



# Mark Scheme (Results)

January 2020

Pearson Edexcel International GCSE in  
Biology (4BI1)  
Paper 2BR

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Question Number	Answer	Mark
<b>1(a)</b>	<ul style="list-style-type: none"> <li>regrows / maintained / does not run out / enough / sufficient / keep going / lasts / reliable / renewable / eq (1)</li> </ul>	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>1(b)</b>	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>absorb water (1)</li> <li>absorb mineral (ions) / named mineral ion (1)</li> </ul>	<b>ignore nutrients</b>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>1(c)</b>	<p>An answer that makes reference to three of the following points:</p> <p>Similarities:</p> <ul style="list-style-type: none"> <li>both produce CO<sub>2</sub> (1)</li> <li>both are burnt / release energy / used for heating / generate electricity / eq (1)</li> </ul> <p>Differences:</p> <ul style="list-style-type: none"> <li>biofuel is carbon neutral / release CO<sub>2</sub> previously absorbed in growth / does not contribute (as much to) to greenhouse effect / global warming / climate change / eq(1)</li> <li>biofuel is renewable (1)</li> </ul>	<p><b>allow converse for differences</b></p> <p><b>no credit for biofuel does not release greenhouse gas</b></p>	<b>3</b>

Question Number	Answer	additional guidance	Mark
<b>1(d)</b>	<p>An answer that makes reference to one of the following points:</p> <ul style="list-style-type: none"> <li>• use fences / barriers / eq (1)</li> <li>• kill / cull / hunt deer / introduce predator / named predator / eq (1)</li> </ul>	<p>ignore biological control unqualified</p>	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>1(e)</b>	<p>A description that makes reference to five of the following points:</p> <ul style="list-style-type: none"> <li>• in coppiced and non-coppiced woodland / before and after coppicing (1)</li> <li>• use quadrats (1)</li> <li>• repeat / take more than one reading (1)</li> <li>• place at random (1)</li> <li>• count / how many / number (of each) <u>species</u> / each plant / each type of plant (1)</li> <li>• control day / year / season / eq (1)</li> <li>• use same species / type / same / similar woodland / woodland with same biodiversity / same plant to be coppiced (1)</li> </ul>	<p><b>allow count how many species</b></p> <p><b>allow use Simpson's index</b></p> <p><b>but not just count organisms</b></p>	<b>5</b>

Question Number	Answer	Mark
<b>1(f)(i)</b>	An answer that makes reference to one of the following: <ul style="list-style-type: none"><li>• more pollination / pollinators / bees / butterflies / eq (1)</li><li>• more predatory insects / insects that eat pests / ladybirds that eat caterpillars / eq (1)</li></ul>	<b>1</b>

Question Number	Answer	Mark
<b>1(f)(ii)</b>	An answer that makes reference to one of the following: <ul style="list-style-type: none"><li>• more (insect) herbivores / caterpillars / eat / damage / destroy / become pest for crop / eq (1)</li><li>• food for birds / mammals that eat crops (1)</li></ul>	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>1(g)</b>	An explanation that makes reference to two of the following points: <ul style="list-style-type: none"><li>• different / some plants / species prefer / grow (best) / thrive in / require / adapted to live in low light / high light / different light / eq (1)</li><li>• less competition / eq (1)</li><li>• so different / more <b>species</b> (1)</li></ul>	<b>must state species for mp3</b>	<b>2</b>

Total = 16 marks

Question Number	Answer	Mark
<b>2(a)</b>	D pancreas <i>A is not correct as the brain does not produce insulin</i> <i>B is not correct as the liver does not produce insulin</i> <i>C is not correct as the ovary does not produce insulin</i>	<b>1</b>

Question Number	Answer	Mark
<b>2(b)</b>	A description that makes reference to the following points: <ul style="list-style-type: none"><li>• lower <b>blood</b> glucose / converts <b>blood</b> glucose 1)</li><li>• to glycogen (1)</li><li>• (stored in) in muscles / liver (1)</li></ul>	<b>2</b>

