



Mark Scheme (Results)

January 2021

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1B and Science (Double
Award) (4SD0) Paper 1B

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Publications Code 4BI1_1B_2101_msc

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Question Number	Answer	Mark
1(a)	<p>The only correct answer is B 1</p> <p>A is not correct as 0 is not the correct number of chromosomes</p> <p>C is not correct as 2 is not the correct number of chromosomes</p> <p>D is not correct as 23 is not the correct number of chromosomes</p>	1

Question Number	Answer	Mark
1(b)	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • energy / ATP / respiration /eq (1) • movement / swimming / tail movement/ eq (1) 	2

Question Number	Answer	additional guidance	Mark
1(c)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • digest / break down egg membrane / eq (1) • allow (nucleus) to enter / penetrate egg (1) • fertilisation / fusion (1) 	ignore wall / shell etc	2

Question Number	Answer	Additional guidance	Mark
1(d)	<p>An answer that makes reference to 2 of the following points:</p> <ul style="list-style-type: none"> • vagina • uterus / womb /cervix • oviduct / fallopian tube 	<p>two marks for all 3 in correct order</p> <p>one mark for 3 structures wrong order</p> <p>one mark for 2 structures in correct order</p> <p>vagina oviduct = 1</p> <p>uterus vagina oviduct = 1</p> <p>oviduct vagina = 0</p> <p>uterus oviduct = 1</p> <p>vagina uterus = 1</p> <p>ign route after fertilisation</p>	2

Total = 7 marks

Question Number	Answer	Mark
2(a)	small fish	1

Question Number	Answer	additional guidance	Mark
2(b)(i)	<p>A description that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • photosynthesis (1) • chloroplasts / chlorophyll (1) • absorbs / traps light /eq (energy) (1) • starch / glucose / carbohydrate (1) 	allow formula or from equation	3

Question Number	Answer	additional guidance	Mark
2(b)(ii)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • respiration / heat loss (by plant) (1) • cannot digest / egested / not absorbed /eq (1) • uneaten / die / decomposition (1) • excretion (1) 		2

Question Number	Answer	Mark
2(c)	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • increase surface area (1) • enzymes (1) 	2

Total 8 marks

Question Number	Answer	Mark												
3(a)(i)	<table border="1"> <thead> <tr> <th>statement</th> <th>letter</th> </tr> </thead> <tbody> <tr> <td>contains the least carbon dioxide</td> <td>A</td> </tr> <tr> <td>contains the most glucose after a meal</td> <td>G</td> </tr> <tr> <td>contains the least oxygen</td> <td>J</td> </tr> <tr> <td>contains the least urea</td> <td>F</td> </tr> <tr> <td>contains blood at the highest pressure</td> <td>B</td> </tr> </tbody> </table>	statement	letter	contains the least carbon dioxide	A	contains the most glucose after a meal	G	contains the least oxygen	J	contains the least urea	F	contains blood at the highest pressure	B	5
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Question Number	Answer	additional guidance	Mark
3(a)(ii)	<p>An answer that makes reference to two of the following points:</p> <p>A / pV has</p> <ul style="list-style-type: none"> • thin(ner) wall (1) • <u>less</u> muscle (1) • <u>less</u> elastic tissue (1) • wide(r) / big(er) / lumen (1) 	<p>allow converse for J</p> <p>allow thin</p> <p>allow wide</p> <p>ignore ref to valves</p>	2

Question Number	Answer	Mark
3(b)	<p>An answer that makes reference to five of the following points:</p> <ul style="list-style-type: none"> • more (capillaries to transport) oxygen / glucose (1) • more (aerobic) respiration / less <u>anaerobic</u> respiration (1) • more ATP/ more energy (1) • (more) muscle contraction (1) • less lactic acid (1) • effective for long distance events / ineffective for power events / type of performance not specified / only leg muscle sampled / eq(1) • other factor(s) / age / lung (capacity) / heart (rate) named other factors affect performance (1) • need to test more than one person / not repeated / eq (1) 	5

