



EXAM PAPERS PRACTICE

Biodiversity and Natural Resources -1

Name: _____

Class: _____

Date: _____

Time:

Total Marks Available:

Total Marks Archived:

Level: Edexcel A level Biology

Subject: Biology

Exam Board: Pearson Edexcel Level 3 GCE AS and A level Biology A (Salters-Nuffield) and also

Pearsons Edexcel AS and A Level Biology B (9BI0) - Is however suitable for use by AS and A

level Biology Students of other Boards

Topic: Biodiversity and Natural Resources -4

Type: Mark Scheme

To be used by all students preparing for Edexcel AS and A level Biology A and Biology B - Students of other Boards may also find this useful



Mark Scheme

Q1.

Question Number	Answer	Mark
(i)	<p>The only correct answer is C G (which is the xylem)</p> <p><i>A is not correct because E does not contain lignin</i></p> <p><i>B is not correct because F, which is phloem, does not contain lignin</i></p> <p><i>D is not correct because H is not xylem</i></p>	(1)

Question Number	Answer	Mark
(ii)	<p>The only correct answer is B F (this is phloem)</p> <p><i>A is not correct because E is not phloem</i></p> <p><i>C is not correct because G is not phloem</i></p> <p><i>D is not correct because H is not phloem</i></p>	(1)



EXAM PAPERS PRACTICE

Q2.

Question Number	Answer	Mark
(i)	<p>The only correct answer is B - sclerenchyma fibres provide support</p> <p><i>A is not correct because it is not phloem</i></p> <p><i>B is not correct because it is not sieve tubes</i></p> <p><i>D is not correct because it is not xylem</i></p>	(1)

Question Number	Answer	Mark
(ii)	<p>The only correct answer is A - phloem that transports organic solutes</p> <p><i>B is not correct because sclerenchyma does not transport water</i></p> <p><i>C is not correct because sieve tubes do not synthesise organic solutes</i></p> <p><i>D is not correct because it is not xylem</i></p>	(1)

Question Number	Answer	Mark
(iii)	<p>The only correct answer is D - xylem vessel that transports water and mineral ions</p> <p><i>A is not correct because it is not phloem</i></p> <p><i>B is not correct because it is not a sclerenchyma fibre</i></p> <p><i>C is not correct because it is not a sieve tube</i></p>	(1)



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Question Number	Answer	Additional guidance	Mark
(iv)	An answer that makes reference to the following <ul style="list-style-type: none">length of line correctly measured (1)correct conversion to μm (1)image size divided by actual size to give magnification (1)	Example of calculation 36mm ALLOW 37mm 36000 ALLOW 37000 $36000/320 = 112.5$ OR $37000/320 = 115.6$ Correct answer without working gains full marks	(3)

Q3.

Question Number	Answer	Mark
(i)	The only correct answer is D - ribosome <i>A is not correct because amyloplasts are only found in plant cells</i> <i>B is not correct because chloroplasts are only found in plant cells</i> <i>C is not correct because mesosomes are only found in bacterial cells</i>	(1)



EXAM PAPERS PRACTICE

Question Number	Answer	Mark
(ii)	<p>The only correct answer is A-amyloplast</p> <p><i>B is not correct because Golgi apparatus is found in plant and animal cells</i></p> <p><i>C is not correct because mesosomes are found only in bacterial cells</i></p> <p><i>D is not correct because some animal cells also have a vacuole</i></p>	(1)

Question Number	Answer	Mark
(iii)	<p>The only correct answer is D-smooth endoplasmic reticulum</p> <p><i>A is not correct because amyloplasts are only found in plant cells</i></p> <p><i>B is not correct because animal cells do not have a cell wall</i></p> <p><i>C is not correct because pili are only found in bacterial cells</i></p>	(1)

Q4.

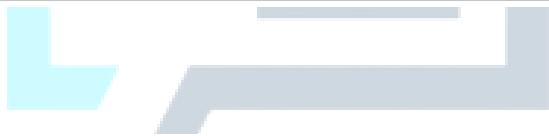
Question Number	Answer	Mark
	<p>C - anatomical, behavioural and physiological</p> <p><i>The only correct answer is C</i></p> <p><i>A is incorrect because there is also a physiological adaptation</i></p> <p><i>B is incorrect because there is also a behavioural adaptation</i></p> <p><i>D is incorrect because there is also an anatomical adaptation</i></p>	(1)



Q5.

