



GCSE MARKING SCHEME

JANUARY 2017

**SCIENCE - BIOLOGY 2 (LEGACY)
4471/01/02**

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.

Biology 2 Foundation Tier

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept	
FT	HT								
1		(a)	(i)	2	Each correct column in table 1 mark				
			feature of cell		alga				bacterium
			nucleus						x
			chlorophyll		✓				x
			cell wall						
cytoplasm	✓	✓							
					cell length over 10 µm	✓			
					Tick or cross at bottom of each column				
			(ii)	1	More {features/ owtte} in common with algae (than bacteria)/ it has chlorophyll/ it is a similar size (to alga)/ they are both over 10µm/ it is bigger than the bacteria; It = <i>Anabaena</i>	It has all the features of the alga but no nucleus Reverse answer			
		(b)	(i)	1	Carbon dioxide and Oxygen;	Correct formulae			
			(ii)	1	Absorbs/ takes in light;	trap	Uses/ sun	Picks up/ attracts/	
Total Mark				5					

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
2		(a)		2	A Trachea; B Bronchus;	windpipe Bronchi		
		(b)	(i)	1	15, 13;			
			(ii)	2	14.3;; Correct answer – 2 marks, 43/3 – 1 mark incorrect answer but correct method – 1 mark 14.33 – 1 mark	ecf		
			(iii)	3	Ribs – down and in; Volume – decreased; Pressure – Increased;			
Total Mark				8				

Question Number								
FT	HT	Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
3		(a)	(i)	2	ACAAT;; 5 correct = 2 marks 4 correct = 1 mark 0/1/2/3 correct = 0 marks			
			(ii)	1	Phosphate;			
		(b)	(i)	1	Amino acid;			
			(ii)	2	(form a) <u>code</u> ; (determining){order/sequence} of amino acid/ decides which amino acid (goes where)/ decides the type of amino acid;			
	Total Mark				6			

Question Number								
FT	HT	Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
4		(a)	(i)	1	Oesophagus;	gullet		
			(ii)	2	Drawing shows Bolus further down than in A; Wall of oesophagus constricted close to and above Bolus; (Pinch must be just above the bolus)			
			(iii)	2	Peristalsis ; (Muscles) <u>contract</u> ;		relax	(muscles) tighten/ shorten/ squeeze
		(b)	(i)	1	Gall bladder;			
			(ii)	2	Any 2 (x1) from: <ul style="list-style-type: none"> • Acts on <u>fats</u>/OWTTE; • Emulsifies/breaks down {<u>droplets/ globules</u>}; • To increase surface area (for enzyme to act); • neutralisation of acid/ is alkaline; digest fat to smaller molecules = 1 mark			Emulsifies Molecules
	Total Mark				8			

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept	
FT	HT								
5		(a)		1	To show that the {results/ temp rise/ heat produced} (for flask A) were linked to <u>living</u> / respiring} peas/ {Living peas/ peas in flask A} respire/ {Dead peas/ peas in flask B} do not respire;			Which is alive and which is dead	
		(b)	(i)	1	From graph = 17,18;				
			(ii)	2 1	5 plots correct = 2 marks 4 plots correct = 1 mark 0/1/2/3 correct = 0 marks ± ½ small square Line = 1 mark		No label required		
		(c)		2	Any two from: <ul style="list-style-type: none"> Reaches <u>higher</u> value/ are higher; Increased more {rapidly/ quickly}; {Increase/ rise} starts {earlier/immediately/ DAY 0} Temperature rises throughout the experiment in flask A (but does not in flask B) Accept answers referring to B if clear and a comparative answer	Two correct values		hotter steeper temperature increases every day	
		(d)	(i)	1	Heat;	thermal			
			(ii)	1	Respiration;	respire			
	Total Mark				9				

Biology 2 Foundation/Higher Tier

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
6	1	(a)	(i)		1	The <u>increased number of cigarettes</u> smoked the <u>more deaths from lung cancer</u> / the more you smoke the more chance you have of <u>dying from lung cancer</u> (OWTTE);			Higher risk of dying/ cigarette smoking increases deaths from lung cancer
			(ii)	I	1	(350 – 160 =) <u>190</u> ;			
				II	1	(230 x 30 = 230 x 10 x 3 =) <u>6900</u> ;			
		(iii)		1	People who don't smoke/smoke 0 cigarettes per day also die from lung cancer / can still get lung cancer;	{14/15/16} people die from lung cancer who do not smoke/ {420/450/480} people die from lung cancer in Wales who do not smoke			
		(b)		1	Tar;		carcinogen		
		(c)		1	Emphysema/heart disease/ COPD;	Cardiovascular disease/ CVD		bronchitis	
Total Mark					6				

