New Specification

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Double Award Science: Biology

Unit B1

Higher Tier

[GSD12]

MONDAY 27 FEBRUARY 2012
9.30 am–10.30 am

MARK SCHEME

				AVAILABLE MARKS
1	(a)	(i)	electricity generated, Residential, Transport (all three needed for mark) [1]	
		(ii)	$\frac{400}{4200} \times 100 = 9.5\%$ decrease Correct answer – award 2 marks (400 = 1 mark /4200 × 100 = 1 mark) [2]	
		(iii)	more houses use natural gas/double glazing/cavity wall insulation/ roof insulation/solar panels/less coal fires/less fossil fuels/using more renewable/more efficient/conserve energy/become more economical/people more aware (Do **not** accept: milder winters, global warming) [1]	
		(iv)	graph B shows a steady increase (in the percentage of electricity from renewable sources); this means less fossil fuels being burned to generate electricity; so the Electricity generated data (Graph A) show a decrease in carbon dioxide emissions between 2000 and 2008/Graph A less electricity generated/less CO_2 produced from 2000 to 2008/less CO_2 produced because more coming from renewable; [3]	
	(b)		non-living/physical factors (Do **not** accept an example on its own such as wind etc) [1]	
	(c)		Any two from: ● carbon dioxide (and other greenhouse gases) act as a blanket/ acts as a greenhouse (Do **not** accept: ozone, hole in ozone layer) ● allow sun's rays to reach the Earth's surface ● but prevent the escape of heat from the Earth's surface/traps heats/keeps heat/traps sunlight/prevents sun's rays from leaving ● hence the temperature of the atmosphere and Earth's surface increases [2]	
	(d)		to set targets to reduce global warming/so that not too much pollution/ to check or reduce or prevent global warming/prevent climate change/ in case there is an increase accept a consequence such as melting polar ice caps [1]	11

2 **(a)** Any three from:

- men up to age 44 years higher cholesterol than women/younger men have higher cholesterol than women (comparison needed)
- from age 45 years and older women always have higher cholesterol than men/older women have higher cholesterol than men
- cholesterol increases in men up to 55–64 years then declines
- cholesterol increases in women up to 55–64 years then declines
- women have higher cholesterol levels when older
- 55–64: highest cholesterol levels for both **or** both same at 16–24.

[3]

(b) reference to graph Y: increases circulatory illnesses;
reference to graph X: because of increasing cholesterol levels [2]

(c) Any two from:

- obesity
- high blood pressure
- diabetes.

(Do **not** accept: heart disease, strokes) [2]

AVAILABLE MARKS

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AVAILABLE MARKS

3 **(a)** Any three from:

- biological catalyst/speeds up rate of reaction
- enzymes break down (**not** digest as given in question)
- large molecules into small or smaller molecules
- Insoluble molecules into soluble molecules
- so that the products can be absorbed/for absorption/pass into blood
- example substrate of starch/fat protein [3]

(b) enzyme A;
because works best in acid conditions
(found in the stomach) [2]

(c) Indicative content

- each villus is a finger-like shape
- this increases the surface area
- single layer of cells in wall/thin wall
- short diffusion distance (for absorption)
- has network of blood capillaries/good blood supply/connect to blood stream
- sugars and amino acids enter blood capillaries/products enter blood capillaries
- lacteal present
- digested fats absorbed into lacteals
- presence of microvilli [6]

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Response	**Mark**
Candidates use appropriate specialist terms throughout using at least 5 of the above points to describe the structure of a villus and explain how the structures are adapted for absorption. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
Candidates use some appropriate specialist terms throughout using 3 or 4 of the above points to describe the structure of a villus and they partially explain how some of the structures are adapted for absorption. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
Candidates partially describe using 1 or 2 of the above points the structure of a villus and partially explain how it is adapted for absorption using some of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1–2]
Response not worthy of credit.	[0]

