GCSE MARKING SCHEME

SUMMER 2019

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

INTRODUCTION

This marking scheme was used by WJEC for the 2019 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 2019

GENERAL INSTRUCTIONS

<u>Recording of marks</u>

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.

<u>Marking rules</u>

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.

<u>Extended response question</u>

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

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)			Alhagi	1			1		
	(b)			Small leaves **and** less water {loss/ needed/ used}(1) Reject no water loss (Sharp) {spines/ thorns} **and** protection from <u>herbivores</u>/ stop them being <u>eaten</u> (1) Ignore reference to predators/ prey Seed case **and** stop seeds from drying out/ protects seeds from heat/ protects {seeds/them} from being eaten Reject protects seeds unqualified		1 1		2		
	(c)			Plant A roots {wider/ shallower/ more spread out/ closer to the surface}/ Plant B roots {narrower/ deeper/ longer}/ Plant A has short roots plant B has long roots (needs both plants if comparative words are not used) (1) Ignore bigger/ smaller To find <u>water</u> (1) Accept collect/ look for/ get		1 1		2		
				Question 1 total	**1**	**4**	**0**	**5**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			{Stem cells/ they/it} can {turn/ change/ develop/ grow/ specialise/ adapt} into {intestinal/liver/cardiac/nerve/blood/muscle/ other} cells/ tissues	1			1		

	(b)			daughter cells are genetically identical — True/ T/✓
				
				produces four daughter cells — False /F/ ✗
				
				daughter cells retain the original chromosome number — True/ T/✓
				
				daughter cells have chromosomes in pairs — True/ T/✓
				
				produces gametes — False /F/ ✗
				
				all 5 correct = 3
				   4 correct = 2
				   3 correct =1
					3			3		

	(c)			Any **three** (x1) from: • no need to {find/ wait for} donor/ quicker as already have own stem cells/ no waiting list (1) • {no/ less chance of} rejection/ reference to compatibility/ no antibody response/ Body accepts them (1) • same {tissue type/ DNA/ genes} (1) • no ethical issues/ do not have to kill {embryos/ potential life} (1) • no {side effects/ negative reaction} (1)	3			3		
				Question 2 total	**7**	**0**	**0**	**7**	**0**	**0**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	virus	1			1		
		(ii)	Mutation/ mutate	1			1		
	(b)		Any **one** (x1) from: • Contact/ touching • aerosol/ coughing/ sneezing/ inhaling/ through the air • body fluids/ named body fluid/ sexually transmitted • water • insects • (contaminated) food • contaminated needles	1			1		

	(c)		**2** given **5** given **4** **6**
			
			all 4 correct = 3
			    3 correct = 2
			    2 correct = 1
				3			3		

			Question 3 total	**6**	**0**	**0**	**6**	**0**	**0**

5

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		X = sweat gland	1			1		
		(ii)		Y = blood vessel/ capillary	1			1		
	(b)	(i)	I	all 5 plots correct = 2 marks 4 plots correct = 1 mark		2		2	2	2
			II	line drawn accurately		1		1	1	1
		(ii)		Any **three** (x1) from • {Sweat/ it} comes onto {surface/ skin/ towel}/ sweat comes out sweat pore (1) • heat from {flask/ hot water/ body} (1) • evaporates (water on towel/ sweat on skin surface) (1) • so temperature goes down/ cools the body (1)		3		3		2
		(iii)		temperature {remains high/ higher/ slowly decreases/ does not decrease by much}/ they overheat/ retain heat/ they are cooling down slowly (1) {no/less} sweat produced (1)			2	2		
5				**Question 4 total**	**2**	**6**	**2**	**10**	**3**	**5**

Question				Marking details	AO1	AO2	AO3	Total	Maths	Prac
5	(a)			B	1			1		
	(b)	(i)		straight line drawn at 150 all the across the graph		1		1	1	
		(ii)	I	250 = 2 marks If incorrect award 1 mark for 250 000 400 – 150 400 000 – 150 000		1 1		2	1 1	
			II	18 million/ 18 000 000 = 2 marks If incorrect award 1 mark for 150000 × 120		1 1		2	1 1	
		(iii)	I	{Stock/ mass/ numbers} {went down/ numbers fell} (1) below the safe stock (1)			1 1	2		
			II	<u>Trend</u> in stock leads to extinction (in that year/ by 2015)/ <u>line</u> would go to 0 (by 2015) Accept reference to graph/ pattern			1	1		
			III	(The fish/ it/ stock/ cod/ mass) {went up/ increased}			1	1		
	(c)			industrial materials/ medicines/ (human) well-being/ OWTTE	1			1		
				Question 5 total	**2**	**5**	**4**	**11**	**5**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6				Indicative content: *either:* <u>2 groups</u> • test reaction time of both groups before drinking • give one group decaffeinated drink • blind test • one group caffeinated drink • carry out reaction time test/ do the test/ measure the distance on the ruler/ owtte *or:* <u>one group only</u> • test reaction time before drinking • give them decaffeinated drink • blind test • then caffeinated drink (or vice versa) • carry out reaction time test/ do the test/ measure the distance on the ruler/ owtte • repeat/ several trials/ idea of doing it again • compare/ look at results **two** from • same volumes/ amount (of solution)/ • concentrations (of solution)/ • temperatures (of solution) • background noise/ • light • distance between fingers • drop from same height above fingers/ hand • Time since drinking coffee • Same position of hand on table • Same hand (left/ right)		3	1 2	6		

