

Mark Scheme (Results)

Summer 2024

Pearson Edexcel International GCSE In Biology (4BI1) Paper 1B

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## **General Marking Guidance**

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded.
   Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1(a)(i)	C (oak tree)	1
	A is not the answer as beetle is not the producer	
	B is not the answer as deer is not the producer	
	D is not the answer as tick is not the producer	

Question Number	Answer	Additional guidance	Mark
1(a)(ii)	oak / tree → caterpillar → mouse → tick (2)	Allow 1 for correct order. No credit for pyramids	2

Question Number	Answer	Mark
1(a)(iii)	D (mouse)	1
	A is not correct as the ant is not at two levels	
	B is not correct as the blue jay is not at two levels	
	C is not correct as the caterpillar is not at two levels	

Question Number	Answer	additional guidance	Mark
1(b)(i)			2
	Calculation method <b>not marking</b>		
	points	allow 1 mark for	
		correct measurement of	
	Measurement of line 10.4 cm / 104	line 10.3-10.5cm or	
	mm	103-105 mm with units	
	Measurement of line ÷ 3.5mm	or allow 1 mark for	
	Treasurement of line 1 Stormin	dividing by 3.5 or 35	
	= 29-30 (2)		
		allow range 29.0 - 30.0	
	Correct answer = 2 marks	for 2 marks	

Question Number	Answer	Additional guidance	Mark
1(b)(ii)		Function must match substance not credit for function alone	4
		Naming two correct substances gains 2 marks	
		ignore blood cells / platelets / oxygen / hormones / antibodies / enzymes	
		allow named vitamin / or vitamins / for one mark	
	s substance 1 (1)	minerals / named mineral for one mark	
	<ul><li>substance 1 (1)</li><li>required for function</li></ul>	examples	
	1 (1)	allow glucose (1)	
		for energy / respiration (1)	
		Iron (1)	
		for haemoglobin / red blood cells / eq (1)	
	substance 2 (1)	allow amino acids (1)	
	<ul><li>required for function 2 (1)</li></ul>	for protein (synthesis) / eq (1)	
		allow proteins / named protein / eq	
		for growth / eq (1)	
		allow cholesterol / fatty acids / lipoproteins / eq (1)	
		for energy / insulation / eq (1)	
		allow water (1)	
		for keeping body hydrated/ transport /as solvent / eq (1)	
		allow Vitamin C (1)	
		for prevents / scurvy /eq (1)	

Question Number	Answer	additional guidance	Mark
1(b)(iii)	An answer that makes reference to two of the following:		2
	<ul> <li>tick picks up / bites / sucks up / absorbs</li> <li>blood from infected animal / animal with disease / eq (1)</li> </ul>		
	<ul> <li>bacteria / virus / pathogen / eq (1)</li> </ul>		
	<ul> <li>feed / bite / (new / uninfected ) other animal /eq (1)</li> </ul>	Allow transfer if ref to biting in answer	

total 12 marks

Question Number	Answer	Mark
2(a)(i)	B (Q)	1
	A is not the answer as P is not the style	
	C is not the answer as S is not the style	
	D is not the answer as T is not the style	

Question Number	Answer	Mark
2(a)(ii)	D (U)	1
	A is not the answer as P does not release pollen	
	B is not the answer as R does not release pollen	
	C is not the answer as T does not release pollen	

Question Number	Answer	Mark
2(a)(iii)	A (P)	1
	B is not correct as pollen grains do not germinate on R	
	C is not correct as pollen grains do not germinate on S	
	D is not correct as pollen grains do not germinate on U	

Question Number	Answer	Mark
2(b)	A description that makes reference to the following:	3
	P feathery / large surface area / outside flower /exposed / eq (1)	
	R absent / smaller / not coloured / green / eq (1)	
	<ul> <li>T longer / hinged / outside flower / exposed / eq</li> <li>(1)</li> </ul>	

