GCSE MARKING SCHEME

SUMMER 2016

SCIENCE – BIOLOGY 2
4471/01/02

INTRODUCTION

This marking scheme was used by WJEC for the 2016 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.

GCSE Biology 2 – Foundation only questions

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
1		(a)	(i)		1	Forest;	trees		
			(ii)		2	Agriculture; Building /Towns;	Farms/ farmland/ use of land to grow crops		deforestation
			(iii)		1	Surrounded by agricultural land/ smaller area (at Kawanga); it = Kawanga	reverse argument for Jozani		Near to agricultural land
			(iv)		2	1600/2 -150; Answer 650; (Incorrect answer, correct method =1) Correct answer , no working =2)	649.92/ 649.9		
		(b)			1	Any one from: • {prevent /work against/ control/ ban/ stop} selling monkeys to other countries/ • stop exporting of monkeys/ • stop trafficking of monkeys;			Hunting/ poaching/ selling monkeys unqualified
		Total Mark			7				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
2		(a)	(i)		1 1 1	<u>Cell</u> wall; Cytoplasm; Vacuole;	 Cell sap		
			(ii)		1	{Allow/ control/ lets/ enables } entry and exit of molecules/substances/ particles/ 'things';	Controls what goes in and out (of the cell)	protection	
		(b)	(i)		1	A **and** C;			
			(ii)		1	cytoplasm/nucleus/cell membrane;			
		Total Mark			6				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
3		(a)			1 1	Mitosis; correct spelling Any one from: • two <u>daughter/ new</u> cells/ • <u>daughter</u> cells have same chromosome number as the mother cell;	There is only one division	Genetically identical to mother cell/ there are only two cells	
		(b)	(i)		1	Column 1 80 Column 2 23 Both correct for **1 mark**			
			(ii)		2	4; Gametes/ sperm/ egg;			
		(c)	(i)		1 2	Correct scale (must include 0 at origin and go up to at least 110); all plots correct and labelled (2 marks);; tolerance ±½ small square 1 error = 1 mark More than one error = 0 marks Joining plots with line = 1 error Missing 1 label = 1 error Missing more than1 label = 2 errors			
			(ii)		1	B;			
		Total Mark			9				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
4		(a)			1 1	Light; Water **and** Oxygen;	sunlight		Sun/ solar
		(b)	i		2	increase then {plateau/ levels off}; plateau occurs at 4%;	Range of 3-4%	Reference to figures from *y*-axis	
			ii		1 1	34 – 20; 14; (correct answer but no working shown = 2) (incorrect answer but correct readings = 1)			
		(c)			2	Iodine (solution); {Yellow/Orange/Brown} to {blue-black / black};	Iodide		
		Total Mark			8				

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
5		(a)			1	{Warnings/ notice/ information/ pictures} {<u>on packets/ on the back</u>};	'Smoking kills' on the packet		
		(b)	(i)		2	Tar content increases (rates of lung) cancer increases; Large increase at 11(mg) tar;	ORA		
			(ii)		1	Increases (rate of lung cancer);			
		(c)			2	Emphysema/ description of emphysema/ COPD; Coughing/shortness of breath / short of oxygen ; **OR** Heart disease/ CVD; Heart attack/ heart failure/ thrombosis **OR** Stroke; Mobility/ paralysis/ speech difficulties **OR** Angina; Chest pain/ mobility issues	Damage to alveoli		
		Total Mark			6				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
6	**1**	(a)			1	3;	3 per m^2 $3/m^2$ 3 m^{-2}		$3m^2$
		(b)			1	540$\underline{m^{2;}}$ unit needed			
		(c)			1	1620; allow ecf from (a) and (b)			
		(d)			1	29.6; allow ecf from (c)	30		
		(e)			1	Any one from: • increase {number/ area/ size} of quadrats/ • repeat investigation / • do two separate studies – one of shaded area and one in the full sunlight area;	Use a bigger sample size/ throw quadrat more often	Throw the quadrat more	Use transects
		Total Mark			5				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
7	**2**	(a)			3	• (only) living things respire/ {germinating/ living} peas respire (dead do not)/ peas in A respire; • producing heat (linked to respiration); • so temperature rose in flask A but not in flask B;	ORA		
		(b)			2	• (disinfectant) kills {microorganisms/ bacteria/ fungi}; Any one from: • which would {respire/ release heat}/ • so you can be confident that the {heat release/respiration} is from the peas;	Destroys	get rid of	Denatures/ stops them growing
		Total Mark			5				

