



## Mark Scheme (Results)

January 2020

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

## **Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at [www.edexcel.com](http://www.edexcel.com) or [www.btec.co.uk](http://www.btec.co.uk). Alternatively, you can get in touch with us using the details on our contact us page at [www.edexcel.com/contactus](http://www.edexcel.com/contactus).

## **Pearson: helping people progress, everywhere**

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: [www.pearson.com/uk](http://www.pearson.com/uk)

January 2020

Publications Code 4BI1\_2BR\_msc\_20200305

All the material in this publication is copyright

© Pearson Education Ltd 2020

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>	ignore biological control unqualified	<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>	<p>D pancreas</p> <p><i>A is not correct as the brain does not produce insulin</i></p> <p><i>B is not correct as the liver does not produce insulin</i></p> <p><i>C is not correct as the ovary does not produce insulin</i></p>	<b>1</b>

Question Number	Answer	Mark
<b>2(b)</b>	<p>A description that makes reference to the following points:</p> <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>	<p>B cow insulin acts as an antigen</p> <p><i>A is not correct as it does not act as an antibody</i></p> <p><i>C is not correct as it is not due molecule size</i></p> <p><i>D is not correct as it is not a pathogen</i></p>	<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>	<p><b>not just gene so gene for insulin or human gene or gene from pancreas ok</b></p>	<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>	$1 \text{ rhino} = 100 - 99.95 = 0.05\%$ $1.0\% = 1 \div 0.05 = 20$ $100\% = 1/0.05 \times 100$ $20 \times 100$ $= 2000 \text{ (3)}$	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 200 = 0.21</math></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
4(d)	<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>	6

Total = 15 marks

Question Number	Answer	Additional guidance	Mark
<b>5(a)</b>	<p>An answer that makes reference to two of the following points:</p> <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>	<p>allow converse for RNA</p> <p>single</p> <p>ribose</p> <p>uracil U not T thymine</p> <p>shorter /smaller</p>	<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>	<p>D organ S</p> <p><i>A is incorrect as P does not store urine</i></p> <p><i>B is incorrect as Q does not store urine</i></p> <p><i>C is incorrect as R does not store urine</i></p>	<b>1</b>

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

Question Number	Answer	additional guidance	Mark
<b>6(c)(i)</b>	<p>An answer that includes two of the following:</p> <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