Question Number								
FT	HT	Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
7	2	(a)		1	Movement of {molecules/ particles} from a high concentration to a low concentration/down a concentration gradient;			Semi permeable membrane
		(b)	(i)	1	starch <u>molecules</u> are too big to pass through the (pores) in the {Visking tubing/ membrane}/ {holes/ pores} in the {visking tubing/ membrane} are too small for the starch <u>molecules</u> to pass through;	Reverse argument		
			(ii)	1	<ul style="list-style-type: none"> Substance X - carbohydrase/amylase; 			Enzyme
				1	<ul style="list-style-type: none"> {Substance X/carbohydrase/amylase/enzyme} {digests/breaks down/hydrolyses} starch; if wrong enzyme is named do not award mark 			Changed/ turns into/ converted
				1	<ul style="list-style-type: none"> Starch is broken down into glucose; 			
				1	<ul style="list-style-type: none"> <u>molecules</u> which are small enough to {diffuse/pass} through the (pores in the) {Visking tubing/ membrane}; 			
		(c)		1	35 ° C;			
Total Mark				7				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
8	3	(a)	(i)	1	45 million/45 000 000/ 4.5×10^7 ;			
			(ii)	1	4.5 million/4 500 000/ 4.5×10^6 ;	ecf		
		(b)		2	<p>$135\ 000 + 225\ 000 = 360\ 000$</p> <p>$45\ 000 + 60\ 000 = 105\ 000$</p> <p>$360\ 000 - 105\ 000 = \underline{255\ 000} \text{ m}^3 / 255 \times 1000 \text{m}^3 ; ;$</p> <p>Award 2 marks for correct answer.</p> <p>If answer is incorrect award 1 mark for use of four readings from graph (135, 225, 45, 60) (ignoring factor 1000)</p> <p>Award 1 mark for correct answer with no unit</p>			
		(c)		1	The number of trees is decreasing, if production of timber is not controlled, the tree will become extinct;			Reference to demand
Total Mark				5				

Question Number		Mark	Answer
FT	HT		
9	4	6	<p>Indicative content</p> <ul style="list-style-type: none"> • expired air contains less oxygen/ 16% • expired air contains more carbon dioxide/ 4% • expired air contains more water vapour/ saturated /1% • expired air contains the same concentration of nitrogen • some of the oxygen from inspired air {diffuses/ passes} into blood (around the alveoli) and is used in respiration • blood returning to {alveoli/ lungs} contains higher concentrations of carbon dioxide which has been made in respiration • correct ref. to the increase in water vapour, in expired air, coming / evaporating from air pathways/ from respiration • nitrogen is not {used/ involved} in respiration <p>correct percentages must be given for top band</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 and 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	carbon dioxide + water glucose + oxygen	Correct symbols	Ignore chlorophyll/ light written above/ below arrow.	If these terms are written anywhere else in the equation then do not award the mark
		(b)		I	1 1	the sugar concentration/ it/ glucose increases; because <u>light</u> is available for <u>photosynthesis</u> ; (2nd mark only awarded if 1st mark awarded)	sunlight		Sun/ daytime
				II	1 1 1	{No light/ not enough light} for photosynthesis/ it is dark so no photosynthesis takes place; {Sugar/ it/ glucose} decreases; Because sugar used in cell respiration or converted to starch; 3 rd mark only awarded if 2 nd mark awarded			
		Total Mark			6				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	6	(a)		1	Nucleus/ mitochondria;			
		(b)		1	A always matches to T and C always matches to G;	Pairs with/ bonds with/ complementary base pairs with	Incorrect spelling of bases	Goes with/
		(c)	(i)	1	Mitosis (correct spelling)			
		(c)	(ii)	1	Meiosis (correct spelling)			
		Total Mark		4				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	7	(a)		1	Transect;	transecting		
		(b)	(i)	1	<u>under stones</u> at { <u>Station 6/lowest station/last station</u> };			
			(ii)	1	Protection {from predators/ from drying/ UV}/ Better adapted to living in water;			
		(c)		1	{Algae/ seaweed/ plants} need light (so live on top of stones)/ algae photosynthesis;			
				1	herbivores eat the plants/ food;			
					mark points can be linked either way			
		Total Mark		5				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	8	(a)	(i)	1	A Cloudy/white/milky and B Colourless/ clear/ transparent		No change/ stays the same	
		(b)	(i)	1 1 1	(In A) yeast {fermented the sugar/respired/ carried out fermentation}; Producing carbon dioxide; This pushed up the plunger; 3 rd mark linked to 2 nd			
			(ii)	1 1 1 1	Water passed out of yeast; from where it was in high conc to where it was in low conc/down a gradient; through a semi permeable membrane In B {yeast was killed / there was no respiration/ no carbon dioxide produced/ no fermentation}; 2 nd mark linked to 1st			
		Total Mark		8				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
	9	(a)		2	Any two (x1) from: Active {transport/ uptake} takes place; Against concentration gradient/ OWTTE; using {energy/respiration/ATP};			
		(b)	(i)	3	Increases uptake; Enzymes involved (in respiration); Increased kinetic energy/ more successful collisions; MUST RELATE TO ENZYMES increases rate of enzyme activity = 2 marks			
			(ii)	2	Decrease in uptake; stops {respiration/ enzyme action};			
		Total Mark		7				

Question Number		Mark	Answer
FT	HT		
	10	6 QWC	<p>Indicative content</p> <ul style="list-style-type: none"> • Alien species are species that are introduced to an area where it is not normally found. • Named example. e.g. Japanese knotweed, (must be clear) • Negative effect on native wildlife described. • One advantage of biological control • One disadvantage of biological control • One advantage of chemical control • One disadvantage of chemical control <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 and 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	