



Rewarding Learning

**General Certificate of Secondary Education
2014–2015**

Science: Single Award

Unit 1 (Biology)

Higher Tier

[GSS12]

TUESDAY 24 FEBRUARY 2015, MORNING

**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) | Antibodies are complementary shape to antigens [1] | [3] | 9 | | | | | | | | | |
| | | antibodies latch on to antigens/microorganisms [1] | | | | | | | | | | | |
| | (ii) | Phagocyte/white blood cell surrounds/engulfs microorganism [1] | | | [2] | | | | | | | | |
| | | microorganism is digested/broken down/destroyed/killed [1] | | | | | | | | | | | |
| | (b) (i) | Percentage of children vaccinated fell to around 45%/half after 1998 [1] | [2] | | | | | | | | | | |
| | | from 2005 on the numbers vaccinated have risen to 90% [1] | | | | | | | | | | | |
| (ii) | Number of children vaccinated never reaches 100% | [1] | | | | | | | | | | | |
| (c) | Active | [1] | | | | | | | | | | | |
| 2 | (a) (i) | DNA | [1] | 7 | | | | | | | | | |
| | | (ii) | | | People with albinism do not have melanin/protection (against UV light) [1] | | | | | | | | |
| | | are at increased risk of (skin) cancer [1] | [2] | | | | | | | | | | |
| | (b) (i) | <table border="1" style="margin-left: 40px;"> <tr> <td></td> <td>A</td> <td>a</td> </tr> <tr> <td>A</td> <td>AA</td> <td>Aa</td> </tr> <tr> <td>a</td> <td>Aa</td> <td>aa</td> </tr> </table> | | | A | a | A | AA | Aa | a | Aa | aa | [2] |
| | | | A | | a | | | | | | | | |
| | A | AA | Aa | | | | | | | | | | |
| a | Aa | aa | | | | | | | | | | | |
| Gametes [1] offspring [1] | | | | | | | | | | | | | |
| (ii) | aa | [1] | | | | | | | | | | | |
| (iii) | 75%/3 out of 4 children do not have albinism/3:1 | [1] | | | | | | | | | | | |
| 3 | (a) (i) | A – oxygen; B – carbon dioxide (both needed) | [1] | 5 | | | | | | | | | |
| | | (ii) Respiration | | | | | | | | | | | |
| | (b) (i) | 3.5 arbitrary units [1] | [2] | | | | | | | | | | |
| | | maximum yield with minimum lighting (cost) [1] | | | | | | | | | | | |
| | (ii) | More carbon dioxide/light heat for photosynthesis/ other appropriate response (e.g. no damaging effect of wind) | [1] | | | | | | | | | | |

4 (a) Indicative content

- number of pots each with different number of seedlings
- **any two** from: same type/volume compost/same water/same light/same temperature/left for same length of time/same size of pot/same type of seed
- (at end measure) mass/number of leaves/any suitable plant feature
- most growth would be in pots with fewest seedlings (or converse)
- due to reduced competition between plants (or converse)

| Band | Response | Mark |
|------|--|---------|
| A | Candidates must use appropriate specialist terms throughout to describe how to investigate the effect of planting density on plant growth using five or six 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 investigate the effect of planting density on plant growth 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 how to investigate the effect of planting density on plant growth 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 | Response not worthy of credit. | [0] |

[6]

(b) (i) Rhododendron/other appropriate example

[1]

(ii) Introduced by man/spread rapidly/outcompete native species

[1]

8

5 (a) (i) Iron/mineral

[1]

(ii) 13.5

[1]

(iii) Water

[1]

(b) Insulin [1]

large amount of sugar in the drink/insulin converts sugar to glycogen/
reduces sugar levels/speeds up respiration [1]

[2]

5

| | | | AVAILABLE MARKS | |
|-----|---|--|-----------------|----|
| 6 | (a) | (i) Prostate gland [1] provides food for sperm [1] | [2] | 8 |
| | | (ii) Both sperm tubes labelled X | [1] | |
| | (b) | (i) Vasectomy numbers increase with age [1] level off at age 50–59/at 29 [1] | [2] | |
| | | (ii) Will want children later/not married yet/unsure of plans | [1] | |
| (c) | Maintains uterine lining [1] to nourish embryo/foetus (in pregnancy)/for pregnancy [1] | [2] | | |
| 7 | (a) | (i) 377–375 | [1] | 7 |
| | | (ii) (Carbon dioxide) levels higher in winter than summer (in any one year) [1] (increased) burning of fossil fuels to provide heat/less photosynthesis in winter (or converse) [1] | [2] | |
| | (b) | Increasing/high levels of carbon dioxide [1] forms barrier in atmosphere/‘greenhouse’ layer [1] traps/reflects heat back/stops heat escaping from atmosphere [1] | [3] | |
| | | (c) Ice field areas/water levels/changing climates | [1] | |
| 8 | (a) | (i) Spread of disease over a large area (many countries)/many (thousands) of people affected | [1] | 10 |
| | | (ii) Any two from <ul style="list-style-type: none"> • spreads easily/by close contact • no vaccine/no cure • virus so cannot be controlled by antibiotics | [2] | |
| | (b) | (i) Fungus infected bacteria (in Petri dish) [1] substance diffused/spread from fungus [1] killing/stopping growth of bacteria [1] | [3] | |
| | | (ii) Any three from <ul style="list-style-type: none"> • type A increased (slightly) in number/unaffected • type B all killed/numbers dropped sharply • type A antibiotic resistant/penicillin killed B/B not resistant • type A increased as less competition for space/food/resources | [3] | |
| (c) | Invitro – animal testing – clinical trials | [1] | | |

- 9 (a) (i) Wide range/many flowers/plants [1]
- (ii) Sample uncut and cut sections of hedgerows and verges [1]
count number of species/types of plants and/or animals in each [1]
reliability explained, e.g. sample several uncut and cut hedgerows
and verges/or comparison over time [1] [3]
- (iii) Reduced vision for motorists/cover safety signs [1]
- (b) **Any three from**
- sun is original source of energy
 - plants/producers convert light energy into food/chemical energy
 - primary consumers eat producers (plants)/secondary consumers eat primary consumers
 - idea of energy *flow* (i.e. not a cycle) – energy needs to continually enter chain [3]

AVAILABLE
MARKS

8

10 (a) Indicative content

- **genetic screening** can identify presence of genetic disease (in foetus)
- allowing mother to have abortion (or early treatment for foetus/child)
- screening can raise ethical issues for parents/insurance companies may not provide insurance or insurance could be more expensive/ disease may not be curable/could lead to miscarriage
- **gene therapy** allows 'normal' gene/allele to replace faulty gene/allele
- any benefit described, e.g. normal lung function in cystic fibrosis/treat cystic fibrosis
- any problem identified, e.g. introduced gene does not reach all affected parts/not passed on to offspring
- **GM crops** have (beneficial) gene introduced from another species
- any benefit described, e.g. faster growth/disease resistance/help solve world hunger problems
- any problem described, e.g. possibility of 'superweeds'/allergies/negative public perception/expensive

| Band | Response | Mark |
|------|--|---------|
| A | Candidates must use appropriate specialist terms throughout to describe the benefits and problems of genetic advances using seven or more 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 benefits and problems of genetic advances using four to six 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 benefits and problems of genetic advances using one to three 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) The review of scientific progress by other scientists/experts [1]
 identifies errors/increases collaboration/increases knowledge/check the work is correct [1]

[2]

8

Total**75**AVAILABLE
MARKS