GCSE MARKING SCHEME

JANUARY 2016

SCIENCE – BIOLOGY 2
4471/01/02

INTRODUCTION

This marking scheme was used by WJEC for the January2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

Biology 2 Foundation Tier

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
1		(a)	i		3	four bars correct height;;; (3 = 2marks 2= 1mark)	½ small square tolerance on height		
			ii		3	I woodland/ seashore; II river/farmland; III farmland;			
			iii		1	woodland;			most birds
		(b)	i		1	240 000 **and** 3500;			
			ii		1	loss of habitat/ habitat destruction/ loss of nest sites;	cutting down {hedges/ trees}/ monoculture/ pesticides/ herbicides/ insecticides	farmland destroyed/ deforestation/ more predators/ hunting/ climate change/ pollution/ building	quarrying/ dumping/ landfill/
		Total Mark			9				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
2		(a)	i		3	A cell membrane; B cytoplasm; C cell wall;			
			ii		1	fungi;			
		(b)			1	nucleus;			
		(c)			1	budding;			
		(d)			1	{divide/ split} in <u>two</u>;	binary fission	separate	doubled/ mitosis/ split in half
		Total Mark			7				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
3		(a)	i		1	sugar **and** phosphate;			
			ii	I	1	T C G (any order); **1 mark**			
				II	2	**Any two from:** A-T; C-G; they are in pairs;		triplet code/ double helix	
		(b)			1	C;			
		(c)			1	nucleus;	chromosome		
		Total Mark			6				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
4		(a)			2	carbon dioxide; oxygen;	CO_2 O_2		CO^2/ CO2 O2/ O^2
		(b)			2	{contains/ has} chlorophyll/ chlorophyll is found in chloroplast; Absorbs light ;	{traps/ takes in} light		Chlorophyll alone attracts light
		(c)	i		2	(rate) increases then {plateaus/ stays the same}; at 3 a.u. light intensity;			
			ii		2	80 - 50; 30;	Correct answer = 2 marks		
		Total Mark			8				

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
5		(a)			1	(ragwort/ weedkiller) are poisonous;	cattle are killed		cattle are harmed
		(b)			2	alien (species); Plume moth;			
		(c)			1	biological (control)/ biocontrol;			bio
		(d)			1	more parts of plant eaten/ it eats all parts of the plant reproduction rate high/ reproduced quickly; it = plume moth	weed beetle ate less parts of the plant / weed beetle only ate leaves and stems/ weed beetle reproduced slower **must be comparative**		
		(e)			1	to check that Plume moth did not {attack/ eat/ destroy/ harm} other {species/ organisms/ animal/ OWTTE}/ did not compete with other (native) {species/ organisms/ plant / animal/ OWTTE}(for resources)/ does not carry disease/ does not become a pest itself;			find out if there are problems
		Total Mark			6				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
6	**1**	(a)			1	cell is the basic unit of life all living things are made of cells/ new cells are created from old cells (OWTTE);	cells make up all organisms cells divide into new cells	 cells can split and divide	
		(b)			2	**Any two from:** • do not have a cellular structure; • require a host to make new viruses/can only reproduce <u>inside</u> a cell; • do not grow; • do not produce waste; • do not respond to stimuli; • do not have an energy metabolism/ do not respire (OWTTE); • can be crystallised	not made of cells	 do not have metabolism	do not have a nucleus/ membrane/ cell wall/ DNA/ RNA
		(c)			1	light microscope **and** **Reason –** <u>living</u> organisms cannot be observed under the EM/ EM can only observe <u>dead</u> organisms; **Both for 1 mark**			Electrons kill organisms
		Total Mark			**4**				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
7	**2**	(a)	i		2	{number/ number of boys/ number of girls} <u>starting</u> smoking is decreasing; difference between the number of boys and girls <u>starting</u> smoking is narrowing ;			More girls start smoking than boys/ less boys start smoking than girls
			ii		2	102 000/ 62 000 000 x100; 0.16/ 0.16451613/ 0.165/ 0.2%;	Correct answer = 2 marks		0.17
		(b)			1	smoking seen as anti-social/ smoking now known to affect non-smokers/ do not want {parents/ carers} to know/ smoking under age is illegal;		Passive smoking	
		(c)			2	reduces surface area of {alveoli/ air sac}/ {alveoli/ air sac} {tear/ rip open/ become smooth/ damaged}/ causes lungs to fill up with liquid; reduces oxygen in {blood stream/ body}/ less gas exchange **2nd mark is linked to 1st mark**			
		Total Mark			**7**				