Question Number	Answer	Mark
<b>2(c)</b>	B cow insulin acts as an antigen <i>A is not correct as it does not act as an antibody</i> <i>C is not correct as it is not due molecule size</i> <i>D is not correct as it is not a pathogen</i>	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>2(d)</b>	<p>A description that makes reference to three of the following points:</p> <ul style="list-style-type: none"><li>• human gene / allele / DNA (for insulin) gene from pancreas (1)</li><li>• (cut with) restriction enzyme (1)</li><li>• (join with) ligase (1)</li><li>• vector / plasmid (1)</li></ul>	<b>not just gene so gene for insulin or human gene or gene from pancreas ok</b>	<b>3</b>

Question Number	Answer	Mark
<b>2(e)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"><li>• aseptic conditions / sterilise /eq (1)</li><li>• remove / kill other pathogens / bacteria /eq (1)</li><li>• reduce <u>competition</u> (1)</li><li>• reduce <u>contamination</u> (1)</li><li>• cools to water / does not leave residue /eq (1)</li></ul>	<b>3</b>

Total 10 marks

Question Number	Answer	Additional guidance	Mark
<b>3(a)</b>	1 rhino = $100 - 99.95 = 0.05\%$  $1.0\% = 1 \div 0.05 = 20$  $100\% = 1/0.05 \times 100$  $20 \times 100$  $= 2000$ (3)	award full marks for correct numerical answer without working  <b>allow one mark for 0.05</b>  <b>and allow one mark for 20</b>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>3(b)</b>	An answer that makes reference to three of the following points: <ul style="list-style-type: none"><li>not all eggs survive / some die / some are not viable / do not accept nucleus / do not fuse / not all eggs divide / differentiate (1)</li><li>not all embryos implant / survive (1)</li></ul>	<b>ignore reference to fertilisation</b>	<b>2</b>

Question Number	Answer	Mark
<b>3(c)(i)</b>	sperm / sperm cell / spermatazoa / spermatazoon	<b>1</b>

Question Number	Answer	Mark
<b>3(c)(ii)</b>	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• (cell) division / mitosis (1)</li> <li>• place <b>embryo in uterus</b> (1)</li> <li>• surrogate mother (1)</li> <li>• Southern white rhino (1)</li> <li>• Northern white rhino too old (1)</li> </ul>	<b>4</b>

Total 9 marks

Question Number	Answer	additional guidance	Mark
<b>4(a)</b>	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• cut plant under water / set up under water (1)</li> <li>• seal connection / check for leaks / dry leaf / no air gaps / airtight / eq (1)</li> <li>• (observe/ introduce) air bubble (1)</li> <li>• measure distance / movement / record position (1)</li> <li>• use reservoir/ tap to reset bubble / move bubble on to scale / use reservoir to measure volume/ eq (1)</li> <li>• convert answer into volume by <math>\pi r^2 h</math> distance times <math>\pi r^2</math> (1)</li> </ul>	<p><b>ignore count bubbles</b></p> <p>measure distance moved by bubble = 2</p>	<b>4</b>

Question Number	Answer	Mark
<b>4(b)</b>	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• light (1)</li> <li>• temperature (1)</li> <li>• humidity (1)</li> <li>• carbon dioxide / CO<sub>2</sub> (1)</li> </ul>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>4(c)</b>	<p>water loss per cm<sup>2</sup> in 30 minutes is <math>10.5 \times 10^{-4}</math> = 0.00105</p> <p>water loss with area of 200 cm<sup>2</sup> is <math>0.00105 \times</math> 200 = 0.21</p> <p><math>0.21 \div 30 = 0.007</math> cm<sup>3</sup> per min</p> <p><math>1 \div 0.007 =</math></p> <p>143 / 142.9 / 142.86 / 142.857 etc (3 marks)</p>	<p>award full marks for correct numerical answer without working</p> <p>one mark for <math>\times 200</math></p> <p>one mark for <math>\div 30</math></p> <p>allow 2 marks for 1.43 or 1430 or 14.3 etc and for other versions eg 1.429 eq</p> <p>allow 140 for 3 marks</p>	<b>3</b>

