

# Mark Scheme January 2009

GCE

GCE Biology (8BI01)

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January 2009

Publications Code US020818

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## Mark Schemes

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## GENERAL INTRODUCTION

Mark schemes are prepared by the Principal Examiners and revised, together with the relevant questions, by a panel of senior examiners and subject teachers. The schemes are further amended at the Standardisation meetings attended by all examiners. The Standardisation meeting ensures as far as possible that the mark scheme covers the candidates' actual responses to questions and that every examiner understands and applies it in the same way.

The schemes in this document are the final mark schemes used by the examiners in this examination and include the amendments made at the meeting. They do not include any details of the discussions that took place in the meeting, nor do they include all of the possible alternative answers or equivalent statements that were considered to be worthy of credit.

It is emphasised that these mark schemes are working documents that apply to these papers in this examination. Every effort is made to ensure a consistent approach to marking from one examination to another but each marking point has to be judged in the context of the candidates' responses and in relation to the other questions in the paper. It should not be assumed that future mark schemes will adopt exactly the same marking points as this one.

Edexcel cannot under any circumstances discuss or comment informally on the marking of individual scripts. Any enquiries about the marks awarded to individual candidates can be dealt with only through the official Enquiry about Results procedure.

## Unit Codes and Unit Titles

These Mark Schemes cover the units offered in this examination for Advanced Subsidiary Biology (8BI01) and Advanced Biology (9BI01). The units available in this examination series for the complete qualifications are listed in the table below.

Level	Unit	Biology	
AS	1	6BI01	Lifestyle, Transport, Genes and Health
	2	6BI02	Development, Plants and the Environment
	3	6BI03	Practical Biology and Research Skills
A2	4	6BI04	The Natural Environment and Species Survival
	5	6BI05	Energy, Exercise and Coordination
	6	6BI06	Practical Biology and Investigative Skills

## Cashing in

The following tables show the units that must be taken in order to obtain an award for AS or Advanced GCE Biology, or for AS or Advanced GCE Biology (Human).

### Advanced Subsidiary

Level	Unit	8BI01 Biology
AS	1	6BI01
	2	6BI02
	3	6BI03

### Advanced GCE

Level	Unit	9BI01 Biology
AS	1	6BI01
	2	6BI02
	3	6BI03
A2	4	6BI04
	5	6BI05
	6	6BI06

## GENERAL INFORMATION

The following symbols are used in the mark schemes for all questions:

Symbol	Meaning of symbol
; semi colon	Indicates the end of a marking point
eq	Indicates that credit should be given for other correct alternatives to a word or statement, as discussed in the Standardisation meeting
/ oblique	Words or phrases separated by an oblique are alternatives to each other
{ curly brackets	Indicate the beginning and end of a list of alternatives (separated by obliques) where necessary to avoid confusion
() round brackets	Words inside round brackets are to aid understanding of the marking point but are not required to award the point
[] square brackets	Words inside square brackets are instructions or guidance for examiners
[CE] or [TE]	Consecutive error / transferred error

### Crossed out work

If a candidate has crossed out an answer and written new text, the crossed out work can be ignored. If the candidate has crossed out work but written no new text, the crossed out work for that question or part question should be marked, as far as it is possible to do so.

### Spelling and clarity

In general, an error made in an early part of a question is penalised when it occurs but not subsequently. The candidate is penalised once only and can gain credit in later parts of the question by correct reasoning from the earlier incorrect answer.

No marks are awarded specifically for quality of language in the written papers, except for the essays in the synoptic paper. Use of English is however taken into account as follows:

- the spelling of technical terms must be sufficiently correct for the answer to be unambiguous  
e.g. for amylase, 'ammalase' is acceptable whereas 'amylose' is not  
e.g. for glycogen, 'glicojen' is acceptable whereas 'glucagen' is not  
e.g. for ileum, 'illeum' is acceptable whereas 'ilium' is not  
e.g. for mitosis, 'mytosis' is acceptable whereas 'meitosis' is not
- candidates must make their meaning clear to the examiner to gain the mark.
- a correct statement that is contradicted by an incorrect statement in the same part of an answer gains no mark - irrelevant material should be ignored

Unit 1 6BI01

Question Number	Answer	Mark
1	<ol style="list-style-type: none"><li>1. platelets / thrombocytes ;</li><li>2. prothrombin ;</li><li>3. enzyme ;</li><li>4. fibrinogen ;</li><li>5. fibrin ;</li><li>6. cells / erythrocytes / platelets / thrombocytes ;</li></ol>	(6)

