



GCSE MARKING SCHEME

SUMMER 2018

**GCSE (NEW)
DOUBLE AWARD SCIENCE
BIOLOGY 2 - UNIT 4
3430U40-1 and 3430UD0-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2018 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.

**DOUBLE AWARD SCIENCE
UNIT 4 BIOLOGY 2**

MARK SCHEME SUMMER 2018

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied). Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer. Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statements.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao	=	correct answer only
ecf	=	error carried forward
bod	=	benefit of doubt

FOUNDATION TIER

Question				Marking details	Marks Available					
					AO 1	AO 2	AO 3	Total	Maths	Prac
1		(i)		{Light (intensity)/it} {decreases/ goes down} (in the wood/along transect) (1) (levels off and) then {increases/ goes up} again (1)		2		2		
		(ii)	I	number of plant species in 1 m ²		1		1	1	
			II	all 6 bars accurately drawn = 2 marks 5= 1 mark <1 small square Reject line graph/ stick graph Bar minimum 1 small square Must be clear which site each bar relates to		2		2	2	
		(iii)		(changes in) light (intensity) affect the number of <u>species</u> / any correlation between light (intensity) and the number of <u>species</u>		1		1		1
		(iv)		yes, because the number of <u>species</u> is related to light intensity/OWTTE/ use of data			1	1		1
		(v)		one from: water/nutrients/minerals/named nutrients/ temperature/pH		1		1		1
				Question 1 total	0	7	1	8	3	3

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		Animal/ animalia		1		1		
		(ii)		<i>Erinaceus</i>		1		1		
	(b)			only one (scientific) name/ it is {universal/ international/ all around the world}/ avoids confusion (1) many common names/ different names around the world (1)	2			2		
				Question 2 total	2	2	0	4	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		stimuli (1) impulses (1)	1 1			1 1		
		(ii)	I	Neurones Accept sensory neurone Reject motor neurone/ relay neurone	1			1		
			II	brain/spinal cord	1			1		
	(b)	(i)		Any one (x1) from • Hearing gets worse from 15/20 metres (for both pupils and teachers) • {Teacher/ older people} hearing deteriorates more from 15/ 20 metres • There is no change in hearing for 15 m/ up to 20m • Everyone could hear (the buzzer) up to 15 m • At {20/25}m more pupils than teacher could hear (the buzzer)			1	1		
		(ii)		Any one (x1) from: both groups (tested at): same distances/ same buzzer/ same number of people		1		1		1
		(iii)		Any one (x1) from: length of time/ volume/loudness/ frequency of buzzer/ same age in each group/ same room/ same background noise/ same gender			1	1		1
		(iv)		more people (1) more representative/ repeatability/ to spot anomalies (1) Reject repeat experiment Second mark point can only be awarded if first mark point correct			2	2		2
				Question 3 total	4	1	4	9	0	4

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		chromosomes	1			1		
		(ii)		DNA	1			1		
	(b)	(i)	I	DD		1		1		
			II	dd		1		1		
		(ii)		purple (flower)			1	1		
		(iii)		one dominant and one recessive (1) <u>allele</u> (1) reject gene different alleles of the same gene = 2 marks there are different alleles = 1 mark	2			2		
				Question 4 total	4	2	1	7	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		{Organism/ living thing/ micro-organism/ microbe} which causes <u>disease</u> Reject bacteria/ virus	1			1		
		(ii)		any two (x1) from: <ul style="list-style-type: none"> • contact/ touch • aerosol/ sneezing/ coughing/ inhaling • body fluids/ named body fluid/sexually transmitted • contaminated water • insects/ named insect e.g. mosquito • contaminated food Reject air unqualified	2			2		
	(b)	(i)		penicillin allow other	1			1		
		(ii)		<u>bacteria become resistant to antibiotics</u>	1			1		
	(c)	(i)	I	June 15 – July 15		1		1	1	
			II	(numbers are) increasing / (numbers are) close to the unsafe level(1) unsafe level likely to be passed before end of June/next sample/ within the month (1)			2	2		
		(ii)	I	species A increases and decreases (1) species B increases (1)		2		2		
			II	Need continue to monitor species B (as it is still increasing)			1	1	1	
				Question 5 total	5	3	3	11	2	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6				<p><i>Indicative content</i></p> <ul style="list-style-type: none">Correctly identify A as mitosis and B as meiosis <p><u>Mitosis</u></p> <ul style="list-style-type: none">produces two (daughter) cells,each with 4 chromosomes/ same number of chromosomes as {first/ mother} cellgenetically identical/ clonesgrowth/ repair /replacement of cells /asexual reproduction <p><u>Meiosis</u></p> <ul style="list-style-type: none">produces 4 cells,each with 2 chromosomes/half number of chromosomesgenetically different/ not clonesgametes/sexual reproduction <p>5 – 6 marks At least seven correct statements from indicative content <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.</i></p> <p>3 – 4 marks At least four correct statements from indicative content <i>There is a line of reasoning which is partially coherent, largely relevant, and with some structure.</i></p>	3	3		6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1 – 2 marks At least one correct statement from indicative content <i>There is a basic line of reasoning which is not coherent, largely irrelevant, and with very little structure.</i> 0 marks <i>No attempt made or no response worthy of credit.</i>						
				Question 6 total	3	3	0	6	0	0