Question Number	Answer	Mark
2(c)(i)	<ul> <li>runners / bulbs / corms/ tubers / rhizomes /eq (1)</li> </ul>	1

Question Number	Answer	additional guidance	Mark
2(c)(ii)	<ul> <li>cuttings / grafting / layering / tissue culture / micropropagation / eq (1)</li> </ul>	Reject cloning	1

Question Number	Answer	additional guidance	Mark
2(d)	An answer that makes reference to the following:		3
	Allow two / three in one numbered line		
	<ul> <li>no gametes produced in asexual / no meiosis in asexual / gametes produced in sexual / meiosis in sexual / one parent cell (1)</li> </ul>	Only mitosis in asexual ignore ref to number of parents	
	<ul> <li>no fusion or fertilisation in asexual / present in sexual (1)</li> <li>offspring are clones / show no genetic variation in asexual / genetic variation in sexual /eq (1)</li> </ul>	sexual involves fusion of gametes scores mp 1 and mp 2	
	<ul> <li>asexual faster / shorter time / sexual slower / longer time / eq (1)</li> </ul>		

Question Number	Answer	additional guidance	Mark
2(e)	An explanation makes reference to three of the following:  • selective breeding / artificial selection (1)  • cross red (flower)/ unscented (flower) with white (flower) / scented (flower)/ eq (1)  • select / breed / offspring with red and scent /eq (1)  • repeat / for many generations eq (1)	Ignore ref to GM as it is the farmer  Cross varieties / the plants  ignore desired characteristics alone	3

total 14 marks

Question Number	Answer	additional guidance	Mark
3	<ul> <li>milk (1)</li> <li>pasteurisation / sterilisation (1)</li> <li>killed (1)</li> <li>Lactobacillus / Streptococcus (1)</li> </ul>	allow dead / destroyed	7
	<ul><li>lactose (1)</li><li>anaerobic (1)</li><li>lactic acid / lactate (1)</li></ul>		

total 7 marks

Question Number	Answer	additional guidance	Mark
4(a)	$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$ (2)	Unbalanced but correct symbols scores 1 No credit for word equation	2

Question Number	Answer	Additional guidance	Mark
4(b)(i)	An explanation that makes reference to two of the following		2
	<ul> <li>bubble would not move / CO<sub>2</sub> also moves / shifts bubble /eq (1)</li> </ul>		
	<ul> <li>carbon dioxide is produced / released /eq (1)</li> </ul>	not just CO <sub>2</sub> present	
	<ul> <li>(only) oxygen consumption measured / eq (1)</li> </ul>		

Question	Answer	Additional	Mark
Number		guidance	
4(b)(ii)		Allow description	1
	<ul><li>water bath / eq (1)</li></ul>	of beaker filled	
		with water and	
		Bunsen	
		Ignore Bunsen	
		alone	

Question Number	Answer	additional guidance	Mark
4(c)(i)	Calculation method not marking points		2
	22 + 25 + 24 = 71	Allow 1 mark for 71 or ÷ 3	
	71 ÷ 3	or 23.7/	
	= 24 (2)	23.67/ 23.6 recurring	

Question Number	Answer	Additional guidance	Mark
4(c)(ii)	An explanation that makes reference to three of the following:		3
	<ul> <li>increases (kinetic) energy of molecules / molecules move faster / eq (1)</li> </ul>	not energy of bubble	
	collide more frequently / form more enzyme substrate complexes/eq (1)		
	• respiration (rate) increases / eq (1)	no credit for	
	<ul> <li>more oxygen consumed / oxygen used faster/ eq (1)</li> </ul>	increased movement of bubble	
	<ul> <li>ref to/ nearer to optimum temperature for <u>enzymes</u> / eq (1)</li> </ul>	202010	

total 10 marks

Question Number	Answer	Mark
5(a)(i)	C (1,2 and 4 only)	
	A is not correct as water vapour is a greenhouse gas	
	B is not correct as oxygen is not a greenhouse gas and water vapour is a greenhouse gas	
	D is not correct as oxygen is not a greenhouse gas	

