



Pearson  
Edexcel

## 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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Question Number	Answer	Mark
<b>1(a)</b>	<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>	<b>1</b>

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

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

Question Number	Answer	Additional guidance	Mark
<b>1(d)</b>	<p>An answer that makes reference to 2 of the following points:</p> <ul style="list-style-type: none"> <li>• vagina</li> <li>• uterus / womb /cervix</li> <li>• oviduct / fallopian tube</li> </ul>	<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>	<b>2</b>

Total = 7 marks

Question Number	Answer	Mark
<b>2(a)</b>	small fish	<b>1</b>

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

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

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

Total 8 marks

Question Number	Answer	Mark												
<b>3(a)(i)</b>	<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	<b>5</b>
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Question Number	Answer	additional guidance	Mark
<b>3(a)(ii)</b>	<p>An answer that makes reference to two of the following points:</p> <p>A / pV has</p> <ul style="list-style-type: none"> <li>• thin(ner) wall (1)</li> <li>• <u>less</u> muscle (1)</li> <li>• <u>less</u> elastic tissue (1)</li> <li>• wide(r) / big(er) / lumen (1)</li> </ul>	<p>allow converse for J</p> <p>allow thin</p> <p>allow wide</p> <p>ignore ref to valves</p>	<b>2</b>

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

Total 12 marks

Question Number	Answer	Mark										
<b>4(a)</b>	<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><b>natural selection</b></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	<b>natural selection</b>	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)	<b>3</b>
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Question Number	Answer	additional guidance	Mark
<b>4(b)(i)</b>	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• (more) grass flourishes / grows well / survives / not killed by zinc / eq (near mine) (1)</li> <li>• less competition (1)</li> <li>• mutation (1)</li> <li>• reproduce (1)</li> <li>• pass allele / gene / DNA on to offspring (1)</li> </ul>	other species killed by zinc near mine	<b>4</b>

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

Total 11 marks

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

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

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



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

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

Total 10 marks

Question Number	Answer	Mark
<b>6(a)(i)</b>	Circle around axon terminals	<b>1</b>

Question Number	Answer	Mark
<b>6(a)(ii)</b>	<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>	<b>1</b>

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

Question Number	Answer	Mark
<b>6(b)(i)</b>	<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>	<b>1</b>

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

Question Number	Answer	Additional guidance	Mark
<b>6(b)(iii)</b>	<ul style="list-style-type: none"> <li>• 90cm = 0.9m</li> <li>• <math>90 \div (\text{speed}) 440 = 0.20\text{s}</math></li> </ul> $0.9 \div (\text{speed}) 4.4 = 0.20\text{ s}$ <p>= seconds</p> <ul style="list-style-type: none"> <li>• <math>2.0 \times 10^{-1}</math> (3)</li> </ul>	<p>award full marks for correct numerical answer without working regardless of speed used</p> <p>allow 1 mark for 0.9 (m) <b>or</b> speed expressed as x 100 cm/s (440 idea)</p> <p>allow 1 mark for <math>90 \div \text{speed}</math> <b>or</b> <math>0.9 \div \text{speed}</math></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>	<b>3</b>

Total 9 marks

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

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

Question Number	Answer	additional guidance	Mark
<b>7(b)(i)</b>	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 <b>mmol</b> and <b>percentage / % germination</b> (1)  P points correctly plotted within one square (1)	if non linear scale can still get P  bar chart loses L	<b>5</b>

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

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

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

16 marks

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

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

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

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

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

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

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

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

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



Question Number	Answer	Mark
<b>9(c)</b>	<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>	<b>1</b>

Question Number	Answer	Mark
<b>9(d)</b>	<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>	<b>1</b>

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

Total 11 marks

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

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

Total 9 marks

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

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