



EXAM PAPERS PRACTICE

On the Wild Side -3

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 -3

Type: Mark Scheme

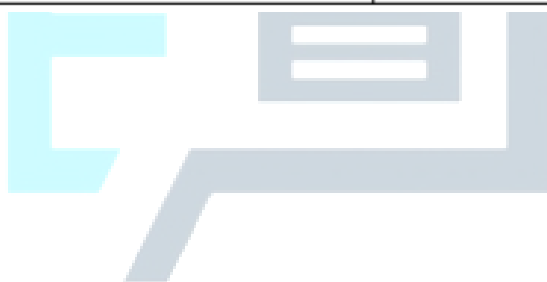
To be used by all students preparing for Edexcel AS and A level Biology A and Biology B - Students of other Boards may also find this useful



Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
(i)	An answer that makes reference to the following: <ul style="list-style-type: none">treatment of seeds with sodium chloride or sodium chloride and gibberellin has no effect on the number of seeds that germinate (1)		(1)





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Question number	Answer	Additional guidance	Mark																																																												
(ii)	<p>Choose an item.</p> <ul style="list-style-type: none"> • correct expected value calculated (1) • $(O - E)^2$ values calculated (1) • Sum of $(O - E)^2$ values divided by expected value (1) 	<p>Example of calculation:</p> <p>= 42</p> <p>36, 81 and 9</p> <p>$126 \div 42 = 3$</p> <p>ALLOW calculations based on E value of 48 or 50</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Obs</th> <th>Exp</th> <th>$(O - E)^2$</th> <th>$(O - E)^2/E$</th> </tr> </thead> <tbody> <tr> <td>48</td> <td>42</td> <td>36</td> <td>0.857143</td> </tr> <tr> <td>33</td> <td>42</td> <td>81</td> <td>1.928571</td> </tr> <tr> <td>45</td> <td>42</td> <td>9</td> <td>0.214286</td> </tr> <tr> <td></td> <td></td> <td></td> <td>3</td> </tr> <tr> <td colspan="4"> </td> </tr> <tr> <td>48</td> <td>50</td> <td>4</td> <td>0.08</td> </tr> <tr> <td>33</td> <td>50</td> <td>289</td> <td>5.78</td> </tr> <tr> <td>45</td> <td>50</td> <td>25</td> <td>0.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td>6.36</td> </tr> <tr> <td colspan="4"> </td> </tr> <tr> <td>48</td> <td>48</td> <td>0</td> <td>0</td> </tr> <tr> <td>33</td> <td>48</td> <td>225</td> <td>4.6875</td> </tr> <tr> <td>45</td> <td>48</td> <td>9</td> <td>0.1875</td> </tr> <tr> <td></td> <td></td> <td></td> <td>4.875</td> </tr> </tbody> </table> <p>Correct answer with no working gains full marks</p>	Obs	Exp	$(O - E)^2$	$(O - E)^2/E$	48	42	36	0.857143	33	42	81	1.928571	45	42	9	0.214286				3					48	50	4	0.08	33	50	289	5.78	45	50	25	0.5				6.36					48	48	0	0	33	48	225	4.6875	45	48	9	0.1875				4.875	(3)
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Question number	Answer	Additional guidance	Mark
(iii)	An answer that makes reference to the following: <ul style="list-style-type: none">calculated value is significant at $p = 0.05$ (1)at 2 degrees of freedom (1)		(2)

Q2.