Question Number	Answer	Mark
2(a)	1. translation ; 2. transcription ; 3. translation ; 4. translation ; 5. transcription ;	(5)

Question Number	Answer	Mark
2(b)(i)	glutamine ;	(1)

Question Number	Answer	Mark
2(b)(ii)	cysteine glutamine cysteine arginine proline proline ;	(1)

Question Number	Answer	Mark
2(b)(iii)	ATC ;	(1)

Question Number	Answer	Mark
2(b)(iv)	U G U G A A U G U C G G C C A C C C ;	(1)

Question Number	Answer	Mark
2(b)(v)	The polypeptide chain would be no more than 89 amino acids long ;	(1)



Question Number	Answer	Mark
3(a)(i)	<ol style="list-style-type: none"> <li>1. two glucose molecules correctly drawn ;</li> <li>2. indication that water is formed ;</li> <li>3. glycosidic bond correctly drawn ;</li> </ol>	(3)

Question Number	Answer	Mark
3(a)(ii)	glycosidic (bond) ;	(1)

Question Number	Answer	Mark
3(b)	<ol style="list-style-type: none"> <li>1. reference to amylose and amylopectin ;</li> <li>2. credit details of amylose e.g. straight chain, spiraled, 1-4 links ;</li> <li>3. credit details of {amylopectin / starch} e.g. branched, (1-4 and) 1-6 links ;</li> <li>4. idea that it is easily hydrolysed ;</li> <li>5. idea of compact structure ;</li> <li>6. (leading to) more glucose in a smaller space (in a cell) ;</li> <li>7. idea of being {insoluble / large} ;</li> <li>8. (leading to ) it {not diffusing out of cells / having {little / no} osmotic effect} / eq ;</li> </ol> <p>NB maximum of 3 marks for structural points (pts 1, 2, 3, 5 and 7)</p>	max (4)

Question Number	Answer	Mark
4(a)	<ol style="list-style-type: none"> <li>1. {fatty acids / tails} are {hydrophobic / non-polar} ;</li> <li>2. so orientate themselves away from {water / polar environment} /eq ;</li> <li>3. {phosphate / heads} are {hydrophilic / polar} ;</li> <li>4. so can interact with {water / polar environment} / eq ;</li> <li>5. reference to {cytoplasm / tissue fluid / eq} as the polar environment ;</li> </ol>	max (3)

Question Number	Answer	Mark
4(b)(i)	<p>Any two from:</p> <p>temperature,  surface area / volume (of beetroot),  part,  age,  variety,  storage,  source,  volume of ethanol,  same {wavelength / filter} ;;</p>	max (2)

Question Number	Answer	Mark
4(b)(ii)	<ol style="list-style-type: none"> <li>1. {cells / membranes / eq} damaged (by cutting up of pieces) / eq ;</li> <li>2. (as a result pigment) could leak out of {vacuoles / cells} ;</li> </ol>	(2)

Question Number	Answer	Mark
4(b)(iii)	rinse pieces (thoroughly) / dab pieces dry / eq ;	(1)

Question Number	Answer	Mark
4(c)(i)	increased ethanol concentrations, increases intensity / eq ;	(1)

Question Number	Answer	Mark
4(c)(ii)	<ol style="list-style-type: none"> <li>1. reference to {disruption / eq} of membrane ;</li> <li>2. ethanol is a (non-polar / organic) <u>solvent</u> ;</li> <li>3. idea that {lipids / eq} dissolve (in alcohol) ;</li> <li>4. idea that increase in ethanol causes solution to be less polar ;</li> <li>5. idea that orientation of phospholipids depends on water around it ;</li> </ol>	max (2)

Question Number	Answer	Mark
5(a)	<ol style="list-style-type: none"> <li>1. thick wall drawn ;</li> <li>2. {two / three / four} layers indicated ;</li> </ol> <p>Max two from the following correctly labelled:</p> <ol style="list-style-type: none"> <li>3. lumen ;</li> <li>4. {endothelium / epithelium / endothelial layer / epithelial layer / tunica intima} ;</li> <li>5. { (smooth) muscle / elastic fibres / elastin / tunica media } ;</li> <li>6. {connective tissue / tunica adventitia} ;</li> </ol>	max (3)