Question Number	Answer	Mark
5(a)(ii)	An explanation that makes reference to the following:	2
	<ul> <li>IR / long wave radiation is absorbed / traps IR / long wave radiation / traps heat / prevents heat escaping / eq (1)</li> </ul>	
	(so) increases (global) temperature / earth warms / global warming /eq (1)	

Question Number	Answer	Additional guidance	Mark
5(b)(i)	Calculation method not marking points	23.9-24.9= 3 marks Full marks for answer no working / wrong working  If not correct answer	3
	readings = agriculture 50, energy 110, business 118, transport 175	allow 1 mark for all correct readings even if unlabelled (+/- 1)	
	adding together $50 + 110 + 118 + 175 = 453$		
	% energy = $(110 \div 453) \times 100$ = 24% (3) allow range 23.9-24.9	allow 1 mark for dividing 110 (109-111) by their total	

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	An answer that makes reference to five of the following:		5
	1. overall emissions fall / less mass / eq (1)	allow all fall after 2020	
	<ol><li>energy most in 1990 / falls the most / (large) fall in energy /eq(1)</li></ol>		
	3. <b>energy</b> now generated by wind / solar / less from coal / gas power stations / less burning of fossil fuels/ eq (1)	allow more renewable energy	
	4. <b>transport</b> increases / increases then falls / transport falls from 2009 / 2010 / eq (1)	allow transport drops after 2020	
	5. more cars / more emissions / (then) change to / more electric / hybrid cars / less travelling to work / eq (1)		
	6. <b>agriculture</b> drops / eq (1)		
	7. less cattle farmed / less methane released / eq (1)		
	8. <b>business</b> little change / drops slightly / eq (1)	allow drops after 2020	

total 11 marks

Question Number	Answer	Mark
6(a)(i)	B (oxygen)	
	A is not the answer as carbon dioxide is not released	
	C is not the answer as methane is not released	
	D is not the answer as nitrogen is not released	

Question Number	Answer	Mark
6(a)(ii)	A (chloroplast)	
	B mitochondrion is not the site of photosynthesis	
	C nucleus is not the site of photosynthesis	
	D ribosome is not the site of photosynthesis	

Question Number	Answer	Mark
6(a)(iii)	temperature / carbon dioxide concentration / pH / background light / same bulb/ lamp / time period / eq (1)  (1)	1

Question Number	Answer	additional guidance	Mark
6(b)(i)	An answer that refers to the following		5
	<ul> <li>scale linear and plot half grid on y (1)</li> <li>lines straight and through points (1)</li> </ul>	at least 2.5 large square on y	
	<ul> <li>axis correct way around (distance on x axis) (1)</li> </ul>	,	
	points correctly plotted (1)	No P if all 3 lines plotted No P if	
	units distance from lamp in cm <b>and</b> bubbles per minute (1)	extrapolate rate to 0 Max 4 for bar	
		chart No L	

Question Number	Answer	additional guidance	Mark
6(b)(ii)	An explanation that refers to three of the following		3
	as distance increases rate falls / fewer bubbles / eq (1)	Mp1 No credit for converse	
		Allow converse for mp 2 and mp 3	
	<ul> <li>as light intensity reduces / less light energy</li> <li>/ light becomes limiting factor (1)</li> </ul>	Not just less light	
	<ul> <li>slower rate of / less photosynthesis (1)</li> <li>less <u>oxygen</u> released / fewer <u>oxygen</u> bubbles released (1)</li> </ul>	Mp4 No credit for converse	

Question Number	Answer	Additional guidance	Mark
7(a)	An answer that refers to three of the following		3
	• red cell has no nucleus eq (1)	white cell has nucleus	
	• red cell biconcave disc / eq (1)	white cell not biconcave / irregular shape	
	• red cell small(er) /eq (1)	white cell large(r)	
	<ul> <li>red cell contains haemoglobin / eq (1)</li> </ul>	white cell no haemoglobin	

