



Mark Scheme (Results)

Summer 2022

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 2B

Question Number	Answer		Mark
1 (a)(i)	methane / nitrous oxides / CFCs / water <u>vapour</u> / eq (1)	Accept other correct named greenhouse gases Reject carbon monoxide	1

Question Number	Answer	Additional guidance	Mark
1 (a)(ii)	1.8×10^{13} (3)	Accept 18 000 000 000 000 or 18 trillion for two marks Accept 18×10^{12} for two marks Accept 18 or (727 + 37 - 746) or 18 with other incorrect standard form for one mark <i>Example of calculation:</i> <ul style="list-style-type: none"> • $727 + 37 - 746 = 18$ • $\times 1\,000\,000\,000\,000$ • <i>conversion to standard form</i> 	3

Question Number	Answer	Additional guidance	Mark
<p>1 (a)(iii)</p>	<p>An answer that makes reference to two of the following.</p> <ul style="list-style-type: none"> • ice (caps) melt / glaciers melt / eq (1) • flooding / sea level rises / eq (1) • loss of habitat / desertification / droughts (1) • extinctions / disrupted food chains / migration of species / damaged ecosystems / decreased plant yields / decreased productivity / eq (1) • destruction of coral reefs / coral bleaching / eq (1) • spread of disease / pests / pathogens / eq (1) • extreme weather / climate change / changes in weather patterns / eq (1) 	<p>Accept two correct answers within one answer space</p>	<p>2</p>

Question Number	Answer	Additional guidance	Mark
1 (b)	<p>An explanation that makes reference to four of the following.</p> <ul style="list-style-type: none"> • plants take in / absorb, <u>carbon dioxide</u> (1) • for photosynthesis (1) • carbon (dioxide) is converted into / stored as suberin / locked up in suberin / eq (1) • suberin does not decay for long periods / suberin decomposes slowly / suberin remains for long period of time / eq (1) • perennial plants remain for long periods of time / do not die off / grow for many years / don't die each year / don't have to be replanted / eq (1) • <u>slower / less carbon dioxide</u> is released from decomposition / decay / (respiration of) decomposers (1) 	<p>Ignore carbon</p> <p>Accept roots decompose slowly / eq</p> <p>Ignore carbon</p>	4

Question Number	Answer	Additional guidance	Mark
1 (c)	<p>The only correct answer is D</p> <p>A is incorrect as the amylase digests starch</p> <p>B is incorrect as ligase sticks DNA</p> <p>C is incorrect as lipase digests fats</p>		1

Question Number	Answer	Additional guidance	Mark
1 (d)	<p>An answer that makes reference to two of the following.</p> <ul style="list-style-type: none"> • prevent water loss (1) • (due to) osmosis (1) • when water moves from a higher water potential to a lower water potential / eq prevents plant cells becoming flaccid / wilting / stay turgid (1) 	<p>Ignore water gain Ignore waterproof</p> <p>Allow water moves from dilute solution to more concentrated solution Accept movement from high concentration <u>of water</u> to low concentration <u>of water</u></p>	2

Question Number	Answer	Additional guidance	Mark
1 (e)	<p>An answer that makes reference to three of the following.</p> <ul style="list-style-type: none"> • produce large numbers / large scale / eq (1) • fast (process) / quick(er) / eq (1) • all crops produce suberin / all plants are (genetically) identical / all clones / eq / (1) • less risk of cross pollinating (with wild plants) / pollinating wild plants / spreading (trans)gene into wild / eq (1) • can be done at, any time of year / all year / eq (1) 	<p>Ignore faster growth of plants Accept no variation / guarantees characteristics/ all have the gene</p>	3

(Total for Question 1 = 16 marks)

Question Number	Answer	Additional guidance	Mark
2(a)	<p>An answer that makes reference to one of the following.</p> <ul style="list-style-type: none"> • sterilised / unsterilised / eq (1) • presence of bacteria / absence of bacteria / eq (1) • heated / unheated soil / eq (1) • soil sample / soil used (1) 		1