Question Number	Answer	Mark
5(b)	<ol style="list-style-type: none"> <li>1. idea of {wide wall / eq} (to withstand) blood under high pressure ;</li> <li>2. reference to narrow lumen to maintain high pressure ;</li> <li>3. reference to presence of {elastic fibres / eq} to allow vessel to stretch ;</li> <li>4. recoil {maintains pressure / squeezes blood} ;</li> <li>5. reference to (smooth) muscle contracts to {squeeze / eq} blood along} ;</li> <li>6. idea that {smooth lining / eq} reduces friction ;</li> <li>7. {folded lining / eq} to allow artery to stretch / eq ;</li> </ol>	max (2)

Question Number	Answer	Mark
5(c)	<ol style="list-style-type: none"> <li>1. (walls of) veins more than one layer of cells and capillaries one layer /eq ;</li> <li>2. (walls of) veins contain {connective tissue / (smooth) muscle / collagen / elastic tissue}, capillaries do not / eq ;</li> <li>3. veins have valves in them and capillaries do not / eq ;</li> <li>4. veins do not have pores but capillaries do /eq ;</li> <li>5. veins have wide lumen, capillaries have narrow lumen /eq ;</li> </ol>	<p>max (2)</p>

Question Number	Answer	Mark
6(a)(i)	<ol style="list-style-type: none"> <li>1. A has a {greater / eq} effect than B / eq ;</li> <li>2. A lowers total cholesterol more than B / eq ;</li> <li>3. A lowers LDL more than B / eq ;</li> <li>4. A raises HDL more than B / eq ;</li> <li>5. manipulation of figures to quantify mp 2 or 3 or 4 ;</li> </ol>	max (3)

Question Number	Answer	Mark
6(a)(ii)	<ol style="list-style-type: none"> <li>1. drug A ;</li> <li>2. the {total cholesterol / LDL} levels are lower ;</li> <li>3. statins inhibit cholesterol synthesis ;</li> <li>4. statins result in more LDL receptors on liver cells ;</li> <li>5. so more LDL will be {cleared / eq} from the blood / eq ;</li> </ol>	max (3)

Question Number	Answer	Mark
6(b)	<p>Any two from:</p> <p>gastrointestinal {problems / cancer} e.g. constipation, bowel complaints,  {joint / muscle} problems e.g. cramps, myositis, pain, myopathy,  muscle breakdown,  liver problems,  kidney problems,  mental health problems e.g. depression,  reduced vitamin uptake,  respiratory cancer ;;</p>	max (2)

Question Number	Answer	Mark
6(c)(i)	<ol style="list-style-type: none"> <li>1. reference to the (general) increase in heart disease with age ;</li> <li>2. more 18-44 year old females develop heart disease than males / eq ;</li> <li>3. in all other age groups more males have heart disease than females / eq ;</li> <li>4. greatest difference between females and males in the group 65 - 74 ;</li> <li>5. credit manipulation of figures ;</li> </ol>	max (3)

Question Number	Answer	Mark
6(c)(ii)	<ol style="list-style-type: none"> <li>1. {420 / 425} - {30 / 35} / 390 / 385 / 395 ;</li> <li>2. 11 - 13 ;</li> </ol>	(2)

Question Number	Answer	Mark
7(a)	<ol style="list-style-type: none"> <li>1. overall increase in number of deaths / eq ;</li> <li>2. 1920 - 1924: no change / eq ;</li> <li>3. {slight / eq} increase between 1924 and {1936 / 1937} ;</li> <li>4. {sharp / eq} increase between {1936 / 1937} and {1955 / 1960 / 1969} ;</li> <li>5. drop after 1969 / eq ;</li> <li>6. correct manipulation of figures to quantify any of mps ;</li> </ol>	max (3)

Question Number	Answer	Mark
7(b)(i)	when one variable changes there is also a change in an accompanying variable / eq ;	(1)

Question Number	Answer	Mark
7(b)(ii)	<ol style="list-style-type: none"> <li>1. {the shape of the two graphs is similar / eq} / change in number of deaths from lung cancer similar to change in number of cigarettes smoked / eq ;</li> <li>2. idea that the changes in number of deaths is approximately the same number of years after the changes in cigarette smoking ;</li> </ol>	(2)