Question Number	Answer	Additional Guidance	Mark
(a)	1. (rate of) { energy incorporated into / production of / eq} {biomass / organic material} ; 2. in {plants / producers} ;	2. Accept from photosynthesis	(2)

Question Number	Answer	Additional Guidance	Mark
(b)(i)	1. very little GPP in seagrass / majority present in {microphytobenthos and phytoplankton / phytoplankton} ; 2. (roughly) equal distribution (of GPP) between microphytobenthos and phytoplankton ;	1. Accept only 2.5 to 5% in seagrass, 95% in micro and phyto, more than 50% or about 55% of phyto 2. Accept about 50% in each Accept idea that GPP in microphytobenthos is slightly lower than in phytoplankton	(2)



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Question Number	Answer	Additional Guidance	Mark
(b)(ii)	<ol style="list-style-type: none"> idea of obtaining a value from the chart e.g. percentage, area, degrees, ratio ; idea of how to use this to calculate GPP ; 	<p>Ignore units</p> <p>1. Accept appropriate figures in range 50 – 55 %</p> <p>2. Accept e.g. (percentage) multiplied by 8.4×10^6</p> <p>NB $\frac{\text{angle} \times 840 \times 10^6}{360} = 2 \text{ marks}$</p> <p>$\frac{\text{area of segment} \times 840 \times 10^6}{\text{area of circle}} = 2 \text{ marks}$</p>	(2)

Question Number	Answer	Additional Guidance	Mark
(b)(iii)	<ol style="list-style-type: none"> {more / fast / high / eq} photosynthesis ; water less {cloudy / churned up } / shallow water / high light penetration / eq ; high {nutrient / carbon dioxide} levels in the sea / eq ; {high / optimum} temperatures ; high light intensity (in this area) / eq ; idea of less respiration ; 	<p>2. Accept less current, less tidal</p>	(2)
Question Number	Answer	Additional Guidance	Mark
(c)	<ol style="list-style-type: none"> $\text{NPP} = \text{GPP} - \text{R}$ / eq ; energy lost as heat / eq ; named use of energy (released by respiration); 	<p>1. Accept correct description in words</p> <p>3. Accept e.g. movement, opening of flowers, glycolysis, metabolic processes</p>	(2)



Q3.

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">• because plants produce {organic compounds/biomass} from photosynthesis (1)• plants remove carbon dioxide (from the atmosphere) (1)• because animals produce (more) carbon dioxide by respiration (1)• because (some) animals produce methane (1)	<p>ALLOW named biological molecule e.g. starch, sugar</p> <p>ALLOW plants are carbon neutral</p> <p>ALLOW converse for plants</p>	Expert (3)

Question Number	Answer	Additional guidance	Mark
(ii)	<p>An explanation that makes reference to the following</p> <ul style="list-style-type: none">• (deforestation cuts down) trees which are carbon sinks (1)• {burning / decomposition} of these trees releases carbon dioxide into the atmosphere (1)• without trees there is {less/no} photosynthesis to remove carbon dioxide (from the atmosphere) (1)	<p>ALLOW trees are stores of carbon</p>	Expert (3)



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Q4.

Question number	Answer	Additional guidance	Mark
	<p>A description that makes reference to four of the following:</p> <ul style="list-style-type: none">• select two fields with similar {pests / abiotic} factors (1)• spray one field with a high concentration of pesticide and one with the {minimum / low} concentration of pesticide (1)• using a random sampling method to count pests in each field (1)• repeat sampling over a period of time (1)• description of how results would demonstrate competitive release (1)	<p>ALLOW select patients with similar {cancer / tumours}</p> <p>ALLOW different doses of chemotherapy or cancer-treating drugs</p> <p>ALLOW measurement of size of tumour</p> <p>e.g. if number of pests in field sprayed with high concentration of pesticide show greater number of pests then it will prove the effect of competitive release</p> <p>OR</p> <p>If the cancer responds better to low dose of drugs proves competitive release</p>	<p>Expert</p> <p>(4)</p>



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Question number	Answer	Additional guidance	Mark
	<p>A description that makes reference to four of the following:</p> <ul style="list-style-type: none">• suitable study group selected (1)• treat one group with high dose and a second group with {minimum / lower} dose (1)• suitable sampling method (1)• repeat sampling over a period of time (1)• description of how results would demonstrate competitive release (1)	<p>e.g. (two) groups of patients with same cancer (two) similar fields (two) flasks of bacteria</p> <p>e.g. chemotherapy agent pesticide antibiotic</p> <p>e.g. scanning random quadrats zones of inhibition</p> <p>e.g. (demonstrates competitive release if eventually)</p> <p>number of pests in field sprayed with high concentration of pesticide greater than number in field sprayed with lower concentration</p> <p>the cancer responds better to low dose of drugs than high dose</p> <p>only the low dose treated group remain sensitive to the antibiotic</p>	<p>Expert (4)</p>



Q5.