Question Number	Answer	Mark
	<p>B - Eukaryota</p> <p><i>The only correct answer is B</i></p> <p><i>A is incorrect because the electron micrograph has a nucleus and other membrane bound organelles so must be a eukaryote</i></p> <p><i>C is incorrect because the electron micrograph has a nucleus and other membrane bound organelles so must be a eukaryote</i></p> <p><i>D is incorrect because the electron micrograph has a nucleus and other membrane bound organelles so must be a eukaryote</i></p>	<p>(1)</p>

Q6.



Question number	Answer	Additional guidance	Mark
	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">• magnesium is needed to make chlorophyll (1)• because chlorophyll is required for photosynthesis (1)• because shoots need (chlorophyll) to carry out photosynthesis to grow (1)	<p>ALLOW required to replace organic molecules stored in seed that have been used up</p>	<p>Choose an item.</p> <p>(2)</p>



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Q7.

Question Number	Answer	Additional guidance	Mark
	<p>An answer the makes reference to five of the following:</p> <ul style="list-style-type: none">• description of how temperature will be controlled (1)• identification of another appropriate abiotic factor to control (1)• provide nutrients (for cells) (1)• use of aseptic technique (to prevent contamination of cell culture) (1)• culture for a stated period of time (1)• description of method of measuring growth (1)	<p>e.g. set temperatures using a {water bath / incubator}</p> <p>e.g. pH / humidity/ carbon dioxide concentration / oxygen concentration</p> <p>ALLOW description of aseptic technique</p> <p>ALLOW times greater than 2 hours ALLOW culture at each temperature for the same period of time</p> <p>ALLOW e.g. measure {mass / number / area} of cells at beginning and end of culture</p>	<p>(5)</p>



Q8.

Question Number	Answer	Additional Guidance	Mark
	<p>A description that makes reference to three of the following:</p> <ul style="list-style-type: none">• description of role in protection (1)• description of role in repopulation (1)• description of role in education (1)• description of role in research (1)	<p>E.g. protection from poachers, hunting, vet care, administering medicines</p> <p>E.g. increase numbers, breeding programmes, release back into the wild</p> <p>E.g. conservation</p> <p>E.g. Improving health, discovering better nutrition, breeding cycles, developing a genetic database</p>	<p>(3)</p>



EXAM PAPERS PRACTICE

Q9.

Question Number	Answer	Additional Guidance	Mark
(i)	A (complete mineral ion solution)		(1)

Question Number	Answer	Additional Guidance	Mark
(ii)	D (validity)		(1)

Question Number	Acceptable Answer	Additional Guidance	Mark
(iii)	<ul style="list-style-type: none">• Mass of one seed correctly calculated (1)• Calcium ion content for one seed calculated (1)• Correct answer (1)	<p><u>Example of Calculation:</u> $1 \div 200 = 0.005(\text{g})$ $(21 \times 0.005) \div 100$ or 0.00105 $= 1.05 (\mu\text{g})$</p> <p>Allow full marks for correct answer with no working</p>	(3)



EXAM PAPERS PRACTICE

Question Number	Acceptable Answer	Additional Guidance	Mark
(iv)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">• seedlings not deficient in magnesium ions, chlorophyll production not affected (1)• seedlings of rice deficient in calcium ions were shorter due to less calcium ions stored in the seed (1)• seedlings of fenugreek did not suffer calcium ion deficiency due to the greater content of calcium ions in the seed (1)		(3)



EXAM PAPERS PRACTICE

Q10.

Question Number	Answer	Mark
(i)	The only correct answer is –A <i>amino acids</i> B is incorrect because nitrates are not found in cellulose C is incorrect because nitrates are not found in starch D is incorrect because nitrates are not found in sucrose	Computer (1)

Question Number	Answer	Mark
(ii)	The only correct answer is –C <i>nucleic acids</i> A is incorrect because phosphate is not found in cellulose B is incorrect because phosphate is not found in chlorophyll D is incorrect because phosphate is not found in sucrose	Computer (1)

Question Number	Answer	Mark
(iii)	The only correct answer is – C <i>chlorophyll</i> A is incorrect because magnesium is not found in amino acids B is incorrect because magnesium is not found in cellulose D is incorrect because magnesium is not found in starch	Computer (1)



EXAM PAPERS PRACTICE

Q11.