Question Number	Answer	Mark
7(b)(iii)	Any two from:  number of people in survey, where the survey was carried out, information about their occupation, their family medical history, age, did they smoke, information on lifestyle ;;	max (2)

Question Number	Answer	Mark
7(c)	<ol style="list-style-type: none"> <li>1. credit a reference to reduced <u>diffusion</u> (of gases) ;</li> <li>2. this results in {less / slower} exchange of {gases / oxygen / carbon dioxide} / eq ;</li> <li>3. reference to decrease in surface area of {alveoli / gas exchange surface} ;</li> <li>4. (destruction of capillaries results in) less surface area of capillaries / eq ;</li> <li>5. (also) less blood flow / eq ;</li> <li>6. less oxygen carried by blood / eq ;</li> <li>7. suitable reference to effect on concentration gradient ;</li> </ol>	max (4)

Question Number	Answer	Mark
8(a)(i)	<ol style="list-style-type: none"> <li>(central) C shown with H atom and three other groups attached ;</li> <li>{COOH / COO<sup>-</sup>} and {NH<sub>2</sub> / NH<sub>3</sub><sup>+</sup>} shown ;</li> <li>phenylalanine's R group drawn, attached to a C atom ;</li> </ol>	(3)

Question Number	Answer	Mark
8(a)(ii)	<ol style="list-style-type: none"> <li>reference to formation of enzyme - substrate complex / eq ;</li> <li>idea that the {phenylalanine / R group / substrate} {binds / fits} with active site (of enzyme) ;</li> <li>reference to {bonds being broken / bonds made / induced fit / lowers activation energy / eq} ;</li> <li>adding the OH group (to the phenylalanine R group) / eq ;</li> <li>idea that {tyrosine / product} released from (enzyme / active site) ;</li> <li>as {tyrosine / R group / product} no longer binds to active site / eq ;</li> </ol>	max (4)

Question Number	Answer	Mark
8(b)(i)	<ol style="list-style-type: none"> <li>drop in blood levels of phenylalanine in first {7 / 21} days / eq ;</li> <li>idea that it {levels out / stays low / fluctuates a little / eq} (for the rest of the time period) ;</li> </ol>	(2)

Question Number	Answer	Mark
8(b)(ii)	<ol style="list-style-type: none"> <li>1. reference to use of normal {alleles / gene} ;</li> <li>2. coding for {phenylalanine hydroxylase / enzyme} ;</li> <li>3. reference to introduction of {allele / DNA / gene} into (target) cells ;</li> <li>4. into {DNA / chromosome / nucleus} ;</li> <li>5. reference to use of vector (to introduce gene into cells) ;</li> <li>6. named vector e.g. virus, liposomes ;</li> <li>7. credit reference to mode of delivery of vector e.g. nebuliser, spray , injection ;</li> </ol>	max (3)

Question Number	Answer	Mark
8(b)(iii)	water / saline / virus (only) / (empty) liposomes / vector (only) / use of placebo / eq ;	(1)

Unit 2 6BI02

Question Number	Answer	Mark
1(a)	<ol style="list-style-type: none"> <li>1. {one / few / similar} cell types ;</li> <li>2. working together / for the { same / eq } function / often cells come from the same origin / eq ;</li> </ol>	(2)

Question Number	Answer	Mark
1(b)(i)	<ol style="list-style-type: none"> <li>1. three (or more) cisternae drawn ;</li> <li>2. cisternae curved ;</li> <li>3. cisternae getting smaller ;</li> <li>4. cisterna /pre- or post-Golgi vesicle correctly shown ;</li> </ol> <p>max 2 for drawing</p> <ol style="list-style-type: none"> <li>5. arrow(s) pointing from convex / forming side to concave / mature side ;</li> </ol>	max (3)

Question Number	Answer	Mark
1(b)(ii)	<ol style="list-style-type: none"> <li>1. some (amino acids) do not enter the cell / eq ;</li> <li>2. some amino acids are not used (in protein synthesis) / eq ;</li> <li>3. some protein is {elsewhere in the cell / on ribosome / in RER / in cytoplasm / in mitochondria / in vesicles / in nucleus /eq} ;</li> <li>4. not modified / eq ;</li> <li>5. some {metabolised / eq} ;</li> <li>6. some has been ejected from cell / eq ;</li> <li>7. reference to radioactive decay / decrease ;</li> </ol>	max (3)

