



GCSE MARKING SCHEME

SUMMER 2016

**SCIENCE – BIOLOGY B1
4461/01/02**

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 1

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
1		(a)		3	1 C/ bacteria 2 B/insects 3 A (<i>given</i>) 4 D/ mosses 5 E/ mammals all 4 correct = 3; 2/3 correct = 2; 1 correct = 1;			
				1	Fungus and bacteria; <i>either order</i> <i>BOTH required for the mark</i>			letters
				1 1	insects and mammals; <i>either order.</i> <i>BOTH required for the mark</i> animal; 2 nd MP linked to first - cannot access second mark if wrong organisms or no organisms given in first marking point If B and E given for first marking point – no credit, but can award second mark if correct			letters
				Total Mark		6		

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
2		(a)	(i)		2	all six bars plotted and drawn accurately;; 2 marks one error; 1 mark $\pm\frac{1}{2}$ small square tolerance on height Ignore differing widths Reject line/ stick graphs			
			(ii)		1	40;			
		(b)			1	<u>age</u> ;			
		Total Mark			4				

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
3		(a)			2	(pesticide) {kills/ destroys} {pests/animals/weeds/insects/fungi }; that would {eat/kill/harm/damage/compete with/ feed on} {it/them/crop/plant};	named pest	get rid of/ stop named weed	Bacteria
		(b)			4	DDT; toxic; fertility; consumers;			
		Total Mark			6				

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
4		(a)	(i)		2	X = (clamp)stand; Y = boiling tube;	test tube		
			(ii)		3	Any three from <ul style="list-style-type: none"> • measuring cylinder/syringe • thermometer • Bunsen (burner) • balance • safety glasses/ goggles 	weighing scales/ digital scale		measuring jug scales glasses
		(b)	(i)		1	1.5; No unit needed	answer not in table but in answer space (must have unit - °C)		
			(ii)		1	to make a fair comparison/ OWTTE; e.g. to work out if the results would be the same if the sweets weighed the same			Fair test
			(iii)		2	more {heat/energy} lost (in Megan's method); as the {sweet/flame} was held {lower/further away} (from the boiling tube); ORA			

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
		(c)	(i)	1	42.9;	answer not in table but in answer space must have unit (g)		
			(ii)	1	22.9; Ecf from (i) Answer from (i) – 20 = award 1 mark			
		(d)		1	fat;	glycogen		
		Total Mark		12				

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT	(a)	(i)						
5			(i)		1	<u>erector muscle</u> ;			
			(ii)		1	Hair shaft to be shown raised; Hair should be higher than first diagram and no higher than 90° and should attach to the correct end of the muscle. Hair must protrude from the surface of the skin.			
			(iii)		1	it contracts/ contracting/ contraction;			Tenses/ pulls/ tightens/ shortens
			(iv)		2	traps layer of air; which is an insulator	Holds air/ keeps layer of air Poor conductor of heat	Keeps heat in	Traps heat
		(b)			3	<ul style="list-style-type: none"> • <u>more</u> sweat produced (on a hot day); • {comes onto/spread over} the {skin/surface}/ comes through the (sweat) pore; evaporation (takes heat out); 			
Total Mark					8				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept									
6	1	(a)	(i)		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Gametes</td> <td>D</td> <td>D</td> </tr> <tr> <td>d</td> <td>Dd</td> <td>Dd</td> </tr> <tr> <td>d</td> <td>Dd</td> <td>Dd</td> </tr> </table> <p>F1</p>	Gametes	D	D	d	Dd	Dd	d	Dd	Dd			
Gametes	D	D															
d	Dd	Dd															
d	Dd	Dd															
				1 1	<p>Gametes correct 1 mark Mechanics of cross correct 1 mark If use different letters cannot award gametes mark but can award mechanics mark</p>												

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept									
FT	HT	(a)	(ii)														
6	1				<p style="text-align: center;">F2</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Gametes</td> <td>D</td> <td>d</td> </tr> <tr> <td>D</td> <td>DD</td> <td>Dd</td> </tr> <tr> <td>d</td> <td>Dd</td> <td>dd</td> </tr> </table> <p>Gametes correct 1 mark Must use any two of their F₁ offspring from (i) Mechanics of cross correct (must generate a 3:1 ratio) 1 [If incorrect letters are used in (a)(i) allow ECF for 1 (a)(ii) to access both marks] If different letters used in second punnett square to first = 0 marks</p>	Gametes	D	d	D	DD	Dd	d	Dd	dd			
Gametes	D	d															
D	DD	Dd															
d	Dd	dd															
		(b)		1	repeatability/increased confidence in results	Identify anomalies		Reliability/ accuracy/ validity/ reproducibility									
		(c)		1	So that the {work/results/experiments} can be {verified/confirmed}/ to see if they get the {same/ similar/different} results/ reproducibility;		To see if Mendels work was right/ correct/ true	Repeatability/ validity/ accuracy/ reliability									
Total Mark				6													

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
7	2	(a)		1 1	0.44/ 0.4/ 0.442/ 0.44178082 (tonnes) Correct answer = 2 marks If answer incorrect allow 1 mark for $129 \div 292$			
		(b)	(i)	1	Any one from: <ul style="list-style-type: none"> to allow stocks time to recover ref to sustainability because unless harvesting stops fishery will die out/ conserve stock allows them to reproduce to reach harvestable levels 		Conservation/ to allow cockles to breed	Extinction/ species running out
			(ii)	1	<ul style="list-style-type: none"> restrict harvesting to specified time e.g. once a week/ quota scheme/ collect a certain {mass/ weight} limit number of fishermen allowed If state a {mass/ weight} it must be realistic (less than 2 tonnes/ day)			