Question Number	Answer	Additional guidance	Mark
(i)	<p>An explanation that makes reference to three of the following</p> <ul style="list-style-type: none">• many of the elephants with tusks were killed (for their ivory) / large percentage of population do not have tusks (1)• elephants without tusks were more likely to survive and breed (1)• therefore passing on alleles for not having tusks (1)• increasing the frequency of homozygous recessives in the population (1)	ALLOW converse	(3)

Question Number	Answer	Additional guidance	Mark
(ii)	<p>A description that makes reference to the following</p> <ul style="list-style-type: none">• calculate the {allele frequencies/ number of dominant and recessive alleles} (in the population in Mozambique) (1)• (regular) sampling over a period of time (1)		(2)



Q12.

Question number	Answer	Mark			
	<p>The only correct answer is B -</p> <table border="1"><tr><td>7</td><td>28</td><td>21</td></tr></table> <p>A is not correct because column 2 shows the number for a gamete and column three for a normal cell</p> <p>C is not correct because columns one and three show numbers for normal cells</p> <p>D is not correct because column one shows the number for a normal cell and column two shows the number for a gamete</p>	7	28	21	(1)
7	28	21			

Q13.

Question Number	Answer	Additional guidance	Mark
(a)(i)	<ol style="list-style-type: none">reference to {polymerase chain reaction / PCR} ;polymerase (enzyme) {added / eq };idea of need for primers and nucleotides ;{90-98} (°C) → {50-65} (°C) → {70-75} (°C) ;idea that cycle needs to be repeated {several times / to make several copies of DNA / eq};	1. Accept as a ref to PCR machine	(4)

Question Number	Answer	Additional guidance	Mark
(a)(ii)	(DNA) {profiling / fingerprinting / (gel) electrophoresis} ;	Ignore Southern blotting, PCR Accept DNA profile / DNA fingerprint	(1)



EXAM PAPERS PRACTICE

Question Number	Answer	Additional guidance	Mark
(b)	<ol style="list-style-type: none">1. idea of work appearing in a (Scientific) journal or being presented at a conference ;2. idea that validity or reliability is considered ;3. by other scientists / ref to peer review ;	1. Accept publishing a paper, scientific meeting	(2)

Question Number	Answer	Additional guidance	Mark
(c)(i)	<ol style="list-style-type: none">1. reference to different {conditions / environments /eq} (in each region) ;2. idea of different selection pressures ;3. idea of {restricted gene flow / separate gene pools} ;4. reference to reproductive isolation;	1. Accept appropriate named factor e.g. temperature 3. Ignore different allele frequency	(2)

Question Number	Answer	Additional guidance	Mark
(c)(ii)	<ol style="list-style-type: none">1. idea of different {alleles/ gene pool} ;2. idea that this leads to {new / different} phenotypes ;3. idea of new {allele / gene} can be {advantage / disadvantage} ;4. reference to (advantageous) {(mutated) gene / (new) allele} passed onto offspring ;	1. Ignore allele frequency 2. Accept traits / characteristics / features	(2)



Q14.

Question Number	Answer	Additional Guidance	Mark
(i)	An answer that makes reference to two of the following: <ul style="list-style-type: none">• modifies proteins (1)• forms vesicles (1)• removes (some) water from the protein / concentrates the { protein / glycoprotein } (1)	e.g. addition of carbohydrate to protein / formation of glycoprotein ALLOW processes protein IGNORE folds protein e.g. lysosomes / secretory vesicle / vesicle in synaptic knob ALLOW packages proteins into vesicles	(2)

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to three of the following: <ul style="list-style-type: none">• (for phase 1) – to make sure the phospholipase inhibitor is not harmful (1)• (for phase 2) – to see if it is effective in { treating the condition / preventing allergic reactions to wasp venom } (1)• (for phase 3) – to gather much data / data for statistical tests / to look for rare side effects (1)• to test for side effects in { phase 1 / phase 2 } (1)	ALLOW finding safe dosage ALLOW reference to how the drug is absorbed / metabolised ALLOW double blind trials to compare effectiveness with a placebo / previous drug	(3)



Q15.

