



EXAM PAPERS PRACTICE

On the Wild Side -2

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: On the Wild Side -2

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



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Mark Scheme

Q1.



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Question Number	Acceptable Answer	Additional Guidance	Mark
(b)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">• survivors will have antibodies specific to the virus in their plasma (1)• antibodies given to individuals infected with Ebola will provide passive immunity (1)• the antibodies provided will		(3)

Question Number	Acceptable Answer	Additional Guidance	Mark
	therefore (1) { agglutinate / opsonise } the virus particles		



Question Number	Acceptable Answer	Additional Guidance	Mark
(c)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">• vaccine stimulates immune response to make antibodies specific to viral proteins (1)• mutations in the virus nucleic acid (1)• results in a change in the shape of the viral proteins (1)• therefore antibodies can no longer bind to the virus (1)	<p>Accept reference to antigens</p> <p>Ebola is an RNA virus but allow reference to mutations in DNA</p>	(4)



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Q2.

Question Number	Acceptable Answer	Additional guidance	Mark
(a)	$NPP = GPP - R$ (1)		(1)

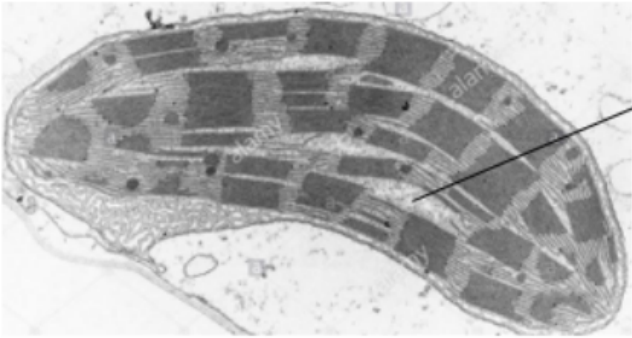
Question Number	Acceptable Answer	Additional guidance	Mark
(b)(i)	A description that makes reference to the following: <ul style="list-style-type: none">• use of several quadrats of stated area placed at random (1)• heather placed in drying oven until constant mass (1)		(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(b)(ii)	<ul style="list-style-type: none">• (gradient) $46.875 \text{ (g m}^{-2} \text{ yr}^{-1}) \times 22.186 \text{ (kJ) = } 1039.97 \text{ (g kJ m}^{-2} \text{ yr}^{-1})$ (1)• $(1037.97 \div 3\,144\,000) \times 100 =$	Example $750 \text{ g m}^{-2} \div 16 \text{ years} = 46.875 \text{ g m}^{-2} \text{ yr}^{-1}$	(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(b)(iii)	An explanation that makes reference to the following: <ul style="list-style-type: none">• moss not all removed by burning so quickly re-grows (1)• mat grass colonises after 1 year and outcompetes moss for {light / minerals / water} so is the dominant plant after 5 years (1)• both decrease as heather colonises and becomes dominant as the heather outcompetes them both for {light / minerals / water} (1)		(3)



Q3.

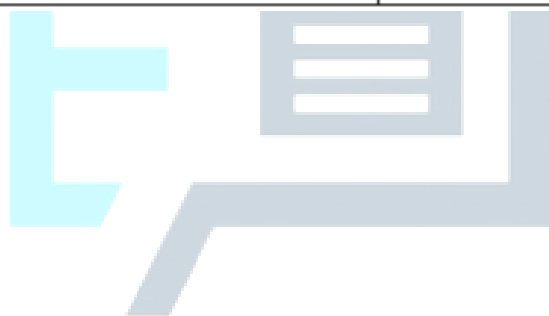
Question number	Answer	Additional guidance	Mark
(i)		<p>ALLOW location of carbon fixation</p> <p>IGNORE unqualified letters</p>	<p>Expert</p> <p>(1)</p>

Question number	Answer	Additional guidance	Mark
(ii)	<ul style="list-style-type: none"> • granum 	<p>ALLOW stack of thylakoids / thylakoid / grana</p>	<p>Graduate</p> <p>(1)</p>

