

Mark Scheme (RESULTS)

June 2008

GCE

GCE Biology (Salters Nuffield) (6132/01)

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

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.

Question Number	Answer			Mark																												
1	<table border="1"> <thead> <tr> <th data-bbox="384 255 576 353"></th> <th data-bbox="576 255 772 353">Plant (eukaryotic) cell</th> <th data-bbox="772 255 968 353">Animal (eukaryotic) cell</th> <th data-bbox="968 255 1171 353">Bacterial (prokaryotic) cell</th> </tr> </thead> <tbody> <tr> <td data-bbox="384 353 576 421">Cell wall</td> <td data-bbox="576 353 772 421">✓</td> <td data-bbox="772 353 968 421">✗</td> <td data-bbox="968 353 1171 421">✓</td> </tr> <tr> <td data-bbox="384 421 576 488">Chloroplasts</td> <td data-bbox="576 421 772 488">✓</td> <td data-bbox="772 421 968 488">✗</td> <td data-bbox="968 421 1171 488">✗ ;</td> </tr> <tr> <td data-bbox="384 488 576 595">Nuclear membrane</td> <td data-bbox="576 488 772 595">✓</td> <td data-bbox="772 488 968 595">✓</td> <td data-bbox="968 488 1171 595">✗ ;</td> </tr> <tr> <td data-bbox="384 595 576 703">Cell (unit) membrane</td> <td data-bbox="576 595 772 703">✓</td> <td data-bbox="772 595 968 703">✓</td> <td data-bbox="968 595 1171 703">✓ ;</td> </tr> <tr> <td data-bbox="384 703 576 770">Ribosomes</td> <td data-bbox="576 703 772 770">✓</td> <td data-bbox="772 703 968 770">✓</td> <td data-bbox="968 703 1171 770">✓ ;</td> </tr> <tr> <td data-bbox="384 770 576 837">Centrioles</td> <td data-bbox="576 770 772 837">✗</td> <td data-bbox="772 770 968 837">✓</td> <td data-bbox="968 770 1171 837">✗ ;</td> </tr> </tbody> </table>				Plant (eukaryotic) cell	Animal (eukaryotic) cell	Bacterial (prokaryotic) cell	Cell wall	✓	✗	✓	Chloroplasts	✓	✗	✗ ;	Nuclear membrane	✓	✓	✗ ;	Cell (unit) membrane	✓	✓	✓ ;	Ribosomes	✓	✓	✓ ;	Centrioles	✗	✓	✗ ;	max (5)
	Plant (eukaryotic) cell	Animal (eukaryotic) cell	Bacterial (prokaryotic) cell																													
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Question Number	Answer	Mark
2	<ol style="list-style-type: none"> 1. insulin <u>detaches</u> from ribosomes / <u>rough</u> endoplasmic reticulum / RER ; 2. (insulin) passes <u>through</u> / <u>inside</u> endoplasmic reticulum (to golgi body) ; 3. (insulin) passes from endoplasmic reticulum to golgi body in vesicles ; 4. (insulin) assumes 3-D shape whilst passing through ER ; 5. (insulin) is (further) modified inside golgi body ; 6. (insulin) is enclosed in vesicles budded off / produced by golgi body ; 7. vesicles fuse / join with cell membrane (releasing insulin to exterior) ; 8. (insulin passes through cell membrane) by <u>exocytosis</u> ; 	<p>max (5)</p>

Question Number	Answer	Mark
3(a)	<ol style="list-style-type: none"> 1. cellulose has β-, starch has α-glucose ; 2. cellulose has unbranched, starch can have branched molecules ; 3. cellulose molecules are much longer / several thousand (glucose) molecules long whilst starch several hundred ; 4. cellulose molecules are straight, starch molecules are coiled / spiral ; 5. cellulose molecules are only of one type, starch can be a mixture of two types of molecules / amylose and amylopectin ; 6. cellulose only has 1 - 4 <u>glycosidic</u> bonds whilst starch has 1 - 4 and 1 - 6 <u>glycosidic</u> bonds ; 	max (3)

Question Number	Answer	Mark
3(b)	<ol style="list-style-type: none"> 1. (cellulose) molecules parallel / side by side ; 2. joined by <u>hydrogen</u> bonding ; 	(2)

Question Number	Answer	Mark
3(c)	<ol style="list-style-type: none"> 1. (cohesion is) the attraction between like molecules / water molecules (tendency) to stick together / eq ; 2. by <u>hydrogen</u> bonding ; 3. appropriate references to polarity of water molecules ; 	max (2)

Question Number	Answer	Mark
4(a)	<ol style="list-style-type: none"> 1. (so) DNA/skin cells not protected from UV ; 2. so increased chance of <u>mutation</u> ; 	(2)

