



GCSE MARKING SCHEME

JANUARY 2016

**SCIENCE – BIOLOGY 1
4461/ 01/02**

INTRODUCTION

This marking scheme was used by WJEC for the January 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.

Biology 1 Foundation Tier

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
1		(a)		1	<u>herbivores</u> ;			
		(b)		1	A;			
		(c)	i	1	5 and 7;			
			ii	1	400;			
			iii	1	5(m ²);	ecf (ii)		
			iv	1	220;			
		(d)		3	any three from: <ul style="list-style-type: none"> • <u>{not enough/ competition for}</u> {food/grass}/ not enough to eat; • disease; • (qualified reference to weather/climate) e.g. too hot/ too cold; • increase in {predators/ hunters/OWTTE}; • <u>{not enough/ competition for}</u> water; 	drought	Ref to reproduction alone	No/ less/ lack of food illness Climate change
	Total Mark				9			

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
2		(a)	i	4	<p>one mark for correct adaptation plus one for a correct explanation.</p> <p>any two from:</p> <ul style="list-style-type: none"> • <u>thick</u> hair; good insulator/ reduces heat loss; • <u>black</u> coat colour; {absorbs/takes in} heat ; • <u>small</u> ears; <u>reduced surface area</u> for heat loss; 	Keeps <u>more</u> heat in		Keeps heat in/ keeps it warm
				1	it has finger like ends on the trunk;			Attracts heat
			(b)		3	<p>{<u>Too/very</u>} cold/ temperature is low};</p> <p>for {bacteria/fungi/micro-organisms/decomposers};</p> <p>so no {decay/decomposition};</p>	Correct reference to micro-organisms	
		Total Mark			8			

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
3		(a)	i		1	pancreas;			pancrease
			ii		1	liver;			
			iii		1	in the blood(stream);	blood vessels/ veins/ arteries/ capillaries		in blood cells
		(b)			1	C;	1,2 and 3		
		(c)			1	glucose;	sugar		blood sugar
		(d)			2	<u>{regular / description of regular}</u> exercise/ exercise often; eat less <u>{carbohydrate/starch/ sugar/ fat}</u> ;			more exercise/ keep fit eat less food/ control the quantity of fat/ eat <u>no</u> fat
		Total Mark				7			

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
4		(a)	i	1	photosynthesis;			
			ii	1	respiration;			
			iii	1	carbon dioxide;	CO ₂		
		(b)		1	{releases/ adds/ produces/ more} carbon dioxide;	CO ₂ / gas X if named in iii		CO ² / Co ₂
		Total Mark			4			

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept									
FT	HT																
5		(a)	i	1	lips;												
			ii	1	elbow;												
		(b)		2	{skin becomes/ it becomes/ fingertips, cheek and elbow become} less sensitive; no effect on lip sensitivity/ lip sensitivity stays the same;	skin becomes less sensitive except the lips = 2 marks		reference to any less than the three areas for the 1 st mark point									
		(c)		4	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">sense organ</th> <th>stimulus detected</th> </tr> </thead> <tbody> <tr> <td style="background-color: #cccccc;"><i>given</i></td> <td>touch/ pressure;</td> </tr> <tr> <td style="background-color: #cccccc;"><i>given</i></td> <td>light;</td> </tr> <tr> <td>ear;</td> <td style="background-color: #cccccc;"><i>given</i></td> </tr> <tr> <td style="background-color: #cccccc;"><i>given</i></td> <td>chemical(s);</td> </tr> </tbody> </table>	sense organ	stimulus detected	<i>given</i>	touch/ pressure;	<i>given</i>	light;	ear;	<i>given</i>	<i>given</i>	chemical(s);		
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Total Mark				8													

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept									
6	1	(a)	i	1	the mother Nn and the father Nn ; (both correct for 1 mark)												
			ii	1 1	gametes correct from ai; mechanics of cross correct – this mark can be awarded even if the gametes are incorrect; <table border="1"> <tr> <td></td> <td>N</td> <td>n</td> </tr> <tr> <td>N</td> <td>NN</td> <td>Nn</td> </tr> <tr> <td>n</td> <td>Nn</td> <td>nn</td> </tr> </table>		N	n	N	NN	Nn	n	Nn	nn	ecf from ai Use of wrong letters from ai (except X and Y)		Any reference to X and Y
	N	n															
N	NN	Nn															
n	Nn	nn															
			iii	1	circle around nn ;			any other letters									
			iv	1	$\frac{3}{4}$ / 75%/ 0.75/ three out of four; must relate to their Punnett square			ratio/ no credit if any letters other than Nn used									
		(b)		1	<u>early</u> {treatment/ cure}/ treatment straight away/ {quicker/ sooner} treatment;	gene therapy as equivalent of treatment											
Total Mark				6													

Biology 1 Foundation and Higher tier

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
7	2	(a)		1	the transfer of {genes/DNA} from one organism to another/ the {modification/altering} of {genes/ DNA} within an organism; (OWTTE)	species/ living thing as equivalent to organism		
		(b)	i	1	Japan;			
			ii	1	9;			
			iii	2	number of cases of blindness decreases/ no blindness/ prevents blindness; Because {they / both groups} are now {reaching RDA/ having enough vitamin A}; 2nd mark linked to 1st	plenty of vitamin A/ stops vitamin A deficiency		more vitamin A
		(c)		2	health concerns from <u>eating</u> GM foods/ <u>eating</u> GM crops {will harm them/ have side effects}; concerns about GM organisms breeding with native organisms;	eating GM crops will poison them/ they do not if it is safe to eat		
Total Mark				7				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
8	3	(a)	i	1	{organism/species/ animal/ plant} which {indicates/shows} the {presence/level} of {pollution/pollutants/ named pollutant};			
			ii	1	pH/ {oxygen/ O ₂ };	numbers of bacteria		sewage/ PH/ ph
		(b)		3	(greater the distance from city) pH {increases/ becomes less acidic}/ less acidic gases/ less correctly named gases}; (greater the distance from city) {lichen increases/ less lichen destroyed/ more lichen survives }; (greater the distance from city) less <u>pollution</u> ; 3rd marking point linked to 1st or 2nd marking point	reverse argument for all marking points it= lichen		
		Total Mark		5				

