



Mark Scheme (Results)

January 2020

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

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

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

Question Number	Answer	Additional guidance	Mark
1(c)	<p>An answer that makes reference to three of the following points:</p> <p>Similarities:</p> <ul style="list-style-type: none"> both produce CO₂ (1) both are burnt / release energy / used for heating / generate electricity / eq (1) <p>Differences:</p> <ul style="list-style-type: none"> biofuel is carbon neutral / release CO₂ previously absorbed in growth / does not contribute (as much to) to greenhouse effect / global warming / climate change / eq(1) biofuel is renewable (1) 	<p>allow converse for differences</p> <p>no credit for biofuel does not release greenhouse gas</p>	3

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

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

Question Number	Answer	Mark
1(f)(i)	An answer that makes reference to one of the following: <ul style="list-style-type: none"> • more pollination / pollinators /bees /butterflies / eq (1) • 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: <ul style="list-style-type: none"> • more (insect) herbivores / caterpillars / eat / damage / destroy / become pest for crop /eq (1) • 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: <ul style="list-style-type: none"> • different / some plants / species prefer / grow (best) / thrive in / require / adapted to live in low light / high light / different light /eq (1) • less competition / eq (1) • so different / more species (1) 	must state species for mp3	2

Total = 16 marks

Question Number	Answer	Mark
2(a)	<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>	1

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

Question Number	Answer	Mark
2(c)	<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>	1

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

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

Total 10 marks

Question Number	Answer	Additional guidance	Mark
3(a)	$1 \text{ rhino} = 100 - 99.95 = 0.05\%$ $1.0\% = 1 \div 0.05 = 20$ $100\% = 1/0.05 \times 100$ 20×100 $= 2000 \text{ (3)}$	award full marks for correct numerical answer without working allow one mark for 0.05 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: <ul style="list-style-type: none"> • not all eggs survive / some die / some are not viable / do not accept nucleus / do not fuse / not all eggs divide / differentiate (1) • not all embryos implant / survive (1) 	ignore reference to fertilisation	2

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

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

Total 9 marks

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

Question Number	Answer	Mark
4(b)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • light (1) • temperature (1) • humidity (1) • carbon dioxide / CO₂ (1) 	2

Question Number	Answer	Additional guidance	Mark
4(c)	<p>water loss per cm² in 30 minutes is $10.5 \times 10^{-4} = 0.00105$</p> <p>water loss with area of 200 cm² is $0.00105 \times 200 = 0.21$</p> <p>$0.21 \div 30 = 0.007$ cm³ per min</p> <p>$1 \div 0.007 =$</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 $\times 200$</p> <p>one mark for $\div 30$</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>	3

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"> • more transpiration (stream) / water loss / evaporation in wind (1) • cools plant / prevents overheating /eq (1) • more mineral ions / named mineral transported (1) • (function of named mineral ion) nitrate for amino acids / magnesium for chlorophyll / phosphate for DNA / ATP (1) • plant wilts / cells not turgid/eq(1) • wind may snap stems /eq (1) • wind may dry the soil (1) • plants may close stomata so reducing photosynthesis (1) • no information on /plant growth affected by light/ temperature / CO₂ / other named abiotic factor(s) (1) • investigation not repeated / eq (1) • no information about / species other species / plants may respond differently than experimental plant (1) • field trials needed / only done in lab/eq(1) 	<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
5(a)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • DNA is double strand(ed) / double helix (1) • DNA contains deoxyribose (1) • DNA contains thymine / T not U / uracil(1) • DNA longer / larger (1) 	<p>allow converse for RNA</p> <p>single</p> <p>ribose</p> <p>uracil U not T thymine</p> <p>shorter /smaller</p>	2

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

Question Number	Answer	Mark
5(b)(ii)	4200 (1)	1

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

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

Total = 10 marks

Question Number	Answer	Mark
6(a)	<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>	1

Question Number	Answer	Mark
6(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>	1

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

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

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

Total = 10 marks