FOUNDATION/HIGHER

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7/1	(a)	(i)		To prevent (the development of) diabetes/ (early diagnosis is vital) so it can be treated {as soon as possible/ earlier} not cure		1		1		
		(ii)		no – {ethnic / age/ genetics} are risk factors/ can run in families			1	1		
	(b)			{control/reduce} diet high in {carbohydrate/ sugary/ fat} food/ <u>regular</u> exercise (1) (in order to) prevent {obesity/ being overweight}/ to lose weight (1)	2			2		
	(c)			(excess) glucose/ blood sugar will not be {converted /stored} (1) as glycogen/ in the liver (1) so (blood) glucose level will remain high (1)	3			3		
				Question 7/1 total	5	1	1	7	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8/2	(a)	(i)		(16.8 - 12.3)/12.3 x 100 (1) 36.59-37 = 2 marks 36.58/ 36.5/ 36 = 1 mark		2		2	2	
		(ii)		site A because it has the greater spread of bars/more bars/ greater spread of mass Allow use of data			1	1		1
		(iii)		sampled at random			1	1		1
		(iv)		so that the {work/results/experiments} can be {verified/confirmed/reproduced}/ to see if they get the {same/different} results/ to compare results/ /to test reproducibility	1			1		1
	(b)			Any three (x1) from <ul style="list-style-type: none"> • Have an adaptation/ characteristic • Which gives them an advantage • For survival • So they are able to reproduce / produce offspring/ pass on the advantageous {genes/ alleles} 		3		3		
				Question 2/8 total	1	5	2	8	2	3

HIGHER

Question				Marking details	Marks available														
					AO1	AO2	AO3	Total	Maths	Prac									
3	(a)	(i)		Offspring/results are obtained quickly/ does not take a long time to get results/ short life cycle		1		1		1									
		(ii)		(Greater) confidence in result	1			1		1									
	(b)	(i)		either of the 2 flies with dark end to abdomen		1		1											
				Gametes correct (1) <table><tr><td>Gametes</td><td>R</td><td>R</td></tr><tr><td>r</td><td>Rr</td><td>Rr</td></tr><tr><td>r</td><td>Rr</td><td>Rr</td></tr></table> Mechanics correct (1)	Gametes	R	R	r	Rr	Rr	r	Rr	Rr		2		2		
Gametes	R	R																	
r	Rr	Rr																	
r	Rr	Rr																	
	(c)	(i)		All ratios 3: 1		1		1	1										
		(ii)		{Flies/ embryos/ they} died/ one or both flies were {sterile/ infertile} flies did not mate/ flies diseased/ eggs did not hatch/ develop Reject no offspring unqualified			1	1											
		(iii)		Results for red eyed flies and white eyed flies have been inserted in wrong columns/ OWWTE Do not accept that the wrong flies were mated because no cross could produce this ratio. Do not accept a mutation occurred			1			1 1									
		(iv)		<table><tr><td>Gametes</td><td>R</td><td>r</td></tr><tr><td>R</td><td>RR</td><td>Rr</td></tr><tr><td>r</td><td>Rr</td><td>rr</td></tr></table> Gametes correct 1 mark Mechanics correct 1 mark	Gametes	R	r	R	RR	Rr	r	Rr	rr		2		2		
Gametes	R	r																	
R	RR	Rr																	
r	Rr	rr																	
				Question 3 total	1	7	2	10	1	4									

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4				<p>Indicative content:</p> <ul style="list-style-type: none"> • receptors in skin receive the stimulus • impulse • transmitted to coordinator/spinal cord • along sensory neurone/nerve cell • then to relay neurone/nerve cell • then to motor neurone/nerve cell • then to muscle/effector • which contracts withdrawing hand • one correct reference to synapses <p>5-6 marks At least seven points from indicative content <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i></p> <p>3-4 marks At least four points from indicative content <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i></p>	6					