Question Number	Answer	Additional guidance	Mark
	<p>An explanation that makes reference to the following</p> <ul style="list-style-type: none">• (in the early stages of glacial retreat) the soil may lack nitrates (1)• (however) lupin plants can use the { ammonium ions / source of nitrogen } produced by the bacteria (1)• (therefore can) synthesise { amino acids / chlorophyll / nucleic acids / nitrogenous bases } (1)	<p>ALLOW other sources of nitrogen lacking</p> <p>ALLOW produce for synthesise ALLOW protein</p>	<p>(3)</p>

Q16.

Biology A (Salters-Nuffield) Advanced Paper 3 (9BN0/03)

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)	Tonoplast		(1)

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)	<ul style="list-style-type: none">• selection of correct points from the graph (1)• calculation of percentage (1)• difference in percentage (1)	<p>0.17 AU , 0.23 AU , 0.26 AU</p> <p><u>Example of calculation:</u> 35.3% ÷ 13.0% = 22.3%</p> <p>Allow full marks for correct answer with no working</p>	<p>(3)</p>



Question Number	Acceptable Answer	Additional Guidance	Mark
(c)(i)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">interferes with { tertiary / 3-D } shape of the channel proteins (1)therefore causes channel proteins to		(2)

Question Number	Acceptable Answer	Additional Guidance	Mark
(c)(ii)	<p>An answer that makes reference to four of the following:</p> <ul style="list-style-type: none">solutions with a range of pH values (1)pieces of beetroot of same surface area (1)control of other named relevant variables (1)measurement of absorbance of solution using colorimeter (1)repeats at each pH value to calculate mean (1)	<p>e.g. temperature / volume of solution / time left in solution /</p>	(4)



Q17.

Question Number	Answer	Additional guidance	Mark						
(i)	Correct completion of the table <table border="1"><tr><td>$n(n-1)$</td></tr><tr><td>2</td></tr><tr><td>56</td></tr><tr><td>0</td></tr><tr><td>72</td></tr><tr><td>6</td></tr></table>	$n(n-1)$	2	56	0	72	6	All figures need to be correct	(1)
$n(n-1)$									
2									
56									
0									
72									
6									

Question Number	Answer	Additional guidance	Mark
(ii)	<ul style="list-style-type: none">• correct calculation of $N(N-1)$ (1)• correct calculation of D (1)	<u>Example of calculation</u> $N(N-1) = 23 \times 22 = 506$ $\Sigma n(n-1) = 136 \quad 506 \div 136$ $D = 3.72$ ALLOW 3.7 ALLOW ecf from 7(a)(i) Correct answer without working gains full marks	(2)



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Q18.

Question Number	Acceptable Answer	Additional guidance	Mark
(a)(i)	An explanation that makes reference to the following: <ul style="list-style-type: none">• (small pieces) provides large surface area to volume ratio (1)• (use of ethanol for a long time means) the antibacterial substance is soluble in ethanol and more will be extracted (1)		(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(a)(ii)	$\pi 2.15^2$ (1) 14.5 cm ² (1)		(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(b)(i)	An explanation that makes reference to the following: <ul style="list-style-type: none">• the <i>t</i>-test assess the significance of the difference between the means of the two treatments (1)• Chi squared not appropriate because there are no expected values (1)• correlation coefficient not appropriate because the independent variable is discontinuous / not continuous (1)		(3)



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Question Number	Acceptable Answer	Additional guidance	Mark
(b)(ii)	$2.37^2 \div 9 = 0.62$ and $3.60^2 \div 9 = 1.44$ (1) $\sqrt{0.62 + 1.44} = 1.44$ (1) $(27 - 25) \div 1.44 = t = 1.39$ (1)	Correct answer gains full marks	(3)

Question Number	Acceptable Answer	Additional guidance	Mark
(b)(iii)	An answer that makes reference to the following: <ul style="list-style-type: none">• there is no significant difference between the clear area caused by garlic compared with that caused by chloramphenicol (1)• $p > 0.05$ (1)• difference due to chance (1)• therefore accept null hypothesis (1)	Allow marking points for the calculated value of t from the candidate	(4)

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Question Number	Acceptable Answer	Additional guidance	Mark
(c)(i)	An explanation that makes reference to the following: <ul style="list-style-type: none">• suggests cedar wood oil has no anti-microbial effect on <i>E. coli</i> and all other oils do (1)• quoting at least two values from: rosemary 2%, geranium 0.5%, garlic 0.125% / manipulation of data to show relative effects (1)		(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(c)(ii)	An answer that makes reference to the following: <ul style="list-style-type: none">• for cedar wood oil try concentrations above 4% (1)• for all the others, try concentrations below 0.0625% (1)		(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(c)(iii)	A description that makes reference to the following: <ul style="list-style-type: none">• only one tray per species – need repeated measurements (1)• species – only used one species of bacteria / only used extracts from four plant species (1)		(2)



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Q19.