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
8	**3**	(a)			2	both arrows pointing → **1 mark each** ;;			
		(b)	i		2	<table><tr><th></th><th>Flask A</th><th>Flask B</th></tr><tr><td>Appearance of limewater after 1 minute</td><td>clear/ colourless/ transparent/ slightly cloudy;</td><td>cloudy/milky/ chalky/ white;</td></tr></table>			flask A - no change
			ii		2	expired air contains more carbon dioxide than inspired air; therefore turns (the limewater) {cloudy quicker/ more cloudy};			
		(c)			1	limewater in flask **A** would also have turned cloudy/limewater in both flasks would have turned {cloudy/ cloudier}; **must relate to answer given in table**			
		Total Mark			**7**				

FT	HT	Mark	Answer
9	**4**	6 QWC	**Indicative content** **Mouth** (reference to teeth is not irrelevant) • starch in the bread • is digested to sugars/ glucose/ maltose • by carbohydrase/ amylase • from saliva **Oesophagus/gullet** • food passes along the oesophagus/gullet • by peristalsis/ description of peristalsis **Stomach** (reference to pH is not irrelevant) • protein in chicken • digested to amino acids • by protease **Butter/ fat** • Correct reference to butter not being digested until after the stomach **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.
Total Mark		6	

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	5	(a)			2	the use of a {living organism/ predator/ animal/ plant/ living thing/ parasite} to {control/ kill/ destroy/ limit}; {alien species / pest/ weed};	alien species (in correct context)		
		(b)	i		2	**Any two from:** • check that target species is being {destroyed/ controlled}; • check that it does not become a pest itself; • ensure that no other species are harmed; • check that it can survive in the environment; • check that it does not carry disease;			affects food chain
			ii	I	1	for every twenty biological control agents {selected/ tested} only one is used/ 1 in {20/21} is successful ;			
				II	1	**any one from:** • risk of {target/pest species} becoming resistant to {chemical control agent/ it}; • (chemical control agent) has many harmful side effects; • (chemical controlled agent) is not very specific/also {kills/ harms} not target species;			affect target species
		Total Mark			6				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	6	(a)			2	both {require/ break down/ use/ need} glucose; both release energy/ produce ATP;	provide energy/ release heat energy	involve glucose	{produce/ create/ make/ generate} energy
		(b)	i		1	18;			
			ii		1	any figure between:1050 - 1100 (cm^3);			
			iii		2	24 x {1240/1250}; (1240) = 29 760 cm^3 (1250)= 30 000 cm^3 ; answer without unit = 1 mark	range of figures1240-1250 Correct answer = 2 marks 30dm^3		
		(c)			2	**Any two from:** • oxygen reaches {muscles/ blood} quicker/carbon dioxide is removed from {muscles/ blood} quicker; • {more oxygen/greater volume of oxygen} reaches {muscles/ blood} ; • reference to lactic acid/ oxygen debt/ less anaerobic respiration/ more aerobic respiration;			amount of oxygen
		Total Mark			8				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	7	(a)	i+ ii		1	**both for 1 mark** light **+** temperature;			carbon dioxide/ dark/ cold
		(b)	i		3	**Any three from:** • {least/lowest} glucose (produced); • because no {light/ sunlight}/ it is dark; • so no photosynthesis; • glucose {changed into starch/ used in respiration/ used in energy} ;	lack of light		sun/ less light
			ii		3	{max/ highest} glucose (produced); {high/ most/ more} light; photosynthesis occurs ;			light present
		Total Mark			7				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	8	(a)			3	starch was present in {**A**/ unripe banana}; {sugar/ glucose} was present in {**B/** ripe banana}; starch is {broken down/ digested/ changed} to sugar;			
		(b)	i		3	water moved out of the {banana/ cells/ OWTTE} (by osmosis); from high concentration of water to low concentration of water/ idea of {passing down a gradient or correct solute potential idea}; via Semi Permeable Membrane;			
			ii		2	idea of dynamic equilibrium expressed as equal rate of movement of water in and out/ no net {movement/ flow}; there was no gradient of water concentration/solute potential was equal/ concentrations were equal;			no osmosis similar concentrations
		(c)			1	increase confidence in results;	repeatability/ {identify/ rule out} anomalous results	reliable/ validity	accuracy/ reproducibility/ fair testing
		Total Mark			9				

Question Number			
FT	HT	Mark	Answer
	9	6 QWC	**Indicative content** • A transect is used. • Stretch a {rope/ tape measure} marked at regular intervals along the length of the field • Identify/ record the plant at each point • Measure/ record the height of each plant • Record {profile/ OWTTE} • Plants are shorter at A than at B because: - More water collects at B than at A - Plants are trampled/ mown/cut at A - Plants at B grown longer towards light/ phototropism - Or other sensible reasons e.g. Wall retains heat so higher temperature/ plants {at B/ by the wall} are protected from the wind **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.
		6	