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Mark Scheme (FINAL)
June 2008

GCE

GCE Biology (Salters Nuffield) (6132/01)

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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.

PRE-STANDARDISATION MARK SCHEME – UNIT SN2 (6132/01)
AS BIOLOGY (Salters-Nuffield) June 2008

STRICTLY CONFIDENTIAL

Principal Examiner: David Slingsby; 8 Westfield Grove, Wakefield, West Yorkshire WF1 3RS.
Telephone: 01924 378608
Email: hagdale@btinternet.com

Team Leader: John Stacey; Pines Cottage, Main Street, Beckley, Rye, East Sussex, TN31 6RR.
Telephone: 01797 260 669
Email: staceytrethake@yahoo.co.uk

Team Leader: Bernadette Medany; 27 Lindford Road, Bishopdown Farm, Salisbury, Wilts, SP1 3WX.
Telephone: 01722 410905
Email: medanyb@godolphin.wilts.sch.uk

Team Leader: Lissa Doyle, 17 Aspen House, 19 Hulse Road, Southampton, Hants, SO15 2SD.
Telephone: 07853 130438
Email: lissadoyle@hotmail.com

(1) You must have provisionally marked 15 of every item **ONLINE** before the Standardisation Meeting on **10/06/2008** in order to familiarise yourself with the Pre-standardisation mark scheme.

(2) At the meeting the mark scheme will be discussed and amplified. It will be amended in the light of the discussion and of marking experience. Assistant Examiners will then be asked to take part in an Agreement Trial. The marks will be compared and discussed. Scripts used in Agreement Trials may be taken away from the meeting for reference purposes; these must be **destroyed** at the conclusion of marking.

(3) Within **48 hours** of the Standardisation meeting, Assistant Examiners must mark fully, ONLINE, a sample of **10** of every item in the light of the amended FINAL mark scheme which you will be able to access **ONLINE.** Please note that you will not be able to mark any more responses until after you have received clearance from your Team Leader, and any differences are resolved.

(4) Once clearance has been received from the Team Leader, you MUST start marking and all your marking MUST be done by **the contract completion date in your contract.**

(5) Further checks on your marking will be made by your Team Leader at any point throughout the marking period to ensure that your marking is accurate.

Please contact the ePEN helpdesk for technical queries:

Online Associates Helpdesk

Telephone	0800 169 9202
Email	**UKservicedesk@pearson.com**

GCE Biology SNAB Exam Management Contact Details

QDAM	Damian Riddle
Tel	0207 190 5024
Email	damian.riddle@edexcel.org.uk
Address	Edexcel
	5th Floor
	190 High Holborn London
	WC1V 7BH

Subject Leader	Assie Yamin
Tel	0207 190 4741
Email	assie.yamin@edexcel.org.uk
Address	Edexcel
	5th Floor
	190 High Holborn London
	WC1V 7BH

Exams Co-ordinator	Katerina Keplova
Tel	0207 190 4367
Email	katerina.keplova@edexcel.org.uk
Address	Edexcel
	5th Floor
	190 High Holborn London
	WC1V 7BH

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>1</td><td>
<table>
<tr><th></th><th>Plant (eukaryotic) cell</th><th>Animal (eukaryotic) cell</th><th>Bacterial (prokaryotic) cell</th></tr>
<tr><td>Cell wall</td><td>✓</td><td>×</td><td>✓</td></tr>
<tr><td>Chloroplasts</td><td>✓</td><td>×</td><td>× ;</td></tr>
<tr><td>Nuclear membrane</td><td>✓</td><td>✓</td><td>× ;</td></tr>
<tr><td>Cell (unit) membrane</td><td>✓</td><td>✓</td><td>✓ ;</td></tr>
<tr><td>Ribosomes</td><td>✓</td><td>✓</td><td>✓ ;</td></tr>
<tr><td>Centrioles</td><td>×</td><td>✓</td><td>× ;</td></tr>
</table>
Notes
One mark per line.

Reject tick crosses or any blank spaces i.e. whole line correct for one mark
</td><td>max 5</td></tr>
</table>

Question Number	Answer	Mark
2	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> ;	**max 5**

Question Number	Answer	Mark
3(a)	1. cellulose has ß, 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 ; **ACCEPT** converse 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 glycosidic bonds whilst starch has 1 – 4 and 1 – 6 glycosidic bonds ;	**max 3**

Question Number	Answer	Mark
3(b)	1. (cellulose) molecules parallel / side by side ; 2. joined by hydrogen bonding ; **ACCEPT** H-bonding in context	**2**

Question Number	Answer	Mark
3(c)	1. (cohesion is) the attraction between like molecules / water molecules (tendency) to stick together / eq ; 2. by hydrogen bonding ; **ACCEPT** H bonding 3. appropriate references to polarity of water molecules ;	**max 2**

Question Number	Answer	Mark
4(a)	1. (so) DNA/skin cells not protected from UV ; 2. so increased chance of mutation ;	**2**

Question Number	Answer	Mark
4(b)	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)	1. some (cancerous) cells may have broken off / not all cancerous cells were removed ; 2. travels to other parts of the body in the blood / lymph ; 3. metastasis / secondary tumours ; 4. a different tumour may arise independently / eq ;	**max 2**

Question Number	Answer	Mark
5(a)	1. halves the chromosome number / one of each pair in gamete / haploid cells ; 2. randomly assorts the chromosomes / genes ; 3. provides genetic variation ; 4. the diploid number is maintained (in the zygote) ;	**max 2**

Question Number	Answer	Mark
5(b)	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)	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> ;	**max 3**

Question Number	Answer	Mark
6(a)	1. the rate of hatching {increases with temperature up to / peaks at} 28°C ; 2. as the temperature increases above 28°C hatching rate decreases ; 3. reference to optimum temperature ;	**max 2**

Question Number	Answer	Mark
6(b)	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)	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)	1. the deeper the layer the older (the layer)/ eq ; 2. use of (radio)carbon dating of the peat; **ACCEPT** ^{14}C / C_{14} **REJECT** reference to carbon dating of pollen grains	**max 1**

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

Question Number	Answer	Mark
7(b)	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)	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)	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 ; **ACCEPT** refs to NPP 3. increased CO_2 release further increases global warming;	**max 2**

Question Number	Answer	Mark
8(a)	1. CO_2 released (by burning sunflower oil) has only {just / recently / eq} been absorbed by photosynthesis / eq ; 2. $C0_2$ from burning fossil fuel has been out of circulation for millions of years / eq ; 3. if the sunflower oil were not burnt the CO_2 would still be released by decay/respiration (of organisms which feed on it) / eq ; 4. (using sunflower oil) carbon neutral/does not make a net addition to the CO_2 concentration of the atmosphere ;	**max 2**

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

Question Number	Answer	Mark
8(b)(ii)	(sunflower) 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)	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)	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)	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 ; **REJECT** less specific responses	**max 2**

Question Number	Answer	Mark
9(a)(i)	mitosis / cloning ; [spelling of mitosis must be correct]	**1**

Question Number	Answer	Mark
9(a)(ii)	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)	1. in case 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)	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)	**NB:** If it is not clear which point of view the candidate is taking he or she cannot gain more than three marks **Against** Credit **any three** of the points below: 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 ; **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" ; **For** Credit **any three** of the points below: 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 ; **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" ;	**max 4**