



*Rewarding Learning*

**General Certificate of Secondary Education  
2013–2014**

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**Science: Single Award**

Unit 1 (Biology)

Higher Tier

**[GSS12]**

**TUESDAY 13 MAY 2014, MORNING**

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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>	<p><b>(a)</b> All points correct [2] 1 error [1] more than 1 error [0] line joined between points [1] [3]</p> <p><b>(b) (i)</b> Oxygen [1]</p> <p><b>(ii)</b> The number of bubbles/oxygen given off decreases with distance from lamp [1] reduced photosynthesis [1] due to reduced light intensity [1] [3]</p> <p><b>(c)</b> Phototropism [1]</p>		8
<b>2</b>	<p><b>(a)</b> Group 1 = 24 [1] Group 2 = 44 [1] [2]</p> <p><b>(b)</b> The test tube in the apparatus set up by Group 2 is not insulated or converse [1] so a lot of heat is lost out into the room or converse [1] [2]</p>		4
<b>3</b>	<p><b>(a) (i)</b> Any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>• the number of people (males and females) with skin cancer has increased (every year) from 1975/over time</li> <li>• the number of females with skin cancer is (always) higher than the number of males</li> <li>• in 2010 the rates of skin cancer cases in both males and females is the same</li> <li>• when the rate of skin cancer cases rises in females it also rises in males [2]</li> </ul> <p><b>(ii)</b> Rates will decrease [1] Less exposure to UV rays [1] [2]</p> <p><b>(b) (i)</b> Any <b>two</b> from: risk of Down Syndrome increases with age under 35 risk of miscarriage exceeds that of Down Syndrome over 35 risk of Down Syndrome greater than miscarriage [2]</p> <p><b>(ii)</b> Religious conviction/not wishing to have ethical decision to make/ if other children in family/other appropriate response [1]</p> <p><b>(c)</b> Mutation [1]</p>		8

#### 4 Indicative content

- in vitro testing medicines or drugs are developed in the laboratory/tested on cells
- does the drug work
- animal testing is testing on live animals/whole body systems
- many people are opposed to animal testing for ethical reasons
- a drug may have different effect on animal as on a human (due to humans being a different species)
- clinical trials/medicines or drugs are given to humans
- to see if the drug works on humans/what the required dose will be/if there are any side effects
- licensed for use when medicines or drugs are shown to be effective/safe (with no or limited side effects)

Band	Response	Mark
A	Candidates must use appropriate terms throughout to describe what stages this new antibiotic would have to go through before it could safely be given to humans using <b>six to eight</b> of the points above. 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 what stages this new antibiotic would have to go through before it could safely be given to humans using <b>three to five</b> of the points above. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates use <b>one to two</b> of the points above. They use limited spelling, punctuation and grammar to describe what stages this new antibiotic would have to go through before it could safely be given to humans. They 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]

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AVAILABLE  
MARKS

			AVAILABLE MARKS	
5	(a) (i)	C	[1]	
	(ii)	Any <b>two</b> from <ul style="list-style-type: none"> <li>• tubes kept at same temperature</li> <li>• left for same length of time</li> <li>• same (type of) broth</li> </ul>	[2]	
	(iii)	Pasteur	[1]	
	(b) (i)	Modified/weakened/dead microorganisms (allow antigens)	[1]	7
	(ii)	Line reaches immunity over time [1] and remains above immunity achieved line [1]	[2]	
6	(a) (i)	Acid rain carried by clouds/water vapour (which can travel great distances)	[1]	
	(ii)	Sample numbers of dead fish/defoliated/dead trees/record lake pH/erosion of buildings [1] at specific intervals (e.g. weekly, monthly) [1]	[2]	
	(iii)	Alternative fuels/chimney filters/desulfurisation of fuel	[1]	
	(b)	Large number/range of habitats [1] (each) with large number of different flowering plants/insects/birds [1]	[2]	6
7	(a)	Gene is section of DNA/small part of chromosome that codes for a characteristic/protein [1] alleles are alternative forms of a gene [1] Not 2 different genes	[2]	
	(b)	Dominant allele (gene) is expressed/characteristic shows if heterozygous/ overpowers recessive allele [1] recessive allele is masked by dominant allele/characteristic only shows if homozygous [1]	[2]	
	(c)	homozygous – both alleles (genes) are the same [1] heterozygous – alleles (genes) are different [1]	[2]	
8	(a)	Any <b>three</b> from: <ul style="list-style-type: none"> <li>• strengthens heart (muscle)</li> <li>• can pump more blood with each beat/increases output/bigger output</li> <li>• therefore needs to beat less often/less wear and tear/lower heart rate</li> <li>• explanation of burning up fat</li> </ul>	[3]	
	(b)	Reason: Many people affected/long-term condition [1] (explanation must link with reason) [1]	[2]	

- 9 (a) (i) Guanine – 30; thymine – 20 [1]
- (ii) Everyone’s DNA is different [1]
- (iii) Any **three** from
- sequence of three (DNA) bases code for an amino acid Not protein
  - one strand/side of DNA used as coding strand
  - base triplet
  - amino acids join together to form protein [3]
- (b) (i) Multinational/large amount of money/great time involved [1]
- (ii) The more closely related species are the more similar their DNA/  
base sequences [1]

AVAILABLE  
MARKS

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### 10 Indicative content

- a hormone is a **chemical** that travels in the **blood** to a **target organ**  
(points in bold – 1 mark each)
- Any named hormone from the list below
  - oestrogen
  - progesterone
  - testosterone
  - insulin (max 2)
- one explanation for each named hormone
  - oestrogen involved in repair of uterus/stimulates ovulation/controls secondary sexual characteristics
  - progesterone builds up/maintains lining in uterus/at low levels causes menstruation
  - testosterone controls secondary sexual characteristics
  - insulin reduces blood glucose levels/converting glucose to glycogen (max 2)

Band	Response	Mark
A	Candidates must use appropriate terms throughout to describe hormone action in humans using <b>six to seven</b> of the points above. 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 hormone action in humans using <b>four to five</b> of the points above. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates use <b>one to three</b> of the points above. They use limited spelling, punctuation and grammar to describe hormone action in humans. They have made limited use of specialist terms. The form and style are of a limited standard.	[1–2]
D	Not worthy of credit.	[0]

[6]

6

			AVAILABLE MARKS
11 (a) (i)	As planting density increases average mass of individual plants decreases [1] decrease is greater at higher planting densities [1] competition for space/light/competition for nutrients (minerals)/water [1]	[3]	
(ii)	At planting density of 80 average mass of individual plants = 0.5 kg [1] $80 \times 0.5 = 40$ [1]	[2]	
(iii)	Any <b>three</b> from <ul style="list-style-type: none"> <li>• as planting density increases overall crop mass increases up to 60 (m<sup>2</sup>)</li> <li>• falls at higher planting densities</li> <li>• (at lower planting densities) increase in plant number leads to greater total crop mass</li> <li>• (at higher planting densities) total crop mass falls as reduction in individual plant mass has greater effect than increasing number of plants</li> </ul>	[3]	
(b) (i)	Any <b>three</b> from <ul style="list-style-type: none"> <li>• reduced damage by insects/insects unable to feed on maize/ kills insect pests</li> <li>• less crop wastage/less money spent on insecticides/more crop harvested</li> <li>• less pollution (by pesticides)</li> <li>• other insects/food chains not affected</li> </ul>	[3]	
(ii)	Possibility of 'superweeds'/allergies/fear of 'unknown'/side effects unknown	[1]	12
		<b>Total</b>	<b>75</b>