Question Number	Answer	additional guidance	Mark
<b>4(d)</b>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• more transpiration (stream) / water loss / evaporation in wind (1)</li> <li>• cools plant / prevents overheating /eq (1)</li> <li>• more mineral ions / named mineral transported (1)</li> <li>• <b>(function of named mineral ion)</b> nitrate for amino acids / magnesium for chlorophyll / phosphate for DNA / ATP (1)</li> <li>• plant wilts / cells not turgid/eq(1)</li> <li>• wind may snap stems /eq (1)</li> <li>• wind may dry the soil (1)</li> <li>• plants may close stomata so reducing photosynthesis (1)</li> <li>• no information on /plant growth affected by light/ temperature / CO<sub>2</sub> / other named abiotic factor(s) (1)</li> <li>• investigation not repeated / eq (1)</li> <li>• no information about / species other species / plants may respond differently than experimental plant (1)</li> <li>• field trials needed / only done in lab/eq(1)</li> </ul>	<p>at least one from</p> <p>not just take up more water</p> <p>max 5 from</p>	<b>6</b>

Total = 15 marks

Question Number	Answer	Additional guidance	Mark
<b>5(a)</b>	An answer that makes reference to two of the following points: <ul style="list-style-type: none"><li>• DNA is double strand(ed) / double helix (1)</li><li>• DNA contains deoxyribose (1)</li><li>• DNA contains thymine / T not U / uracil(1)</li><li>• DNA longer / larger (1)</li></ul>	allow converse for RNA  single  ribose  uracil U not T thymine  shorter /smaller	<b>2</b>

Question Number	Answer	Mark
<b>5(b)(i)</b>	GUA GUA GGA GUA GAU	<b>1</b>

Question Number	Answer	Mark
<b>5(b)(ii)</b>	4200 (1)	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>5(c)</b>	<p>An explanation answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• ( deletion / insertion) will change amino acid sequence / all amino acids / whole protein (1)</li> <li>• ref (to change / not change) (shape of) active site (1)</li> <li>• no enzyme binds / does not bind / fit / react with substrate /eq(1)</li> <li>• enzyme / protein does not function /eq (1)</li> </ul> <ul style="list-style-type: none"> <li>• (substitution) some codon(s) / triplet(s) / may code(s) for same amino acid(s) (1)</li> <li>• so not all changes (in a base / sequence) change any amino acids (1)</li> <li>• (substitution) (only) one amino acid changes in protein (1)</li> <li>• enzyme / protein still functions (1)</li> </ul>	<p><b>once</b></p> <p><b>once</b></p>	<b>4</b>

Question Number	Answer	Mark
<b>5(d)</b>	<p>An answer that makes reference to one of the following points:</p> <ul style="list-style-type: none"> <li>• radiation / gamma rays / x-rays / ultraviolet / UV light (rays) / alpha particles / eq (1)</li> <li>• mutagens / smoking / tobacco / alcohol (1)</li> </ul>	<b>1</b>

Total = 10 marks

Question Number	Answer	Mark
<b>6(a)</b>	D organ S <i>A is incorrect as P does not store urine</i> <i>B is incorrect as Q does not store urine</i> <i>C is incorrect as R does not store urine</i>	<b>1</b>

Question Number	Answer	Mark
<b>6(b)</b>	B organ Q <i>A is not correct as organ P does not produce adrenaline</i> <i>C is not correct as organ R does not produce adrenaline</i> <i>D is not correct as organ S does not produce adrenaline</i>	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>6(c)(i)</b>	An answer that includes two of the following: <ul style="list-style-type: none"><li>• urea (1)</li><li>• water (1)</li><li>• ions / salt / named ion / named salt (1)</li></ul>	ignore urine	<b>2</b>

Question Number	Answer	additional guidance	Mark
<b>6(c)(ii)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"><li>• female only transports urine / urination / no gametes (1)</li><li>• separate reproductive passage / vagina / birth canal / eq (1)</li></ul>	not just used for excretion	<b>2</b>

Question Number	Answer	Mark
<b>6(d)</b>	<p>An explanation that makes reference to four of the following points :</p> <ul style="list-style-type: none"><li>• (increased) sweat (1)</li><li>• blood concentration increases / blood water potential decreases (1)</li><li>• (more) ADH (1)</li><li>• from pituitary glands (1)</li><li>• more water reabsorbed from <u>collecting duct</u> (1)</li><li>• lower volume / less urine / more concentrated urine produced (1)</li></ul>	<b>4</b>

Total = 10 marks

