



GCSE MARKING SCHEME

SUMMER 2017

**GCSE (NEW)
SCIENCE - BIOLOGY 1 (DOUBLE AWARD) UNIT 1**

3430/U10-1 / 3430UA0-1

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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.

**SCIENCE-BIOLOGY 1 (DOUBLE AWARD)
UNIT 1**

MARK SCHEME

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.

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)			Microscope/ light microscope	1			1		1
	(b)			400= 2 marks If incorrect award the following for 1 mark 10 x 40		2		2	2	1
	(c)			(add a) stain/ named stain/ iodine (solution)/ methylene blue Ignore dye			1	1		
	(d)			Contains {chromosomes/DNA/ genetic information/ genes}/ controls (activities of) cell	1			1		1
				Question 1 total	2	2	1	5	2	3

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			amino acids (1) lipids (1) Ignore: Fats fatty acids and glycerol (either order) (1)	3			3		
	(b)			A = 3 B = 2 C = 4 D = 1 all four correct (1)		1		1		
	(c)	(i)		(as temperature increases) {the rate/it} {rises/ increases} (1) to optimum/until 35°C (1) NOT 6a.u. then falls (1)		3		3		
		(ii)		(shape of the) <u>active site</u> {destroyed/ changed/ deformed/ damaged} (1) <u>substrate</u> cannot {bind/ fit/ join/ attach/ connect} (1)	2			2		
				Question 2 total	5	4	0	9	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			484/ 485 = 2 marks 484.5 = 1 mark If answer incorrect award 1 mark for correct working eg $1615 \times \frac{30}{100}$ or 1615×0.3 or $1615 \times 0.1 \times 3$		2		2	2	
	(b)			increased confidence/ to be able to draw a valid conclusion/ increase validity NOT reliable/ fair testing/ accuracy			1	1		
	(c)	(i)		2		1		1		
		(ii)		9		1		1	1	
		(iii)		capillaries	1			1		
		(iv)		<u>More oxygen is supplied</u> (1) More lactic acid is produced <u>More glucose is supplied</u> (1) More anaerobic respiration takes place <u>More aerobic respiration takes place</u> (1) More than 3 underlined – 1 for each additional underline Award 0 if all five responses underlined	3			3		
	(d)			{energy/ glucose/ sugar/ calories/ kJ} are {in excess/ not used}(1) {Stored/ builds up} as fat (1)	2			2		
				Question 3 total	6	4	1	11	3	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			<u>small intestine</u>	1			1		
	(b)	(i)		✓ (1) ×× (1) (✓)✓ (1)		3		3		3
		(ii)		starch (molecule) {too big/ larger} <u>and</u> the glucose (molecule) {smaller/ small} (enough)/ starch is larger than glucose (1) to fit through {holes/ pores} in tubing (1) 2 nd point linked to 1 st	2			2		
				Question 4 total	3	3	0	6	0	3

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			Cancer	1			1		
	(b)	(i)	I	all 5 points correct = 2 marks 4 points correct = 1 mark 0/1/2/3 points correct = 0 marks Tolerance +/- ½ small square		2		2	2	
			II	straight line connecting each point <u>including</u> 2009		1		1	1	
		(ii)		Any one from <ul style="list-style-type: none"> • {line/%/it/ results} did not fall {until after 2008/ until 2009} • {line/%/it/ results} stayed the same in 2008 • values in (2007 and) 2008 {were the same/ did not change} • {line/%/it/ results} stayed the same for a year 			1	1		
		(iii)	I	Continuing trend from plotted points with straight line using a ruler from 2014 – 2020 + correct answer 13/ from candidates graph		1		1	1	
			II	the (rate of) decline is <u>constant</u> / continues to drop at 1% per year or description of ECF if pattern shown on graph rather than straight line Accept 'the pattern is repeated' NOT continues to decrease			1	1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iv)		One (x1) from: raise price/excise duty/tax (1) education on dangers(1) encourage use of alternatives (1) raise age for buying cigarettes (1) plain packaging (1) Remove from display (1) NOT ban smoking		1		1		
5	(c)			<i>Indicative content</i> <ul style="list-style-type: none"> • two groups/ smokers and non smokers • measure breathing rate • repeat • find the mean • compare the two groups • two fair testing – • e.g. same age/ fitness/ gender/ length of time smoking/ number smoked per day/ whether they had exercised prior to test 5 – 6 marks : Detailed description of the entire investigation <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>			6	6		6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				<p>3 – 4 marks : Outline general description of the investigation <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure.</i> <i>The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i></p> <p>1 – 2 marks : Partial description of investigation <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure.</i> <i>The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation</i></p> <p>0 marks: No attempt made or no response worthy of credit.</p>						
				Question 5 total	1	5	8	14	4	6