Question Number	Answer	Mark
	B light-independent reaction	(1)

Q6.

Question Number	Answer	Mark
(i)	C – humidity <i>The only correct answer is C</i> <i>A is not correct because resistance to infection is a biotic factor</i> <i>B is not correct because pathogens are biotic factors</i> <i>D is not correct because ocean pH is an abiotic factor but not one relevant to plants and their pathogens</i>	(1)

Question Number	Answer	Mark
(ii)	B – global warming <i>The only correct answer is B</i> <i>A is not correct because increase CO₂ to 1080 ppm does not decrease photosynthesis</i> <i>C is not correct because increased CO₂ to 1080 ppm does not increase plant respiration</i> <i>D is not correct because increased CO₂ to 1080 ppm does not cause ozone depletion</i>	(1)



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Question Number	Answer	Additional Guidance	Mark
(iii)	<p>An explanation that makes reference to the following</p> <ul style="list-style-type: none">• carbon dioxide (is a greenhouse gas and) causes global warming• a relevant description of a change in the distribution of ash trees (with increasing CO₂ concentrations)• (because increased CO₂) would result in a change in the range for <i>H. fraxineus</i> (1)• and ash trees will be found in regions without <i>H. fraxineus</i>• change in range of { <i>H. fraxineus</i> / ash trees } linked to a relevant aspect of climate change	<p>e.g. an increase to 430 ppm leads to more ash trees in the east or an increase to 1080 ppm leads to more ash trees in the north</p> <p>e.g. temperature increase, change in humidity, change in rainfall patterns</p>	(5)

Q7.

Question Number	Answer	Additional Guidance	Mark
	reaction A = phosphorylation ; reaction B = hydrolysis ;		(2)



Q8.

Question Number	Answer	Additional Guidance	Mark
	B carbon dioxide and water		(1)

Q9.

Question Number	Answer	Mark
	C $\text{kJ m}^{-2} \text{year}^{-1}$	(1)

Q10.

Question Number	Answer	Mark
(i)	The only correct answer is D thylakoids <i>A is not correct because the cristae are not found in the chloroplast</i> <i>B is not correct because the matrix is not found in the chloroplast</i> <i>C is not correct because the stroma is not the site of the light-dependent reactions</i>	(1)

Question Number	Answer	Mark
(ii)	The only correct answer is D reduced NADP, ATP and oxygen <i>A is not correct because carbon dioxide is not a product of photosynthesis</i> <i>B is not correct because glucose is the end product of the light independent reactions</i> <i>C is not correct because reduced NAD is not a product of the light-dependent reactions</i>	(1)



EXAM PAPERS PRACTICE

Question Number	Answer	Mark
(iii)	<p>The only correct answer is D water</p> <p><i>A is not correct because glucose is not the source of hydrogen in the light-dependent reactions</i></p> <p><i>B is not correct because reduced NAD is not the source of hydrogen in the light-dependent reactions</i></p> <p><i>C is not correct because reduced NADP not the source of hydrogen in the light-dependent reactions</i></p>	(1)

Q11.

Question Number	Answer	Additional guidance	Mark
	<p>An answer that makes reference to four of the following</p> <ul style="list-style-type: none">• fewer seeds will lead to a decrease in the plant population(1)• fewer seeds means that there is less {food / energy} (1)• lipids and carbohydrates contain (large amounts) of stored energy(1)• the monkeys will not be able to generate enough heat to survive the cold winters(1)• the monkey population will decrease in size (1)	<p>ALLOW lipids needed for insulation/less respiration to generate heat</p>	(4)



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Q12.