Question Number	Answer	additional guidance	Mark
7(b)(i)	Calculation method not marking points	Allow 1 mark for × 5.2	3
	4.3 × 5.2	Allow 2 mark for 22.4 $\times$ 10 $^{12}$ or 22.36 $\times$ 10 $^{12}$ for correct answer	
	= 22.36	but not in correct standard form	
	22.4 × 10 <sup>12</sup>	allow full marks for 2.236 $\times$ 10 $^{13}$	
	2.2 × 10 <sup>13</sup> (3)	$2.24 \times 10^{-13}$	

Question Number	Answer	additional guidance	Mark
7(b)(ii)	Calculation method not marking points	Allow 1 mark for 3 or 151 -148	2
	151 - 148 = 3		
	(3÷ 148) × 100	Allow 2.027 / 2.027027 etc	
	= 2.03% (2)		

Question	Answer	additional	Mark
Number 7(b)(iii)	An answer that makes reference to five of the	guidance	5
7(b)(iii)	following:		3
	<ol> <li>large numbers / study / reliable results / eq (1)</li> </ol>		
	<ol> <li>fewer people in study / lower numbers at altitude than sea level /eq(1)</li> </ol>		
	3. more women than men / eq (1)		
	4. no information on age /health / body mass / eq (1)		
	5. Hb increases from 0 to 1890 / from 0 to 2270 / with altitude eq (1)		
	6. (as) more red cells (produced) (at 1890) (at 2270) / eq (1)	allow lower	
	7. as less partial pressure of oxygen / less (availability of) oxygen / eq (1)	oxygen concentration	
	8. to enable oxygen transport / uptake / aerobic respiration / eq (1)	allow for gas exchange	
	9. little change in Hb / (slight) reduction from 1890 to 2270 / eq (1)		
	10.as small(er) increase in altitude / eq (1)		
	11. drop in red cells from 1890 to 2270 / eq (1)		
	12. men have more Hb/ more red cells (at every altitude) than women / eq (1)		

total 13 marks

Question Number	Answer	Mark
8(a)	<ul> <li>an allele that is only expressed in the homozygote / only in phenotype of homozygote / only shown in (phenotype) if two copies/ needs two copies to be expressed / not expressed in the heterozygote / not expressed if dominant allele present / not always expressed / eq (1)</li> </ul>	1

Question Number	Answer	additional guidance	Mark
8(b)(i)	An answer that includes	Allow other symbols	3
	A Ff / heterozygous (1)		
	B Ff / heterozygous (1)		
	C ff / homozygous recessive (1)		

Question Number	Answer	additional guidance	Mark
8(b)(ii)	An answer that includes the following:  • Ff and Ff (1)	Allow from Punnett square	3
	• F and f (1)	If correct gametes and offspring from incorrect parents allow TE 1 max	
		Allow any letters so long as genetics correct ignore X and Y but allow X and x or Y and y	
	FF Unaffected Ff Unaffected (x2)     (Ff) ff affected 1 / allow correct     phenotype ratio (1)	Must have genotypes and phenotypes	

Question Number	Answer	additional guidance	Mark
8(c)(i)	An explanation that refers to three of the following		3
	<ul> <li>pancreas produces / releases amylase / proteases / lipases / eq (1)</li> <li>no / less digestion of starch to maltose /eq (1)</li> <li>no / less digestion of proteins to amino acids / (poly)peptides to amino acids /eq (1)</li> <li>no / less digestion of lipid to fatty acids and glycerol (1)</li> <li>less absorption of smaller molecules / soluble molecules / amino acids / glucose / fatty acids / eq (1)</li> </ul>	allow 1 mark for less digestion / break down as fewer enzymes released only if mp 2 or 3 or 4 not awarded	