Question Number	Answer	Mark
2(a)	chloroplast / (sap / large / permanent) {vacuole / vacuole membrane / tonoplast} / cellulose cell wall ;	(1)

Question Number	Answer	Mark
2(b)(i)	<ol style="list-style-type: none"> <li>1. spindle fibres contract / eq ;</li> <li>2. {chromatids / daughter chromosomes / eq} ;</li> <li>3. {pull apart / separate / eq} ;</li> <li>4. reference to kinetochore / centromere leads ;</li> <li>5. move to opposite {poles / eq} of cell ;</li> </ol>	max (3)

Question Number	Answer	Mark
2(b)(ii)	<ol style="list-style-type: none"> <li>1. membrane bound organelles {present / eq} / correctly named organelle e.g. mitochondrion ;</li> <li>2. has {80s / large} ribosomes ;</li> <li>3. nucleus will reform / eq ;</li> <li>4. presence of cellulose cell wall ;</li> </ol>	max (2)

Question Number	Answer	Mark																								
2(c)(i)	<table border="1"> <thead> <tr> <th>Stage of the cell cycle</th> <th>Number of cells in each stage</th> <th>Percentage in each stage (%)</th> </tr> </thead> <tbody> <tr> <td>Interphase</td> <td></td> <td></td> </tr> <tr> <td>Prophase</td> <td></td> <td></td> </tr> <tr> <td>Metaphase</td> <td>2 ;</td> <td></td> </tr> <tr> <td>Anaphase</td> <td></td> <td></td> </tr> <tr> <td>Telophase</td> <td></td> <td></td> </tr> <tr> <td>Cytokinesis</td> <td>4 ;</td> <td></td> </tr> <tr> <td>TOTAL</td> <td></td> <td></td> </tr> </tbody> </table>	Stage of the cell cycle	Number of cells in each stage	Percentage in each stage (%)	Interphase			Prophase			Metaphase	2 ;		Anaphase			Telophase			Cytokinesis	4 ;		TOTAL			(2)
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Question Number	Answer	Mark
2(c)(ii)	<ol style="list-style-type: none"> <li>1. interphase ;</li> <li>2. most found at this stage (at any one time) / correct reference to figure from table ;</li> </ol>	(2)

Question Number	Answer	Mark
2(c)(iii)	not enough {data / samples / cells / slides} {observed / counted} / (data) only taken from one point in time ;	(1)

Question Number	Answer	Mark
3(a)(i)	graph shows {positive correlation / eq} between nitrate concentration and seedling growth ;	(1)

Question Number	Answer	Mark
3(a)(ii)	some seedling growth without any nitrates added / eq ;	(1)

Question Number	Answer	Mark
3(a)(iii)	0 (mmol dm <sup>-3</sup> ) ;	(1)

Question Number	Answer	Mark
3(a)(iv)	reference to seedlings could have all been different lengths to start off / final length is not a measure of growth / growth needs to take into account change (and time) / eq ;	(1)

Question Number	Answer	Mark
3(a)(v)	plants grow in other {dimensions / eq} / idea of more likely to be an error in measuring length ;	(1)

Question Number	Answer	Mark
3(a)(vi)	<ol style="list-style-type: none"> <li>1. temperature ;</li> <li>2. volume of solution ;</li> <li>3. light / eq ;</li> <li>4. measuring technique / eq ;</li> <li>5. stage of development e.g. same number of leaves / eq ;</li> <li>6. idea of seedlings raised in same {environment / eq} / named environmental condition ;</li> <li>7. idea of seedlings being genetically similar to start with e.g. same parent plant ;</li> </ol>	max (3)

Question Number	Answer	Mark
3(b)	<p>0.125 to 0.13 ;</p> <p>mmol dm<sup>-3</sup> ;</p>	(2)