Question number	Answer	Additional guidance	Mark
(iii)	<p>A description that makes reference to three of the following:</p> <ul style="list-style-type: none"> • large surface area (1) • containing {chlorophyll / photosystems / photosynthetic pigments} (1) • to absorb as much light as possible (1) • the membrane (contains) electron transport chain / (contains) ATP synthase for the synthesis of ATP (1) 	<p>ALLOW PSII</p> <p>IGNORE to absorb light unqualified</p> <p>ALLOW ATP-ase</p>	<p>Expert</p> <p>(3)</p>



Question number	Answer	Additional guidance	Mark
(iv)	<p>A description that makes reference to the following:</p> <ul style="list-style-type: none">• (the enzyme) RUBISCO (1)• combines carbon dioxide with RuBP (1)• unstable {6 carbon / 6C} molecule breaks down into (two) GP (1)	<p>ALLOW five carbon molecule / 5C molecule / ribulose biphosphate</p> <p>ALLOW glycerate phosphate</p>	Expert (2)





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Q4.

Question Number	Answer	Additional Guidance	Mark
	<p>An explanation that makes reference to five of the following:</p> <ul style="list-style-type: none">• as a result of a mutation (1)• (cyanobacteria) produce proteins containing the amino acid cysteine (1)• (cysteine rich proteins) produce {heat stable enzymes / proteins resistant to unfolding} (1)• other adaptations such as {enzymes with large hydrophobic cores / simpler protein folds / amino acids that do not bond to metal ions } (1)• high temperatures act as a selection pressure (1)• allowing them to {survive / replicate} and pass advantageous allele to next generation (1)	<p>ALLOW 'pass alleles for heat tolerance to next generation'</p>	<p>(5)</p>



Q5.

Question Number	Answer
* (i)	<p>Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme.</p> <p>The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant.</p> <ul style="list-style-type: none">• feeding behaviours• anatomy• genetic differences• no information on whether they can interbreed to produce fertile offspring• different locations do not indicate that they are different species• no information on number of elephants used for DNA analysis• GBA alleles K and L are exclusive to one type of elephant / genetic isolation



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Level	Mark	Descriptor	
Level 0	Marks	No awardable content	
Level 1	1-2	<p>An answer may be attempted but with limited interpretation or analysis of the scientific information with a focus on mainly just one piece of scientific information.</p> <p>The answer will contain basic information with some attempt made to link knowledge and understanding to the given context.</p>	<p>Makes reference to one of behavioural, phenotypic, anatomical or genetic differences</p>
Level 2	3-4	<p>An answer will be given with occasional evidence of analysis, interpretation and/or evaluation of more than one pieces of scientific information.</p> <p>The answer shows some linkages and lines of scientific reasoning with some structure.</p>	<p>Makes reference to more than one of behavioural, phenotypic, anatomical or genetic differences</p> <p>Also includes an interpretation of allele data or considers reasons why may not be different species</p>
Level 3	5-6	<p>An answer is made which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of all pieces of scientific information.</p> <p>The answer shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.</p>	<p>Also includes an interpretation of allele data and considers reasons why may not be different species</p>



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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">• two populations are geographically isolated from each other (1)• therefore reduced gene flow between the two populations (1)• which leads to allopatric speciation (1)• different selection pressures leading to natural selection (1)	<p>ALLOW description of populations separated by a geographical feature</p> <p>ALLOW description of natural selection in context of selection pressures</p>	3

Q6.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	<ul style="list-style-type: none">• appropriate x and y axis values identified (1)• correct answer 4.5 (1)	<p><u>Example of Calculation:</u> $(1800 - 900) \div 200$ $= 4.5$</p> <p>Allow full marks for correct answer with no working</p>	(2)



Question Number	Acceptable Answer	Additional Guidance	Mark
(ii)	<p>An answer that makes reference to two of the following:</p> <ul style="list-style-type: none">• maize produce more above ground dry mass for a particular amount of incident radiation (1)• maize fix more carbon for a particular leaf nitrogen concentration (1)• maize will grow in less optimum conditions so better for biofuel production (1)		(2)



Question Number	Acceptable Answer	Additional Guidance	Mark
(iii)	<p>An answer that makes reference to the following:</p> <ul style="list-style-type: none">• { select / plant } a field of sugar cane (1)• sample, at suitable time intervals, using randomly placed quadrats (1)• measure light intensity (1)• harvest, dry and weigh sugar cane (1)• { monitor / record } other abiotic factors (1)		(5)



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Q7.