Question Number	Answer	Additional guidance	Mark
8(c)(ii)	An explanation that refers to two of the following		2
	<ul> <li>reduce likelihood of pregnancy / less likely to conceive / eq (1)</li> </ul>	Ignore no / less reproduction	
	<ul> <li>sperm / semen cannot enter <u>fallopian tube</u> / <u>oviduct</u> 1)</li> </ul>		
	<ul> <li><u>fertilisation</u> less likely / no <u>fertilisation</u> / <u>fusion</u> (of gametes) (1)</li> </ul>		

total 12 marks

Question Number	Answer	additional guidance	Mark
9(a)(i)	An answer that makes reference to two of the following:  • sunlight / light / eq (1)  • volume /mass of solution / eq (1)  • number of plants / number of leaves / size of leaves / size of plant /health of leaves (at start)/ eq(1)  • same species / use duckweed /eq (1)  • time / duration/ eq (1)  • all jars covered /eq (1)	Not temperature not amount of solution allow amount of leaves	2

Question Number	Answer	additional guidance	Mark
9(a)(ii)	An explanation that makes reference to two of the following:		2
	<ul> <li>it (complete solution) (contains all minerals) so produces normal growth / ideal growth / eq (1)</li> </ul>		
	<ul> <li>distilled water contains no minerals / plant would be lacking all minerals / would not grow normally /eq (1)</li> </ul>		
	<ul> <li>so any difference in growth due to missing one mineral / eq (1)</li> </ul>		

Question Number		dditional uidance	Mark
9(a)(iii)	An explanation that makes reference to two of the following:  • photosynthesis /eq (1)  • to produce glucose (for respiration) / eq (1)  • for growth / to allow normal growth / eq (1)		2
Question Number	Answer	Ма	rk
9(a)(iv)	<ul> <li>mineral that is missing / absent from solution / minerals present / composition of solution / solutio eq (1)</li> </ul>	on /	1

Question Number	Answer	Mark
9(b)(i)	<ul> <li>(quantitative / number of leaves) uses number / is measured / counted / and (qualitative / size of leaf) is a type / category / uses words / observed / subjective /opinion / eq (1)</li> </ul>	1

Question Number	Answer	additional guidance	Mark
9(b)(ii)	An answer that makes reference to 6 of the following:		6
	<ol> <li>complete / no minerals lacking/ A have most leaves / largest leaves / eq(1)</li> </ol>		
	<ol> <li>complete / no minerals lacking / A have dark green / greenest leaves /eq (1)</li> </ol>		
	3. <b>minus nitrate / B</b> have few / least / smaller / smallest leaves / less green /yellow/ eq (1)		
	4. nitrate required for amino acid / protein / chlorophyll / chloroplasts / nitrate required for growth /eq (1)		
	5. <b>minus magnesium / C</b> have few / small <b>er</b> / less green / yellow / eq (1)		
	6. magnesium required for chlorophyll / chloroplasts / photosynthesis /eq(1)		
	7. <b>minus iron / D have</b> few / smal <b>ler</b> leaves / less green / least green / yellow / eq (1)		
	8. iron required for chlorophyll /chloroplasts / photosynthesis / eq (1)	allow iron required for	
	<ol> <li>Not repeated / not reliable / few plants used / eq (1)</li> </ol>	respiration	

total 14 marks

Question Number	Answer	additional guidance	Mark
10	An answer that makes reference to six of the following:  C use glasshouses with three or more concentrations / levels / amounts of carbon dioxide / eq (1)	at least 3 concentrations of CO <sub>2</sub> use 3 different conc. OK the conc. don't need to be stated allow high / medium /zero	6
	O use crop plants of same species eq/ (1)  R repeat each concentration /eq (1)		
	M1 measure mass / kg / amount of seeds / number of leaves / fruit / size (of leaves) / eq (1)	Not yield alone not height	
	M2 after <b>stated</b> time / eq (1)		
	S1 temperature / (sun)light / same season / eq (1)		
	S2 same soil / water / humidity / fertiliser / minerals/ pH/ eq (1)		

total 6 marks