Rewarding Learning

General Certificate of Secondary Education
2016–2017

# Double Award Science: Biology

## Unit B1

## Higher Tier

**[GSD12]**

**TUESDAY 16 MAY 2017, 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)** | A: Brain;<br>B: Spinal cord [2] | |
| | **(b)** **(i)** | 2 [1] | |
| | **(ii)** | 3 [1] | 4 |
| **2** | **(a)** | Any **two** from:<br>• thirst;<br>• lethargy/tiredness;<br>• high blood glucose;<br>• glucose in the urine [2] | |
| | **(b)** **(i)** | Insulin;<br>liver [2] | |
| | **(ii)** | • Converts glucose to glycogen/stores glucose as glycogen;<br>• Increased respiration of glucose;<br>• Glucose converted to fat/glucose stored as fat;<br>• Increased/more uptake of glucose [2] | |
| | **(c)** **(i)** | • The percentage decreases with increasing age/age group/as children get older;<br>• 25 to 9/14 to 9/25 to 14/decreases by 16 [2] | |
| | **(ii)** | 1620 ÷ 100 × 25;<br>= 405 [2] | |
| | **(iii)** | Kim – incorrect;<br>Mike – cannot tell from the data [2] | 12 |

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| 3 | (a) | (i) | Can see more ground/wider field of view/can see more prey/can easily see rabbit/less likely to be seen by prey/less likely to be heard by prey/doesn't scare prey [1] | |
| | | (ii) | **Sharp** beak/long or **curved** talons/forked tail [1] | |
| | (b) | (i) | 14 breeding pairs = 28 chicks hatched;<br>50% survive = 14 chicks survive;<br>14 plus original 28 = 42 birds [3] | |
| | | (ii) | Any **two** from:<br>• habitats destroyed/deforestation;<br>• some birds emigrated;<br>• some poisoned/poached/hunted/killed;<br>• poaching/hunted/killed;<br>• lack of food/starvation/no prey/competing for food;<br>• disease [2] | |
| | (c) | (i) | Any **two** from:<br>• Traps light or energy from the sun;<br>• makes food/glucose/starch;<br>• by photosynthesis [2] | |
| | | (ii) | Common voles/voles [1] | |
| | | (iii) | • Yellow oat grass → earthworms → common voles → red kites<br>• Arrows in correct direction from the producer [2] | 12 |

AVAILABLE MARKS

**4 (a) Indicative content**

- Substrate A broken down/Stain A removed;
- Substrate A complementary shape to/fits the active site of enzyme 2/fits into enzyme 2;
- Substrate B is **not** broken down/not removed;
- Substrate B is **not** complementary to either enzyme 1 or 2 or does not fit into both enzymes;
- Lock and key theory;
- Enzyme 1 does **not** break down/remove substrate A/B/Stain A or B or both
- Enzyme 1 is **not** complementary/does not fit/substrate A/B/Stain A or B or both

| Response | Marks |
|---|---|
| Candidates must use appropriate specialist terms throughout using **at least 5** of the above points to describe the effect of the washing powder on **both** substrate molecules. They use good spelling, punctuation and grammar and the form and style are of a high standard. | [5]–[6] |
| Candidates must use some appropriate specialist terms using **3 or 4** of the above points to describe the effect of the washing powder on the substrate molecules. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard. | [3]–[4] |
| Candidates must use **1 or 2** of the above points to describe the effect of the washing powder on one the substrate molecules. They use limited spelling, punctuation and grammar and little use of specialist terms. | [1]–[2] |
| Response not worthy of credit. | [0] |

[6]

**(b)** Enzyme(s) denatured/substrate would not fit into enzyme; so substrate/stain not broken down/stain remains on clothes [2]

8

**5 (a)** Distance of burning crisp from tube/complete burning of food/crisp/same amount of stirring/size of boiling tube [1]

**(b) (i)** Rise in temperature = 1512 ÷ (20 × 4.2)/1512 ÷ 84;
= 18 °C [2]

**(ii)** More fat in the fried crisp/less fat in baked [1]

**(c)** Any **two** from:

- More heat transferred to the water by heat transfer coil;
- Less heat lost to the atmosphere due to the insulating layer;
- Supply of oxygen for complete burning of food [2]

6

| | | | AVAILABLE MARKS |
|---|---|---|---|
| 6 | (a) | A = Denitrification<br>B = Decomposition/decay<br>C = Nitrification [3] | |
| | (b) (i) | Glucose/sugar/sucrose/oxygen [1] | |
| | (ii) | Nitrogen changed to nitrate;<br>for amino acids/protein [2] | |
| | (c) (i) | Some of the nitrate had been used up/absorbed/less nitrate/<br>after harvesting nitrates not replaced/denitrification [1] | |
| | (ii) | $\frac{3495}{100} \times 60$; 2097;<br>3495 – 2097 = 1398 [3] | |
| | (iii) | Clover had been planted in Year 1 (must have clover mark to get 3 marks); Any two from<br>Decomposition of clover/decay/breakdown;<br>**More** nitrogen fixation than Field B;<br>**More** nitrogen gas converted to nitrate;<br>**More** nitrification/**more** ammonia to nitrate [3] | 13 |
| 7 | (a) (i) | Eutrophication [1] | |
| | (ii) | Description – BOD increases;<br>Any **three** from:<br>• Algae die;<br>• Decomposing/decomposition/broken down;<br>• By bacteria/decomposers/fungi;<br>• Use up oxygen [4] | |
| | (b) | Biodiversity increases/more types of organisms/more species [1] | |
| | (c) | Bloodworm/rat tail maggots/sludgeworms [1] | 7 |

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| 8 | (a) | (i) | Red [1] | |
| | | (ii) | $CO_2$ at atmospheric level/no change in carbon dioxide level/carbon dioxide used equals carbon dioxide produced [1] | |
| | (b) | | Carbon dioxide levels increased;<br>**Only** respiration/respiration but no photosynthesis [2] | |
| | (c) | (i) | Blue [1] | |
| | | (ii) | Highest pH/least acidic/most alkaline/pH 8.6;<br>Less/least carbon dioxide present/more/most carbon dioxide absorbed/decrease in $CO_2$/takes in $CO_2$ at faster rate [2] | |
| | (d) | | Purple [1] | 8 |
| | | | **Total** | **70** |