

Mark Scheme (Final)

January 2009

GCE

GCE Biology (6101/01)

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)	1. maltose ; 2. sucrose ; 3. cellulose ; 4. starch ;	(4)

Question Number	Answer	Mark
1(b)	1. made up of more than one monomer / eq ; 2. glycosidic / covalent bonds / eq ; 3. contain { C, H ,O / hydroxyl group / eq } ; 4. all contain { hexose sugars / glucose } ;	maximum (2)

Question Number	Answer	Mark
2	<ol style="list-style-type: none">1. (di) polar / dipoles ;2. solvent ;3. hydrogen / H ;4. latent heat of vapourisation ;5. (specific) heat capacity ;	(5)

Question Number	Answer	Mark
3(a)	metaphase occurs after prophase and before anaphase	(1)

Question Number	Answer	Mark
3(b)	<ol style="list-style-type: none"> 1. two chromatids and centromere shown ; 2. centromere correctly labelled ; 3. chromatid(s) correctly labelled ; 	(3)

Question Number	Answer	Mark
3(c)	<ol style="list-style-type: none"> 1. { (sister) chromatids / centromeres } have separated / eq ; 2. spindle fibres { visible between chromosomes / shorter } ; 3. chromosomes are { shorter / (in late anaphase) longer } ; 4. { groups / clusters } of chromosomes towards each pole of cell / eq ; 	maximum (2)

Question Number	Answer	Mark
4(a)	<ol style="list-style-type: none"> 1. DNA ; 2. [candidates should show evidence that they have considered the ratio of dry mass to number of molecules present] e.g. {one molecule (of DNA) has highest dry mass / each molecule (of DNA) represents 1.55% of dry mass / dividing dry mass by number of molecules is greatest (for DNA) / eq} ; 	(2)

Question Number	Answer	Mark
4(b)	<ol style="list-style-type: none"> 1. glycogen consists of one type of monomer / only glucose / eq ; 2. a protein consists of { up to twenty amino acids / eq } ; 3. amino acids can be arranged in many different sequences / eq ; 	maximum (2)

Question Number	Answer	Mark
4(c)	<ol style="list-style-type: none"> 1. reference to any two types of RNA (eq mRNA, tRNA, and rRNA) ; 2. idea of each amino acid has a different tRNA / eq ; 3. idea of different mRNA for each protein produced / eq ; 	maximum (2)

Question Number	Answer	Mark
5(a)	<ol style="list-style-type: none"> 1. production of ATP / eq ; 2. reference to aerobic respiration ; 3. reference to {Krebs cycle / electron transport chain / oxidative phosphorylation} ; 	<p>maximum (2)</p>

Question Number	Answer	Mark
5(b)	<ol style="list-style-type: none"> 1. correctly drawn shape of mitochondrion ; 2. several non-stylised cristae drawn ; 3. correct size, ie 14.0 - 14.6 cm ; 4. matrix and crista labelled correctly ; 	<p>(4)</p>

Question Number	Answer	Mark
6(a)	one mononucleotide correctly identified (ring around sugar, phosphate and base) ;	(1)

Question Number	Answer	Mark
6(b)	adenine and guanine ;	(1)

Question Number	Answer	Mark
6c(i)	nucleus / nucleoplasm ;	(1)

Question Number	Answer	Mark
6(c)(ii)	<ol style="list-style-type: none"> 1. (mono)nucleotides line up along one DNA strand / one strand acts as a template / eq ; 2. reference to complementary base pairing / eq ; 3. hydrogen bonds form (between the bases) / eq ; 4. (mono)nucleotides join together by {condensation reactions / phosphodiester bonds / eq } ; 5. correct reference to RNA polymerase ; 6. mRNA chain separates from DNA / eq ; 	maximum (3)

Question Number	Answer	Mark
6(d)(i)	(antisense drugs) translation and (triplex drugs) transcription ;	(1)

Question Number	Answer	Mark
6(d)(ii)	UCAGUA / TCAGTA ;	(1)

Question Number	Answer	Mark
7(a)	<ol style="list-style-type: none"> 1. reference to fluid mosaic structure ; 2. reference to phospholipid bilayer ; 3. phosphate / heads pointing outwards / eq ; 4. (fatty acid) tails pointing inwards / eq ; 5. reference to proteins ; 6. reference to {intrinsic / extrinsic / channel / enzyme /eq } protein ; 7. reference to cholesterol (within bilayer) ; 8. reference to glycocalyx / eq ; <p>Comment ACCEPT points from suitable labelled diagrams</p>	<p>maximum (5)</p>

Question Number	Answer	Mark
7(b)(i)	<ol style="list-style-type: none"> 1. A is the most and D is the least likely to cross / eq ; 2. reference to same ability of B and C to cross membrane ; 3. manipulation of permeability figures to quantify one of the above points ; 	<p>(3)</p>

Question Number	Answer	Mark
7(b)(ii)	<ol style="list-style-type: none"> 1. substance A has a high (oil-water partition) coefficient / eq ; 2. therefore can dissolve in the lipid portion of the membrane / (phospholipids) bilayer ; 3. (more specifically) dissolves in the {inner part of bilayer/ hydrophobic region of bilayer/fatty acids} ; 4. (can then pass through) by diffusion ; 	<p>maximum (3)</p>

Question Number	Answer	Mark
8(a)(i)	<p>Activation energy</p> <ol style="list-style-type: none"> 1. idea of energy needed for a chemical reaction to begin / eq ; 2. enzymes reduce it / eq ; <p>Catalyst</p> <ol style="list-style-type: none"> 3. (chemical that) {speeds up / increases rate of} a reaction ; 4. without itself being changed / used over and over again / not used up / does not alter the product ; <p>[allow mp2 once in either context]</p>	(4)

Question Number	Answer	Mark
8(a)(ii)	<ol style="list-style-type: none"> 1. curve should show same energy levels at start and finish as on original graph ; 2. activation energy should be lower ; 	(2)

Question Number	Answer	Mark
8(b)(i)	hydrolysis ;	(1)

Question Number	Answer	Mark
8(b)(ii)	peptide / covalent ;	(1)

Question Number	Answer	Mark
8(b)(iii)	<ol style="list-style-type: none"> 1. 126 ; 2. correct division by 36 to give 3.5 (arbitrary units per hour) ; 	(2)

Question Number	Answer	Mark
8(b)(iv)	<ol style="list-style-type: none"><li data-bbox="440 327 1066 427">1. most of the { protein / substrate } already { broken down / used up / digested } (by 36 hours) ;<li data-bbox="440 461 1066 562">2. (after 36 hours reaction is slowing because) { protein / substrate concentration } is now limiting factor / eq ;<li data-bbox="440 595 1142 663">3. (before 36 hours) idea of more collisions / eq (so the rate is fast) ;	(2)