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# Mark Scheme (Results)

## January 2020

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

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| Question Number | Answer | Mark |
|---|---|---|
| **1(a)** | • regrows / maintained / does not run out / enough / sufficient / keep going / lasts / reliable / renewable /eq (1) | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **1(b)** | An answer that makes reference to two of the following points:<br>• absorb water (1)<br>• absorb mineral (ions) / named mineral ion (1) | **ignore nutrients** | **2** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **1(c)** | An answer that makes reference to three of the following points:<br>Similarities:<br>• both produce $CO_2$ (1)<br>• both are burnt / release energy / used for heating / generate electricity / eq (1)<br>Differences:<br>• biofuel is carbon neutral / release $CO_2$ previously absorbed in growth / does not contribute (as much to) to greenhouse effect / global warming / climate change /eq(1)<br>• biofuel is renewable (1) | **allow converse for differences**<br>**no credit for biofuel does not release greenhouse gas** | **3** |

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| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **1(d)** | An answer that makes reference to one of the following points:<br><br>• use fences / barriers / eq (1)<br><br>• kill / cull / hunt deer / introduce predator /named predator / eq (1) | ignore biological control unqualified | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **1(e)** | A description that makes reference to five of the following points:<br><br>• in coppiced and non-coppiced woodland / before and after coppicing (1)<br><br>• use quadrats (1)<br><br>• repeat / take more than one reading (1)<br><br>• place at random (1)<br><br>• count / how many / number (of each) <u>species</u> / each plant / each type of plant (1)<br><br>• control day / year / season / eq (1)<br><br>• use same species / type / same / similar woodland / woodland with same biodiversity / same plant to be coppiced (1) | **allow count how many species**<br><br>**allow use Simpson's index**<br><br>**but not just count organisms** | **5** |

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| Question Number | Answer | Mark |
|---|---|---|
| **1(f) (i)** | An answer that makes reference to one of the following:<br>• more pollination / pollinators /bees /butterflies / eq (1)<br>• more predatory insects / insects that eat pests / ladybirds that eat caterpillars / eq (1) | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **1(f)(ii)** | An answer that makes reference to one of the following:<br>• more (insect) herbivores / caterpillars / eat / damage / destroy / become pest for crop /eq (1)<br>• food for birds / mammals that eat crops (1) | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **1(g)** | An explanation that makes reference to two of the following points:<br>• different / some plants / species prefer / grow (best) / thrive in / require / adapted to live in low light / high light / different light /eq (1)<br>• less competition / eq (1)<br>• so different / more **<u>species</u>** (1) | **must state species for mp3** | **2** |

Total = 16 marks

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| Question Number | Answer | Mark |
|---|---|---|
| **2(a)** | D pancreas<br>*A is not correct as the brain does not produce insulin*<br>*B is not correct as the liver does not produce insulin*<br>*C is not correct as the ovary does not produce insulin* | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **2(b)** | A description that makes reference to the following points:<br>• lower **blood** glucose / converts **blood** glucose 1)<br>• to glycogen (1)<br>• (stored in) in muscles / liver (1) | **2** |

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

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| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **2(d)** | A description that makes reference to three of the following points:<br>• human gene / allele / DNA (for insulin) gene from pancreas (1)<br>• (cut with) restriction enzyme (1)<br>• (join with) ligase (1)<br>• vector / plasmid (1) | **not just gene so gene for insulin or human gene or gene from pancreas ok** | **3** |

| Question Number | Answer | Mark |
|---|---|---|
| **2(e)** | An explanation that makes reference to three of the following points:<br>• aseptic conditions / sterilise /eq (1)<br>• remove / kill other pathogens / bacteria /eq (1)<br>• reduce <u>competition</u> (1)<br>• reduce <u>contamination</u> (1)<br>• cools to water / does not leave residue /eq (1) | **3** |

Total 10 marks

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| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **3(a)** | 1 rhino = 100 – 99.95 = 0.05%<br><br>1.0% = 1÷0.05 =20<br><br>100% = 1/0.05 x 100<br><br>20 x 100<br><br>= 2000 (3) | award full marks for correct numerical answer without working<br><br>**allow one mark for 0.05**<br><br>**and allow one mark for 20** | **3** |

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **3(b)** | An answer that makes reference to three of the following points:<br><br>• not all eggs survive / some die / some are not viable /do not accept nucleus / do not fuse / not all eggs divide / differentiate (1)<br><br>• not all embryos implant / survive (1) | **ignore reference to fertilisation** | **2** |

| Question Number | Answer | Mark |
|---|---|---|
| **3(c)(i)** | sperm / sperm cell / spermatazoa / spermatazoon | **1** |