8

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				5-6 marks At least 7 points of indicative content. *There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant to the argument.* **3-4 marks** At least 4 points of indicative content *There is a line of reasoning which is partially coherent, supported by some evidence and with some structure. Mainly relevant information is included in the response but there may be some minor errors or the inclusion of some information not relevant to the argument.* **1-2 marks** 1- 3 points of indicative content *There is a basic line of reasoning which is not coherent, supported by limited evidence and with very little structure. There may be significant errors or the inclusion of information not relevant to the argument.* **0 marks** *No attempt made or no response worthy of credit.*						
6				**Question 6 total**	**0**	**3**	**3**	**6**	**0**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7/1	(a)	(i)		Gene – a {section/ part/ piece/ sequence/ length} of {DNA/ chromosome} (that codes for a particular characteristic/ protein) Reject {strand/ molecule} of DNA	1			1		
		(ii)		Allele – (alternative/ different) {form/ version/ type/ variation} of a gene	1			1		
	(b)	(i)		Gametes Nn and Nn (1) Genotypes of offspring NN, Nn, Nn, nn (1) If candidates use different letters to N and n max 1.		2		2		
		(ii)		nn/ (homozygous) recessive (1) If had {dominant allele/ N} they would not {have cystic fibrosis/ be affected} /(1) Do not award second mark if genotype is given as NN or Nn or heterozygous or homozygous dominant		1	1	2		
		(iii)		{NN/ homozygous dominant} **and** {Nn/ heterozygous }		1		1		
	(c)			{Most phenotypes/ they} are {the result of/ controlled by/ have/ need} {multiple genes/ more than one (pair of) gene} / also affected by environment/ reference to epigenetics Accept more than one pair of genes	1			1		
				Question 7/1 total	**3**	**4**	**1**	**8**	**0**	**0**

Question				Marking details	Marks available					
					AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
8/2	(a)			A – {cell/ plasma} membrane B – cytoplasm C – cell wall	3					
	(b)	(i)		{All/the} bacteria killed/ {no/ prevents} bacterial growth (1)		1				1
		(ii)		Accept any answer greater than 1 (µg/cm^3) ≤ 2 (µg/cm^3)		1			1	1
2		(iii)		Test at smaller intervals (of concentrations) (1) Between 1.00 and 2.00 µg/cm^3 / given value between 1.00 and 2.00 µg/cm^3 (1) Test at 1.2,1.4,1.6, 1.8 and 2.0 = 2 marks			2			2
				Question 8/2 total	**3**	**2**	**2**	**7**	**1**	**4**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3		(i)		P - Meiosis Q- Mitosis Both for 1 mark Correct spelling only		1		1		
		(ii)		A – 19 B – 19 C – 38 D - 38 All correct = 2 3 correct = 1 0/1/2 =0		2		2		
		(iii)		Daughter cells produced as a result of {meiosis/ P} are genetically different/ Daughter cells produced as a result of {mitosis/ Q} are {genetically identical/ clones}	1			1		
				Question 3 total	**1**	**3**	**0**	**4**	**0**	**0**

