



*Rewarding Learning*

**General Certificate of Secondary Education  
2012–2013**

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**Science: Single Award**

Unit 1 (Biology)

Higher Tier

**[GSS12]**

**TUESDAY 14 MAY 2013, 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 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.

1 (a) (i) Nucleus [1]

(ii) Genes [1]

(b) (i)

		r
r		rr
	Rr	

Gametes correct [1] offspring correct [1] [2]

(ii) 50% [allow ncm] [1]

(iii) RR [1]

6

2 (a) (i) Time for antibodies to be made/immune system responding to infection [1]

(ii) Takes time for immunity level to be achieved [1]  
antibody level remains high [1] [2]

(b) Phagocytes engulf/surround/bacteria/microbes [1]  
bacteria/microbes are digested/eaten/killed [1] [2]

(c) (i) Flu is a virus/antibiotics do not work on viruses [1]  
Antibiotics only work on bacteria [1] [2]

(ii) Bacterial/microbe resistance/bacteria mutate [1]

8

3 (a) 1970 [1]

(b) Any **three** from

- both percentage of males who smoke and lung cancer in males decreasing from 1950–2010/when percentage of male smokers high, number of males with cancer high
- when percentage of male smokers low/number of males with lung cancer low
- when percentage of female smokers rise so does number with lung cancer
- lag between smoking and lung cancer peaks due to time taken to develop lung cancer
- more male (than female) smokers, more males than females had lung cancer [3]

(c) Any **two** from

- carbon monoxide in cigarette smoke
- reduces blood's ability to carry oxygen/less oxygen
- for respiration [2]

6

4 (a) **Indicative content**

- increased combustion/use of fossil fuels
- deforestation
- increases carbon dioxide in atmosphere/too much carbon dioxide
- greenhouse layer/carbon dioxide layer traps escaping heat energy/heat cannot escape from atmosphere
- climate change/more extreme weather conditions
- melting of ice caps/sea levels rise
- alternative fuels/reduced combustion/energy efficiency
- increase in forests

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe global warming using <b>six to 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 global warming using <b>three to 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 global warming work using <b>one or two</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	Not worthy of credit.	[0]

[6]

(b) Only grow where pollution levels are low/high levels of pollution kills them

[1]

7

			AVAILABLE MARKS
5	<p>(a) (i) Inversely proportional/when mass of fish caught high mass of fish eggs low/when mass of fish caught low mass of fish eggs high [1] if more fish caught fewer fish left to produce eggs/or converse [1] [2]</p> <p>(ii) Any <b>three</b> from</p> <ul style="list-style-type: none"> <li>● in 1980–2000 more eggs spawned/numbers increase</li> <li>● in 1980–2000 fewer fluctuations</li> <li>● use of nets with larger mesh sizes allowed smaller fish to escape/mature</li> <li>● and lay eggs/breed</li> </ul> <p>[3]</p> <p>(b) Any <b>three</b> from</p> <ul style="list-style-type: none"> <li>● causes growth of algae/water plants</li> <li>● block out light from submerged plants</li> <li>● bacteria (decomposing dead plants)</li> <li>● use up oxygen causing death of fish</li> </ul> <p>[3]</p>		8
6	<p>(a) 7/28 [1] 25% [1] [2]</p> <p>(b) (i) <b>Chemical messengers</b> that travel in the <b>blood</b> to a <b>target organ</b> (all three components in bold included = 2; any two = 1) [2]</p> <p>(ii) 12–14 [1]</p> <p>(iii) Maintains the uterine lining [1] as preparation for pregnancy [1] [2]</p> <p>(iv) Changes hormone levels [1] and stops the development of an ovum/stops ovulation [1] [2]</p>		9
7	<p>(a) (i) Nitrates [1]</p> <p>(ii) No/fewer dead plants/plants containing nitrogen removed [1] for decay bacteria/for decay/ammonia production [1] less nitrification/fewer nitrates [1] [3]</p> <p>(b) (i) Decay bacteria peak before nitrifying bacteria [1]</p> <p>(ii) Day 8 [1]</p> <p>(iii) Respiration [1]</p> <p>(iv) Saves peat/moss/natural resources/less landfill/not adding chemicals to soil [1]</p>		8

			AVAILABLE MARKS
8	(a)	Transfer (or modification) of DNA/(Bt) genes [1] from one organism to another [1]	[2]
	(b)	Birds	[1]
	(c)	Less pollution/fewer chemical pesticides used [1] do not kill natural predators of pest [1] fewer food shortages/more food [1]	[3]
	(d)	No scientific evidence for GM crops causing harm	[1]
7			
9	(a)	(i) Any <b>three</b> from <ul style="list-style-type: none"> <li>● copper tolerance is a disadvantage/normal plants have an advantage</li> <li>● copper tolerant plants selected against/eliminated by natural selection/out-competed</li> <li>● explanation of how it is out-competed</li> <li>● in typical British field/where there is no copper pollution</li> </ul>	[3]
	(ii)	Normal/non copper tolerant plants cannot survive [1] Copper tolerant plants can survive/have advantage in this environment [1]	[2]
	(b)	Any <b>two</b> from <ul style="list-style-type: none"> <li>● UV rays</li> <li>● damages genes/chromosomes of skin</li> <li>● leading to uncontrolled cell division</li> </ul>	[2]
7			

**10 (a) Indicative content**

- double helix/two strands
- [backbone of] phosphate and sugar
- linked by bases/base pairing/or explained, e.g. A joins with T/  
bases hold strands together
- bases form code/one side of DNA is coding strand
- base triplet is series of 3 bases
- base triplet/three bases code for an amino acid
- [sequence of] amino acids forms protein

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe DNA structure and function using <b>five to seven</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 DNA structure and function using <b>three to four</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 DNA structure/function using <b>one or two</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	Not worthy of credit.	[0]

[6]

**(b)** New discoveries build on previous discoveries/scientists collaborate to produce new research above and beyond what they could do separately [1]

Any **two** from

- Chargaff worked on quantitative analysis of bases/discovered that amount of A=T/C=G
- Franklin then used X-ray diffraction to find overall shape of DNA
- Watson and Crick used modelling to identify double helix structure

[2]

**Total**

AVAILABLE  
MARKS

9

**75**