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
6 / 1	(a)	(i)	Stream 1 – <u>high</u> (pollution) Stream 2 – <u>little / no</u> (pollution) Stream 3– <u>medium</u> (pollution) All correct (2) 2 correct (1) 1 or 0 correct 0 marks		2		2		
		(ii)	Any two (x1) from: Fertilizer/ NPK fertilizer (1) Manure (1) Slurry (1) silage <u>run-off/ seepage</u> (1) Sewage (1) NOT farms/ sewers	2			2		
	(b)		lichens	1			1		
			Question 6/1 total	3	2	0	5	0	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7 / 2	(a)	(i)	A – light / sunlight/ light energy/ solar energy (1) NOT sun B – carbon dioxide/ CO ₂ (1) NOT CO ² / CO2 C – chlorophyll (1) ignore chloroplast		3		3		
		(ii)	<u>B1</u> should contain {a liquid which doesn't affect the experiment/ water/ sodium bicarbonate solution} (1) So that the volume in each flask is the {same/ equal} (1)			2	2		2
		(iii)	To de-starch the plant/ remove the starch/ plant uses up the starch(1) So that any starch found in the leaves was made during the / to show that photosynthesis took place during the experiment(1)	1	1		2		2
	(b)		1 water ignore temperature 2 alcohol/ ethanol/ methanol/ meths 3 water ignore temperature 4 iodine (solution) All 4 correct (3) 3 correct (2) 2 correct (1) 1 correct (0)	3			3		3
			Question 7/2 total	4	4	2	10	0	7

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	<p>A: producers</p> <p>B: {primary/ first (stage)} consumers Ignore herbivore</p> <p>C: {secondary/ second (stage)} consumers</p> <p>Ignore carnivores</p> <p>D: {tertiary/ third (stage)} consumers Ignore carnivores</p> <p>All correct for 1 mark</p>		1		1		
	(b)	(i)	<p>=0.049/ 0.05/ 0.048648/0.04865/0.0486 = 2marks</p> <p>If incorrect award 1 mark for:</p> <p>0.048/ 0.04864/ 0.04 or any other incorrect rounding</p> <p>or</p> $\frac{2500}{5139000} \times 100 (1)$		2		2	2	
		(ii)	<ul style="list-style-type: none"> • A pyramid of numbers shows there is a small number of producers/ example e.g. only 1 oak tree (1) • A pyramid of biomass shows there is a large mass of producers/ example e.g. the 1 oak tree may have a very large mass (1) <p>Reference to animals instead of plants negates the mark</p>			2	2		
		(iii)	<p>faeces/ heat/ excretory waste/ urine/ egested waste/ respiration</p> <p>ignore: growth/ movement/ excretion</p>	1			1		
			Question 3 total	1	3	2	6	2	0

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
4	(a)		movement of {substances/ gas/ molecules/ particles} {down a concentration gradient/ or description of} NOT concentrations move from high to low/ ref to SPM	1			1		
	(b)	(i)	to remove any {glucose and protein/ solution}		1		1		1
		(ii)	<i>Benedict's</i> <ul style="list-style-type: none"> • (Benedict's reagent changed from blue to brick red indicating the) presence of glucose (1) • glucose must have {come from/diffused/ passed through} tubing (1) • must be {pores/holes} in Visking tubing big enough to allow glucose <u>molecules</u> to {pass/diffuse} through (1) <i>Biuret</i> <ul style="list-style-type: none"> • (Biuret test didn't change colour) indicating no protein present (1) • protein couldn't {come from /diffused from/ pass through} tubing (1) • because {pores/holes} in tubing are too small to allow protein <u>molecules</u> (1) 	1	1	1	6		2
			Question 4 total	3	3	2	8	0	3