Question Number	Answer	Additional guidance	Mark
2 (b)(i)	<p>An answer that makes reference to two of the following.</p> <ul style="list-style-type: none"> • remove / dissolve / wash away nitrate present / get rid of nitrates / eq (1) • (so any) nitrate made must have been from the ammonium salt / are due to ammonium salts / eq (1) • so a fair comparison is made / so the test is valid / so the test is fair (1) 	<p>Accept make sure no nitrate present</p> <p>Accept to see if the nitrates come from the ammonia</p> <p>Ignore accurate / reliable</p>	2

Question Number	Answer	Additional guidance	Mark
2 (b)(ii)	<p>An answer that makes reference to four of the following.</p> <ul style="list-style-type: none"> • nitrates present in unsterilised soil (1) • nitrates produced /made from ammonium / ammonia (1) • <u>nitrifying</u> bacteria / <u>nitrification</u> (1) • ammonium is converted into nitrite / nitrite is converted into nitrate (1) • nitrates not present in sterilised soil because there are no bacteria / bacteria were dead / killed / removed (1) 	<p>Ammonium to nitrite to nitrate = 2 marks (mp2 and mp4)</p>	4

	<ul style="list-style-type: none"> not repeated / no measure of quantity of nitrates / qualitative not quantitative (1) 		
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(Total for Question 2 = 7 marks)

Question Number	Answer	Mark
3 (a)(i)	<p>The only correct answer is D (protocists)</p> <p>A is incorrect as the animals do not have chloroplasts</p> <p>B is incorrect as bacteria do not have nuclei</p> <p>C is incorrect as plants are multicellular</p>	1

Question Number	Answer	Mark
3 (a)(ii)	<p>The only correct answer is B (cell membrane and mitochondrion)</p> <p>A is incorrect as animal cells do not have chloroplasts</p> <p>C is incorrect as animal cells do not have chloroplasts</p> <p>D is incorrect as animal cells do not have cell walls</p>	1

Question Number	Answer	Additional guidance	Mark
3 (b)	<ul style="list-style-type: none"> one mark for $6\text{CO}_2 + 6\text{H}_2\text{O}$ (on LHS) (1) one mark for $\text{C}_6\text{H}_{12}\text{O}_6$ (on RHS) (1) 	Accept $6\text{H}_2\text{O} + 6\text{CO}_2$	2

Question Number	Answer	Additional guidance	Mark
3 (c)(i)	<p>An explanation that makes reference to two of the following.</p> <ul style="list-style-type: none"> low / less / no light (1) photosynthesis is slower than respiration / photosynthesis is less than respiration / respiration is faster than photosynthesis / eq (1) 	<p>Accept dark</p> <p>Accept no photosynthesis but respiration occurs</p>	2

	<ul style="list-style-type: none"> more oxygen taken in than released / more oxygen used than produced / there is a <u>net</u> movement of oxygen in / eq (1) 	<p>Ignore respiration <u>gets</u> faster</p> <p>Accept less oxygen released than taken in</p>	
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Question Number	Answer	Additional guidance	Mark
3 (c)(ii)	<p>An explanation that makes reference to three of the following.</p> <ul style="list-style-type: none"> at 10 (au) respiration (rate) and photosynthesis (rate) are equal / at the compensation point respiration and photosynthesis are equal (1) rate of photosynthesis increases (as light intensity increases) (1) photosynthesis rate is greater than respiration rate (1) levels off / eq, because another factor / temperature / carbon dioxide is limiting (1) 	<p>Accept converse</p> <p>Accept levels off as light is no longer limiting Accept at (value between 45 (a.u.) and 55(a.u.) / 40 mm³) another factor / temperature / carbon dioxide is limiting)</p>	3