Question Number	Answer	Mark									
3(c)	<table border="1"> <thead> <tr> <th data-bbox="448 360 608 510">Inorganic ion</th> <th data-bbox="608 360 871 510">Molecule made</th> <th data-bbox="871 360 1115 510">Main role of the molecule in a plant</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 510 608 757">nitrate</td> <td data-bbox="608 510 871 757">amino acid / protein / named protein / enzyme / nucleic acid / named nucleic acid / base ;</td> <td data-bbox="871 510 1115 757">plant growth</td> </tr> <tr> <td data-bbox="448 757 608 1032">calcium</td> <td data-bbox="608 757 871 1032">calcium pectate (pectin)</td> <td data-bbox="871 757 1115 1032">{sticking / holding / eq} (adjacent) plant cells {together / eq} / component of middle lamella ;</td> </tr> </tbody> </table>	Inorganic ion	Molecule made	Main role of the molecule in a plant	nitrate	amino acid / protein / named protein / enzyme / nucleic acid / named nucleic acid / base ;	plant growth	calcium	calcium pectate (pectin)	{sticking / holding / eq} (adjacent) plant cells {together / eq} / component of middle lamella ;	(2)
Inorganic ion	Molecule made	Main role of the molecule in a plant									
nitrate	amino acid / protein / named protein / enzyme / nucleic acid / named nucleic acid / base ;	plant growth									
calcium	calcium pectate (pectin)	{sticking / holding / eq} (adjacent) plant cells {together / eq} / component of middle lamella ;									

Question Number	Answer	Mark
4(a)(i)	<ol style="list-style-type: none"> <li>1. idea that {cell B / eq} can give rise to {many / eq} cell types ;</li> <li>2. idea that cell B cannot give rise to {embryonic cells / eq} ;</li> </ol>	max (2)

Question Number	Answer	Mark
4(a)(ii)	(red) bone marrow (of long bones / ribs) ;	(1)

Question Number	Answer	Mark
4(a)(iii)	<ol style="list-style-type: none"> <li>1. different genes active in different cells / different genes active at different times / some genes {active / inactive} / eq ;</li> <li>2. active genes make mRNA / eq ;</li> <li>3. active genes make proteins / polypeptides / eq ;</li> <li>4. (proteins) control cell {processes / eq} ;</li> <li>5. idea of permanent change (to cell) / eq ;</li> </ol>	max (3)

Question Number	Answer	Mark
4(b)	the gender of turtles is determined by the temperature of the ground in which the eggs are laid ;	(1)

Question Number	Answer	Mark
5(a)(i)	A= acrosome ; B = flagellum ;	(2)

Question Number	Answer	Mark
5(a)(ii)	<ol style="list-style-type: none"> <li>1. has {23 / half} the (required) chromosome complement ;</li> <li>2. (so at fertilisation) full {complement / 46} (of chromosomes) is restored / diploid number restored / eq ;</li> <li>3. correct reference to allowing mixing of alleles / allowing for {genetic variation / eq} ;</li> </ol>	max (2)

Question Number	Answer	Mark
5(a)(iii)	<ol style="list-style-type: none"> <li>1. idea of {jelly layer / eq} hydrolysed ;</li> <li>2. sperm {nucleus/eq} enters the egg cell / egg cell membrane penetrated (by sperm) / eq ;</li> <li>3. reference to meiosis completes / eq ;</li> <li>4. cortical {granules / vesicles / eq} (in egg) {move towards / fuse with} egg cell surface membrane ;</li> <li>5. release {contents / enzymes} ;</li> <li>6. zona pellucida hardens / eq ;</li> <li>7. to prevent polyspermy / eq ;</li> <li>8. egg nucleus envelope breaks down / eq ;</li> <li>9. spindle forms / eq ;</li> </ol>	max (3)

Question Number	Answer	Mark
5(b)(i)	<ol style="list-style-type: none"> <li>1. length increases between 15°C to 30°C ;</li> <li>2. decreases after 30°C ;</li> <li>3. correct manipulation of the data ;</li> </ol>	(2)

Question Number	Answer	Mark
5(b)(ii)	<ol style="list-style-type: none"> <li>1. mean pollen tube length increases as temperature increases (from 15°C) to 30°C for both ;</li> <li>2. variety B has a greater mean pollen tube length than A (up to 30°C) / allow converse ;</li> <li>3. both have {longest length / maximum length} at 30°C ;</li> <li>4. correct comparative manipulation of the data e.g. mean pollen tube length is 50% more for cotton variety B at 30°C ;</li> </ol>	max (2)

Question Number	Answer	Mark
5(b)(iii)	pollen tube dies / enzyme(s) denature / eq ;	(1)

