Pearson Edexcel

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: • absorb water (1) • 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: Similarities: • both produce CO_2 (1) • both are burnt / release energy / used for heating / generate electricity / eq (1) Differences: • 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) • biofuel is renewable (1)	**allow converse for differences** **no credit for biofuel does not release greenhouse gas**	**3**

Question Number	Answer	additional guidance	Mark
1(d)	An answer that makes reference to one of the following points: • use fences / barriers / eq (1) • 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: • 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)	**allow count how many species** **allow use Simpson's index** **but not just count organisms**	**5**

Question Number	Answer	Mar
1(f) (i)	An answer that makes reference to one of the following: • 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: • 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: • 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 **<u>species</u>** (1)	**must state species for mp3**	**2**

Total = 16 marks

Question Number	Answer	Mark
2(a)	D pancreas *A is not correct as the brain does not produce insulin* *B is not correct as the liver does not produce insulin* *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: • lower **blood** glucose / converts **blood** glucose 1) • to glycogen (1) • (stored in) in muscles / liver (1)	**2**

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

Question Number	Answer	additional guidance	Mark
2(d)	A description that makes reference to three of the following points: • human gene / allele / DNA (for insulin) gene from pancreas (1) • (cut with) restriction enzyme (1) • (join with) ligase (1) • 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: • aseptic conditions / sterilise /eq (1) • remove / kill other pathogens / bacteria /eq (1) • reduce competition (1) • reduce contamination (1) • cools to water / does not leave residue /eq (1)	**3**

Total 10 marks

Question Number	Answer	Additional guidance	Mark
3(a)	1 rhino = 100 – 99.95 = 0.05% 1.0% = 1÷0.05 =20 100% = 1/0.05 x 100 20 x 100 = 2000 (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: • 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)	An explanation that makes reference to four of the following points: • (cell) division / mitosis (1) • place **<u>embryo in uterus</u>** (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)	An explanation that makes reference to four of the following points: • 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)	**ignore count bubbles** measure distance moved by bubble = 2	**4**

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

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

Question Number	Answer	additional guidance	Mark
4(d)	An answer that makes reference to the following points: • 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 / CO_2 / 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)	at least one from not just take up more water max 5 from	**6**

Total = 15 marks

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

Question Number	Answer	additional guidance	Mark
5(c)	An explanation answer that makes reference to four of the following points: • (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) • (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)	**once** **once**	**4**

Question Number	Answer	Mark
5(d)	An answer that makes reference to one of the following points: • 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)	D organ S *A is incorrect as P does not store urine* *B is incorrect as Q does not store urine* *C is incorrect as R does not store urine*	**1**

Question Number	Answer	Mark
6(b)	B organ Q *A is not correct as organ P does not produce adrenaline* *C is not correct as organ R does not produce adrenaline* *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: • urea (1) • water (1) • ions / salt / named ion / named salt (1)	ignore urine	**2**

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

Total = 10 marks