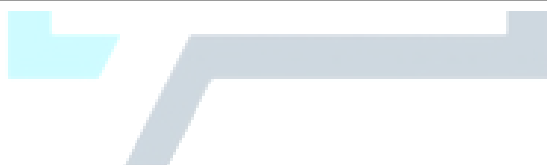


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Question Number	Answer
*	<p>Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme.</p> <p>The indicative content below 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">• standardisation of composition of compost heaps• identification of species• abundance of each species of organism in the sample• determination of C:N / set up compost heaps with different C:N ratios• time e.g. days / intervals / repetition of sampling• other factors to monitor or control e.g. water / gases / humidity / temperature / aeration / mass• sampling technique e.g. location of sample within compost heap / repetition of sampling



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Level	Mark	Descriptor	
0	Marks	No awardable content	
Level 1	1-2	<p>An explanation of how the investigation should be modified may be attempted but with limited analysis, interpretation and/or evaluation of the scientific information. Generalised comments made.</p> <p>The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context.</p>	<p>Measure / set up compost heaps with different C:N ratios</p> <p>Observe species present over time</p>
Level 2	3-4	<p>An explanation of how the investigation should be modified will be given with occasional evidence of analysis, interpretation and/or evaluation of the scientific information.</p> <p>The explanation shows some linkages and lines of scientific reasoning with some structure.</p>	<p>Recording species present / numbers of each species / measuring C:N ratio</p> <p>Monitoring changes over time</p> <p>Control of relevant factors</p>
Level 3	5-6	<p>An explanation of how the investigation should be modified is given which is supported throughout by evidence from the analysis, interpretation and/or evaluation of the scientific information.</p> <p>The explanation shows a well-developed and sustained line of scientific reasoning which is clear, coherent and logically structured.</p>	<p>Description of a suitable sampling technique</p> <p>Linking species present or species density to C:N measurements</p> <p>Use of a statistical test to compare changes of time / C:N ratio</p> <p>Use information on numbers of species and population sizes to demonstrate succession</p>



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Q13.

Question Number	Answer	Additional guidance	Mark
	<p>An answer the makes reference to four of the following:</p> <ul style="list-style-type: none">• use pH buffers at a range of pH values below 7 (1)• provide an excess of ATP (1)• (use) F-6-P at an appropriate concentration (1)• suitable variable controlled (1)• measure quantity of F-2,6-BP produced per unit time (1)	<p>e.g. 2 mmol dm⁻³ (values between 1 and 2.5 mmol dm⁻³)</p> <p>e.g. {enzyme / phosphofructokinase } concentration / temperature</p> <p>ALLOW measure change in concentration of F-2,6-BP / phosphate incorporated</p>	(4)



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Q14.

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>



Q15.

Question Number	Acceptable Answer	Additional guidance	Mark
(a)(i)	An answer that makes reference to the following: <ul style="list-style-type: none">• {cold / buffered} to stop enzyme denaturation (1)• sucrose to stop osmotic loss of water from chloroplasts (1)		(2)

Question Number	Acceptable Answer	Additional guidance	Mark
(a)(ii)	<ul style="list-style-type: none">• tube 3 is a control to show DCPIP does not change colour over time (1)		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
(a)(iii)	An explanation that makes reference to the following: <ul style="list-style-type: none">• set up tubes identical to tube 1 so that chloroplasts are available (1)• set up several tubes to ensure data is reliable (1)• tubes exposed to light of different wavelengths for same time because time affects number of electrons released / tubes exposed to light of same intensity because intensity affects number of electrons released (1)• use a colorimeter with a red filter to measure absorbance (1)		(4)

Question Number	Acceptable Answer	Additional guidance	Mark
(b)(i)	C		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
(b)(ii)	A		(1)



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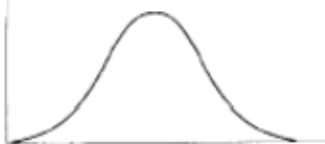
Q16.