Question Number	Answer	Additional guidance	Mark
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3(c)(iii)	two marks for 48 (2)	one mark for correct reading of 38 (1) OR one mark for +10 (1)	2
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Question Number	Answer	Additional guidance	Mark
3 (d)	<p>A description that makes reference to three of the following.</p> <ul style="list-style-type: none"> • move lamp different distances / eq (1) • place same mass / number / volume / concentration <i>Chlorella</i> / algae, in (hydrogen-carbonate indicator) (1) • same volume / concentration of indicator / same temperature / leave for same or stated time / same starting colour of indicator / use a control tube (with no <i>Chlorella</i>) (1) • (indicator turns) yellow with low light / covered tube / and red / purple with high light / uncovered tube (1) 	<p>Accept other correct methods e.g. cover with cloths / foil / change bulb power / use of variable resistor Ignore place in dark and light unqualified</p> <p>Ignore amount</p> <p>Accept place bung in / seal tubes</p> <p>Accept yellow with increase in carbon dioxide / <u>and</u> red / purple with decrease of carbon dioxide Accept correct references to</p>	3

		photosynthesis and respiration	
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(Total for Question 3 = 14 marks)

Question Number	Answer	Additional guidance	Mark
4 (a)	A: ureter (1) B: bladder (1)	Allow phonetic spellings that cannot be mistaken for urethra, e.g. ureta Reject urethra Reject gall bladder	2

Question Number	Answer	Additional guidance	Mark
4 (b)(i)	An answer that makes reference to the following. <ul style="list-style-type: none"> • protein is large (1) • (so) does not pass out of glomerulus / capillary / through basement membrane / does not pass into (Bowman's) capsule (1) 		2

Question Number	Answer	Additional guidance	Mark
4 (b)(ii)	An answer that makes reference to two of the following. <ul style="list-style-type: none"> • glucose is <u>re</u>absorbed / absorbed into the blood / selectively <u>re</u>absorbed (1) • at the proximal convoluted tubule / pct / eq (1) 	Ignore absorbed unqualified	2

	<ul style="list-style-type: none"> • by active transport / uptake (1) 		
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Question Number	Answer	Additional guidance	Mark
4 (c)	<p>An explanation that makes reference to four of the following.</p> <ul style="list-style-type: none"> • hypothalamus detects / osmoreceptors detect high (salt) concentration of blood / low water of blood (1) • pituitary releases ADH / eq (1) • collecting duct (1) • increased permeability (1) • more water (re)absorbed / enters blood / eq (1) 	<p>Accept pituitary produces ADH</p>	4

(Total for Question 4 = 10 marks)

Question Number	Answer	Additional guidance	Mark
5 (a)(i)	0.57 (3)	<p>0.57 gains all three marks</p> <p>Accept 0.90 for two marks</p> <p>OR</p> <p>Accept 0.56 or 0.56(66666....7) or 0.56</p>	3

		recurring for two marks Accept 0.9 or 0.8975 or 1.7 or $\div 3$ for one mark <i>Example calculation (not mark points):</i> $(0.55 + 0.54 + 0.61) = 1.7$ $\div 3$ <i>to two dp</i> Correct answer with no working gains all three marks.	
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Question Number	Answer	Additional guidance	Mark
5 (a)(ii)	<ul style="list-style-type: none"> amino acids / peptides (1) 	Accept polypeptide	1

Question Number	Answer	Additional guidance	Mark
5 (b)(i)	<p>An answer that makes reference to two of the following.</p> <ul style="list-style-type: none"> temperature (1) height / volume / mass / concentration of gelatine / protein/ eq (1) volume / concentration, of, enzyme / bromelain / pineapple juice / eq (1) volume of buffer (1) time (in incubator) (1) surface area of gelatine / SA:vol ratio / width of tube (1) 	<p>Ignore amount</p> <p>Accept gel for gelatine</p> <p>Ignore type / source of protein</p> <p>Ignore type / source of juice</p>	2