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1-2 marks At least one point from indicative content <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i> 0 marks <i>No attempt made or no response worthy of credit.</i>						
				Question 4 total	6	0	0	6	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			39 = 2 marks 39.1 = 1 mark if answer is incorrect award 1 mark for correct method: 23 X 17 ÷ 10 = 1 mark for method		2		2	2	2
	(b)			sampled each area once on the first day and once on the second day/ sampled each area early in morning/ sampled each area on damp day/ allowed {one week/ time} to allow marked snails to mix with the rest of the population		1		1		1
	(c)			<ul style="list-style-type: none"> (Number of song thrushes increased because) white ink spot made the snails {more conspicuous/ less camouflaged/ more visible} / OWTTE (1) use ink which blends in with the background colour of snail/ make markings less obvious/ mark snail on underside (1) 			2	2		2
				Question 5 total	0	3	2	5	2	5

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			Sweat gland (1) erector muscle (1) correctly labelled with no ambiguity with regard to the placing of the arrows	2			2		
	(b)	(i)		Allow 1 mark for correct method with incorrect answer: $187 + 176 + 167 = 530 \div 3 = 177(s)$ $176.7/ 176/ 176.666(recurring)/ 176.6 = 1$ mark		2		2	2	
		(ii)		<u>{Higher</u> the temperature/ the {hotter/ warmer} it is} the <u>more sweating</u> (ORA)			1	1		
		(iii)		Because each volunteer is subjected to one temperature only/ volunteers were all tested at different temperatures/ OWTTE			1	1		1
		(iv)		so that it is known when a colour end point is reached (OWTTE).	1			1		1
	(c)			sweat (on the skin surface) (1) evaporates (1)	2			2		
	(d)			uncontrolled <u>mitosis</u> correct spelling	1			1		
				Question 6 total	6	2	2	10	2	2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			<p>Any three (x1) from:</p> <ul style="list-style-type: none"> lymphocytes divide to produce {clones of cells/ large numbers of {lymphocytes/ plasma cells}} (1) the production of these cells is a <u>slow</u> response (1) some of these produce antibodies which act against the antigen (1) <p>Reject kill / fight / attack antigens Accept destroy antigens</p> <ul style="list-style-type: none"> (other lymphocytes) produce memory cells (1) memory cells react <u>rapidly</u> against the antigen on next contact with body (1) 	3			3		
	(b)			<p>Not Immunised/ Population 1/ the ones that have not been immunised: {Most/ a lot / more people/ a majority}{get the disease/ get sick/ get ill/ get affected OR (five people/ few people/ a minority/ less} {stay healthy/ do not get ill/ sick/ affected/ get the disease} (1)</p> <p>{Immunised/ Population 2/ the ones that have been immunised}: {Most/ a lot / more people/ a majority}{do not get the disease/ do not get sick/ do not get ill/ do not get affected/ stay healthy}/ OR (three people/ few people/ a minority} {get affected/ get sick/ get the disease/ get ill} (1)</p>			2	2		
				Question 7 total	3	0	2	5	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)	(i)		(An invasive species is) {a species/ it is} not native to a location (1) It can spread uncontrollably/ cause damage to the {environment/economy}/ outcompete native species/ cause disease(1)	2			2		
		(ii)		<i>Dikerogammarus (villosus)</i>		1		1		
		(iii)		It will be reduced		1		1		
	(b)	(i)		via/along the Ludwig Canal in {1992/1993/between 1992 & 1993} 1 mark for both answers correct		1		1		
		(ii)		Killer shrimp cannot live in water with a salt content of >2.5%			1	1		
		(iii)		<ul style="list-style-type: none"> Clothing/boots/shoes/wellingtons/waders/trousers/ wetsuits/ diving equipment Fishing tackle/rods/reels Dumping of ships water ballast Wildlife qualified – aquatic birds/ducks/gulls/ predators Ignore whether candidate is referring to killer shrimp eggs or adults		1		1		
		(iv)		$\frac{55.1}{35} = 1.6$ (years) 1.6 = Award 2 marks (correct answer, to 1 dp) If 2 marks are not awarded, award 1 mark for correct method with the use of correct data $1.574/ 1.57/ 1.5 = 1$ mark		2		2	2	
				Question 8 total	2	6	1	9	2	0

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	0	7	1	8	3	3
2	2	2	0	4	0	0
3	4	1	4	9	0	4
4	4	2	1	7	0	0
5	5	3	3	11	2	0
6	3	3	0	6	0	0
7 SD	5	1	1	7	0	0
8 SD	1	5	2	8	2	3
TOTAL	24	24	12	60	7	10
TARGET	24	24	12	60	6	9

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1 SD	5	1	1	7	0	0
2 SD	1	5	2	8	2	3
3	1	7	2	10	1	4
4	6	0	0	6	0	0
5	0	3	2	5	2	5
6	6	2	2	10	2	2
7	3	0	2	5	0	0
8	2	6	1	9	2	0
TOTAL	24	24	12	60	9	14
TARGET	24	24	12	60	6	9