

Mark Scheme (Results)

Summer 2014

GCE Biology (6BI02)
Paper 01R

Unit 2: Development, Plants and
Environment

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:
 - i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear
 - ii) select and use a form and style of writing appropriate to purpose and to complex subject matter
 - iii) organise information clearly and coherently, using specialist vocabulary when appropriate

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.

() means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.

Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.

ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Additional guidance	Mark			
1(a)			(4)			
	Feature	Egg cell only		Sperm cell only	Both	Neither
	Acrosome			<input checked="" type="checkbox"/>		
	Cortical granules	<input checked="" type="checkbox"/>				
	Flagellum			<input checked="" type="checkbox"/>		
	Haploid nucleus				<input checked="" type="checkbox"/>	

Question Number	Answer	Additional guidance	Mark
1(b)	<ol style="list-style-type: none"> 1. (they carry out) (aerobic) respiration ; 2. provide {ATP / energy / eq} ; 3. to { move / drive the / eq } { flagellum / tail } / eq ; 		(2)

Question Number	Answer	Additional guidance	Mark
1(c)	<ol style="list-style-type: none">1. halves the chromosome number / eq ;2. to produce a haploid nucleus / eq ;3. so that at fertilisation the {full complement / diploid number / eq} of chromosomes is restored / eq ;4. allows genetic variation (in gametes) / eq ;5. through independent assortment / eq ;6. through crossing over / eq ;		(4)

Question Number	Answer	Additional guidance	Mark
2(a)(i)	the number of species in { an area / habitat / eq } ;		(1)

Question Number	Answer	Additional guidance	Mark
2(a)(ii)	idea of reduction in species richness ;		(1)

Question Number	Answer	Additional guidance	Mark
2(b)	idea that the plant was found in only one site (in the wild) ;		(1)

Question Number	Answer	Additional guidance	Mark
2(c)(i)	<ol style="list-style-type: none"> 1. from different plants / eq ; 2. to provide genetic variation / eq ; 3. X-rayed ; 4. to check for { viability / viable embryos / eq } ; 	1. ACCEPT large size of seed	(3)

Question Number	Answer	Additional guidance	Mark
2(c)(ii)	<ol style="list-style-type: none">1. dry and cold ; <p style="text-align: center;">AND any two of the following:</p> <ol style="list-style-type: none">2. to {prevent/reduce} enzyme activity ;3. to prevent germination of seeds ;4. to prevent microbial growth / decay/decomposition of seeds ;	IGNORE references to light and low oxygen, ACCEPT low humidity	(3)

Question Number	Answer	Mark
3(a)(i)	C – pluripotency ;	(1)

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	<ol style="list-style-type: none"> 1. idea of appropriate stimulus e.g. chemical, hormone ; 2. idea of activation of some genes ; 3. only the activated genes are transcribed / mRNA made only at active genes / eq ; 4. mRNA translated (on ribosomes) ; 5. protein made / eq ; 6. which {determines / eq} cell {structure / function} / permanently modifies cell / eq ; 7. reference to cell differentiation ; 		(4)

Question Number	Answer	Additional guidance	Mark
3(b)	<ol style="list-style-type: none"> 1. idea of genetically identical cells (to patient) ; 2. no risk of rejection / eq ; 3. no need to take immunosuppressant drugs / eq ; 4. less risk of infection / eq ; 	2. NOT less likely	(2)

Question Number	Answer	Additional guidance	Mark
3(c)	<ol style="list-style-type: none"> 1. no destruction of embryos / eq ; 2. embryo has potential to become a human life / eq ; 3. {religious / ethical } objections / eq ; 		(2)

Question Number	Answer	Additional guidance	Mark
4(a)(i)	<ol style="list-style-type: none"> 1. eukaryote cells have { membrane bound organelles / examples of membrane bound organelle } and prokaryotes do not ; 2. DNA within a nucleus in Eukaryota but not in Bacteria / linear chromosomes in Eukaryota circular in Bacteria ; 3. larger ribosomes in Eukaryota / 80S ribosomes in Eukaryota and 70S in Bacteria / eq ; 4. Bacteria contain { plasmids / pili / peptidoglycan cell wall /eq } and Eukaryota do not ; 	<ol style="list-style-type: none"> 1. e.g. nucleus 4. ACCEPT mesosomes 	(2)