Question Number							
FT	HT	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
		(c)	2	Any two from: fishery closed/ disease/ pollution/ number of cockles dropped below <u>50/m²</u> / cockle beds have died out	All the cockles have been harvested		
		(d)	1	Any one from: other (cockle) beds have died out/ more {food/cockles/prey} (in Three Rivers area) must be comparative		Lots of food	
		Total Mark	7				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
8	3	(a)		3	<ul style="list-style-type: none"> • (it rises because) glucose is {absorbed into/enters} the blood (stream); • pancreas {secretes/ releases/ produces/ makes} insulin; • which converts (excess) glucose to glycogen (in liver) (so blood glucose falls); Correct spelling for glycogen			
		(b)		2	any two from: <ul style="list-style-type: none"> • {glucose/ sugar} level is above {5.9 mmol// normal}{before her meal/ at the start}/ {glucose/ sugar} level was higher than normal before she ate; • rises to a {very/abnormally/ unusually} high level; • hasn't fallen back to her starting level (after 120 minutes)/ takes longer to return to her starting level; • Her (blood) glucose level is always above normal; 			
Total Mark				5				

Question Number		Mark	Answer
FT	HT		
9	4	6	<p>Indicative content:</p> <ul style="list-style-type: none"> • untreated sewage contains nutrients/nitrate/phosphate (NOT fertilisers) • which are (absorbed/ taken in/ taken up/ enters) by {plants/algae/photosynthesisers} • results in {growth/excessive growth/overgrowth (of plants)/ algal bloom/ rapid growth} • {sunlight/ light} blocked • plants die and are decayed by microbes/bacteria/ decomposers • microbes/bacteria increase in number • use up O₂ in respiration • fish suffocate/ fish die from lack of oxygen NOT fish die unqualified <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)	(i)	3	<p>Any three from:</p> <ul style="list-style-type: none"> • At {0/ 20} minutes the root is horizontal; • At 8 minutes the root {curves/ turns/ grows } upwards; • The root gets longer; • The {curvature increases/angle of curvature increases/ roots bend more/ root dips more }; • {At 35min/ after 20 min} the roots start to {bend/ grows/ curves/ turns/ dips } downwards; 	Shows negative gravitropism Shows positive gravitropism	roots grow downwards at any point between 50-200	Roots grow towards gravity/ roots grow downwards unqualified
			(ii)	1	<u>positive</u> gravitropism/geotropism;			
		(b)	(i)	1	The tissues/cells/part of root on the upper grow {quicker/ more} (than on the lower surface) ;	reverse argument		
			(ii)	1	hormone/plant hormone/phytohormone;	auxin		
Total Mark				6				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	6	(a)		2	{Plants / crops} {absorb / take up} nitrates (when growing in the autumn); (More) run off (from bare soil) / (less) run off {when plants are growing/ in growing season};	Not washed away	Fertiliser	Nitrogen
		(b)		1	Provides <u>oxygen</u> for {microorganisms / decomposers/ bacteria / fungi} for <u>respiration</u> ;			
		(c)		2	<u>Protein</u> {changed/ broken down} to ammonia by bacteria; Ammonia {changed/ built up} to nitrates by (nitrifying) bacteria;			Denitrifying bacteria Ammonia broken down to nitrates
		Total Mark		5				

Question Number								
FT	HT	Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
	7	(a)		1	Genetically identical/ {identical / same} {genes / alleles/ genomes / DNA/ genetic code/ genotype/ genetic makeup};			
		(b)		2	Cannot show variation; So cannot have types resistant to the fungi;			They are all the same immune
		(c)		4	<ul style="list-style-type: none"> • Pesticides enter {rivers/water}; • Bioaccumulation/ {build up/ accumulate} in food chain/ OWTTE; • Pesticide reaches toxic {concentration / level/ amount}/ OWTTE Answer must be in context of food chain; • Reduces fertility / prevents {reproduction / egg laying} in Caiman; 			
		Total Mark		7				

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT	(a)	(i)	1	B; A;				
	8		(ii)	1					
		(b)		1	{Genetic/ DNA/ gene} <u>profiling</u> ;			Genetic analysis/ DNA testing/ chromosome profiling/ genetic fingerprinting	
		(c)		1	Species; (correct spelling)				
		(d)		1	iii;				
		Total Mark		5					

Question Number								
FT	HT	Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
	9	(a)		2	$25 \times 25 = 625$ $\times 4 = 2500$ Answer = 1 in 2500 or 1/2500 or 1:2500 or 0.04% or 0.0004 or 4×10^{-4} ; Correct answer = 2 marks Incorrect answer but evidence of correct working = 1 mark			
		(b)		1	They produce {increased / more/ build up/ thick} mucus;		Sticky mucus	Too much mucus
		(c)		1	Healthy lungs have donor's {allele/ genes} / do not have cf {allele/ gene} /they are not nn;	They have dominant/ normal alleles		
		(d)	(i)	1	Use of inhaler / they are inhaled/ they are breathed in;	Asthma type inhaler	virus	Asthma inhaler
			(ii)	1	Lung cells with introduced alleles wear out and are replaced by cells with cf allele / owtte;			
		(e)		1	To check there are no side effects / check there are no long term (harmful) effects;	To check that it is safe		
		Total Mark		6				

Question Number		Mark	Answer
FT	HT		
	10	6 QWC	<p>Indicative content:</p> <ul style="list-style-type: none"> • The gene for sugar attraction was mutated. • This led to variation – some populations/ individuals/ cockroaches} were not attracted to sugar. • Those not attracted to sugar did not eat the poison so survived/ selective advantage/ natural selection • these then reproduce • And passed on the advantageous gene. <p>No upper or middle band for those who describe{ resistance/ immunity} <u>to insecticide.</u></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		7	