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)		multiply the power of the <u>eyepiece</u> lens by the power of the <u>objective</u> lens	1			1		1
	(b)	(i)	phagocyte	1			1		
		(ii) I	$A - A1 = 80 \text{ mm}$	1			1		1
		II	$4000 = 2\text{marks}$ If incorrect allow one of the following for 1 mark only $(80\text{mm} =) 80\,000 (\mu\text{m})$ (1) same units $80\,000 \div 20$ (1) $(20 \mu\text{m} =) 0.02(\text{mm})$ (1) same units $80 \div 0.02$ (1)		2		2	2	2
	(c)	(i)	(tissue/cells) are stained (1) NOT dye/ iodine to make { different features/ different parts/ different cells/ them} {stand out/ clearer/ more visible} (1)		2		2		2
		(ii)	$(57000 \div 500 =)$ 114		1		1	1	
			Question 5 total	3	5	0	8	3	6

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
6	(a)		A Correct position for pancreas (1) line must touch pancreas accept arrow/line labelled A B Correct position for bile duct (1) line must touch bile duct accept arrow/line labelled B	2			2		
	(b)	(i)	{Amylase/ enzyme} has {digested/ broken down} the starch (1)		1		1		1
		(ii)	Tube E/ 2% amylase (1) contained the {greatest/ highest} { <u>concentration/ percentage</u> } of {amylase/ enzyme}/ contained the most concentrated {amylase/ enzyme}(1) NOT more amylase		1	1	2		2
		(iii)	<ul style="list-style-type: none"> hole number 5 (1) no starch free area / no digestion of starch/ no clear area/ all the starch is still there/ no starch removed(1) because {amylase/ enzyme/ Tube C/ solution} had been {(heated to) 100°C/ boiled} (1) which {denatures/destroys} {enzyme/amylase/ active site} (1) 	1	1	1 1	4		2

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)		to act as a control/ to show that it is the {amylase/enzyme} that digests the starch NOT controlled variable	1			1		1
			Question 6 total	4	3	3	10	0	7

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)	Paul has the <u>lowest</u> fitness index (1)		1		1		
		(ii)	The higher the heart rate the lower the fitness index ORA		1		1		
		(iii)	I <u>John</u> $\frac{60}{190} \times 100 = 31.6/ 31.5789474/ 32 = 1 \text{ mark}$ <u>Lucy</u> $\frac{50}{130} \times 100 = 38.5/ 38.461538/ 39 = 1 \text{ mark}$ Reject if incorrectly rounded		2		2	2	
			II Lucy answer must relate to (ii) ECF			1	1		
	(b)		Any two for 1 mark <ul style="list-style-type: none"> • number of men and women • age • body mass/body mass index • intensity of exercise • room temperature • NOT time 			1	1		1
	(c)		because we do not know his height/ he may not be obese but just very tall/ he may have a BMI which shows he is not overweight			1	1		
			Question 7 total	0	4	3	7	2	1

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
8			<p>Indicative content:</p> <ul style="list-style-type: none"> Equation 1 shows aerobic respiration. Equation 2 shows anaerobic respiration. <p>Aerobic respiration</p> <ul style="list-style-type: none"> occurs all the time / when oxygen is available releasing most energy from glucose molecules/ producing <u>more</u> molecules of ATP glucose completely broken down This is an advantage of aerobic respiration . <p>Anaerobic respiration</p> <ul style="list-style-type: none"> occurs when blood/body cannot supply sufficient oxygen (to muscles)/ does not require oxygen releasing less energy / <u>fewer</u> molecules of ATP are produced glucose molecules incompletely broken down This is a disadvantage of anaerobic respiration (Another disadvantage is it also) produces lactic acid/ oxygen debt/ muscle fatigue . <p>5-6 marks Detailed description of the entire process <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 General outline of aerobic and anaerobic respiration <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	0	0	6		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			1-2 marks brief outline of aerobic and anaerobic respiration <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: No attempt made or no response worthy of credit.						
			Question 8 total	6	0	0	6	0	0

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	2	2	1	5	2	3
2	5	4	0	9	0	0
3	6	4	1	11	3	0
4	3	3	0	6	0	3
5	1	5	8	14	4	6
6	3	2	0	5	0	0
7	4	4	2	10	0	7
TOTAL	24	24	12	60	9	19
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	3	2	0	5	0	0
2	4	4	2	10	0	7
3	1	3	2	6	2	0
4	3	3	2	8	0	3
5	3	5	0	8	3	6
6	4	3	3	10	0	7
7	0	4	3	7	2	1
8	6	0	0	6	0	0
Target	24	24	12	60	6	9
TOTAL	24	24	12	60	7	24