Rewarding Learning

General Certificate of Secondary Education
2016–2017

Double Award Science: Biology

Unit B1

Higher Tier

[GSD12]

WEDNESDAY 22 FEBRUARY 2017, 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)** E, A, C, B
E+A = 1st = 1 mark C+B = 2nd = 2nd mark [2]

(b) Respiration/energy/sucrose/cellulose/protein/fat/oil/seeds/fruits/flowers/amino acids [1]

(c) **(i)** Carbon dioxide [1]

(ii) Temperature/light/water/heat/sun [1]

(d) Any **two** from:
- no photosynthesis occurs/no light/it's dark;
- it is a waste of carbon dioxide/CO_2 not used/uneconomic/pointless no profit/waste of money/CO_2 won't be limiting factor [2]

(e) Spreads carbon dioxide better/more even CO_2 distribution/more plants close to carbon dioxide source/plants all receive CO_2/affects all the plants in same way/one would only affect close plants [1]

8

2 **(a)** Phototropism/tropism [1]

(b) Any **two** from:
- the hormone (auxin) accumulates on the shaded side/moves away from the light;
- where it causes elongation/gets bigger/growth (on shaded side); [2]

(c) Ignore seedling width
Seedling B does not bend/grows straight up;
It is the same height or only slightly taller [2]

5

3 **(a)** A – bloodworms; as the level of (nitrate)/pollution is more **high**/low O_2/survive in low O_2/30 nitrate [2]
C – freshwater shrimp and/or stonefly; as they can live where there is no or medium nitrate/pollution [2]

(b) Bacteria/microorganisms/fungi/microbes/decomposers
Decompose the dead algae/aquatic plants/break down algae
Respire/respiration;
using up O_2 [3]

7

				AVAILABLE MARKS
4	(a)	(i)	Feeding/ingestion/consumption/eating/eaten/animals eat plants [1]	
		(ii)	Respiration [1]	
	(b)		Less photosynthesis; means less carbon dioxide is used/absorbed by plants/plants/trees take in CO_2/can't change CO_2 to O_2 [2]	
	(c)	(i)	**More** carbon dioxide/**more** greenhouse gas; **more** heat trapped/**less** heat escapes [2]	
		(ii)	Any **two** from: • ice caps melt/glaciers melting/arctic ice melts • coastal flooding/flooding of low lying areas • rise in sea levels • change in weather patterns/climate change • drought/desertification • loss of habitat **or** described [2]	
	(d)	(i)	More transport/use more energy/related to personal use [1]	
		(ii)	More people in China/more densely populated country more factories in China/more industry in China/more fossil fuels burnt in China [1]	10

AVAILABLE MARKS

5 (a) Indicative content

- **Use measuring cylinder** (to measure a given volume of DCPIP)
- Same amount into a test tube
- DCPIP in tube
- **Use dropper** to add (juice (to DCPIP))
- Shake test tube/swirl the contents/mix/stir
- **Count the number of drops (**of juice added to change colour)
- Colour change from blue to colourless or pink – need **both** colours
- Repeat procedure above for the **other juice**
- Use a different dropper for 2nd juice/or wash out dropper in between juices
- Do repeats for reliability

Max 4 if juice in t.t's

Response	Marks
Candidates use appropriate terms throughout in describing how to test the two juices for vitamin C content. They must use 5–6 points from the indicative content. They use good spelling, punctuation and grammar skills. Form and style are of a high standard.	[5]–[6]
Candidates use appropriate terms throughout in describing how to test the two juices for vitamin C content. They must use 3–4 points from the indicative content. They use satisfactory spelling, punctuation and grammar skills. Form and style are of a satisfactory standard.	[3]–[4]
Candidates include 1–2 points from the indicative content when describing how to test the two juices for vitamin C content. They use limited spelling, punctuation and grammar and have made little use of specialist terms.	[1]–[2]
Response not worthy of credit.	[0]

[6]

(b) Less drops of grapefruit juice needed/more drops of lemon juice needed (to change the colour of the DCPIP)
The DCPIP turned blue to colourless quicker with grapefruit than lemon/or converse [1]

7

				AVAILABLE MARKS
6	(a)	(i)	Any **two** from: • Grind sample up/homogenise/add a small amount of water and grind/make solution of meat • Add Biuret reagent sodium hydroxide + $CuSO_4$ [2]	
		(ii)	Blue to purple (both needed) [1]	
	(b)		Protease A – stomach Protease B – small intestine/ileum [2]	
	(c)	(i)	Amino acids [1]	
		(ii)	Any **three** from: • They provide a large surface area; • Have microvilli; • Wall of villus is one cell thick/short diffusion distance/thin • Good blood supply/lots of capillaries/described • Finger-like shape • Permeable/semi-permeable/selectively permeable [3]	9
7	(a)		Stops oxygen entering/getting in/stop yeast reacting with oxygen [1]	
	(b)		Boiled to remove oxygen/create anaerobic conditions; sterilise it/kill microbes; Cooled so as not to kill the yeast/not to denature the yeast's enzymes/ prevent yeast dying [2]	
	(c)		Yellow; Carbon dioxide/CO_2 produced [2]	
	(d)		Lactic acid/lactate; energy/ small amount of energy (either order) [2]	7

				AVAILABLE MARKS
8	(a)	(i)	To show increase/change due to type of fertiliser experiment To allow comparison with the plots where artificial fertiliser/slurry is applied/to show effect of fertiliser/give baseline mass/show mass of worms before experiment [1]	
		(ii)	Artificial fertiliser increases mass of earthworms/implies compared to control; Artificial fertiliser gives a higher mass of earthworms than slurry/artificial fertiliser gives highest mass of earthworms; Slurry increases the mass of earthworms; Data mark, e.g. artificial fertiliser = 34 g/m^2/slurry = 27 g/m^2 Artificial fertiliser = 12 more than control/slurry 5 more than control; Not both increase mass of earthworms unless comparison to control [3]	
	(b)	(i)	Annelids [1]	
		(ii)	Any **two** from: • **More** respiration/more energy; • For **active** transport/**active** uptake; • Increased uptake of nitrates • nitrates move up/against conc grad/from low to high nitrate [2]	
		(iii)	Nitrification; Converts ammonium (NH_4^+) to nitrate (NO_3^-) (both needed); [2]	9
9	(a)		No photosynthesis; } only respiration = 2 marks Respiration occurs; } which uses up oxygen [3]	
	(b)		Any **three** from: • Both photosynthesis and respiration occur/photosynthesis occurs = 1 mark • Rate of photosynthesis is faster than the rate of respiration = 2 marks • More oxygen is produced than is used/there is a net production of oxygen/photosynthesis produced O_2 = 2 marks [3]	
	(c)		• Less light; less P.S. • Less oxygen produced than at depths 1 m and 2 m/respiration is at same rate at all these depths. [2]	8
			Total	**70**