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| Question Number | Answer | Mark |
|---|---|---|
| **3(c)(ii)** | An explanation that makes reference to four of the following points:<br>• (cell) division / mitosis (1)<br>• place **<u>embryo in uterus</u>** (1)<br>• surrogate mother (1)<br>• Southern white rhino (1)<br>• Northern white rhino too old (1) | **4** |

Total 9 marks

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **4(a)** | An explanation that makes reference to four of the following points:<br>• cut plant under water / set up under water (1)<br>• seal connection / check for leaks / dry leaf / no air gaps / airtight /eq (1)<br>• (observe/ introduce) air bubble (1)<br>• measure distance / movement / record position (1)<br>• use reservoir/ tap to reset bubble / move bubble on to scale / use reservoir to measure volume/ eq (1)<br>• convert answer into volume by $\pi r^2 h$ distance times $\pi r^2$ (1) | **ignore count bubbles**<br><br>measure distance moved by bubble = 2 | **4** |

| Question Number | Answer | Mark |
|---|---|---|
| **4(b)** | An answer that makes reference to two of the following points:<br>• light (1)<br>• temperature (1)<br>• humidity (1)<br>• carbon dioxide / $CO_2$ (1) | **2** |

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

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| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **4(d)** | An answer that makes reference to the following points:<br><br>• more transpiration (stream) / water loss / evaporation in wind (1)<br>• cools plant / prevents overheating /eq (1)<br>• more mineral ions / named mineral transported (1)<br>• **(function of named mineral ion)** nitrate for amino acids / magnesium for chlorophyll / phosphate for DNA / ATP (1)<br><br>• plant wilts / cells not turgid/eq(1)<br>• wind may snap stems /eq (1)<br>• wind may dry the soil (1)<br>• plants may close stomata so reducing photosynthesis (1)<br>• no information on /plant growth affected by light/ temperature / $CO_2$ / other named abiotic factor(s) (1)<br>• investigation not repeated / eq (1)<br>• no information about / species other species / plants may respond differently than experimental plant (1)<br>• field trials needed / only done in lab/eq(1) | at least one from<br><br>not just take up more water<br><br>max 5 from | **6** |

Total = 15 marks

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| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **5(a)** | An answer that makes reference to two of the following points:<br><br>• DNA is double strand(ed) / double helix (1)<br>• DNA contains deoxyribose (1)<br>• DNA contains thymine / T not U / uracil(1)<br>• DNA longer / larger (1) | allow converse for RNA<br><br>single<br><br>ribose<br><br>uracil U not T thymine<br><br>shorter /smaller | **2** |

| Question Number | Answer | Mark |
|---|---|---|
| **5(b)(i)** | GUA GUA GGA GUA GAU | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **5(b)(ii)** | 4200 (1) | **1** |

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| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **5(c)** | An explanation answer that makes reference to four of the following points:<br><br>• ( deletion / insertion) will change amino acid sequence / all amino acids / whole protein (1)<br>• ref (to change / not change) (shape of) active site (1)<br>• no enzyme binds / does not bind / fit / react with substrate /eq(1)<br>• enzyme / protein does not function /eq (1)<br>• (substitution) some codon(s) / triplet(s) / may code(s) for same amino acid(s) (1)<br>• so not all changes (in a base / sequence) change any amino acids (1)<br>• (substitution) (only) one amino acid changes in protein (1)<br>• enzyme / protein still functions (1) | **once**<br><br>**once** | **4** |

| Question Number | Answer | Mark |
|---|---|---|
| **5(d)** | An answer that makes reference to one of the following points:<br>• radiation / gamma rays / x-rays / ultraviolet / UV light (rays) / alpha particles / eq (1)<br>• mutagens / smoking / tobacco / alcohol (1) | **1** |

Total = 10 marks

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| Question Number | Answer | Mark |
|---|---|---|
| **6(a)** | D organ S<br>*A is incorrect as P does not store urine*<br>*B is incorrect as Q does not store urine*<br>*C is incorrect as R does not store urine* | **1** |

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

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **6(c)(i)** | An answer that includes two of the following:<br>• urea (1)<br>• water (1)<br>• ions / salt / named ion / named salt (1) | ignore urine | **2** |

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| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **6(c)(ii)** | An explanation that makes reference to the following points:<br><br>• female only transports urine / urination / no gametes (1)<br><br>• separate reproductive passage / vagina / birth canal /eq (1) | not just used for excretion | **2** |

| Question Number | Answer | Mark |
|---|---|---|
| **6(d)** | An explanation that makes reference to four of the following points :<br><br>• (increased) sweat (1)<br>• blood concentration increases / blood water potential decreases (1)<br>• (more) ADH (1)<br>• from pituitary glands (1)<br>• more water reabsorbed from <u>collecting duct</u> (1)<br>• lower volume / less urine / more concentrated urine produced (1) | **4** |

Total = 10 marks

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