Question Number		Mark	Answer
FT	HT		
9	4	6	<p>Indicative content</p> <ul style="list-style-type: none"> • under warm conditions erector muscle relaxes • hair lies flat • reducing insulation <ul style="list-style-type: none"> • blood vessel widens/dilates/ vasodilates • <u>more blood</u> flows through skin • <u>more heat</u> lost <ul style="list-style-type: none"> • <u>more</u> sweat produced • onto the surface of the skin/ out of the sweat pore • evaporation removing heat <p>TOP BAND must have reference to all three structures.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>
Total Mark		6	

Question Number		Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept													
FT	HT																			
	5	(a)	1	carbohydrate/starch/bread/potato/rice/pasta;	any other source of carbohydrate /starch															
		(b)	1 1	pancreas {secretes/ produces/ makes/ releases} insulin; which converts glucose into glycogen;																
		(c)	1	blood glucose {rises/ increases} to high level/ <u>slow fall</u> in blood glucose levels/ blood glucose levels do not fall to {between 3.5 – 7.5 mmol/l/ normal};																
		(d)	2	<p>1 mark for first two columns circled correctly 1 mark for correct result (linked to first column, even if process incorrect)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Chemical test used</th> <th style="width: 33%;">Process used</th> <th style="width: 33%;">Result of test</th> </tr> </thead> <tbody> <tr> <td>Biuret test</td> <td>Dip in urine sample</td> <td rowspan="4" style="text-align: center; vertical-align: middle;"> Brown (diastix) blue/purple (clintistix) </td> </tr> <tr> <td>Benedict's test</td> <td>Mix with urine sample and heat gently</td> </tr> <tr> <td>Iodine test</td> <td>Mix with urine sample and cool in refrigerator</td> </tr> <tr> <td>Diastix/ Clintistix</td> <td>Mix with urine sample and heat strongly</td> <td style="text-align: center; vertical-align: middle;"> yellow/ green/ orange/ (brick) red (Benedicts) </td> </tr> </tbody> </table>	Chemical test used	Process used	Result of test	Biuret test	Dip in urine sample	Brown (diastix) blue/purple (clintistix)	Benedict's test	Mix with urine sample and heat gently	Iodine test	Mix with urine sample and cool in refrigerator	Diastix/ Clintistix	Mix with urine sample and heat strongly	yellow/ green/ orange/ (brick) red (Benedicts)			
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Total Mark			6																	

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	6	(a)		2	4 correct – 2 marks 2/ 3 correct – 1 mark A D B C			
		(b)		5	protein/urea in sewage; protein/urea changed to ammonia; ammonia changed to nitrate; by bacteria; (must be correct context if mentioned) reference to higher temperature (in May) affecting bacteria;			
		Total Mark		7				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	7	(a)		1	50 (ppm);			
		(b)		3	<u>lead</u> {accumulates/ not broken down/ passed up / builds up / concentration increases} in the {food chain/tissues/ organism}/ lead bioaccumulates; {poisons/ kills} gulls/is toxic to gulls; reduces {fertility/reproduction/breeding};			It accumulates
		(c)		1	carbon dioxide;	methane		biogas
		Total Mark		5				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	8	(a)		1	polar bear + grizzly bear + brown bear;			
		(b)	i	2	Grizzly bear + brown bear; same genus;		same family/ both Ursus	
			ii	1	genetic profile /DNA profiling;			Fingerprinting
		(c)		2	Red panda and giant panda are in different families; Red panda and racoon share <u>more recent</u> common ancestor;	Red panda and racoon are in the same family		
Total Mark				6				

Question Number								
FT	HT	Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
	9	(a)	i	1	DNA;			
			ii	4	chloroquine killed (most) non-resistant Plasmodium ; resistant ones were at an advantage / OWTTE; (survived/selected) to breed/reproduce/ multiplied; {gene <u>for resistance</u> / <u>mutated</u> gene / <u>advantageous</u> gene} passed on;			
		(b)		1	some non-resistant ones had survived the chloroquine previously/ (another) mutation had taken place;			
		Total Mark		6				

Question Number		Mark	Answer
FT	HT		
	10	6	<p>Indicative content</p> <p>Obesity:</p> <ul style="list-style-type: none"> • Link between diet and obesity e.g. excess fat in diet: • (High cholesterol) resulting in {cardio-vascular disease / heart disease / Blood ((coronary) vessels blocked / heart attack/ high blood pressure} • Joint problems/ mobility reduced • Type 2 diabetes • Cancer <p>Alcohol:</p> <ul style="list-style-type: none"> • Cardio vascular / heart disease • Liver damage/ Brain damage/ kidney damage • Cancer • Addiction • Reaction time increased (qualified) <p>TOP BAND answers must refer to both obesity and alcohol and include diet for obesity and a range of factors for alcohol</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>
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