



Rewarding Learning

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

Science: Single Award

Unit 1 (Biology)

Higher Tier

[GSS12]

WEDNESDAY 13 NOVEMBER 2013, AFTERNOON

**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		
1	(a) (i)	Insulin causes reduction in blood glucose level [1]	[2]	6	
		converts glucose to glycogen (in liver) [1]			
	(ii)	Type 1 as insulin taken by injection	[1]		
	(b) (i)	Invitro ----- animal ----- clinical	[1]		
(ii)		Testing on cells/in laboratory [1] expensive equipment/specialist scientists needed/trial and error effect [1]	[2]		
2	(a) (i)	Any three from		7	
		• can live in wider range of forests/habitats			
		• can feed on food (e.g. fallen seeds) on the ground/more places			
		• can eat unripe berries/nuts/seeds/wider range of food			
		• therefore can use up food before the red squirrels can use it			
		• immune to the virus (that can kill red squirrels)	[3]		
	(ii)	More likely to be on the ground/occur in larger numbers	[1]		
	(iii)	Plant more coniferous forests/vaccinate against virus/eliminate or prevent movement of grey squirrels/special feeders for reds/ breeding programmes	[1]		
	(b)	Any two from	• introduced from another country/by man		
			• spread rapidly/increase in numbers rapidly		
• out-compete native species/better adapted than native species			[2]		
3	(a) (i)	Passes genetically through the generations	[1]		
		(ii)	Jack and Jill are carriers/heterozygous/have allele but do not have CF	[1]	
	(b) (i)	cc	[1]		
		(ii)	3	[1]	
	(c) (i)	Chromosome	[1]		
		(ii)	Down syndrome [1] an extra chromosome present [1]	[2]	

4 (a) Indicative content

- plant with leaf (or part of leaf) covered and leaf (or part of leaf) uncovered/one plant in light and one in dark
- method of covering described
- plant left in bright light for e.g. 24 hours to 1 week
- iodine added
- blue black/starch only present where uncovered/in light
- if starch present iodine turns blue/black
- starch only present if photosynthesis takes place

Band	Response	Mark
A	Candidates use appropriate specialist terms throughout to describe an investigation showing that light is needed for photosynthesis using five to seven 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 an investigation showing that light is needed for photosynthesis using three or four 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 an investigation showing that light is needed for photosynthesis using one or two 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	Not worthy of credit.	[0]

[6]

(b) Any two from

- close to top of leaf
- tightly packed
- rich in chloroplasts/chlorophyll

[2]

8

AVAILABLE
MARKS

			AVAILABLE MARKS
5	(a) (i)	Evergreen leaves allows photosynthesis throughout year/for longer [1]	5
	(ii)	Sharp spikes give protection against herbivores/being eaten [1]	
	(b) (i)	Appropriate scale making full use of grid [1] appropriate labels, e.g. number of spikes on X-axis and number of leaves on the Y-axis [1] [2]	
	(ii)	Discrete categories/no intermediate values [1]	
6	(a) (i)	The number of strains resistant to MRSA increases with time [1] (at any time) there are more strains resistant to one antibiotic than two or more [1] [2]	8
	(ii)	Target treatment [1]	
	(b) (i)	Open wounds/high concentration of MRSA/antibiotics in hospitals/ low immunity of patients/many sick people with MRSA [1]	
	(ii)	Any two from <ul style="list-style-type: none"> • medical staff washing hands (between contact with patients) • use of gloves/disposable clothing/aprons • sterilise equipment • isolate infected patients • restricted use of antibiotics • cover open wounds • testing before admission [2] 	
	(c)	Mutation [1] in chromosomes/genes [1] [2]	
7	(a) (i)	72 and 96 from graph [1] 24 increase [1] 33.3% [1] [allow ncm] [3]	8
	(ii)	Heart rate slowing down during the exercise/at four minutes [1]	
	(b) (i)	Lower maximum rate/recovery time shorter/resting rate lower/will not slow down during exercise [1]	
	(ii)	Any three from <ul style="list-style-type: none"> • strengthens heart (muscle) • increases output (when not exercising) • therefore needs to beat less often/lower heart rate • high respiration rate stops cholesterol/fat accumulating • reduces obesity putting less strain on heart [3] 	

		AVAILABLE MARKS
8	<p>(a) When number of children vaccinated is high, number of children infected with whooping cough is low (or converse) [1] vaccinated children unable to catch/spread whooping cough (or converse) [1]</p> <p>(b) (i) A large number of individuals (in the one area) affected</p> <p>(ii) Easily spread (by coughing)/young children weak immune systems (caught before vaccination)</p> <p>(c) Any three from</p> <ul style="list-style-type: none"> • antigens (on microbes) • cause production of antibodies • take time to build up • antibody – antigen reaction (or explained) • clumping/immobilisation • phagocytosis as explained (phagocytes/will engulf or destroy microbes) 	<p>[2]</p> <p>[1]</p> <p>[1]</p> <p>[3]</p> <p>7</p>
9	<p>(a) X – decay/decomposition [1] Y – nitrification [1]</p> <p>(b) Any three from</p> <ul style="list-style-type: none"> • harvesting of crop • removes nitrogen (nitrate) • unable to decay/return nitrate to soil • fertiliser replaces lost nitrate <p>(c) Any two from</p> <ul style="list-style-type: none"> • if excess not used by plants • builds up to toxic levels in the soil • if on sloping ground can run off into waterway • adding nitrate to waterways/direct effect of increase in nitrate, e.g. algal growth • correct consequence of algal growth (e.g. blocks light, bacteria use up oxygen, fish die as shortage of oxygen) 	<p>[2]</p> <p>[3]</p> <p>[2]</p> <p>7</p>

10 (a) Indicative content

- used modelling
- double helix shape/A-T and/or C-G combinations
- Franklin and Wilkins
- X-ray diffraction
- to show helical/spiral structure/3D shape
- Chargaff
- worked out that amount of A = T and amount of C = G
- clear sequence of development

Band	Response	Mark
A	Candidates use appropriate specialist terms throughout to describe working out the structure of DNA using six to eight 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 working out the structure of DNA using three to five 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 working out the structure of DNA using one or two 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	Not worthy of credit.	[0]

[6]

(b) Any two from

- Checking results
- reviewed by experts in the field
- extending theory

[2]

(c) (i) A crop that contains new DNA/genes/chromosomes [1]
from another species [1]

[2]

(ii) Extends range of crop [1]
more profit/more food/less irrigation costs [1]

[2]

12

Total

75