

# Mark Scheme (Final)

## January 2009

GCE

GCE Biology (6105/01)

## 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.

Question Number	Answer	Mark
1(a)(i)	(plant) hormone / growth substance / PGS / synthetic auxin / PGR / growth hormone ;	(1)

Question Number	Answer	Mark
1(a)(ii)	<ol style="list-style-type: none"> <li>1. idea of selective ;</li> <li>2. only {kill / affect} weeds / do not {kill / affect} grass ;</li> <li>3. ref to weeds {broad-leaved / eq}, grasses {narrow-leaved / eq} ;</li> <li>4. ref to differential sensitivity / uncontrolled growth in weeds causes their death / eq ;</li> <li>5. can be used in (very) small quantities / fertiliser boosts grass growth once weeds killed / eq ;</li> <li>6. do not affect other organisms / biodegradable / doesn't bioaccumulate / eq ;</li> </ol>	maximum (3)

Question Number	Answer	Mark
1(b)	<ol style="list-style-type: none"> <li>1. a qualified ref. to diffusion / eq (includes facilitated) ;</li> <li>2. active transport {requires energy / ATP / against concentration gradient} ;</li> <li>3. idea that active transport can {accumulate {ions / eq} in cell / be selective} ;</li> <li>4. ref to protein carriers in membrane / eq ;</li> </ol>	(3)

Question Number	Answer	Mark
2(a)(i)	different letter for each character and dominant and recessive alleles indicated ;	(1)

Question Number	Answer	Mark
2(a)(ii)	correct genotypes using symbols given ;; [max 1 for use of different symbols]  <b>Comment:</b> penalise use of commas, wrong order of alleles, etc.	(2)

Question Number	Answer	Mark															
2(b)(i)	<table border="1"> <thead> <tr> <th>Phenotype</th> <th>Observed frequency</th> <th>Expected frequency</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>3150</td> </tr> <tr> <td></td> <td></td> <td>1050</td> </tr> <tr> <td></td> <td></td> <td>1050</td> </tr> <tr> <td></td> <td></td> <td>350</td> </tr> </tbody> </table>	Phenotype	Observed frequency	Expected frequency			3150			1050			1050			350	(1)
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		1050															
		350															

Question Number	Answer	Mark
2(b)(ii)	<ol style="list-style-type: none"> <li>1. ref to (autosomal) linkage ;</li> <li>2. {genes / alleles} on same chromosome ;</li> <li>3. idea of not independent of each other / inherited together ;</li> <li>4. low chance of {crossing over / eq} ; [NOT no chance]</li> <li>5. unless chiasma(ta) form between them ;</li> <li>6. ref to {bivalent / tetrads} stage ;</li> <li>7. during prophase 1 ;</li> <li>8. idea of high frequencies of parental phenotypes in {F2 / offspring} / eq ;</li> <li>9. idea of low frequencies of {recombinants} / eq ;</li> </ol>	maximum (5)

Question Number	Answer	Mark
3(a)	<ol style="list-style-type: none"> <li>1. idea of a stable community / eq ;</li> <li>2. prevented from reaching climatic climax / eq ;</li> <li>3. by {human intervention / activity / grazing / eq } ;</li> </ol>	(2)

Question Number	Answer	Mark
3(b)	<ol style="list-style-type: none"> <li>1. ref to succession ;</li> <li>2. grazing by sheep {cuts off tall-growing plants / only allows low-growing plants to survive} / eq ;</li> <li>3. (when sheep removed,) grazing stops ;</li> <li>4. {a greater variety of {seedlings / eq} able to grow} / arrival of {shrubs / trees} ;</li> <li>5. taller plants outcompete grasses / eq ;</li> </ol>	(4)

Question Number	Answer	Mark
3(c)	<ol style="list-style-type: none"> <li>1. other grazers present / eq ;</li> <li>2. {seeds / eq} of shrubs did not reach some islands / eq ;</li> <li>3. ref to unsuitable abiotic factor ;</li> </ol> <p><b>Comment</b> mp3 not just climate</p>	(2)

Question Number	Answer	Mark
4(a)	holozoism / holozoic / predator / predation ;	(1)

Question Number	Answer	Mark
4(b)	<ol style="list-style-type: none"> <li>1. both relationships involve two organisms of different species / eq ;</li> <li>2. ref. H.v. and Z. is mutualism, H.v. and D. is predator-prey ;</li> <li>3. in H.v. and Z. both benefit, in H.v. and D. {only H.v. benefits / D. does not benefit} ;</li> <li>4. H.v. and D. are both animals, H.v. and Z. is between an animal and a protoctist / eq ;</li> <li>5. H.v. and Z. is permanent relationship, H.v. and D. is temporary ;</li> </ol> <p><b>Comment</b> mp4 not plants</p>	maximum (3)

Question Number	Answer	Mark
4(c)	<ol style="list-style-type: none"> <li>1. carbohydrate {digested / broken down} by carbohydrase / eq ;</li> <li>2. to give {monosaccharides / glucose} ;</li> <li>3. absorbed by <i>Hydra</i> ;</li> <li>4. ref. to glycolysis ;</li> <li>5. to give pyruvate ;</li> <li>6. (which enters) Krebs' cycle / eq ;</li> <li>7. in mitochondrion (of <i>Hydra</i>) ;</li> <li>8. carbon dioxide released / respiration produces CO<sub>2</sub> ;</li> <li>9. enters chloroplast (of <i>Zoochlorella</i>) / stroma ;</li> <li>10. ref. to fixation to {5C compound / RuBP} ;</li> </ol>	maximum (6)

