PEARSON EDEXCEL IAL BIOLOGY · YBI11

BIOLOGY



MARK SCHEME

UNIT 4: ENERGY FLOW, ECOSYSTEMS AND THE ENVIRONMENT

SCORE	PERCENTAGE
/37	%

STEMUP

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Mark Scheme

Q1.

	Answer	Mark
(a)	The only correct answer is **D**. **A** *is incorrect because thick coat is anatomical, sitting on ice is behavioural and producing metabolic water is physiological* ***B*** *is incorrect because thick coat is anatomical, sitting on ice is behavioural and producing metabolic water is physiological* ***C*** *is incorrect because thick coat is anatomical, sitting on ice is behavioural and producing metabolic water is physiological*	**(1)**

	Answer	Mark
(b)	The only correct answer is **C**. **A** *is incorrect because its niche is its role not something it can produce* ***B*** *is incorrect because its niche is its role not its habitat* ***D*** *is incorrect because its niche is its role not its structure*	**(1)**

Question number	Answer	Additional guidance	Mark
(c)	An explanation that includes the following points: • because there is a lack of (fresh) water (1) • because the sea water is salty (1)	**ACCEPT** (fresh) water is frozen cannot consume the snow / ice	**(2)**

Question number	Answer	Additional guidance	Mark
(d)	An explanation that includes the following points: • (genetic diversity) decreases • because the gene flow reduced (1) • as a result of inbreeding (1)	**IGNORE** refs to mutations increasing diversity **ACCEPT** description e.g. fewer allele combinations passed on	**(3)**

Q2.

Question number	Answer	Mark
(a)	An explanation that includes the following points: • above 60 °C the enzymes are denatured (1) • so there will be no metabolic reactions (1) • because between 50 °C to 60 °C the enzymes are working slowly (1) • because the enzymes are denaturing (1)	(4)

Question number	Answer	Additional guidance	Mark
(b)(i)	• $\log_{10}$ of 5×10^3 and 1.3×10^5 stated (1) • denominator calculated (1) • answer (1) Example of calculation: 3.7 and 5.1 $0.301 \times 4 = 1.204$ 1 / 1.2 / 1.16	Allow ecf Award full marks for correct numerical answer without working	(3)

Question number	Answer	Mark
(b)(ii)	B exponential	(1)

Question number	Answer	Mark
(c)(i)	An explanation that includes the following points: • decomposition will be slower (1) • because the enzymes will be less active (1) • as there is less {heat / kinetic} energy (1)	(3)

Question number	Answer	Mark
(c)(ii)	An explanation that includes the following points: • cytoplasm will be frozen (1) • therefore enzymes and substrates will not be able to {move / collide} (1)	(2)

Q3.

Question number	Answer	Additional guidance	Mark
(a)	An answer that includes three of the following points, with at least **one** similarity and **one** difference : **Similarities** • both have (circular) DNA (1) • both have ribosomes (1) • both have double membranes **Differences** • chloroplasts have stroma and mitochondria have a matrix (1) • chloroplasts have {thylakoids / thylakoid membranes / grana /intergranal lamellae} and mitochondria have {a folded inner membrane / cristae} (1) • chloroplasts have starch grains and mitochondria do not (1)	**DO NOT PIECE TOGETHER** **ACCEPT** both have an envelope	(3)

Question number	Answer	Additional guidance	Mark
(b)(i)	An answer that includes the following points: • (**D**) chlorophyll / light-absorbing pigments / photosystems /PSI / PSII (1) • (**E**) electron carriers / electron transport proteins /cytochromes (1) • (**F**) {ADP / adenosine diphosphate}and (G) {phosphate (ions) / Pi / PO_4^{2-}}and (H) ATP / adenosine triphosphate (1)	**ACCEPT** named pigments **ACCEPT F & G** the other way around **DO NOT ACCEPT** P or incorrectformula for phosphate ions	(3)

Question number	Answer	Additional guidance	Mark
(b)(ii)	• reduced NADP / NADPH	**ACCEPT** {r / red} for reduced reduced NADPH **DO NOT ACCEPT** NADP /reducedNAD/ NADH / reduced NADH	(1)

Question number	Answer	Additional guidance	Mark
(b)(iii)	A description that includes two of the following points: • to split water (1) • electrons replace those lost by {photosystems / PSI / PSII / chlorophyll}(1) • {hydrogen ions / H^+ / protons} involved in formation of NADPH (1)		(2)

Q4.

Question number	Answer	Additional guidance	Mark
(a)	An explanation that includes the following points: • allopatric speciation (1) • (allopatric) because lemurs have the same common ancestorisolated from those in Africa (1) • sympatric speciation (1) • (sympatric) because Sifakas and Indri live together but have adifferent diet (1)	**ACCEPT** geographic speciation **ACCEPT** description of how dietis different	(4)

Question number	Answer	Additional guidance	Mark
(b)(i)	An explanation that includes two of the following points: • because only small quantities of DNA can be collected (1) • therefore need to {amplify / increase the number of copies of} DNA(1) • so that there is enough to {run on gel electrophoresis / analyse}	**ACCEPT** collecting a sample isdifficult	(2)

Question number	Answer	Additional guidance	Mark
(b)(ii)	An explanation that includes two of the following points: • gel electrophoresis run on DNA from both groups of lemurs • pattern of bands were similar showing the lemurs were geneticallysimilar (1) • base sequencing would show similar sequences (1)	**ACCEPT** use of bioinformatics toshow that the base sequences were similar	**(2)**