Total 12 marks

Question Number	Answer	Mark										
4(a)	<table border="1"> <thead> <tr> <th>Example of process</th> <th>Name of process</th> </tr> </thead> <tbody> <tr> <td>plants with a short growing season survive drought</td> <td>natural selection</td> </tr> <tr> <td>growth of algae in rivers polluted by fertiliser</td> <td>eutrophication (1)</td> </tr> <tr> <td>pollen transferred from one plant to another by an insect</td> <td><u>insect</u> pollination (1)</td> </tr> <tr> <td>absorption of nitrate ions from soil using ATP</td> <td>active transport (1)</td> </tr> </tbody> </table>	Example of process	Name of process	plants with a short growing season survive drought	natural selection	growth of algae in rivers polluted by fertiliser	eutrophication (1)	pollen transferred from one plant to another by an insect	<u>insect</u> pollination (1)	absorption of nitrate ions from soil using ATP	active transport (1)	3
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Question Number	Answer	additional guidance	Mark
4(b)(i)	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • (more) grass flourishes / grows well / survives / not killed by zinc / eq (near mine) (1) • less competition (1) • mutation (1) • reproduce (1) • pass allele / gene / DNA on to offspring (1) 	other species killed by zinc near mine	4

Question Number	Answer	additional guidance	Mark
4(b)(ii)	<p>A description that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • use tape measure (1) • <u>quadrat</u> (1) • repeat / several (1) • count plants / estimate percentage cover described (1) 	<p>allow belt transect for mp1</p> <p>allow for quadrats</p> <p>how many</p>	4

Total 11 marks

Question Number	Answer	Additional guidance	Mark
5(a)	Temperature (1)	allow heat loss / temperature loss	1

Question Number	Answer	Mark
5(b)	<p>An answer that makes reference to one of the following points:</p> <ul style="list-style-type: none"> • (to prevent) volume / surface area affecting heat loss / eq • valid comparison / fair test / eq 	1

Question Number	Answer	Additional guidance	Mark
5(c)	<ul style="list-style-type: none"> • covered $40 \div 80 \times 100 = 50\%$ (1) • uncovered $36 \div 80 \times 100 = 45\%$ • difference = 5 (2) 	<p>allow 1 mark for 45 or 50</p> <p>full marks for correct answer</p>	2

Question Number	Answer	additional guidance	Mark
5(d)	<p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • less heat loss if indoors / eq (1) • depends upon outside temperature different in hot country (1) • but only small / 5% difference / eq (1) • animals move around less (1) • more energy for growth / making meat / eggs / milk / less energy used to keep warm /eq (1) • diseases easier to spread (1) • protected from predators (1) • ethical objection / cruel / quality of life idea / eq (1) • eat variety of food outdoors / taste/ eq (1) 	<p>allow converse</p> <p>ignore natural</p>	4

Question Number	Answer	additional guidance	Mark
5(e)	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • use beakers / containers of different sizes / different volumes (1) • keep beakers out of box / keep beakers under box (1) 	<p>allow different volumes of water</p> <p>ignore animals</p>	2

Total 10 marks

Question Number	Answer	Mark
6(a)(i)	Circle around axon terminals	1

Question Number	Answer	Mark
6(a)(ii)	<p>The only correct answer is B motor</p> <p>A is not correct as it is not an association neurone</p> <p>C is not correct as it is not a relay neurone</p> <p>D is not correct as it is not a sensory neurone</p>	1

Question Number	Answer	Mark
6(a)(iii)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • fast (1) • no brain involvement / no thought / automatic /involuntary / eq (1) • less damage / harm / eq (1) 	2

Question Number	Answer	Mark
6(b)(i)	<p>The only correct answer is D wider neurones have faster impulses</p> <p>A is not correct as it is not supported by the graph</p> <p>B is not correct as it is not supported by the graph</p> <p>C is not correct as it is not supported by the graph</p>	1

Question	Answer	Mark
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Number		
6(b)(ii)	4.4 (m per s)	1