Question Number	Acceptable Answer	Additional Guidance	Mark
	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">• use of buffers of different pH (1)• control other variables e.g. temperature (1)• { compare / measure } diameter of clear zone (1)		(3)

Q8.

Question Number	Answer	Additional Guidance	Mark
	<ol style="list-style-type: none">1. idea that carbon dioxide dissolves (in the water / in the oceans) ;2. for {carbon fixation / light-independent reaction / eq} ;3. by {photosynthesis / eq} of {seaweed / algae / (phyto) plankton / autotrophs / eq} ;	<p>1 ACCEPT absorbed / reacts with /diffuses into / becomes carbonic acid</p> <p>3 ACCEPT plants (that live in the sea) IGNORE organisms</p>	(2)



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Q9.

Question Number	Answer	Additional guidance	Mark
	<p>A description that makes reference to three of the following:</p> <ul style="list-style-type: none">• find mean values (1)• use a t-test/ calculate a t-value (1)• (calculated) t-value needs to be greater than the critical value (1)• (compared to cv for) probability of { 0.05 / 5% } (1)	<p>ALLOW use of mean values</p> <p>IGNORE chi-squared test</p> <p>ALLOW compare the t-value to the critical value</p>	<p>(3)</p>

Q10.

Question Number	Answer	Additional Guidance	Mark
	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none">• (addition of bacteria) changes the { gut flora / gut microbes / microbiome } (1)• resulting in a change in taste perception (1)• resulting in a change to { cravings / food preferences } (1)• preventing one type of bacterium controlling { food preferences / taste perception / cravings } (1)	<p>ALLOW (probiotics) outcompete other gut microbes</p> <p>ALLOW affects taste receptors</p>	<p>(3)</p>



Q11.

Question Number	Answer	Additional Guidance	Mark
	<p>An explanation that makes reference to three of the following</p> <ul style="list-style-type: none">• {new / young / growing} trees• resulting in net uptake of carbon dioxide / more carbon dioxide taken in by photosynthesis than released by respiration• therefore reducing carbon dioxide in the atmosphere• which slows the rate of global warming	<p>ALLOW plant more trees</p> <p>ALLOW trees acting as a carbon sink/store</p> <p>ALLOW reduces greenhouse effect</p>	<p>(3)</p>



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Q12.

Question Number	Answer	Additional Guidance	Mark
	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none">• variation in the trypsin gene• (some variations / mutations) result in production of a calcium (ion) binding site• a calcium (ion) binding site confers a (selective) advantage• (vertebrates) survive, reproduce and pass on this (trypsin) allele / the frequency of this (trypsin) allele increases	<p>ALLOW (random) mutations in the trypsin gene</p> <p>ALLOW makes the enzyme more effective</p>	<p>(3)</p>



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Q13.

Question Number	Answer	Additional guidance	Mark
	<p>An explanation that makes reference to four of the following:</p> <ul style="list-style-type: none">• mutation leads to { variation within the population of grass snakes / (snakes with) different colour or markings } (1)• (natural selection led to) those snakes which were better camouflaged surviving to reproduce (1)• (therefore) giving rise to two populations with differing allele frequency (1)• (as the result of natural selection) the two populations became reproductively isolated (1)• sympatric speciation (in the context of new species developing in the same habitat) (1)	<p>ALLOW separate gene pools develop or a change in allele frequency</p> <p>ALLOW can no longer breed with each other</p>	<p>(4)</p>

Q14.

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Question Number	Answer	Additional Guidance	Mark
	<ol style="list-style-type: none">1. (gradual) increase in {average / eq } temperature ;2. (of earth's) {surface / atmosphere} (and oceans) ;	<p>NB IGNORE any explanations as to the cause</p> <p>1 IGNORE warming</p>	<p>(2)</p>



Q15.

Question Number	Answer	Additional guidance	Mark
	<p>An explanation that makes reference to three of the following points</p> <ul style="list-style-type: none">• description of carbon dioxide as a limiting factor (1)• carbon dioxide is fixed to produce { GP / GALP } (1)• (therefore increased carbon dioxide) results in more { carbohydrate / polysaccharides / glucose } being produced (1)• which would lead to a greater rate of { growth / cell division } (1)	<p>ALLOW other relevant biological molecule e.g. amino acids, lipids, nucleic acids</p> <p>ALLOW faster growth</p>	(3)

Q16.