Question Number	Answer	Additional Guidance	Mark
	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">• washing with disinfectant will kill any microorganisms (1)• drying to { reduce chance of germination / decrease enzyme action } (1)• therefore preventing { decay / infection / damage } to the seeds (1)	<p>ALLOW bacteria and / or fungi</p> <p>ALLOW: for long term storage</p>	(3)

Q20.

Question Number	Answer	Additional Guidance	Mark
	<ul style="list-style-type: none">• correct calculation of number of seeds in the sample (1)• correct calculation of percentage that germinated (1)• therefore the remaining seeds are viable (as germination was greater than 75%) (1)	<p>Example of calculation</p> <p>$(1000 \div 50) \times 3 = 60$ seeds (1g = 20 seeds)</p> <p>$(48 \div 60) \times 100 = 80\%$</p> <p>(80% without working gains 2 marks)</p>	(3)



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Q21.

Question Number	Answer	Additional Guidance	Mark
(a)(i)	<ol style="list-style-type: none">1. (successful interbreeding) produces offspring;2. (same species produce) fertile (offspring);3. credit reason why offspring of different species might be infertile ;	<p>Accept converse throughout</p> <p>Ignore viable</p> <p>eg genetic incompatibility, different number of chromosomes, poor quality gametes , low number of gametes</p>	(3)

Question Number	Answer	Additional Guidance	Mark
(a)(ii)	<ol style="list-style-type: none">1. reference to reproductive isolation ;2. different breeding times;3. do not recognise {courtship displays / songs / eq} ;4. physically incompatible eg genitalia ;		(3)

Question Number	Answer	Additional Guidance	Mark
(b)	<ol style="list-style-type: none">1. idea that the two species share the same habitat ;2. idea that the two species experience the same environmental conditions ;3. (therefore) the same selection pressures ;4. idea that they are both well-adapted (to their environment) ;5. idea that no mutations have happened that {improve / change} their {phenotypes / survival};6. {no / few} changes in allele frequency / gene pool is stable ;7. idea that there has been very little change in environment (over the years) ;	<p>Accept similar</p> <p>NB this needs to be in the context of both species being subjected to the same selection pressures</p> <p>Accept similar</p>	(3)



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Q22.

Question Number	Answer	Additional Guidance	Mark
(a)	idea of organisms that breed to produce fertile offspring ;	Ignore reproductively isolated Ignore viable	(1)

Question Number	Answer	Additional Guidance	Mark
(b)	<ol style="list-style-type: none">1. idea of geographical isolation ;2. idea of different {environmental conditions / habitats / eq} ;3. reference to different selection pressures ;4. idea that mutation resulted in {adaptation / increased survival} ;5. idea of {decrease in gene flow / different alleles} ;6. ref to reproductive isolation ;7. credit suitable example e.g. different songs, incompatible genitals ;		(4)



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Question Number	Answer	Additional Guidance	Mark
(c)	<ol style="list-style-type: none">1. idea of descending from common ancestor ;2. idea of living in similar habitats ;3. idea of similar (environmental) {conditions / factors} ;4. idea of similar selection pressures ;5. idea that both well-adapted ;6. idea that mutations have not changed appearance ;7. idea of similar gene pool ;	<p>Accept same for similar throughout</p> <p>2. Accept place / environment / area</p>	(3)

Q23.