Question Number	Answer	Additional guidance	Mark
6(b)(iii)	<ul style="list-style-type: none"> • 90cm = 0.9m • $90 \div (\text{speed}) 440 = 0.20\text{s}$ $0.9 \div (\text{speed}) 4.4 = 0.20\text{s}$ <p>= seconds</p> <ul style="list-style-type: none"> • 2.0×10^{-1} (3) 	<p>award full marks for correct numerical answer without working regardless of speed used</p> <p>allow 1 mark for 0.9 (m) or speed expressed as x 100 cm/s (440 idea)</p> <p>allow 1 mark for $90 \div \text{speed}$ or $0.9 \div \text{speed}$</p> <p>(if not 0.20455 etc)</p> <p>allow 2 marks for marks for correct numerical answer without working but not in standard form</p>	3

Total 9 marks

Question Number	Answer	Mark
7(a)(i)	Radicle/ root / plumule / shoot has grown / seed split/ sprouts /eq (1)	1

Question	Answer	additional	Mark
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Number		guidance	
7(a)(ii)	An answer that includes two of the following <ul style="list-style-type: none"> • Temperature (1) • Volume of solution (1) • Humidity (1) • Oxygen (1) • Light (1) • pH (1) • Carbon dioxide (1) 	ignore amount of water ignore wind allow soil / compost / growth medium	2

Question Number	Answer	additional guidance	Mark
7(b)(i)	An answer that includes two of the following S linear and half of each axis (1) L straight and passing through all points (1) A x axis correct way round (Na Cl or salt conc / eq) (1) U axes labelled with Na Cl / salt concentration in mmol and percentage / % germination (1) P points correctly plotted within one square (1)	if non linear scale can still get P bar chart loses L	5

Question	Answer	additional	Mark
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Number		guidance	
7(b)(ii)	<p>An explanation that makes reference to four of the following points</p> <ul style="list-style-type: none"> • (increasing (salt)concentration) decreases germination (1) • (as concentration of solution increases) (lower) water potential / concentration / osmotic <u>gradient</u> /eq (1) • less water absorbed / water exits /eq (1) • by osmosis (1) • to activate enzymes / digest starch / eq (1) 	allow water potential / concentration gradient described /reversed eg more water molecules inside / eq	4

Question Number	Answer	Additional guidance	Mark
7(c)(i)	<p>An answer that makes reference to the following points</p> <ul style="list-style-type: none"> • roots grow towards gravity (1) • positively gravitropic / geotropic (1) 	<p>Allow converse for stems</p> <p>allow gravitropic</p>	2

Question Number	Answer	Additional guidance	Mark
7(c)(ii)	<p>An answer that makes reference to the following points</p> <ul style="list-style-type: none"> • roots grow away from light (1) • negatively phototropic (1) 	Allow converse for stems	2

16 marks

Question Number	Answer	Mark
8(a)	chemical / solution / eq that kills / destroys / eq pests / animals / plants / insects / eq (1)	1

Question Number	Answer	additional guidance	Mark
8(b)	1319.5 /1320 /1300 km ² (1) Barley (1)	Multiply total area by % sprayed 91 % of 1450	2

Question Number	Answer	additional guidance	Mark
8(c)	An answer that makes reference to two of <ul style="list-style-type: none"> • in winter cold / low temperature / less food eq (1) • fewer insects / pests (1) • less insecticide / pesticide needed (1) 	allow converse for spring spring warmer / more food more insects more insecticide /pesticide	2

Question Number	Answer		Mark
8(d)	An answer that makes reference to four of <ul style="list-style-type: none"> • around 70% / even pattern of herbicide / fungicide and insecticide in fruit crops (1) • high(er)use of herbicide in cereals / low(er) use of herbicide in fruit(1) • as smaller plants / growing plants need to compete with weeds (1) • high(er) use of insecticide in fruit crops / low(er) use of insecticide in cereals (1) • more variation in fungicide use in cereals (1) • high use of fungicide on (rotting) fruit (1) • as fruit more prone to saprophytic decay/ high sugar content / eq 	Allow converse mp 3 allow converse mp 7	4