Question Number	Answer	Additional guidance	Mark
	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none">• relevant example of human activity (1)• increasing a named greenhouse gas (1)• therefore more {heat energy / infrared radiation} is trapped in the atmosphere (1)• causing a mean increase in the {surface / atmospheric} temperature (1)	<p>e.g. burning fossil fuels / landfill / cattle ranching / deforestation</p> <p>e.g. carbon dioxide / methane</p> <p>ALLOW more heat trapped in the atmosphere</p>	(3)



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Q17.

Question Number	Answer	Additional guidance	Mark
(i)	<p>An explanation that makes reference the following:</p> <ul style="list-style-type: none">• hydrolysis of ATP (1)• provides energy for the reaction (1)• provides phosphate group for phosphorylation of F-6-P (1)	<p>ALLOW as the reaction requires energy</p> <p>ALLOW provides {phosphate / Pi} that is added to F-6-P</p>	(3)

Question Number	Answer	Additional guidance	Mark
(ii)	<p>An answer that makes reference to three of the following:</p> <ul style="list-style-type: none">• as concentration of { F-6-P / F-2,6-BP } increases so does the (initial) rate of reaction of the phosphofructokinase (1)• an increasing in the concentration of { F-6-P / F-2,6BP } will increase the rate of glycolysis (1)• up to a maximum (rate) (1)• increasing the concentration of F-2,6-BP reduces the concentration of F-6-P required to achieve the maximum rate of glycolysis (1)	<p>ALLOW 'enzyme' for 'phosphofructokinase'</p> <p>ALLOW F-2,6-BP provides positive feedback to the enzyme activity</p>	(3)



Q18.

Question Number	Answer	Additional guidance	Mark
	<p>An explanation that makes reference to three of the following</p> <ul style="list-style-type: none">• not all of the light falls on the { leaves / plants / producers } (1)• some of the light is reflected (from the surface of the leaf) (1)• some of the light misses the chloroplasts (and passes through leaf) (1)• some of the light is { the wrong wavelength / not absorbed by the chlorophyll } (1)	<p>ALLOW energy instead of light</p> <p>ALLOW some of the light falls on { bark/parts of the plant that do not photosynthesise}</p> <p>ALLOW chlorophyll / photosystem</p> <p>ALLOW description of not all light wavelengths being absorbed</p>	<p>(3)</p>



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Q19.

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

Question Number	Acceptable Answer	Additional guidance	Mark
(b)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">• mosquitoes are geographically isolated in the tunnels (1)• random genetic mutations cause variation in the population which allows some individuals to feed on rats, mice and humans (1)• these individuals {will be selected for / are more likely to survive and reproduce} (1)• the proportion of individuals in the population with this mutation will change over time (1)• over many generations these populations become genetically distinct from the above ground population (1)		(5)

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Q20.



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Question Number	Acceptable Answer	Additional Guidance	Mark
(a)(i)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">• there is no concentration gradient present between the chloroplast and the isolation solution (1)• no net loss of water from the chloroplast from osmosis (1)		(2)



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Question Number	Acceptable Answer	Additional Guidance	Mark
(a)(ii)	An explanation that makes reference to the following: <ul style="list-style-type: none">• low temperature to (temporarily) slow enzyme activity (1)• pH 7.0 so enzymes not denatured (1)• so RUBISCO remains active (1)		(3)

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)(i)	There is no correlation between the concentration of DCMU and the rate of DCPIP colour change		(1)



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Question Number	Acceptable Answer	Additional Guidance	Mark
(b)(ii)	7 and 49		(1)
Question Number	Acceptable Answer	Additional Guidance	Mark
(b)(iii)	<ul style="list-style-type: none">• Correct calculation of numerator (1)• Correct calculation of denominator (1)• Correct calculation of correlation coefficient (1)	<p><u>Example of calculation:</u></p> $(\sum d^2 = 996) \div (n(n^2-1) = 504)$ $= (-) 0.976$ <p>Allow all marks for correct answer with no working</p>	(3)

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)(iv)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">• Selection of appropriate critical value from the table (1)• calculated value is greater (than critical value) (1)• Can reject the null hypothesis / correlation is significant (1)	0.786 , 0.833 , 0.881	(3)



Q21.