		AVAILABLE MARKS
4	**(a)** denitrification/denitrifying bacteria; nitrogen-fixation/fixing or nitrogen fixing bacteria; [2]	
	(b) **(i)** 6613 – 3910 = 2703 correct answer gets 2 marks correct totals get 1 mark (ok if in boxes) [2]	
	(ii) ammonium converted into nitrate (**must** have ammonia or ammonium); involves nitrifying bacteria/needs oxygen/well aerated soil [2]	
	(iii) Any three from: ● algae on surface so less oxygen ● these plants and algae eventually die ● decomposition of plants and algae ● by microorganisms/bacteria ● uses up oxygen; ● fish cannot respire/suffocate/can't breathe (**not** fish die as given in question) [3]	
	(c) Advantages – Any two from (all points relate to FYM): ● FYM is cheaper ● makes use of an animal byproduct or "waste" ● helps retain soil moisture ● slow release of nutrients ● improves soil structure or improves drainage or improves crumb structure or adds humus to the soil ● free/costs less ● organic (Do **not** accept: natural, is not harmful to the environment, can only be spread at certain time of the year/time of application)	
	Disadvantages – Any two from (all points relate to FYM): ● FYM is smelly **or** mucky to apply ● the nutrient content varies or is not known as precisely ● slow release of nutrients i.e. not fast enough for the crop to grow ● uses up more space for storage than bags of artificial fertiliser ● seepage from storage pits can cause water pollution ● more difficult to apply or takes longer to put out manure ● don't know nutrient content ● don't know what is in it/might have harmful bacteria ● could be harmful to the environment/seepage/run-off [4]	13

AVAILABLE MARKS

5 **(a)** to prevent temperature fluctuations/keep temperature constant (**not** keep water) [1]

(b) **Indicative content**

tube A

- colour will be red/no colour change/stays same colour
- rate of photosynthesis equals rate of respiration/CO_2 absorbed equals CO_2 given out

tube B

- purple
- rate of photosynthesis exceeds rate of respiration/more CO_2 taken in than given out

tube C

- yellow
- only respiration occurs (no photosynthesis)/increase in CO_2 [6] 7

Response	Mark
Candidates must use appropriate specialist terms throughout using 5 of the above points to describe the results they would expect and explain, in a logical sequence, the results. 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 throughout using 3 or 4 of the above points to describe results they would expect and partially account for, in a logical sequence, the results. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
Candidates describe the results they would expect or account for these results using 1 or 2 of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1–2]
Response not worthy of credit.	[0]

AVAILABLE MARKS

6 **(a)** **(i)** more species in grassland A/more types of plants/more flowers (Do **not** accept more plants) [1]

(ii) soil moisture/soil fertility or nutrient status/soil pH/temperature (Do **not** accept light) [1]

(b) Indicative content

- for grassland A, set down two tape measures at right angles
- generate random co-ordinates (random number tables or computer)/throw at random
- set quadrat
- record number of plant species within the quadrat/record types of plants (**not** % cover)
- identify plant species/use keys
- record/write down the results
- repeat/throw several times
- divide total numbers (in each quadrat) by number of quadrats/ calculate average number of species per quadrat
- repeat for Grassland B/other area [6]

Response	**Mark**
Candidates must use appropriate specialist terms throughout using at least 5 of the above points to describe how they would have carried out this investigation and explain, in a logical sequence, how the pupils would have obtained these results. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
Candidates must use appropriate specialist terms throughout using 3 or 4 of the above points to describe how they would have carried out this investigation and partially explain, in a logical sequence, how the pupils would have obtained these results. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
Candidates describe using 1 or 2 of the above points how they would have carried out this investigation or explain how the pupils would have obtained these results using some or all of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1–2]
Response not worthy of credit.	[0]

			AVAILABLE MARKS
(c)	**(i)**	net/sweep net [1]	
	(ii)	Any two from: ● grassland A has more flowering plants (photograph) or higher biodiversity (bar chart) (accept reference that A has more flowers or more plants than B) ● so more nectar sources/more food ● so more butterflies [2]	
(d)	**(i)**	sun/sunlight [1]	
	(ii)	second trophic level/trophic level 2 [1]	
	(iii)	Any two from: ● trout loses heat energy (in respiration) (**not** breathing) ● trout uses up energy to swim/move ● energy lost from trout in defaecation/excretion ● bones/scales/fins/gills are not eaten/parts not eaten ● not all trout get caught/trout die/decompose [2]	15
7	**(a)**	ethanol; white (emulsion) [2]	
	(b)	Any three from: ● higher value for calorimeter because ● less heat lost to the air/atmosphere/heatproof platform prevents heat escape ● food is more completely burned in the oxygen which aids combustion ● stirrer circulates heat through the water and temperature increase is thus more accurate ● heat transfer coil results in heat being effectively transferred to the water ● no heat used up heating up the glass ● no heat loss by conduction along mounted needle ● all energy absorbed/less heat lost (**not** difference only – must be justified) ● more oxygen for burning [3]	
	(c)	Glucose ⟶ Lactate/lactic acid + energy [1]	6
		Total	**70**