Question Number	Answer	Mark
4(a)(ii)	ribosomes ;	(1)

Question Number	Answer	Mark
4(b)(i)	rough endoplasmic reticulum / rER / RER ;	(1)

Question Number	Answer	Mark
4(b)(ii)	A – Golgi apparatus ;	(1)

Question Number	Answer	Additional guidance	Mark
4(b)(iii)	<p>*QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence.</p> <ol style="list-style-type: none"> 1. reference to involvement of <i>ribosomes</i> on the { rER / <i>rough endoplasmic reticulum</i> } ; 2. <i>amino acids</i> {being joined by <i>peptide</i> bonds / forming <i>polypeptide</i> chains / forming <i>primary</i> structure of protein } ; <p>OR</p> <p>{folded into 3-D shape / <i>secondary</i> or <i>tertiary</i> structure} in rER ;</p> <ol style="list-style-type: none"> 3. packaged into <i>vesicles</i> at the end of the rER / <i>vesicles</i> {move to / transported to / fuse with / eq} the <i>Golgi apparatus</i> ; 4. idea that { <i>protein/ enzyme</i> } <i>modified</i> in <i>Golgi apparatus</i> ; 5. (<i>modified protein / enzyme / eq</i>) packaged into (<i>secretory</i>) <i>vesicles</i> (by <i>Golgi apparatus</i>) / eq ; 6. <i>exocytosis</i> by <i>secretory vesicles</i> / <i>fusion</i> of <i>vesicles</i> with cell (surface) <i>membrane</i> / eq ; 	<p>*QWC - Emphasis is spelling</p> <p>ACCEPT X, Y, Z where appropriate.</p>	(4)

Question Number	Answer	Additional guidance	Mark
4(c)	<ol style="list-style-type: none">1. different shape molecule requires different enzymes / reference to active site having to have different shape ;2. cellulose is made of β glucose and starch is made of α glucose / eq ;3. 1,6 glycosidic bonds only in starch ;4. starch made of amylose and amylopectin ;5. cellulose is linear / starch is {branched / helical / eq} / eq ;		(4)

Question Number	Answer	Additional guidance	Mark
5(a)(i)	<ol style="list-style-type: none"> 1. the larger the diameter the less tensile strength / negative correlation / eq ; 2. greatest decrease 0.05-0.08 to 0.09-0.12 (mm) ; 3. idea of little change between 0.13-0.16 and 0.33- 0.36 (mm) / no difference between 0.21-0.24 and 0.29 -0.36 (mm) ; 4. slight increase 0.21-0.24 to 0.25-0.28 (mm) ; 5. appropriate manipulation of data ; 		(3)

Question Number	Answer	Additional guidance	Mark
5(a)(ii)	<ol style="list-style-type: none"> 1. {length / mass / eq} of fibre ; 2. age of fibre ; 3. source of fibre / eq ; 4. temperature ; 5. humidity ; 	<p>IGNORE discussion of retting or extraction method</p> <p>3. ACCEPT part of leaf fibre taken from, same leaf / same plant</p> <p>5. ACCEPT water content of fibre</p>	(3)

Question Number	Answer	Additional guidance	Mark
5(b)	<ol style="list-style-type: none"> 1. idea of renewable e.g. more sisal plants can be grown ; 2. resources can be made available for future generations / eq ; 	IGNORE biodegradable	(2)

Question Number	Answer	Additional guidance	Mark
5(c)	<ol style="list-style-type: none"> 1. idea of { thick walls / lignin } for strength ; 2. idea of lignin making fibres waterproof ; 3. flexible therefore do not break easily / eq ; 4. light because they are { hollow / not solid } / eq ; 	<ol style="list-style-type: none"> 1. ACCEPT tough 4. IGNORE dead 	(2)

Question Number	Answer	Additional guidance	Mark
6(a)(i)	idea of secretion of waxy substance ;	ACCEPT presence of oil / lipid	(1)

