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New Specification

Rewarding Learning

General Certificate of Secondary Education
2011–2012

Double Award Science: Biology

Unit B1

Higher Tier

[GSD12]

TUESDAY 15 MAY 2012, MORNING

MARK SCHEME

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				AVAILABLE MARKS
1	(a)	(i)	nitrate; lack protein or amino acids *or* calcium; no/weak cell walls [2]	
		(ii)	Any two from: • no/less chlorophyll/ chloroplasts • less photosynthesis • no sugar/starch [2]	
		(iii)	active transport/active uptake; moves minerals against concentration/diffusion gradient or described [2]	
	(b)	(i)	pea plant gets nitrates/can make amino acids/proteins [1]	
		(ii)	bacteria get sugar/glucose/starch from plant/carbohydrate [1]	
		(iii)	denitrification [1]	
		(iv)	improves soil structure/slower release of minerals /improves drainage/less soluble/less run off/less leaching/breaks down slower/adds humus content [1]	
	(c)	(i)	eutrophication [1]	
		(ii)	bacteria decompose/break down (algae/plants); bacteria use up oxygen; [2]	
		(iii)	die/suffocate/fish cannot breathe/numbers decrease/kills [1]	14

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		AVAILABLE MARKS
2 **(a)** **(i)**	equilibrate/acclimatise to that colour/time for a steady stream of bubbles/time to stabilise/time to adjust [1]	
(ii)	any one from: • amount pondweed • amount of carbonate in water/concentration amount of CO_2/ concentration of carbonate • temperature (of water) • amount of water in beaker/amount of solution • intensity of light/distance of lamp from plant [1]	
(iii)	less time taken to produce gas bubbles/O_2 produced faster/only took 110 s to produce O_2; shows **more** photosynthesis/more starch/more glucose; more yield/faster growth [3]	
(b) **(i)**	phototropism/tropism [1]	
(ii)	hormone [1]	
(c)	unequal distribution of auxin/more auxin on shaded side/auxin moves to the left; causes more cell *elongation* on side away from light/more growth on shaded side/faster growth on that side [2]	9

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AVAILABLE MARKS

3 **(a)** **(i)** lipase [1]

(ii) lipid/fat/oil/substrate + enzyme (lipase) (need both for 1 mark) [1]

(iii) Any two from:
- Volume of solution/fat/concentration/amount of substrate/ amount of water/amount of substances
- Concentration of enzyme/volume of enzyme
- At the required temperature before mixed
- pH [2]

(iv) fatty acids; glycerol [2]

(v)
- Enzyme 1 works best/has optimum temperature at 30 °C;
- Enzyme 2 works best/has optimum temperature at 40 °C;
- Enzyme 1 works fastest at all temperatures;
- Enzyme 2 very slow to break down fat at 60 °C/only breaks down some fat at 60 °C/within washing cycle;
- Because it is denatured;
- Enzyme 1 works slowest at 60 °C;
- Because it is denatured; (only award denatured mark **once**)
- At low temperatures Enzyme 1/2/both enzymes work slowly;
- Because of fewer collisions/less kinetic energy of the molecules;
- Save energy/money sing enzyme 1;
- Enzyme 1 is more thermostable/enzyme 2 less theremostatable;

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Response	Mark
Candidates must use appropriate specialist terms throughout using at least 5 of the above points to describe the properties of the two enzymes and explain with reasons which one should be added to washing powder. Candidates 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 at least 3 of the above points to describe the properties of the two enzymes and explain with reasons which one should be added to washing powder. Candidates use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3-4]
Candidates describe one or two of the properties of the enzymes or explain with a reason which one should be added to washing powder. They use limited spelling punctuation and grammar and they have made little use of specialist terms.	[1-2]
Response not worthy of credit	[0]

[6]

(b) (i) amylase [1]

(ii) amylase is substrate specific/lipase is only specific to fat/amylase is only specific to starch/shapes are not complementary/not fit/ active site does not match [1]

AVAILABLE MARKS

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				AVAILABLE MARKS
4	(a)	(i)	(Symptom) high blood glucose/thirst/lethargy/urinates a lot/tired (Long-term effect) kidney/eye damage/CHD/stroke/loss of limbs/amputation/leg ulcers/blurred vision/circulatory problems/ problems with feet. [2]	
		(ii)	reduce weight/eat less sugar/less fat in diet/less alcohol; exercise [2]	
	(b)	(i)	Benedicts; heat; blue to brick red/orange/red [3]	
		(ii)	Dye did not change colour/dye stays pink/negative result; no glucose in urine/is not a diabetic [2]	
		(iii)	no heating required/no laboratory equipment needed/fast/ handy/easier/convenient/hygienic [1]	
		(iv)	enzyme on Clinistix is specific to glucose/only glucose fits into enzyme active site [1]	11
5	(a)	(i)	more plant species at area C than at A or B or converse/more variety or type of plants at C or away from sea or inland/fewer species closer to the sea) higher total % cover at area C (than at A or B); or converse higher total % as you go inland or lowest total % cover closer to the sea [2]	
		(ii)	Any one from: • too much wind at A/less wind at C • lack soil/minerals at A/more at C • lack fresh water at A/more at C • soil pH at A different from C • warmer inland • too salty near the sea • could be washed away by tide [1]	

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(b) Indicative content

- Use quadrat
- Identify plant species in each quadrat
- Use a key to identify species
- Estimate % cover for each plant species in each quadrat
- Carry out at three areas (or at A, B and C)/line transect/belt transect/place quadrat next to each other/
- Repeat for reliability/use class results
- Name physical factor:- light, wind, pH levels, temperature, edaphic factors e.g. soil humus content, rain
- Describe how to measure a physical factor e.g. light meter/light sensor/anemometer/wind gauge/pH probe/meter/pH indicator/ thermometer/temp. probe/rain gauge/measuring cylinder
- Record/write down results

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 some appropriate specialist terms, 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]

[6]

AVAILABLE MARKS

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					AVAILABLE MARKS
6	(a)	(i)	muscles	[1]	
		(ii)	x axis and y axis scaled (must be over $\frac{1}{2}$ the graph) and correct way round; correct labels on both axes (must include full units); all points correctly plotted including 0,0; points joined by *straight* lines	[4]	
		(iii)	$6.33/6\frac{1}{3}$	[1]	
		(iv)	2.4	[1]	
		(v)	build up is quicker than breakdown; not enough oxygen/tissue runs out of oxygen; tissue resorts to anaerobic respiration	[3]	
	(b)	(i)	keep out oxygen/keep/maintain anaerobic conditions	[1]	
		(ii)	yellow because CO_2 (produced)	[2]	13
				Total	**70**