Question Number	Answer	Mark
4(b)	<ol style="list-style-type: none"> 1. {DNA damaged / reference to (somatic) mutation} by UV / other mutagen ; 2. cells divide faster than cell death / apoptosis reduced / eq ; 3. disruption of mechanisms controlling cell division / cell cycle / uncontrolled cell division ; 4. correct reference to mutation in tumour suppressor genes / oncogenes ; 5. reference to tumour as an abnormal / undifferentiated mass of cells ; 	max (3)

Question Number	Answer	Mark
4(c)	<ol style="list-style-type: none"> 1. some (cancerous) <u>cells</u> may have broken off / not all cancerous cells were removed ; 2. travels to other parts of the body in the <u>blood</u> / <u>lymph</u> ; 3. metastasis / secondary tumours ; 4. a different tumour may arise independently / eq ; 	max (2)

Question Number	Answer	Mark
5(a)	<ol style="list-style-type: none"> 1. halves the chromosome number / one of each pair in gamete / haploid cells ; 2. randomly assorts the chromosomes / genes ; 3. provides <u>genetic</u> variation ; 4. the diploid number is maintained (in the zygote) ; 	max (2)

Question Number	Answer	Mark
5(b)	<ol style="list-style-type: none"> 1. acrosome present ; 2. digestive enzymes / eq ; 3. breakdown jelly surrounding ovum / allow head to reach the ovum membrane ; 4. reference to genetic material passing through ovum membrane ; 	max (2)

Question Number	Answer	Mark
5(c)(i)	16 ;	(1)

Question Number	Answer	Mark
5(c)(ii)	the cells do not {grow / increase in volume} / no new cytoplasm is produced ;	(1)

Question Number	Answer	Mark
5(c)(iii)	<ol style="list-style-type: none"> 1. chromosomes {shorten / coil} / condenses / become visible ; 2. (each chromosome becomes visible) as two chromatids ; 3. nuclear membrane / envelope breaks down ; 4. centrioles position themselves at opposite end of the cell / eq ; 5. spindles formed from microtubules / between {poles / centrioles}/ eq ; 6. chromosomes on the equator / eq ; 7. {<u>attached</u> / eq} by <u>centromeres</u> ; 	<p>max (3)</p>

Question Number	Answer	Mark
6(a)	<ol style="list-style-type: none"> 1. the rate of hatching {<u>increases</u> with temperature <u>up to</u> / <u>peaks at</u>} 28°C ; 2. as the temperature increases above 28°C hatching rate <u>decreases</u> ; 3. reference to optimum temperature ; 	max (2)

Question Number	Answer	Mark
6(b)	<ol style="list-style-type: none"> 1. enzymes have an optimum temperature/ are temperature sensitive ; 2. increased enzyme activity up to 28 °C ; 3. some enzymes distorted / denatured (above 28 °C) ; 4. disrupting metabolic / physiological processes ; 	max (2)

Question Number	Answer	Mark
6(c)	<ol style="list-style-type: none"> 1. (reduced hatching) so reduced population of adults at temperatures over 28 °C ; 2. at places where the present temperatures are currently less than 28 °C global warming would increase populations / hatching rate ; 3. increased population due reduced predation / reduced population due to increased predation ; 4. increased population due to increased food supply / decreased population due to reduced food supply ; 5. early hatching means population out of synchronisation with food supply causing decrease / eq ; 	max (3)

Question Number	Answer	Mark
7(a)(i)	<ol style="list-style-type: none"> 1. the deeper the layer the older (the layer)/ eq ; 2. use of (radio)carbon dating of the <u>peat</u>; 	max (1)

Question Number	Answer	Mark
7(a)(ii)	alder trees grow well in wet places / eq ;	(1)

Question Number	Answer	Mark
7(b)	<ol style="list-style-type: none"> 1. identify the insects ; 2. estimate total insect numbers of each species in each layer ; 3. find out which species of insect live in warm places (today) ; 4. reference to increased numbers of such insects in upper layers of (peat) ; 	max (2)

Question Number	Answer	Mark
7(c)(i)	<ol style="list-style-type: none"> 1. (loss of habitat as) cannot migrate/disperse northwards; 2. competition from other plants advancing from the south ; 	max (1)

Question Number	Answer	Mark
7(c)(ii)	<ol style="list-style-type: none"> 1. will use up stored food / starch / sugar (in respiration) faster than it can be replaced (by photosynthesis) ; 2. therefore limiting growth/ increase in biomass / eq ; 3. increased CO₂ release further increases global warming ; 	max (2)

Question Number	Answer	Mark
8(a)	<ol style="list-style-type: none"> 1. CO₂ released (by burning sunflower oil) has only {just / recently / eq} been absorbed by <u>photosynthesis</u> / eq ; 2. CO₂ from burning fossil fuel has been out of circulation for millions of years / eq ; 3. if the sunflower oil were not burnt the CO₂ would still be released by decay/respiration (of organisms which feed on it) / eq ; 4. (using sunflower oil) carbon neutral/does not make a <u>net</u> addition to the CO₂ concentration of the atmosphere ; 	max (2)

