
- repeat for the other food sample (bread)
- any **two** from – use same mass of food/ensure burning food is same distance away from boiling tube/ensure temperature of water is even throughout boiling tube (use of stirrer)/use the same volume of water
- some burnt food remains/used to heat glass/lost in air

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe how to compare the amount of energy in different foods using <b>six, seven or eight</b> of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe how to compare the amount of energy in different foods using <b>four or five</b> of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe how to compare the amount of energy in food using <b>one, two or three</b> of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

6

### 4 (a) Any **two** from:

- palisade cells are close to the top of the leaf
- they have more chloroplasts
- they are tightly packed together

[2]

(b) (i) Boil [1]  
in ethanol/alcohol [1]

[2]

(ii) Yellow/brown to blue/black

[1]

5

			AVAILABLE MARKS
5	(a)	(i) There is a thick uterine lining present [1]	6
		(ii) Reduced chance [1] as eggs from (one ovary) cannot reach uterus/sperm/be fertilised [1] [2]	
	(b)	(i) Any <b>two</b> from: • chemical messengers • travel in blood • to a target organ (where they act) [2]	
		(ii) Causes ovulation/build-up of uterine lining [1]	
6	(a)	(i) Correct bacterium circled [1]	6
		(ii) (Better adapted) antibiotic-resistant bacteria survive [1] (less well adapted) non-resistant bacteria are killed by antibiotic [1] [2]	
	(b)	(i) Any <b>two</b> from: • many patients in close proximity • many with open wounds • weak immune systems • overuse of antibiotics [2]	
		(ii) Better hygiene/isolation of infected patients/reduction in antibiotic use [1]	
7	(a)	(i) Recovery times decrease over time [1]	6
		(ii) Kellie [1] her recovery times were lowest to start/decreased the least/levelled off after week 5/lowest each week except week 6 [1] [2]	
	(b) Fewer beats (per minute) [1] therefore less wear on heart [1] [2]		
	(c) Eat less salt/less saturated fat/lower cholesterol levels [1]		
8	(a)	(i) Avoids testing on humans at this stage/to see the effect on living organism/whole body systems/similar immune systems [1]	6
		(ii) Humans are different to animals/side effects in humans/check dosage [1]	
		(iii) Distinction between beauty products and medical intervention (or explained) [1]	
	(b) Carbon monoxide (combines) with red blood cells [1] therefore less oxygen transported [1] for respiration [1] [3]		

		AVAILABLE MARKS
<b>9</b>	<p><b>(a)</b> Cytosine 20 [1] adenine and thymine 30 each [1]</p> <p><b>(b) (i)</b> Base triplet</p> <p style="padding-left: 20px;"><b>(ii)</b> Protein</p> <p><b>(c)</b> Chargaff</p> <p><b>(d) (i)</b> Phenotype only shown if two alleles recessive/characteristic masked by dominant allele</p> <p style="padding-left: 20px;"><b>(ii)</b> Gametes correct [1] offspring correct [1]</p> <p style="padding-left: 20px;"><b>(iii)</b> One in four (or equivalent)</p> <p><b>(e)</b> Any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>• digestive system (and other parts of the body) are not treated</li> <li>• spray may not reach all lung cells</li> <li>• CF condition still passed on to offspring</li> <li>• lung cells are constantly replaced/new cells will have cystic fibrosis (regular treatment is required)</li> </ul>	<p>[2]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[2]</p> <p>[1]</p> <p>[2]</p>
		11

## 10 (a) Indicative content

- decay bacteria peak before nitrifying bacteria
- more decay bacteria than nitrifying bacteria
- both decay and nitrifying bacteria increase over time then decrease/  
nitrifying bacteria take longer to increase/nitrifying bacteria decrease more rapidly
- decay bacteria break down plant cuttings into ammonia
- (nitrifying bacteria (then) convert) ammonia into nitrate
- in process called nitrification
- nitrate absorbed into plants from the soil

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the nitrogen cycle using <b>six, seven or eight</b> of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe the nitrogen cycle using <b>four or five</b> of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe the nitrogen cycle using <b>one, two or three</b> of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

- (b) Carbon cycle is unbalanced as more carbon dioxide is entering atmosphere [1]  
due to increased combustion of fossil fuels [1]  
and deforestation [1]

[3]

9

**Total****75**AVAILABLE  
MARKS