Rewarding Learning

General Certificate of Secondary Education
2015–2016

Double Award Science: Biology

Unit B1

Higher Tier

[GSD12]

TUESDAY 17 MAY 2016, 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)	Root hair (cell)	[1]	
		(ii)	Extended with long OK Cell has extension/described; that gives increased surface area	[2]	
	(b)	(i)	Protein/amino acids	[1]	
		(ii)	Artificial fertiliser: 200 nitrate, FYM 6.0/Diff 194/times 33 100 phosphate, FYM 3.5/96.5/28.6 100 potassium, FYM 8.0/92/12.5 Any **one** **Options** More + 1 data statement 2 data statements difference times with numbers	[1]	
		(iii)	Any **three** from: Farmyard manure has: • Slower release of minerals • (Minerals) less likely to be leached/washed out of soil/less runoff/less soluble/less **water** pollution/less eutrophication • Costs less/'free' byproduct from farms/already on farm • Improves soil structure/crumb structure/adds humus/adds organic matter/improves soil texture • Encourages more earthworms/air in the soil	[3]	8
2	(a)	(i)	10 year period: 1990–2000; Decrease: 47 µg/m^3	[2]	
		(ii)	Less burning of fossil fuels Switch to natural gas/less coal or oil used/more renewable sources used or named, e.g. solar Natural gas contains less SO_2/less reliance on fossil fuels	[1]	
	(b)		Crusty lichens; they are the only ones that can grow at 65 µg/m^3 sulfur dioxide they can grow up to 70/others can't survive at 65 or up to 70	[2]	
	(c)		To trigger action if level starts to increase/ensure targets for clean air are being met/in case levels start to go up/avoid fines	[1]	6

AVAILABLE MARKS

3 **(a)** **(i)** In a dark cupboard for 24 hours (or more) [1]

(ii) To show that any starch made is made during the experiment/ to ensure that all starch has been used up/ensure no starch present [1]

(iii) Bacteria in soil **respire**; to stop carbon dioxide entering the flask (around the plant)/bacteria produce CO_2 [2]

(iv)
- **A** – Leaf is yellow-brown and **B** – Black/blue; not blue on its own both for 1st mark
- No starch in **A or** starch in **B**;
- No carbon dioxide in **A or** carbon dioxide present in **B** [3]

(b) **(i)** Less/decreased/smaller number of bubbles [1]

(ii) 23 cm [1]

(iii) To allow the plant to adjust/acclimatise [1]

10

4 **(a)** Any **two** from:
- Large surface area
- Long/the length
- Folds/twists
- Villi/microvilli
- (Produces) enzymes/named enzymes/enzymes present [2]

(b) **Indicative content**

Reduced hydrochloric acid in the stomach: – in Q
- Reduced enzyme activity/enzyme action
- Protease (named as enzyme involved)
- So less digestion of the meat/protein/breakdown slower/takes more time/longer to digest/less food broken down
- **Meat** remains in the stomach for longer
- There will be less amino acids produced (credit mention of amino acids only once in answer)

Small intestine:
- Meat/protein is digested by proteases – do not credit protease if mentioned above
- To amino acids (do not credit if mentioned above)

Products:
- They are absorbed/diffused/active transport;
- Into the blood/capillary/villi/bloodstream;

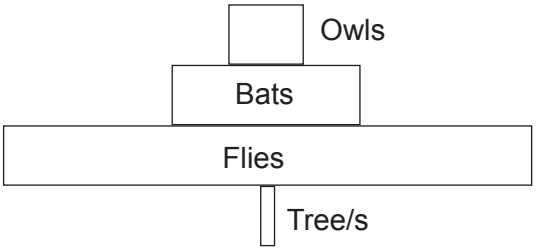
Response	Marks
Candidates use appropriate terms throughout to explain the effect of reduced hydrochloric acid production on digestion in the stomach and describe protein digestion and absorption in the small intestine. They use **five to six** points from the indicative content. They use good spelling, punctuation and grammar. Form and style are of a high standard.	[5]–[6]
Candidates use appropriate terms throughout to explain the effect of reduced hydrochloric acid production on digestion in the stomach and describe protein digestion and absorption in the small intestine. They use **three to four** points from the indicative content. They use satisfactory spelling, punctuation and grammar. Form and style are of a satisfactory standard.	[3]–[4]
Candidates use **one or two** points from the indicative content to explain the effect of reduced hydrochloric acid production on digestion in the stomach and/or describe protein digestion and absorption in the small intestine. They use limited spelling, punctuation and grammar. They make limited use of specialist scientific terms.	[1]–[2]
Response not worthy of credit.	[0]