Question Number	Answer	Additional Guidance	Mark
(i)	<p>1. solution should contain (all) the {mineral / ions} that duckweed needs ;</p> <p>2. at the minimum concentration / eq ;</p> <p>Any two correctly named ion and its corresponding function :</p> <p>e.g. {nitrate (ions) / NO_3^{2-}} for {amino acids / protein / nucleic acid / ATP / chlorophyll / eq}</p> <p>{magnesium ions / Mg^{++}} for chlorophyll</p> <p>{calcium ions / Ca^{++}} for {cell wall / pectate / middle lamella / eq }</p> <p>{phosphate (ions) / PO_4^{3-}} for { nucleic acid /ADP / ATP / NAD /phospholipid / eq} ; ;</p>	<p>1 IGNORE nutrients</p> <p>2 ACCEPT in excess</p> <p>IGNORE carbon dioxide and wrong formulae</p> <p>NOT nitrogen</p> <p>NOT magnesium</p> <p>NOT calcium</p> <p>ACCEPT membrane</p> <p>NOT phosphorous</p>	(3)



Question Number	Answer	Additional Guidance	Mark
(ii)	<ol style="list-style-type: none">1. idea of {extrapolation / drawing a line of best fit / eq} (to estimate number of fronds after 10 days) ;2. read value from graph / eq ;3. idea of subtracting { 50 / 10 } from the number of fronds after 10 days ;	NB Apply this mark scheme even if they describe weighing the fronds and calculating the mass increase 2 IGNORE time refs.	(2)



Q22.

Question Number	Answer	Additional Guidance	Mark
	<ol style="list-style-type: none">1. idea that light is reduced by the deeper water ;2. idea that carbon dioxide levels might be lower deeper down ;3. idea that temperature might be lower deeper down ;4. idea that {photosynthesis / eq} will be reduced ;5. idea that less {glucose / hexose / GALP / GP / eq } produced to convert into {biomass / NPP / eq} ;6. idea that GPP goes down but respiration {stays the same / increases} ;	<p>NB ACCEPT converse of mp 1 - 5 if in context of shallow water</p> <p>5 IGNORE energy</p>	



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Q23.

Question Number	Answer	Additional Guidance	Mark
	<p>An answer that makes reference to five of the following:</p> <ul style="list-style-type: none">• variable {heights / altitude} (1)• {collecting / growing} plants for each sample (1)• standardising plant material to be analysed (1)• other abiotic factors taken into account (1)• method of extraction of pigment (1)• method to measure pigment (1)	<p>ALLOW reference to plant material in place of plants</p> <p>e.g. same mass / same part of plant</p> <p>e.g. humidity, wind speed, soil moisture, soil pH</p> <p>e.g. use of solvent</p> <p>e.g. use of colorimeter</p>	(5)



Q24.

Question Number	Answer	Additional guidance	Mark
	<p>An answer that makes reference to four of the following</p> <ul style="list-style-type: none">• succession has occurred (1)• alder and spruce were the first species of tree to colonise (1)• slowest increase in abundance was spruce (1) • (interspecific) competition occurs between the three species (1) • example of resources competed for (1)	<p>IGNORE primary or secondary</p> <p>ALLOW either alder or spruce</p> <p>ALLOW description of increase and decrease of abundance of each species over time</p> <p>ALLOW spruce and hemlock compete with alder / hemlock competes with spruce and alder</p> <p>e.g. water, mineral ions, light, etc.</p>	<p>(4)</p>

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Question Number	Answer	Additional guidance	Mark
	<p>An explanation that makes reference to the following</p> <ul style="list-style-type: none">• the bare rock was colonised by pioneer species (1)• (these pioneer species) break up the rock (1)• dead plants add {humus / organic matter} (as they decompose) (1)• (eventually trees will be able to grow) as the soil { becomes deeper / can retain more water } (1)	<p>ALLOW algae or lichen</p>	<p>(3)</p>