Question Number	Answer	Mark
8(b)(i)	$1.06 - 0.29 = 0.77 ;$ $\frac{0.77}{1.06} \times 100 = 72.6 / 73(\%) ;$	(2)

Question Number	Answer	Mark
8(b)(ii)	<p>(sunflower)</p> <ol style="list-style-type: none"> 1. down-stream processing costs are lower (than for sugar beet) less energy is needed to turn it into usable fuel ; 2. despite the fact that the yield (of raw sunflower plants per hectare) is much less ; 3. use of figures e.g. the energy needed for down-stream processing is less than one tenth of that needed for sugar beet ; 	max (2)

Question Number	Answer	Mark
8(b)(iii)	<ol style="list-style-type: none"> 1. not enough available farmland ; 2. farmland also needed to produce other crops such as food ; 3. unsuitable climate ; 	max (2)

Question Number	Answer	Mark
8(c)(i)	<ol style="list-style-type: none"> 1. improved yield (per hectare) ; 2. plant quality makes down-stream processing {easier / cheaper / less energy demanding} ; 3. reduced pesticides / fertiliser requirement ; 4. better adapted for climate change ; 5. faster growing / easier to harvest ; 	max (2)

Question Number	Answer	Mark
8(c)(ii)	<ol style="list-style-type: none"> 1. <u>pollen</u> may carry the GM genes to {crops used to feed humans / wild plants} ; 2. GM genes may get into crops used to feed humans ; 3. GM genes may have unforeseen effects on wildlife / the ecosystem / food chains ; 4. the environmental advantages of GM biofuels are not enough to risk unforeseen consequences of GM ; 5. may contaminate organic crops ; 	max (2)

Question Number	Answer	Mark
9(a)(i)	mitosis / cloning ;	(1)

Question Number	Answer	Mark
9(a)(ii)	<ol style="list-style-type: none"> 1. {not all / different} genes are switched {on / off} / active / activated ; 2. correct and appropriate reference to factors / mechanisms for gene switching ; 3. e.g. reference to promoters / transcription factors ; 	max (2)

Question Number	Answer	Mark
9(a)(iii)	<ol style="list-style-type: none"> 1. if you (suffered an accident / disease / deterioration) and needed to replace damaged <u>brain</u> cells ; 2. would be <u>genetically</u> the same as the rest of your cells ; 3. able to replace more than one kind of brain cell ; 4. goes on generating new cells as required / eq ; 	max (2)

Question Number	Answer	Mark
9(b)(i)	<ol style="list-style-type: none"> 1. embryonic cells are easier to work with than adult stem cells ; 2. embryonic cells are (relatively) undifferentiated whereas adult stem cells {are/appear to be} less so ; 3. embryonic stem cells are {totipotent / pluripotent / able to become any kind of cell in the body}, but adult stem cells are {multipotent / able to become only a limited number of cell types} ; 4. embryonic stem cells have a wider range of clinical applications / adult stem cells have a narrower range of clinical applications ; 	max (2)

Question Number	Answer	Mark
9(b)(ii)	<p>Against Credit any three of the points below:</p> <ol style="list-style-type: none"> 1. embryonic stem cells (are taken from embryos) which (are to be considered) unborn children / eq ; 2. use of stem cells is thus effectively murder / lack of respect for embryo as a (potential) human ; 3. a lot of current (embryonic) stem cell treatment is fraudulent / badly regulated / exploits suffering / encourages IVF clinics to ‘create’ more ‘spare’ embryos ; 4. if we wait a few years longer we shall have the same benefits through adult stem cells ; 5. not enough funding for alternatives e.g. adult stem cells ; 6. an embryo becomes a new human at the moment of conception / eq ; <p>The fourth mark: for attempting to balance opposing points of view whilst thoughtfully coming down on one side e.g. “Even though it may benefit people this does not justify taking the life of an unborn child” ;</p> <p>For Credit any three of the points below:</p> <ol style="list-style-type: none"> 1. offers prospect of treatment to many suffering people ; 2. research using alternatives e.g. adult stem cells progressing more slowly than that with embryonic stem cells ; 3. if we ban it in the UK it’ll still happen in other countries ; 4. using spare IVF embryo which would alternatively be destroyed ; 5. research with embryonic stem cells is needed to develop use of adult stem cells ; 6. an embryo is not a new human until it is viable / eq ; <p>The fourth mark: for attempting to balance opposing points of view whilst thoughtfully coming down on one side e.g. “Alleviation of suffering in people (who have already been born) is (ethically) more important than destroying embryos” ;</p>	max (4)