Question Number	Answer	Mark
(i)	<p>The only correct answer is B the number of different species in one area</p> <p><i>A is incorrect because species richness does not measure alleles</i></p> <p><i>C is incorrect because it is not the number of individuals of one species</i></p> <p><i>D is incorrect because it is not the number of individuals of one species and it is not different habitats</i></p>	(1)



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Question Number	Answer	Additional guidance	Mark
(ii)	<p>An answer that makes reference to five of the following</p> <ul style="list-style-type: none">• random sampling in each woodland using suitable method of generating co-ordinates (1)• use of a quadrat to sample at least 10 times in each woodland (1)• count the number of different species in each quadrat (1)• take measures to ensure validity of investigation / measure named abiotic variables (1)• for each woodland, calculate { the total number of species present / number of species / given area } (1)• use a suitable statistical test to compare the data from the two woodlands (1)	<p>e.g. random number tables</p> <p>e.g. carry out the investigation at the same time of year / forests in similar locations / same climate / measure temperature/pH</p> <p>e.g. mean and standard deviation for each woodland / t-test ALLOW Mann-Whitney U test DO NOT ALLOW diversity index</p>	(5)



Q24.

Question Number	Answer	Additional guidance	Mark
	<ul style="list-style-type: none">a group of organisms that can interbreed to produce fertile offspring	ALLOW 'breed', 'reproduce', 'mate' for 'interbreed'	(1)

Q25.



Question Number	Acceptable Answer	Additional guidance	Mark
(a)	C		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
(b)	B		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
(c)	B		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
(d)	An answer that makes reference to one of the following points: <ul style="list-style-type: none">virus has a non-cellular structure whereas bacteria has a cellular structure (1)a virus has a protein capsid whereas a bacterium has a polysaccharide cell wall (1)viruses have one type of nucleic acid whereas a bacterium has two (1)		(1)



Q26.

Question Number	Answer	Additional Guidance	Mark
(a)	<ol style="list-style-type: none">idea that as the {distance from the front edge of the glacier / time} increases, the {complexity / biodiversity / size / eq } of the organisms increases ;reference to (primary) succession ;idea that {algae / lichens / pioneer species} are (the first) organisms to colonise bare rock / eq;idea that {algae / lichen / pioneer species} improve conditions for plants ;idea of competition (limiting species present) ;	<ol style="list-style-type: none">ACCEPT idea that climax community only reached at distance from glacier edgeNOT secondary successionincluding e.g. change rock into soil / increase humus content of soil / increase water contente.g. newer species outcompete previous species	(3)



EXAM PAPERS PRACTICE

Question Number	Answer	Additional Guidance	Mark
(b)(i)	<ol style="list-style-type: none">1. the {role / interaction / eq} of an { <i>Epilobium latifolium</i> / organism / species} within its { ecosystem / habitat / environment } ;2. (<i>Epilobium latifolium</i>) is a producer ;3. idea that <i>Epilobium latifolium</i> provides {food / energy} for other organisms (herbivores / primary consumers / decomposers) ;4. idea that <i>Epilobium latifolium</i> improves soil e.g. holds soil structure together, increases nutrients ;5. idea that <i>Epilobium latifolium</i> provides {shelter / (micro) habitat} for organisms ;	<ol style="list-style-type: none">1. IGNORE community3. NOT prey4. IGNORE food in soil ACCEPT adds organic matter, humus5. ACCEPT named organism e.g. insects	(3)

EXAM PAPERS PRACTICE



EXAM PAPERS PRACTICE

Question Number	Answer	Additional Guidance	Mark
(b)(ii)	<ol style="list-style-type: none">1. idea of using a transect (from front edge of glacier);2. credit method of sampling (along transect) ;3. credit appropriate method of selecting sample sites (along transect) ;4. description of estimate of abundance e.g. number of plants, percentage cover ;5. idea of using more than one transect ;6. credit appropriate method of recording quantitative data ;	<ol style="list-style-type: none">2. e.g. clumps touching transect, quadrat (on transect), number of plants along perpendicular3. e.g. set distance, regular, systematic, flip-flop quadrats NOT random5. IGNORE references to repeating investigation6. e.g. tally chart, table, graph	(4)



EXAM PAPERS PRACTICE

Question Number	Answer	Additional Guidance	Mark
(b)(iii)	<ol style="list-style-type: none">1. credit appropriate named abiotic factor;2. credit appropriate method of measurement of factor ;3. credit appropriate description of where reading should be taken ;4. idea of taking several readings and getting an average / eq ;	<ol style="list-style-type: none">1. e.g. light, soil pH, water content, mineral content, temperature, salinity, wind IGNORE CO₂, O₂, rainfall, humidity2. CE applied e.g. light {probe / sensor / meter / data logger}, {water gauge / drying out soil samples}3. CE applied e.g. reading taken at height of plant, soil sample around roots, quadrat	(3)

EXAM PAPERS PRACTICE



Q27.