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
8	**3**	(a)			2	undifferentiated/ not specialised; can turn into/grow into/ change into/ can differentiate into different kinds of {cells/tissues/organs};	Named cell/ tissue/ organ		
		(b)			1	Any one from: • Destruction of life/ destruction of embryos/ • {reduced/no} {ethical/ moral} issues / {less/no} public disquiet;	Religious issues/ embryos do not have a choice		playing god
		(c)			1	1 **and** 5;			
		Total Mark			4				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
9	4	(a)			1	Any one from: • (small enough) to be absorbed/ • to make food soluble/ • to pass {into the blood/ through the intestine <u>wall</u>};	ORA	To make them smaller	
		(b)	i		1	the rate (of digestion) increases when {pH/ alkalinity} increases; it = rate of digestion	ORA At high pH it is faster		
			ii		2	bile emulsifies fat/ bile turns fat into {droplets/ globules}; bile creates greater surface area for {lipase/enzyme} to work on;	Bile breaks down fats into droplets	Bile breaks down fats	
		Total Mark			4				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
10	5				6 QWC	Indicative content: *diaphragm* • contracts • flattens/ moves down *ribcage* • moves up **and** out • volume of chest/ thorax increases • air pressure in chest/ thorax falls • lung volume increases/ lungs inflate • external air pressure is now higher • so air rushes/is pushed in **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 inaccuracies in spelling, punctuation and grammar. **0 marks**			
		Total Mark			6				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	6	(a)			2	carbon dioxide + water; ⟶ *glucose* + oxygen;	Correct symbols		
		(b)			4	1. **X** has photosynthesised; 2. **X** has starch; 3. **Y** no photosynthesis; 4. starch {turned (back) into glucose/used up}/ destarched;			Reference to stored glucose
		Total Mark			6				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	7	(a)			2	Ratio of A:T approximately equal; Ratio of G:C approximately equal;	Similar masses/ similar ratio		Similar results/ numbers/ amount
		(b)			2	Sugar phosphate label pointing to sides of structure; Base molecule pointing to square/ oblong;	arrow to phosphate labelled sugar and vice versa/ arrow to bond		Arrow to hydrogen bond
		(c)			3	{AAA/ codon/ three bases/ triplet} {are/is} missing; {Triplet code / three bases} determine amino acid; Amino acids determine the protein;			
		Total Mark			7				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	8	(a)			2	Anjum produces less lactic acid/ concentration of lactic acid is lower; It is broken down quicker / removed quicker / repays oxygen debt quicker/ needs a shorter time to recover;			
		(b)			1	The marathon runner does not need to release energy {quickly / in a short time} (like a sprinter);			
		Total Mark			3				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	9	(a)	(i)		1	Loses {water/ volume} when placed in salt solution;			
			(ii)		1	Does not gain or lose {water/ volume} in this range/ stays the same in these concentration/ no net movement of water;			
		(b)			2	Any two from: • pH; • Temperature; • Volume of solution;			Ph/ ph Heat
		(c)			4	• Water passes out; • by osmosis; • from the cell where water is in higher concentration to sea water where it is in lower concentration; • Via semi-permeable membrane;			
		Total Mark			8				

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	10	(a)			2	Any two from: • Pesticide becomes {diluted/ less concentrated}/ pesticide has to be added every two weeks; • does not kill all fish lice; • pesticide kills the lice if above 2.5 concentration ;			
		(b)	(i)		1	biological / biocontrol;			bio
			(ii)		3	Any three from: • Effect of wrasse on biodiversity/ would wrasse {harm/ effect} other species/ become pests; • Would wrasse reproduce/ survive; • Would {salmon/ other predators} eat the wrasse; • Would wrasse spread disease; • Could enough wrasse be obtained / bred to meet demand; • The cost of wrasse is less than the cost of pesticides; • Check wrasse do not leave cages;			
		Total Mark			6				

Question Number			
FT	HT	Mark	Answer
	11	6 QWC	*Indicative content:* **Reference to international trade in species** -Legislation aims to prevent trade in endangered species. **Sites of special scientific interest** -Allow ecosystems to develop unharmed. **Captive breeding** - Endangered spp. can be reintroduced to their habitats. **National parks/ nature reserve** - Allow large scale management of ecosystems via controlled ecotourism/ stop destruction of habitat **Seed banks** - Preservation of rare species for future planting. **Legislation of fishing quotas** - Prevents over fishing and allows build-up of stocks. **Prevent poaching/ hunting of animals** - increase in legislation to stop hunting **Educational awareness e.g. WWF** – make people aware of advantages of conservation **Legislation against pollution/ litter –** relevant examples **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 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	