Question Number	Answer	Additional guidance	Mark
5 (b)(ii)	<p>An explanation that makes reference to three of the following.</p> <ul style="list-style-type: none"> • volume digested increases up to (pH) 5 then decreases (above 5) / volume digested decreases above and below 5 / eq (1) • <u>optimal pH</u> / <u>optimum pH</u> (1) • (away from optimal pH / 5) enzyme denatures / (active site) shape changes / eq (1) • substrate no longer binds / fits / shape not complementary to substrate (1) 	<p>Accept rate increases up to 5 then decreases</p> <p>Accept denatures at high pH / low pH</p> <p>Accept E/S complexes do not form</p>	3

Question Number	Answer	Additional guidance	Mark
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5 (c)	<p>A description that makes reference to the following.</p> <ul style="list-style-type: none"> • add biuret (reagent) / add biuret A and biuret B / sodium hydroxide & copper sulfate (1) • turns lilac / purple / pink / mauve / eq (1) 	<p>Accept correct, alternative tests e.g. ninhydrin test goes red / brown xanthoproteic test goes yellow</p>	2
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(Total for Question 5 = 11 marks)

Question Number	Answer	Additional guidance	Mark
6 (a)	<p>An explanation that makes reference to two of the following.</p> <ul style="list-style-type: none"> • less oxygen (transported) (1) • to muscles (1) • less respiration / less ATP production / less energy release / more lactic acid / more anaerobic respiration (1) 		2

Question Number	Answer	Additional guidance	Mark
6 (b)(i)	UUACCGCCGAGU (2)	<p>one mark for one incorrect pairing or use of T instead of U</p> <p>e.g. UUACCACCGAGU – one mark</p> <p>TTACCGCCGAGT – one mark</p>	2

Question Number	Answer	Additional guidance	Mark
6 (b)(ii)	<p>A description that makes reference to four of the following.</p> <ul style="list-style-type: none"> • <u>transcription</u> occurs in nucleus (1) • production of messenger RNA / mRNA (from DNA) (1) • translation occurs on ribosome / mRNA binds to ribosome / mRNA goes to ribosome (1) • tRNA brings / has amino acids (1) • codon binds to anticodon / codons are complementary to anticodons / (complementary) triplets on tRNA and mRNA bind / eq (1) 	<p>Ignore protein</p>	4

	<ul style="list-style-type: none"> polypeptide produced / amino acids joined together / amino acid chain <p>produced / eq (1)</p>	produced / synthesised	
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Question Number	Answer	Additional guidance	Mark
6 (b)(iii)	<p>An answer that makes reference to four of the following.</p> <p><i>Pros (max 3)</i></p> <ul style="list-style-type: none"> patients produce red blood cells / can exercise / are not breathless / have more energy / eq (1) independent life / transfusions not needed / better quality of life / no need to keep visiting hospitals / eq (1) no rejection (1) less risk of infectious disease (from blood) (1) permanent treatment / long lasting / lasts a lifetime / cure / works for at least 15 months 	<p>Accept converse</p> <p>Accept blood transfusions need frequent hospital visits need to be done often</p> <p>Accept transfusions have risk of infections</p> <p>Accept transfusions need to be done for life</p>	4

	<p>(1)</p> <p>Cons (max 3)</p> <ul style="list-style-type: none"> • need to spend long time in isolation (for treatment) / eq (1) • side effects (1) • small sample size / only tested on two people / needs further testing / more repeats / eq (1) • could cause mutations in DNA / cause cancers (1) • need to be tested for more than 15 months / for longer / eq (1) 	<p>Accept need 15 months / several months in hospital</p> <p>Accept few side effects from transfusions</p> <p>Accept might not work for everyone / no mention of age / sex / health state/ eq</p> <p>Accept time period is too short to tell</p>	
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(Total mark for question 6 = 12 marks)