Question Number	Answer	Mark																		
6(a)	<table border="1"> <thead> <tr> <th>Statements</th> <th>true</th> <th>false</th> </tr> </thead> <tbody> <tr> <td>Polymer of glucose</td> <td>✓ ;</td> <td></td> </tr> <tr> <td>Molecule contains α and β glucose</td> <td></td> <td>✓ ;</td> </tr> <tr> <td>Glycosidic bonds present</td> <td>✓ ;</td> <td></td> </tr> <tr> <td>Molecule may have side branches</td> <td></td> <td>✓ ;</td> </tr> <tr> <td>Molecule can form H bonds with adjacent molecules</td> <td>✓ ;</td> <td></td> </tr> </tbody> </table>	Statements	true	false	Polymer of glucose	✓ ;		Molecule contains α and β glucose		✓ ;	Glycosidic bonds present	✓ ;		Molecule may have side branches		✓ ;	Molecule can form H bonds with adjacent molecules	✓ ;		(5)
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Question Number	Answer	Mark
6(b)	<ol style="list-style-type: none"> <li>1. starch from a renewable {resource / eq} ;</li> <li>2. plastic from oil / eq ;</li> <li>3. oil is a non-renewable resource/ eq ;</li> </ol>	max (2)

Question Number	Answer	Mark
6(c)	<p><u>Similarity</u></p> <p>(sclerenchyma fibres and xylem vessels) both for {support / eq} / both contain lignin / both associated with vascular bundles / both dead / eq ;</p> <p><u>Differences</u></p> <p>only xylem vessels transport {water / mineral / mineral ion / named ion} / position within vascular bundle / only xylem has open ends / type of lignin deposition / eq ;</p>	(2)

Question Number	Answer	Mark
7(a)(i)	<ol style="list-style-type: none"> <li>1. appropriate feature ;</li> <li>2. linked to appropriate explanation ;</li> </ol> <p>e.g.</p> <ol style="list-style-type: none"> <li>1. {streamlined / hydrodynamic / flattened / eq} {body / shape}</li> <li>2. reduces {drag / eq}</li> </ol> <ol style="list-style-type: none"> <li>1. {hooked feet / claws / eq}</li> <li>2. to {cling / attach / hold / eq} onto {rocks / eq}</li> </ol> <ol style="list-style-type: none"> <li>1. wide spread legs</li> <li>2. {to spread over rock / grab rocks / eq}</li> </ol>	max (4)

Question Number	Answer	Mark
7(a)(ii)	<ol style="list-style-type: none"> <li>1. (tube) {breaks water surface / reaches into the air / eq} ;</li> <li>2. acts as a snorkel / description ;</li> <li>3. (atmospheric) air / oxygen obtained ;</li> </ol>	max (2)

Question Number	Answer	Mark
7(b)	<ol style="list-style-type: none"> <li>1. camouflaged in its environment ;</li> <li>2. (more likely) to catch {prey / eq} / {selective advantage / eq} ;</li> <li>3. (therefore) survive to adulthood / eq ;</li> <li>4. to breed / eq ;</li> <li>5. pass on {coat colour allele / genetic information / eq} ;</li> <li>6. to offspring / eq ;</li> <li>7. change in allele frequency over generations ;</li> <li>8. reference to disruptive selection ;</li> <li>9. idea of genetic variation present in ancestral population ;</li> </ol>	max (4)

Question Number	Answer	Mark
8(a)	<ol style="list-style-type: none"> <li>1. eukarya / eukaryote ;</li> <li>2. archaea ;</li> <li>3. bacteria ;</li> </ol>	(3)

Question Number	Answer	Mark
8(b)(i)	<ol style="list-style-type: none"> <li>1. idea that the species is reproductively isolated ;</li> <li>2. produce offspring that are {sexually viable /fertile / eq} ;</li> <li>3. many features in common / reference to homologous ;</li> </ol>	max (2)

Question Number	Answer	Mark
8(b)(ii)	<ol style="list-style-type: none"> <li>1. the number of different alleles / eq ;</li> <li>2. in a population / gene pool ;</li> <li>3. reference to allele frequency ;</li> </ol>	(2)

Question Number	Answer	Mark
8(b)(iii)	<ol style="list-style-type: none"> <li>1. breeding programme / eq ;</li> <li>2. careful selection of mate / eq ;</li> <li>3. allowing only to mate with a different individual to previous mating / eq ;</li> <li>4. only allowing those with different genes to mate / eq ;</li> <li>5. use of genetic testing / eq ;</li> <li>6. record keeping (studbooks) ;</li> <li>7. reason for outbreeding ;</li> <li>8. reintroduction to the wild / eq ;</li> </ol>	<p style="text-align: right;">max (4)</p>



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