[6]

AVAILABLE MARKS

8

5 **(a)** **(i)**



1 mark for tree – smaller than the flies bar and labelled and at bottom;
1 mark for correct pyramidal shape of the top three bars;
1 mark for labels of top three bars in ascending order of flies, bats, owls [3]

(ii) Eat flies that are crop pests/prevent yield loss/promote owls to come to farm [1]

(b) **(i)** Any **four** from:

- nitrates stimulate the growth of algae/plants
- these cause shading/described
- leads to the death of algae/plants
- bacteria/micro-organisms **decompose** the (dead) algae/plants
- bacteria/micro-organisms use up the oxygen [4]

(ii) Increase in bat population;
as more flies for the bats to eat/less competition [2]

10

AVAILABLE MARKS

6 **(a)** First trophic level [1]

(b) **(i)** Human [1]

(ii) 4000; ÷ 60 000 × 100; = 6.7/6.67 [2]

(iii) Any **two** from:
- energy loss as heat/respiration (by the grass)
- not all grass is eaten
- some grass eaten by other herbivores, e.g. rabbits
- some grass passes to the decomposers
- reproduction

assume grass unless otherwise stated [2]

(iv)
1st mark { less energy lost in movement/heat/respiration
cattle have more energy because of less movement/heat/respiration

2nd mark { cattle grow faster/can be sold earlier/bigger cattle
more beef/fatter cattle/cattle gain weight [2] 8

7 **(a)** To ensure that starch and amylase were at the same temperature before being added together [1]

(b)

Slow
Medium
Fast

[1]

(c) Yellow-brown [1]

(d) Repeat the experiment at different temperatures above and/or below 40°C/ wider range of temperatures [1]

(e) Any **three** from:
Blue/black colour remains/no colour change;
at all three temperatures/at every temperature;
starch not broken down/substrate not broken down;
as amylase is denatured/damaged/starch no longer fits into the active site of the enzyme (amylase)
no E–S complex formed [3] 7

			AVAILABLE MARKS
8	(a)	Decomposed/broken down (by bacteria/fungi) to give ammonia/ammonium/NH_4^+ [2]	
	(b)	• Denitrifying bacteria present/Denitrification; • Respire anaerobically; • which convert nitrate to nitrogen gas; **or** • **reduced/less** nitrification/less nitrifying bacteria; • Respire aerobically; • so less ammonia converted to nitrate; **or** • less/reduced nitrogen fixing bacteria/nitrogen fixation; • respire aerobically; • so less nitrogen gas converted into nitrates **also** • crop has shortage of nitrate/lack of amino acids/protein **or** • less respiration/energy of plant • less active uptake of nitrate } max [2] – to get [3] must mention one type of N-bacteria or nitrogen process [3]	5
9	(a)	Any **two** from: • less burning of fossil fuels (at power stations)/Kyoto agreement • solar/wind/wave/geothermal/tidal (alternative electricity generation)/ renewable sources • better insulation (more) efficient energy usage (so there is less need for electricity generation)/people use less electricity • nuclear [2]	
	(b)	Any **two** from: • increased air traffic • increased world population • deforestation • burning of fossil fuels **in other countries** • failure to sign up to international treaties • trying to grow economy in other countries/more industrialisation in other countries/more factories [2]	
	(c)	**(i)** 464.3 ÷ 11; = 42.2/42.21/42; million hectares [3]	
		(ii) There is not enough **land** to absorb all the carbon dioxide produced/ 42 million hectares needed but only 23 million hectares available/ land is needed to produce food [1]	8
		Total	**70**