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Question				Marking details	AO1	AO2	AO3	Total	Maths	Prac
4	(a)			Axis labels (distance + m, percentage cover (no unit) or cover (%) + scale (1) Accept distance on y axis Ignore reference to (percentage cover at each) distance (along transect) on x axis and reference to distance on y axis All plots correct (2) -1 each incorrect plot Appropriate labelled accurate lines (1) Accept plot to plot or curve of best fit		4		4	4	4
	(b)	(i)		Interspecific (competition)	1			1		
		(ii)		{Percentage/ coverage/ cover} of Bluebell increases {along transect/ as you go into the wood} and Dog's Mercury decreases (1) Bluebell {better adapted to survive with/ survives better in} {less light / water/ minerals/ space}/ bluebell outcompetes dog mercury for {light/ water/ minerals/ space}/ bluebell {able to get more/ does not need as much} {light/ water/ minerals/ space}/ ORA (1)		1	1	2		
	(c)	(i)		They are looking the effect of environment on distribution/ transects study distribution/ to see the change along a transect/ owttte/ random sampling does not study distribution		1		1		1
		(ii)		Take samples at more frequent intervals / use larger quadrat / take more transects/ compare with other groups Reject repeat unqualified/ longer transect/ use more quadrats			1	1		1
	(d)			Any **two** (x1) from: Provides (potential) food/ nutrients (1) Industrial/ building materials (1) medicines (1) (human) well being (1)	2			2		
				Question 4 total	**3**	**6**	**2**	**11**	**4**	**6**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			52/ 52.4/ 52.38% = 2 marks If incorrect award one mark for 22/22+20 X 100 52.3		2		2	2	
	(b)	(i)		**One** (x1) from *Animals are good predictors of how humans will respond to drugs:* • can test for side effects/ • (22) side effects in human identified (1) **One** (x1) from *Animal tests cannot predict how humans will respond to a drug:* • animals may not respond in the same way as humans / • only identify {52%/ some} of the side effects correctly/ • do not share all of the same side effects/ • (48) side effects that animals had that people did not/ false positive • (20) side effects in humans not in animals/ false negative (1)			2	2		
		(ii)		More thorough drug testing (1)			1	1		
		(iii)		Used to treat <u>bone</u> cancer (1)			1	1		
				Question 5 total	**0**	**2**	**4**	**6**	**2**	**0**

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Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		A change from {optimal/normal} (internal conditions)/ OWTTE (1) resulting in the body (compensating/responding and) restoring {balance/optimal conditions/normal conditions/set level} (1)	2			2		
		(ii)		temperature pH/ carbon dioxide glucose/ sugar water/ salt/ named ions Any **three** correct for 2 marks Any **two** correct for 1 mark	2			2		
	(b)	(i)		Any **two** (x1) from: • Exercise (1) • Too much insulin (injected) (1) • Not eaten / not had enough {food/sugar/ named food source}/ long time since last meal/ fasting (1) ignore reference to blood sugar being too low		2		2		
		(ii)		Reference to the role of liver (glucagon travels to liver or conversion within liver or storage of glycogen in liver)(1) (Glucagon) converts glycogen into glucose (1) Concentration of <u>blood</u> glucose level rises (above 4.0 mmol/l / to normal range)/ glucose is released into the <u>blood</u>/ <u>blood</u> glucose returns to optimum (1) Accept blood sugar for blood glucose levels		3		3		
				Question 6 total	**4**	**5**	**0**	**9**	**0**	**0**

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
7.	**Indicative content:** • Mutation occurred • in a gene • (Led to) variation • <u>some</u> rats resistant (and some not resistant to warfarin) • Rats with the mutation were {able to survive (in the presence of warfarin)/ not killed (by warfarin)} • This gave them a (selection) advantage. • These rats reproduce/ breed/ produce offspring • {Favourable <u>gene</u>/ the <u>gene</u> for (warfarin) resistance} <u>passed on</u> • This is repeated over many generations **5-6 marks** 7-9 indicative points *There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant to the argument.*	6					

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				3-4 marks 4-6 indicative points *There is a line of reasoning which is partially coherent, supported by some evidence and with some structure. Mainly relevant information is included in the response but there may be some minor errors or the inclusion of some information not relevant to the argument.* **1-2 marks** 1-3 indicative points *There is a basic line of reasoning which is not coherent, supported by limited evidence and with very little structure. There may be significant errors or the inclusion of information not relevant to the argument.* **0 marks** *No attempt made or no response worthy of credit.*						
				Question 7 total	**6**		**0**	**6**	**0**	**0**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
8.	(a)	(i)	adenine	1			1		
		(ii)	23% = 2 marks If incorrect award 1 mark for either (A + T =) 54% (100-54 =) 46		2		2	2	
	(b)	(i)	Triplet (code) / 3 bases (code)/ a codon (1) (one triplet code =) one amino acid/ determines sequence of amino acids (1) Amino acids form proteins (1)	3			3		
		(ii)	Mutation 1 {two/ more} {triplets/ bases} altered / mutation 2 only one {one triplet/ one base} altered (1) Altering bases may alter the amino acids coded for (1) Different protein may be formed/ non functional protein (1)			3	3		
			Question 8 total	**4**	**2**	**3**	**9**	**2**	**0**

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	1	4	0	5	0	0
2	7	0	0	7	0	0
3	6	0	0	6	0	0
4	2	6	2	10	3	5
5	2	5	4	11	5	0
6	0	3	3	6	0	6
7	3	4	1	8	0	0
8	3	2	2	7	1	4
Paper TOTAL	24	24	12	60	9	15

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

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