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Question Number	Answer	Additional Guidance	Mark
(i)	<ul style="list-style-type: none">(symmetrical) bell-shaped curve drawn (1)		(1)

Question Number	Answer	Additional Guidance	Mark
(ii)	<ul style="list-style-type: none">specimen 7 = 1.277 AND $\Sigma x_1^2 = 12.198$ (1)		(1)

Question Number	Answer	Additional Guidance	Mark
(iii)	<ul style="list-style-type: none">Top line of formula correctly calculated (1)correct answer to two significance figures (1)	<u>Example of calculation</u> 9.055 - 9.006 = 0.0054 / 0.00544 / 5.4×10^{-3}	(2)



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Question Number	Answer	Additional Guidance	Mark
(iv)	<ul style="list-style-type: none">top line of formula correctly calculated (1)bottom line of formula correctly calculated (1)correct answer to between three and five significant figures (1)	<p><u>Example of calculation</u></p> <p>0.153</p> <p>0.0336 (OR 0.0337 if 0.00544 used)</p> <p>= 4.55 (OR 4.54 if 0.00544 used)</p> <p>ALLOW answer between 4.5510 and 4.5540</p> <p>Correct answer with no working gains full marks</p>	(3)

Question Number	Answer	Additional Guidance	Mark
(v)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none">there was a significant difference between {the 3% and the 5% salt solution / groups} (1)at the 5% significance level (1)	<p>IGNORE significant correlation / significant relationship</p> <p>ALLOW 95% probability there is a difference e.g. '5% chance that the difference is due to chance' or with 95% certainty'</p> <p>IGNORE $p = 0.05$</p>	(2)



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Q17.

Question Number	Answer	Additional Guidance	Mark
	An answer that makes reference to the following: <ul style="list-style-type: none">thylakoid membrane / grana / granum	ALLOW phonetic spelling ALLOW lamella	(1)

Q18.



Question Number	Answer	Additional Guidance	Mark
(a)	C ; nucleus and large (80S) ribosomes		(1)

Question Number	Answer	Additional Guidance	Mark
(b)	A ; algae have chloroplasts, the fungi do not		(1)

Question Number	Answer	Additional Guidance	Mark
(c)	1. (advantage of sexual reproduction / meiosis) {genetically different / greater gene pool / greater genetic diversity /eq} ; 2. (advantage of asexual reproduction / mitosis) faster / one of each organism needed / conserves advantageous alleles ;	2. Accept don't need a mate	(2)

Question Number	Answer	Additional Guidance	Mark
(d)(i)	C ; area exposed to bright sunlight and protected from the wind		(1)



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Question Number	Answer	Additional Guidance	Mark
(d)(ii)	<ol style="list-style-type: none">1. idea of using a quadrat ;2. idea of {random / systematic} sampling (of wall) ;3. {count number of squares/ determine area} containing lichen /eq ;4. credit an indication of how the percentage was calculated ;	<p>1. Accept description of quadrat, use of photo and a grid</p> <p>3. NB reference to measuring percentage cover only is too vague as it is repeating stem of question</p>	(3)

Question Number	Answer	Additional Guidance	Mark
(d)(iii)	<ol style="list-style-type: none">1. ref to use of light {probe / sensor / eq} ;2. idea of taking several measurements ;	<p>1 Accept description of a light sensor</p> <p>2. Accept ref to places or times of day</p>	(2)

Question Number	Answer	Additional Guidance	Mark
(d)(iv)	<ol style="list-style-type: none">1. plot a (scatter) graph of light intensity against lichen / eq ;2. reference to looking for a correlation ;3. reference to use of statistics test ;4. appropriate named test eg Spearman's rank, Pearson ;	<p>2. Accept ref to line of best fit, ref to correlation coefficient also gets Mp 3</p>	(3)



Q19.

Question Number	Acceptable Answer	Additional Guidance	Mark
	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none">• deforestation results in (geographical) isolation of the populations of Aye-eyes (1)• resulting in reduced gene flow between the populations (1)• different selection pressures leading to natural selection (1)• leading to sympatric speciation (1)		(3)



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Q20.