8(e)	An answer that makes reference to <ul style="list-style-type: none">• use biological control (1)• using a predator (species) (such as Encarsia) to target / eat / consume (specific) pest / insect / eq (eg whitefly) (1)	use nets (1) exclude insects from plants / eq (1) allow introduce consumer of insect / Allow example ladybird for aphids for mp 2	2
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Total 11 marks

Question Number	Answer	Mark
9(a)(i)	Sickle shaped red blood cells stick to each other / caught / trapped /eq walls of blood vessels / eq (1)	1

Question Number	Answer	Mark
9(a)(ii)	An explanation that makes reference to three of the following points <ul style="list-style-type: none"> • cold temperatures reduce blood flow / cause more sickling (1) • less oxygen (at high altitude) (1) • less respiration / (more) <u>anaerobic</u> respiration (1) • more lactic acid (1) • (less) energy / ATP (1) 	3

Question Number	Answer	Mark
9(b)(i)	only expressed when homozygous / two copies / no dominant allele present / not expressed in heterozygote /eq (1)	1

Question Number	Answer	Additional guidance	Mark
9(b)(ii)	0.75×0.5 $\frac{3}{4} \times \frac{1}{2}$ 0.375 or $\frac{3}{8}$ or 37.5% (2)	Allow 1 mark for $\frac{3}{4}$ or 0.75 or 75% or one mark for $\frac{1}{2}$ or 0.5 or 50%	2

Question Number	Answer	Mark
9(c)	<p>The only correct answer is D</p> <p>A is not correct as bacterium does not cause malaria</p> <p>B is not correct as fungus does not cause malaria</p> <p>C is not correct as plant does not cause malaria</p>	1

Question Number	Answer	Mark
9(d)	<p>The only correct answer is B</p> <p>A is not correct as chlorophyll not found in red blood cells</p> <p>C is not correct as iron is not a pigment</p> <p>D C is not correct as magnesium not found in red blood cells</p>	1

Question Number	Answer	Additional guidance	Mark
9(e)	<p>An answer that includes two of the following points</p> <ul style="list-style-type: none"> • red cells smaller (1) • red cells have no nucleus (1) • red cells are biconcave /eq (1) 	<p>Allow converse for wbc</p> <p>allow (mature) RBC's lack mitochondria</p> <p>ign haemoglobin</p>	2

Total 11 marks

Question Number	Answer	Additional guidance	Mark
10(a)	<p>An explanation answer that makes reference to five of the following points</p> <ul style="list-style-type: none"> • temperature increases (kinetic) energy / particle movement / more collisions / eq (1) • difference in concentration / concentration gradient increases rate of movement (1) • short(er) distance increases diffusion /eq (1) • surface area to (volume ratio) increases diffusion (1) • mass / size of particle smaller particles move faster (1) • larger particles / charged particles cannot pass through cell membrane (1) • (increased) oxygen / ATP / respiration / energy for active transport (1) 	<p>allow converse</p> <p>thin walls</p> <p>villi / microvilli / eq</p>	5

Question Number	Answer	Additional guidance	Mark
10(b)	<p>An answer that makes reference to the four of the following points</p> <ul style="list-style-type: none"> • diffusion <u>passive</u> (1) • diffusion from high concentration to low / requires concentration gradient (1) • active transport requires ATP / energy/ oxygen / respiration (1) • active transport requires membrane / carrier proteins (1) • diffusion can take place in non-living systems (1) 	<p>appropriate converse mp2-5</p>	4

Total 9 marks

Question Number	Answer	additional guidance	Mark
11	<p>An answer that makes reference to four of the following points</p> <ul style="list-style-type: none"> • C change amount of starch (1) • O use same species / strain / genotype / mass / volume / measure of yeast (1) • R repeat each flour type more than once / eq (1) • M1 measure height / volume of dough / bread / use ruler (1) • M2 after stated time / same time (1) • S1 use same measure of flour / volume / mass of flour / volume/ mass of water / eq (1) • S2 same temperature / knead for stated / same time / eq (1) 	<p>ign amount</p> <p>ign amount</p> <p>allow cook at same temp</p>	6