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	1. active at night / inactive in day OR 2. idea of spreading wax over skin OR 3. idea of hunting in trees rather than on the ground ;		(1)

Question Number	Answer	Additional guidance	Mark
6(a)(iii)	1. idea of avoiding predation 2. idea of conserving water in dry habitat 3. avoiding high temperatures during the day 4. idea of finding prey more easily at night ;	The answer to 6(a)(iii) must be awarded related to 6(a)(ii) 2. ACCEPT reduce dehydration	(1)

Question Number	Answer	Additional guidance	Mark
6(b)	<ol style="list-style-type: none"> 1. idea that it eats insects {at night / in trees} ; 2. {within the community / ecosystem /habitat / environment / eq } / hot, dry areas with trees ; 		(2)

Question Number	Answer	Additional guidance	Mark
6(c)	<p>*QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence.</p> <ol style="list-style-type: none"> 1. idea of selection pressure / change in environment / hot and dry habitat ; 2. reference to { competition / predation } ; 3. mutation (in frog) ; 4. idea of advantageous allele e.g. allele for waxy secretions ; 5. idea that individuals with advantageous { alleles / characteristics / eq } survive and breed ; 6. idea of (advantageous) { allele / mutation } being passed on (to future generations) ; 7. idea of increased frequency of advantageous alleles in the population ; 	<p>*QWC - Emphasis is logical sequence</p> <p>7. ACCEPT more individuals with this adaptation in the population /</p>	(5)

Question Number	Answer	Additional guidance	Mark
7(a)	two recessive alleles / homozygous recessive / no allele for pigment ;	ACCEPT two lower case letters NOT homologous	(1)

Question Number	Answer	Additional guidance	Mark
7(b)(i)	colour of flowers ;	NOT white hydrangeas	(1)

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	<ol style="list-style-type: none"> 1. idea that at { low / acidic } pH more aluminium ions available ; 2. because the flowers are blue at low pH 3. the plant has taken up more aluminium ; 	1 ACCEPT converse for high pH	(3)

Question Number	Answer	Additional guidance	Mark
7(b)(iii)	<ol style="list-style-type: none"> 1. no pigment allele present / does not have the genotype for coloured flowers ; 2. idea that no pigment is present ; 3. idea that aluminium ions have no effect ; 	<ol style="list-style-type: none"> 1. ACCEPT is homozygous recessive 	(2)

Question Number	Answer	Additional guidance	Mark
7(c)	<ol style="list-style-type: none"> 1. multiple { alleles / genes } for a (single) characteristic ; 2. on more than one locus ; 3. idea of genes interacting ; 		(2)

Question Number	Answer	Mark
8(a)(i)	B – nitrate ;	(1)

Question Number	Answer	Mark
8(a)(ii)	B – chlorophyll ;	(1)

Question Number	Answer	Additional guidance	Mark
8(b)(i)	<ol style="list-style-type: none">1. idea of greater mass with calcium nitrate ;2. difference is significant / error bars do not overlap / eq ;3. manipulation of data ;		(2)

Question Number	Answer	Additional guidance	Mark
8(b)(ii)	<ol style="list-style-type: none">1. idea of choosing Red Delicious because of greater mass of apples ;2. idea of choosing Red Delicious because fertiliser has less effect on mass of apples ;3. idea of data overlap for Red Delicious and Golden Delicious when using calcium nitrate ;4. idea of choosing calcium nitrate because of {greater mass of apples / has equal effect on both trees} ;5. manipulation of data ;	1. ACCEPT converse argument e.g. not Golden Delicious as lower mass of apples	(2)

Question Number	Answer	Additional guidance	Mark
8(c)	<ol style="list-style-type: none">1. idea that there is more contact between cells e.g. fewer spaces, cell shape ;2. reference to calcium pectate ;3. middle lamellae holding cells together ;4. idea that more calcium resulting in more { pectate / middle lamellae } ;5. idea of { stronger cell structure / less spaces between cells / thicker cell walls } resulting in firmer fruit ;	<ol style="list-style-type: none">1. ACCEPT smaller cells, closer packing 5. ACCEPT reference to cells being packed closer together	(4)



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