Question Number	Answer	Additional guidance	Mark
(a)	<ol style="list-style-type: none">1. reference to increase in {metabolic rate / enzyme activity / eq} as temperature rises ;2. reference to increase in {kinetic / eq} energy of molecules (as temperature rises) / eq ;3. reference to increase in {enzyme-substrate complexes / energy of collisions / eq} (as temperature rises) ;4. idea of {inactivation at lower temperatures/ denaturation at higher temperatures} of enzymes ;5. idea that temperature affects {differentiation / growth /division / eq} ;	<p>1. Accept converse argument for mp 1 – 3</p> <p>2. Accept movement</p> <p>4. Accept the idea that enzyme-substrate complexes cannot be made if denaturing</p>	(3)

Question Number	Answer	Additional guidance	Mark
(b)	<ol style="list-style-type: none">1. idea that temperature affects {survival / development / growth / metabolism / cell division / eq} ;2. idea that enzymes affect {development / growth / metabolism / cell division/ eq} ;3. idea that temperature affects enzymes ;4. idea that different frogs have different enzymes ;		(2)



EXAM PAPERS PRACTICE

Question Number	Answer	Additional guidance	Mark
(c)	<i>sylvatica,</i> <i>pipiens,</i> <i>palustris,</i> <i>clamitans</i> ; ;	if order correct but reversed = 1 mark	(2)

Question Number	Answer	Additional guidance	Mark
(d)	<ol style="list-style-type: none">1. idea that different species are reproductively isolated ;2. idea of different breeding {times / seasons / eq} ;3. idea of different {breeding / courtship / eq} {behaviour / rituals / displays / colour / songs / croaks / eq} ;4. idea that population at {northerly / southerly} limit of range may not develop (to adulthood) ;5. idea that breeding between different species results in infertile offspring ;	3. Accept idea of incompatible {genitalia / gametes}	(3)



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Question Number	Answer	Additional guidance	Mark
(e)	<ol style="list-style-type: none">1. idea that global warming will increase the temperature (at the latitudes) ;2. idea that temperatures (at these latitudes) may become too high for any of the species ;3. idea that new temperature may be above the maximum to complete development or above the upper lethal limit ;4. idea that species move {north / to cooler regions / eq} ;5. ref to change in {food source / predators / competition / eq} ;	2.Accept become extinct	(3)

Q28.

Question Number	Answer	Additional Guidance	Mark
	<p>An answer that makes reference to the following:</p> <ul style="list-style-type: none">• the (pulling) force the fibre can withstand before breaking <p>(1)</p>	ALLOW mass or weight instead of force	(1)



Q29.

Question Number	Answer	Additional Guidance	Mark
(i)	<ul style="list-style-type: none">• correct values for p and q (1)• value for 2pq calculated (1)• correct number of people calculated (1)	<p>Example of calculation</p> <p>p = 0.9975 and q = 0.0025 OR p = 0.9976 and q = 0.0024 ALLOW opposite values for p and q</p> <p>2pq = 0.0048 to 0.0050</p> <p>319 200 to 332 500</p> <p>Correct answer with no working gains full marks</p>	(3)

Question Number	Answer	Additional Guidance	Mark
(ii)	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none">• because the allele for LGMD2A may undergo mutation (1)• because gene flow may cause alleles to be lost or gained from the population (1)• due to { natural selection / (changed) selection pressure } (1)• because people with the condition may not have children (1)	<p>ALLOW random mutations to allele</p> <p>ALLOW: immigration / emigration</p> <p>ALLOW confers an advantage / disadvantage</p>	(3)



Q30.

Question Number	Answer	Additional Guidance	Mark
	<p>An answer that makes reference the following:</p> <ul style="list-style-type: none">• sclerenchyma (fibres) on the outer side of the {vascular bundle / phloem} (1)• xylem (vessels) on the {inner side / inside} of the vascular bundle (1)	<p>ALLOW correctly labelled diagram</p> <p>ALLOW sclerenchyma outside vascular bundle</p> <p>ALLOW xylem in the vascular bundle</p>	(2)