Question Number	Answer	Mark
5(a)	amylose has straight / unbranched / helical (chain) amylopectin has branched (chain) ;  1-4 (glycosidic) {links / bonds} only in amylose, 1-4 and 1-6 {links / bonds} in amylopectin ;	(2)

Question Number	Answer	Mark
5(b)	<ol style="list-style-type: none"> <li>1. {digested / broken down} to give glucose / eq ;</li> <li>2. glucose is respired / eq ;</li> <li>3. ref. to source of energy ;</li> </ol>	(2)

Question Number	Answer	Mark
5(c)(i)	<ol style="list-style-type: none"> <li>1. idea that {gene / DNA} {extraction / yield} from bacteria may be very small / eq ;</li> <li>2. PCR used to {magnify / increase} quantity of {gene / DNA} ;</li> <li>3. to produce enough for {commercial / eq} use ;</li> </ol>	(2)

Question Number	Answer	Mark
5(c)(ii)	<ol style="list-style-type: none"> <li>1. abiotic factors are {non-living / physical} factors ;</li> <li>2. that (might) affect growth of plants ;</li> <li>3. ref to {differences / variation / eq} in yields in different regions ;</li> <li>4. in all three varieties ;</li> <li>5. use of manipulated figures ;</li> </ol>	maximum (3)

Question Number	Answer	Mark
5(c)(iii)	<ol style="list-style-type: none"> <li>1. in some regions, hybrids {increase yield by more than 100% / more than double yield} (compared with traditional varieties) / eq ;</li> <li>2. idea that extra additional yield using Bt GM varieties is relatively little compared with hybrids ;</li> <li>3. {cost / availability} of GM seed</li> <li>4. other reason, eg. Ethical, benefits of the hybrid (such as taste, disease resistance) ;</li> </ol>	(3)



Question Number	Answer	Mark
6(a)	population consists of members of the same species, community consists of members of different species / eq ;	(1)

Question Number	Answer	Mark
6(b)	<ol style="list-style-type: none"> <li>1. left for sufficient time to mix freely with rest of population / eq ;</li> <li>2. second sample captured ;</li> <li>3. number of marked individuals in second sample noted ;</li> <li>4. (and) total number in second sample ;</li> <li>5. formula quoted ;</li> </ol>	(3)

Question Number	Answer	Mark
6(c)	<ol style="list-style-type: none"> <li>1. incorrect ;</li> <li>2. primary consumers {are herbivores / eat plants / eq} ;</li> <li>3. pond skaters are {predators / eat animals / do not eat plants / eq} ; [NOT pond skaters are not herbivores]</li> <li>4. they are {secondary / tertiary / higher} consumers ;</li> </ol>	(3)

Question Number	Answer	Mark
6(d)	<ol style="list-style-type: none"> <li>1. acid-rain will lower pH of pond(water) ;</li> <li>2. idea that digestive enzymes only work {within a narrow pH range / at optimum pH} ;</li> <li>3. so alters shape of active site / ionization of enzymes / eq ; [NOT denature]</li> </ol>	(2)

Question Number	Answer	Mark
6(e)	<ol style="list-style-type: none"> <li>1. non-biodegradable insecticides {are persistent / do not break down / eq} ;</li> <li>2. remain in bodies of dead / dying insects ;</li> <li>3. pass into pond skaters and (then) into fish and (then) into birds / {along the food chain to birds} ;</li> <li>4. ref to bioaccumulation / description ;</li> </ol>	(3)

Question Number	Answer	Mark
7(a)(i)	<ol style="list-style-type: none"> <li>1. decrease in population ;</li> <li>2. increase in {mean / average} beak depth ;</li> <li>3. narrower range of beak depth ;</li> <li>4. use of data to support at least one change ;</li> </ol>	(2)

Question Number	Answer	Mark
7(a)(ii)	<ol style="list-style-type: none"> <li>1. less food ;</li> <li>2. cannot support large population ;</li> <li>3. increases intra-specific competition ;</li> <li>4. birds with smaller beaks {starve/ die out}, because they cannot eat large, tough seeds / birds with larger beaks can eat large, tough seeds when small, soft seeds run out / selection of large beaks ;</li> </ol>	(3)

Question Number	Answer	Mark
7(b)(i)	<p>ref to {characteristic / trait / feature} controlled by more than {2 genes / eq} ;</p> <p>tends to show continuous variation ;</p>	(2)

Question Number	Answer	Mark
7(b)(ii)	<ol style="list-style-type: none"> <li>1. ref. to selection</li> <li>2. ref to changes in {allele / gene} frequencies ;</li> <li>3. {fewer / eq} alleles for smaller beaks / {more / eq} alleles for larger beaks ;</li> </ol>	(2)

Question Number	Answer	Mark
7(c)	<ol style="list-style-type: none"> <li>1. ref to {drought / water shortage} as a selection pressure ;</li> <li>2. some plants {have adaptations to resist water loss / more likely to survive drier conditions} ;</li> <li>3. favours / ref to xeromorphic plants ;</li> <li>4. plants with large tough seeds {survive / increase in number} no finches eat small seeds / eq ;</li> </ol>	(3)