Question Number	Answer	Additional Guidance	Mark
	<ul style="list-style-type: none">peer review (1)	ALLOW reviewed by other scientists IGNORE peer assessment	(1)

Q21.

Question number	Answer	Additional guidance	Mark
	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none">there was isolation of (populations) of finches (1)there were different selection pressures (at the different locations) (1)(different / random) mutations in (different) populations of finches (1)therefore allowing populations to adapt to different selection pressures (1)	<p>ALLOW finches in different locations</p> <p>ALLOW different food sources act as a selection pressure</p> <p>ALLOW different beak shapes due to mutations DO NOT ALLOW selection pressures caused mutations</p> <p>ALLOW finches with better adapted beaks passed on their (favourable) alleles resulting in a change in the {allele frequency / gene pool}</p>	Expert (3)



Q22.

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)



Q23.

Question Number	Answer	Additional guidance	Mark
	<p>An explanation that makes reference to two of the following:</p> <ul style="list-style-type: none">• $GPP - R = NPP$ (1)• {organic molecules / glucose} used in respiration to provide energy (1)• because the more {organic molecules / glucose} used in respiration, the less is available for the production of biomass (1)	<p>ALLOW word equation or rearranged equation</p> <p>ALLOW more respiration results in less biomass</p>	(2)

Q24.

Question Number	Answer	Additional Guidance	Mark
(a)(i)	$NPP = 4680$; $R = 5720$;	NB If there are no answers in the box, look for answers in the space below question If answers are the wrong way round, award 1 mark If both answers are wrong, accept $R = 10168.9 / 10169$	(2)

Question Number	Answer	Additional Guidance	Mark
(a)(ii)	<ol style="list-style-type: none">1. $NPP = GPP - R$ / eq;2. 55% (GPP energy) is lost / eq ;3. energy lost as heat / eq ;4. to provide energy for {active transport / any other named energy-requiring process} ;5. NPP is {(stored) energy / energy available for next trophic level / eq} ;	<p>Accept correct description in words</p> <p>eg movement (opening of flowers, turning of leaves), glycolysis</p> <p>Ignore idea that energy is used for respiration unqualified</p> <p>Accept biomass</p>	(3)



EXAM PAPERS PRACTICE

Question Number	Answer	Additional Guidance	Mark
(b)	<ol style="list-style-type: none">1. cattle {are primary consumers / herbivores / eat grass / eat plants / eq} ;2. (therefore) gain energy (available as NPP) ;3. idea of grazing capacity of the grassland ;4. idea of affect on yield of {meat / milk / eq} ;5. idea of changing to a more {efficient / NPP yielding} crop ;	<p>Accept idea that farmer is ensuring that there is enough NPP available for his cattle</p> <p>Accept growth rate</p>	(3)

Question Number	Answer	Additional Guidance	Mark
(c)	<ol style="list-style-type: none">1. idea of variation over short periods of time;2. idea that whole year gives an {average / overall / eq} value ;3. idea that biomass includes {all / undigestible / inedible / eq} organic material ;4. idea that rate of productivity may influence how much grazing is possible ;	eg more NPP on a sunny day, seasonal	(2)

EXAM PAPERS PRACTICE



Q25.

Question Number	Answer	Additional guidance	Mark
	<p>An answer that makes reference to four of the following points</p> <ul style="list-style-type: none">• (difference in number of species) not due to temperature and soil moisture content as they are the {same/similar} in the two woodlands (1)• the light intensity is the most likely reason for the greater number of species as it is higher in the deciduous woodland (1)• description of the effect of light intensity on plant growth (1)• the pH of the soil in the coniferous woodland is acidic so this may also reduce the number of species found (1)• only plant species considered and not other organisms (1)	<p>e.g. high light intensity allows a greater rate of photosynthesis / more photosynthesis or plants need to be adapted to low light intensities</p>	<p>(4)</p>